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Foreword

This Technical Specification has been produced by the 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 this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 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 specification;

1 Scope

This Technical Report provides background information, motivations, descriptions of service drivers, and concepts regarding general service requirements and service features of Release 2000, consisting of an evolved Release 99, and IP multimedia services. The IP multimedia services will be developed in a phased approach and a longer term vision is presented in the report.

The evolved Release 99 and the first phase of IP multimedia services of 3GPP Release 2000 are described in this TR provide the basis for the detailed Stage 1 specification work.

The focus of the TR is:

- Support and evolution of 3GPP Release 99
- High level vision of multimedia services
 - Examination of potential service drivers
- New and evolved service capabilities and end user benefits
- Case study of realisation of some services (e.g. CFU)
- Evaluation of what does and does not need to be standardised
- Release a roadmap of time of delivery expectations for standards and products
- Release a Feature List of global interest and potential service candidates
- Division of responsibility between S1 and S2, dialogue between the two groups is required. There is a need to set expectations.

This TR has been created to ease the development of 3GPP Release 2000 , and this document can be used to guide 3GPP in the creation of new specifications and CRs to existing specifications for the realisation of mobile communications services based on the Release 2000 specifications.

Editor's note: text which has right hand side border marking as shown with this editorial note requires to be reviewed further.

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] TR 21.905: "Vocabulary for 3GPP Specifications"
- [3] TS 22.101: "Service principles"
- [4] TS 22.105: "Services and Service Capabilities"
- [5] TS 22.060: "General Packet Radio Service (GPRS) stage 1"
- [6] TS 22.003: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Circuit Teleservices supported by a Public Land Mobile Network (PLMN)"
- [7] TS 22.004: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; General on supplementary services"

- [8] TS 22.121: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; The Virtual Home Environment"
- [9] TS 22.057: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Mobile Station Application Execution Environment (MExE); Service description, Stage 1"
- [10] TS 22.078: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Customised Applications for Mobile network Enhanced Logic (CAMEL); Service definition - Stage 1"
- [11] TS 22.038: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; USIM/SIM Application Toolkit (USAT/SAT); Service description; Stage 1"
- [12] TS 22.001: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)"
- [13] TR 21.978: Feasibility Technical Report - CAMEL Control of VoIP Services

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this TR the following definitions apply:

All IP network: an integrated telecommunications network that uses IP for the end to end transport of all user data and signaling data (i.e. including call control)

Editor's note: the support of an IP or 04.08 call control in an all IP network requires clarification; the current definition states that the call control is also IP based. Some delegates have expressed reservations. This may be best resolved by specifically defining the various networks covered by Release 2000, namely

- a) CS domain only: no PS domain, 04.08 CC only*
- b) hybrid network: CS domain and PS domain with interworking between the domains*
- c) all IP transport: CS domain and/or PS domain support, with 04.08 and/or SIP/H.323 CC running on IP bearers*
- d) all IP network: end to end IP for data, CC and bearers (the "pure" IP vision)*

Basic services: basic services are the teleservices and bearer services as defined in [6] and [7]

Circuit switched (CS) domain: the CS domain comprises all network functionality for provision of bearer and teleservices in a circuit orientated manner

Editor's note: S2 has been requested to review the CS domain definition in TS 22.003. Then all definitions shall be collected to 21.905

Circuit services: the services enabled by the circuit switched domain

Emergency call: a mobile originated basic call that terminates at a national or local emergency center. Provision of location information to the emergency center is a mandatory feature in some countries

Hybrid network: a telecommunications network consisting of the union of circuit switched and packet switched domains, and the interworking functions between them.

IP multimedia service: a multimedia service that is purely provided by end to end IP protocols (e.g. SIP, H.323)

IP telephony: a voice call that uses IP based protocols (e.g. SIP, H.323) and IP for transport of all user data and signalling data. IP telephony is an example of an IP multimedia service which uses only a single medium.

Multimedia service: a service 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 service may involve multiple parties, multiple connections, and the addition or deletion of resources within a single communication

session. Multimedia services may be provided using either circuit switched domain, or packet switched domain, or a combination of circuit switched and packet switched domains.

Operator specific service: any service offered to a mobile user that is not standardised by the 3GPP specifications

Packet switched domain: the PS domain comprises all network functionality for provision of bearers in a packet orientated manner

Editor's note: S2 has been requested to review the PS domain definition in TS 22.003. Then all definitions shall be collected to 21.905

Release 99: 3GPP specified release of complete technical specifications for the definition and development of telecommunication services (including both CS and PS services) scheduled for completion in year 1999

Release 2000: 3GPP specified release of complete technical specifications for the definition and development of telecommunication services (including both CS and PS services) including IP-based multimedia services (as defined in this TR) scheduled to be completed by the end of year 2000

Subscriber: a subscriber is an entity that has a subscription with an operator/service provider for the provisioning of specific services. The subscriber is also responsible for paying the bill for the services utilized

Supplementary service: a supplementary service modifies or supplements a basic telecommunication service (cf. 22.004 [7])

Teleservice: the services identified in 22.003 [6].

User: a user is an entity associated with a subscriber that is capable of using the subscribed services

VoIP: a voice call established over an IP based transport network

3.2 Abbreviations

For the purposes of this TR the following abbreviations apply:

3GPP	3 rd Generation Partnership Project
AoC	Advice of Charge
CAMEL	Customised Application for Mobile Enhanced Logic
CCBS	Completion of Calls to Busy Subscriber
COLP	COnnected Line identification Presentation
COLR	COnnected Line identification Restriction
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CNAP	
CNAR	
CS	Circuit Switched
CUG	Closed User Group
HLR	Home Location Register
IP	Internet Protocol
IPT	IP Telephony
GPRS	General Packet Radio Service
MExE	Mobile station Execution Environment
O&M	Operations and Maintenance
ODB	Operator Determined Barring
OSA	Open Service Architecture
OSS	Operator specific services
PS	Packet Switched
QoS	Quality of Service
SAT	SIM Application Toolkit
SoLSA	Support of Local Service Area
UE	User Equipment
VHE	Virtual Home Environment
VoIP	Voice over IP
WAP	Wireless Application Protocol

4 High level vision

4.1 Phased approach for network and services evolution

The network support for IP multimedia services shall be developed in a phased approach, commencing with support of an evolved Release 99, through to the support of IP multimedia services.

Editor's note: the possible phases should be clarified here as an indication.

4.2 Release 2000

Release 2000 shall support Release 99 specified in the 22-series specifications, as may be amended by this TR. The requirements of the Release 99 series of specifications, or their services, service capabilities and technical contents, are not replicated in this TR, however their technical requirements are automatically included in Release 2000 by reference. Further, any modification or evolution of the Release 99 as may be defined in this TR also form part of Release 2000.

Additionally, this TR identifies the requirements in Release 2000 for IP multimedia services.

4.3 The IP vision

The communication industry is going through a period of explosive change, which is both enabling and driving the convergence of services. Organisations and service providers are seeking ways to consolidate voice and data traffic platforms and services. With a number of technological solutions to choose from, the Internet Protocol (IP) is today considered the most promising platform on which to build the new integrated services.

The ease of developing new applications together with IP's ability to communicate between different networks has led to IP being seen as a convergence layer that promises to evolve from a mere data platform to a provider of a much larger variety of services. An increasing demand for bandwidth, connectivity features and economy that can not be supplied by the CS mobile networks in the present form, is leading the mobile telecommunications world to reinvent itself via IP.

The IP protocol has opened up a whole range of communication applications, which may allow operators to develop totally new value added services as well as to enhance their existing solutions. The open architecture and platforms supported by the IP protocols and operating systems may lead to applications and new opportunities that are more difficult to replicate using a standard switched centralised solution. Thus, the main drivers for IP services are new services as the plain voice telephony is gradually moving to multimedia. IP Telephony is seen as very important step forward to the mobile information society.

Future networks potentially offer the operators a complete solution for multimedia including IP Telephony. The solution, based on the 3GPP Release 2000 standards, consists of terminals, GERAN or UTRAN radio access networks and PS domain evolved core network.

A major part of the evolution of new applications is foreseen to be in IP multimedia based services. One of the main objectives for 3GPP specifications is therefore to ensure that the availability and behaviour of these applications when used via the 3GPP mobile access is at least as good as when used via other mobile access types.

4.4 Services evolution

Operators will want to offer multimedia services in a homogenous and efficient way. Since the transition to IP multimedia services will not happen overnight, both traditional mobile circuit switched services and IP multimedia services need be supported simultaneously. Circuit switching will live for many years together with IP multimedia services, and there will be a large number of legacy terminals to be supported. Also, because of real-life limitations on how quickly change occurs in networks and the mix of terminals in the network, operators may find that they must have an architecture to support different kinds of terminals and roaming between networks. It is unlikely that all networks

will develop at the same speed. Hybrid architecture may be best for the majority of the operators because it allows low-risk evolution from the current networks, while enabling a full service offering. Release 2000 shall support service offerings being independent from transport technology.

The following provides an overview of Release 2000:-

- Hybrid Architecture
 - network evolution path
- New Capabilities
 - IP based call control
 - Realtime (including Voice) services over IP with end-to-end QoS
 - GERAN (support for GSM radio including EDGE)
 - Services provided using toolkits (CAMEL, MExE, SAT, VHE/OSA)
 - Backwards compatibility with Release 99 services
 - No degradation in QoS, security, authentication, privacy
 - Support for inter-domain roaming and handover

The above list is not exhaustive, and is further elaborated in this TR.

4.5 User perspective of services

GSM (and UMTS) succeed in a competitive marketplace due to the consistent provision of a rich diversity of high quality services. The enabling mechanisms (e.g. toolkits) which allow deployment of these services are transparent to the user. This is shown in Figure 1 below.

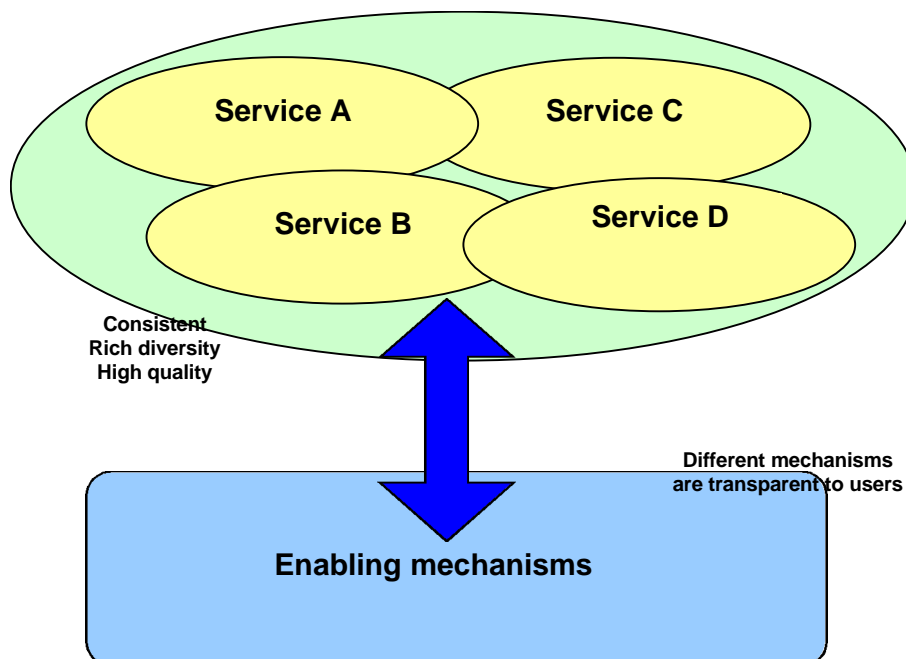


Figure 1. Transparent provision of services

Services may be categorised as basic, supplementary, operator specific, or multimedia. These categories of services may be transparent to users. Different enabling mechanisms may be used to provide services. This is shown in figure 2.

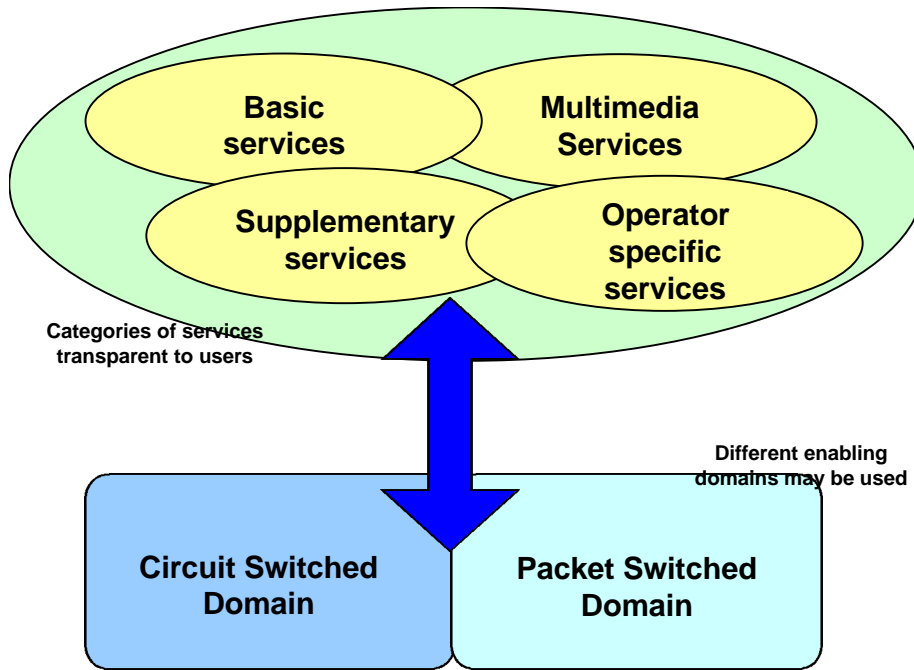


Figure 2: Different types of services and enabling domains

With succeeding releases, new and improved services and enabling mechanisms are developed and deployed. In general, most users do not experience a reduction in the available service set, or degradation in the quality of the offered services. This is depicted in Figure 3.

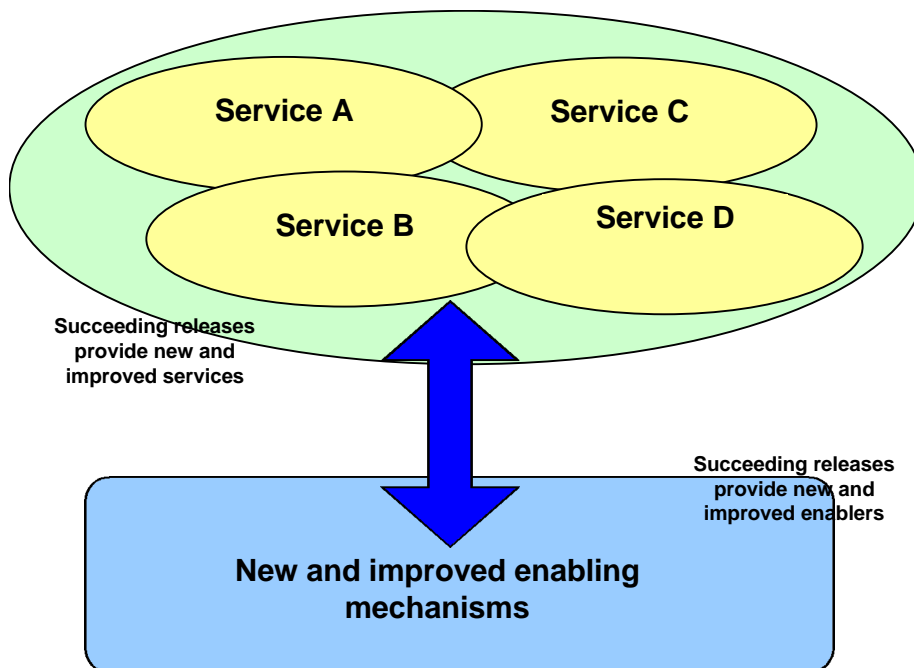


Figure 3: Succeeding releases provide new and improved services and enabling mechanisms

In Release 2000, new and improved enabling mechanisms and services may be made available. Additionally, a future network option shall enable the provision of services without using circuit switched. In this case, the set of services available to the user, and the quality of the offered services shall be no less than that available in networks which use circuit switched enablers. This is shown in figure 4.

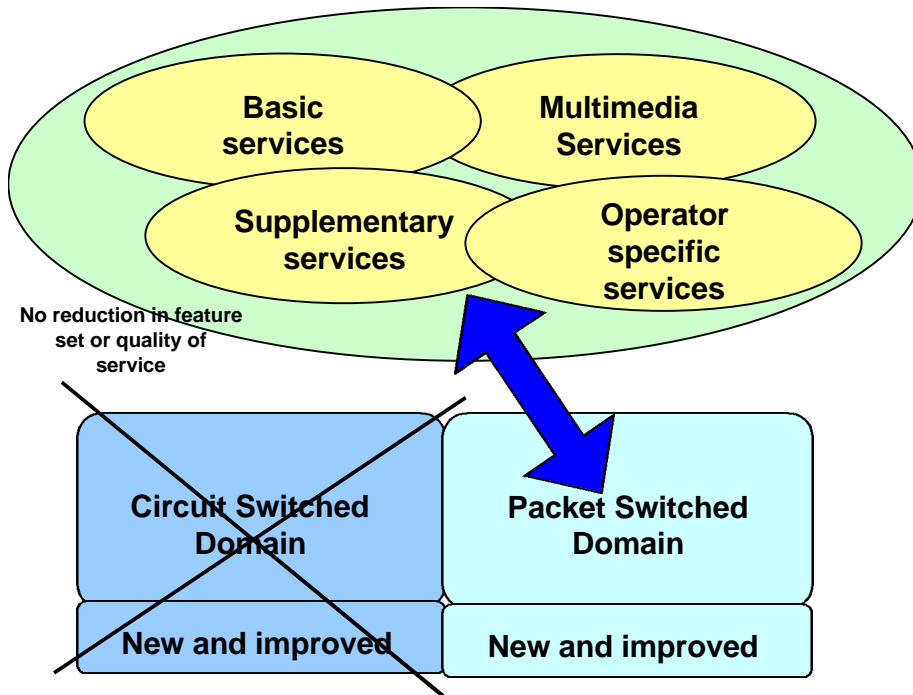


Figure 4: Network option

4.6 Services, call control and transport

A Release 2000 network may have a circuit domain, a packet domain, or a hybrid network consisting of a circuit domain and packet domain network infrastructure. In addition to teleservices available from Release 99 new services, termed multimedia services, shall be available. Multimedia services may also enable enhanced usage and management of teleservices. The relationship between these tele/multimedia services, and the circuit/packet transport may be logically depicted as shown in Figure 5.

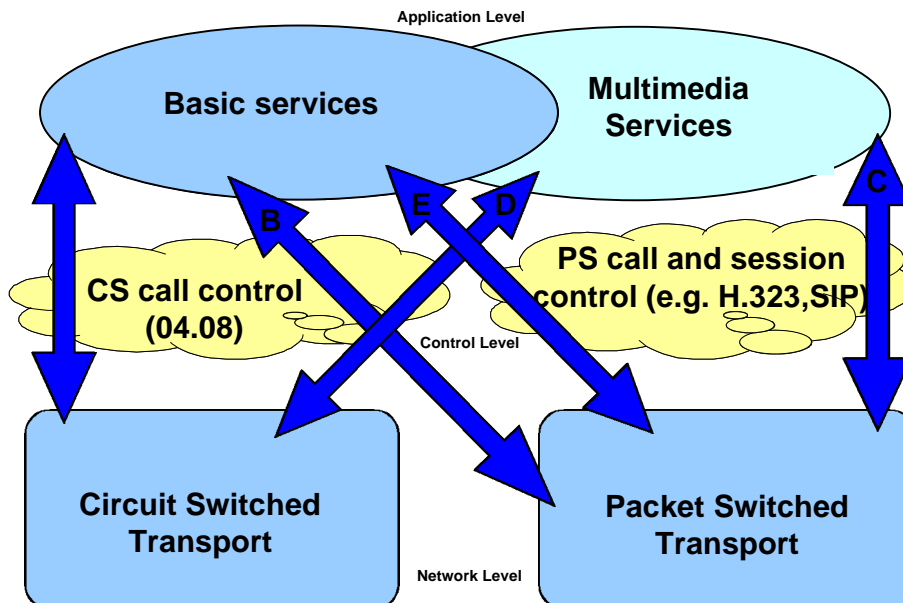


Figure 5: Services and domains

The logical relationship between the teleservices, multimedia services, call control and the transport mechanism is subsequently described.

- “A” relationship
The “A” relationship refers to the existing relationship between the basic services, circuit switched call control and circuit switched transport (such as existing GSM telephony).
- “B” relationship
The “B” relationship refers to the support of basic services based on circuit switched control protocol and a packet switched routing and transport. The same set of end user services may be provided across both the “A” and the “B” relationships. The existence of “B” relationship would be transparent to the end user from both a service capability and a user interface perspective. The “B” relationship could be a path for the evolution of GSM to packet based (IP) networks where a backward compatibility to existing CS-based voice terminals is provided.
- “C” relationship
The “C” relationship refers to the relationship between the IP multimedia services, packet call and session control and the transport. The “C” relationship may represent the existing capabilities of GPRS to provide multimedia services, and represent evolutionary enhancements to further the deployment of IP based services. The “C” relationship is not merely the evolution of the 2G services and mobile terminals to the 3G environment, but also represents a new category of services, mobile terminals, services capabilities, and user expectations. Service Providers are not required to provide the existing supplementary services built on the basic services of the “A” and “B” relationships across the “C” relationship, although some comparable services (e.g. emergency services) may be required. It is envisioned that in future releases which provide all services through a single service / transport relationship, that the network will enable provision of the same or similar services that users are accustomed to, with no reduction in quality of service, security, privacy, or authentication. Any new multimedia service which may have a similar name or functionality to a comparable standardised service, does not necessarily have to have the same look and feel from the user's perspective of the standardised service. However, the “C” relationship shall provide sufficient capabilities to allow a Service Provider to develop and implement Release 2000 versions of these services that would have the same user interface and quality of service to the end user. Voice communications is one, but not the only, real-time multimedia service that would be provided across the “C” relationship.
- “D” relationship
The “D” relationship refers to the relationship between the multimedia services and circuit switched transport (e.g. H.324 supported in Release 99).
- “E” relationship
The “E” relationship refers to the relationship of the existing basic services (including existing supplementary services built on the basic services) based on new packet switched control protocols, routing and transport (e.g. the re-implementation of 22.002, 22.003 and 22.004 based on IP protocols). This is not envisaged within Release 2000.

4.7 High level service requirements

Introduction of new technologies shall improve the user's service experience (i.e. shall not impose a reduction in the service set available or a reduction in the quality of service). New technologies shall be introduced in a manner allowing for a transition from existing technologies (i.e. GPRS and circuit switched) providing a clear and smooth evolution path.

Release 2000 shall:-

1. In general, provide backwards compatibility with the services offered by the Release 99 standard (including existing GPRS and circuit switched technology basic services, supplementary services, and operator specific services)
 - a) The “C” relationship in Figure 5 shall provide sufficient capabilities to allow a Service Provider to develop and implement Release 99 services that would be transparent to the end user. Further, Release 99 services implemented across the “C” relationship may utilise the additional capabilities of the Release 2000 multimedia environment to provide the end user with enhanced capabilities and improved user interfaces.
 - b) Not all of the existing Release 99 services need to be supported in the PS domain. Some exceptions may exist, as identified in the feature list in Annex A. A minimum set of IP multimedia service capabilities shall be defined to enable roaming.
 - c) To enable service compatibility and access independence, it shall be possible to implement evolving IP multimedia services to be compatible with the same services when used via other types of accesses, e.g. via fixed lines
2. Enable provision of IP multimedia services with the same (or greater) quality of service as their equivalent Release 99 GPRS and circuit switched services (if they exist).
 - a) The enabling mechanisms (transport technology, etc.) shall be transparent to the user.
 - b) Networks supporting IP multimedia services shall have the ability to provide, on an end to end basis, a Quality of Voice at least as good as that achieved by the Release 2000 circuit-switched (e.g. AMR codec based) wireless systems when interworking with other networks supporting IP multimedia services, other access networks, PLMNs or PSTNs.

3. It shall be possible for IP multimedia services to be provided without a reduction in privacy, security, or authentication compared to corresponding Release 99 GPRS and circuit switched services.
4. Support roaming (detailed scenarios require to be identified).
5. Release 2000 shall be able to support IP multimedia services using both transparent and non-transparent bearer capabilities.
6. Respect spectrum efficiency (e.g. over the air interface, potential use of header stripping/compression techniques) for multimedia services.
7. Release 2000 shall be able to support simultaneous realtime and non-realtime multimedia services.
8. Release 2000 shall be able to support QoS parameters for realtime packet bearers
9. Enable support of negotiable QoS for multimedia services
10. Release 2000 shall be able to support interworking between the packet and circuit switched services, and with PSTN, ISDN and Internet.
11. Enable compliance with regional regulatory mandates for IP multimedia services (see Annex C).
12. Enable support of integrated O&M (e.g. operations, administration, maintenance, provisioning etc.)
13. Enable support of charging and billing
14. Enable support of flexible addressing schemes(e.g. for IP multimedia services users allocate a new number, re-apply current users circuit switched numbers, different CS and PS domain numbers)
15. Release 99 UE shall be able to provide complete Release 99 services to the subscriber when operating in Release 2000 networks
16. Allow a Release 99 circuit switched UE to operate and use the services in a Release 2000 network configuration shown by Relationship B of figure 5.

4.8 IP Multimedia services high level requirements

The support of multimedia services in Release 2000 requires a flexible approach which will allow operators to differentiate their services in the market place as well customise them to meet specific user needs. This can be achieved through the use of standardised service capabilities that can be used by tool-kits, in both networks and terminals, for the creation of services. This approach has already been adopted for the specification of the service capabilities provided by VHE (see [3], [4] and [8]).

For Release 2000, multimedia service descriptions should only be used to determine the requirements for standardising service capabilities, and should not result in the services themselves being standardised.

A key requirement is for 3GPP Service Capabilities to enable the support of IP based multimedia services. See clause 7.2.

4.8.1 Basic requirements

The following basic requirements shall be supported for multimedia services:

1. IP Multimedia Services shall extend the range of services supported by the CS domain, and provide multimedia capabilities. IP Multimedia Services shall not just simply replicate the CS domain supported services.
2. IP Multimedia services shall be able to support the user with consistent behaviour regardless of how they are accessed (e.g. menu on phone, WWW page from home or the office, or voice activated services, in the home network or in a serving network).
3. **IP Multimedia services shall be able to personalize support of individual media components of a multimedia call in a user profile, and not necessarily handle all media components of a multimedia call in the same way. An example may be a multimedia call where the voice medium is forwarded to the user and the video medium forwarded to an appropriate terminal or storage device.**
4. **The user shall be able to personalize IP multimedia service behavior at an "object" level within his service environment in a user profile. For example, the user may personalise forwarding for email, SMS message, MMS message, real time voice, real time multimedia, image, etc.**
5. **Call completion shall not simply be based on routing to a destination, but take into account the personalised media requirements of the involved parties (e.g. media splitting, media translation etc.). Interaction with the called user's profile shall be supported, or alternatively direct interaction with the called party may be required to allow for user selection.**

4.8.2 User personalization and administration of services

It shall be possible for the user to manage their IP multimedia call handling in various ways. The user shall be able to provision and activate services as follows:

1. For all subsequent calls
 - Via the terminal
 - Via a User Service Modification service on-line (voice or WWW)
 - When a call arrives or is in progress
2. For the next call
 - Via the terminal
 - When a call arrives or is in progress

It shall be possible to change diversion and forwarding criteria in a flexible way, from a multiplicity of terminals and the service to be consistently supported.

4.8.3 User context

It shall be able to support modified handling of an incoming IP multimedia call as a result of the context of the called party, for example:-

- the called party's communications capabilities (i.e. the basic services of the called party)
- the called party's environment, which will be described by various parameters including:
 - time
 - location
 - terminal capabilities
 - circumstances (e.g. driving)
 - called party's identification (e.g. user at work, user at home etc.)
 - called party's choice of communication type (e.g. voice only)
 - called party's preferences, resulting in the call being:
 - presented to the called party
 - rejected subject to user specified criteria (e.g. calling party ID, media type, location)
 - diverted to another destination
 - diverted to a different medium (e.g. voice to email).
 - the called party's state, i.e. detached, idle mode, in a call, etc
- calling party's identification (e.g. work, family, anonymous)

The above example list of user context information is not exhaustive, and identifies user context information which may be managed by the user (e.g. in a user profile), or may be pertinent to the network. It shall be possible to perform handling of the context to process the multimedia call in one or more of the following:-

1. serving network,
2. home network
3. third party
4. calling user's terminal
5. called user's terminal.

Similar support shall be available to modify the handling of an outgoing multimedia call with respect to the context of the calling party.

4.8.4 Example multimedia scenarios

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

1. The user is in a voice call, and receives an incoming video call. The user decides not to accept the call, 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 call, and receives an incoming video call. The user decides to accept the call but wishes to switch between the two calls.
3. The user is idle in a network and not involved in a call. The user modifies his user profile to divert all voice calls 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 call, the calling party identity is displayed and user shall be able to decide whether to accept the call, or divert to a messaging system. The user shall be able to request media handling of the call (e.g. media splitting to different destinations, media conversion).
5. The user is busy in a call when receiving an incoming call, but responds to the calling party that he will return the call later. The user may request that the calling party's details are stored with reminder in user's profile.

4.9 High level Quality of Service requirements

Support of Quality of Service (QoS) in Release 2000 is a means of supporting QoS network resources management, and negotiating the amount of network resources given to a user by the underlying network. The network may employ a number of QoS mechanisms, and the end user negotiates the network QoS through a set of standard parameters.

Note: the QoS parameters which may be modified require to be clarified

Release 2000 shall support the following QoS requirements:-

- The UE shall be able to set QoS parameters independent of any application utilising the mobile for transport for mobile originated and mobile terminated multimedia services. The setting of QoS parameters by the user shall provide the capability to restrict the QoS requests by applications on the UE, subject to the QoS limits of the user's subscription with the service provider. The QoS settings of the UE shall override any application specified QoS, and do not affect the user's QoS subscription with the service provider. For example, if the application requests a bit rate of 56kb but the mobile user is only willing to pay for 14.4kb, then the UE setting takes precedence. The user's application may also be remote from the user's terminal (e.g. on a MExE server).
- The network shall be able to dynamically negotiate the level of QoS. That is, the network shall be able to support negotiation initiated by any of the elements involved including the UMTS network itself, other connected networks, the mobile station and the application itself. This shall apply to all traffic classes, i.e., Conversational class, Streaming class, Interactive class and Background class. In addition, the network setting of QoS shall require subscriber concurrence – either through subscriber action at the mobile or through subscription information (i.e., the HSS).
- Subscriber (either direct or by the Release 2000 network on behalf of the subscriber) modification of UMTS/GPRS network-initiated requests for QoS treatment shall be supported.
- Mobile terminals that only support UMTS/GPRS (i.e., PDP context activation) QoS mechanisms shall require the network to act on its behalf in securing end to end QoS when required by the user in subscription information since in this case there is no application layer that could request end to end QoS.
- The IP network shall provide mechanisms whereby service providers can implement QoS based pricing. This implies that the network identifies within the associated CDR the QoS requested and the QoS provided.
- The network and the subscriber/application shall be able to dynamically negotiate the quality of service level for which the subscriber is willing to pay.

5. Release 2000 services

The Release 2000 development is based on strong evolution from 3GPP Release 1999. Many items have already been commenced in earlier releases and will be improved or finalised in Release 2000. All Release 99 services shall be supported in Release 2000, unless a specific service is deleted from Release 2000 as detailed below.

5.1 New Release 2000 services

This following major service developments are planned for Release 2000.

- IP multimedia services
- CAMEL phase 4 (See 22.078).
- LCS with UTRAN (See 22.071).
- SoLSA with UTRAN (See 22.043).
- Wideband AMR speech codec (See 22.003).
- etc.

In addition there are many small enhancements to existing services. The above list is neither exhaustive nor complete.

5.2 Release 99 services not supported by Release 2000

No unsupported services identified.

6 Applicability of existing toolkits

This clause reviews the applicability of the existing toolkits from Release 99.

6.1 CAMEL

Release 2000 shall incorporate CAMEL improvements following Release 99 (e.g. Phase 4).

Users shall be able to use their existing CAMEL services in a consistent manner in Release 2000 networks. This shall occur in a transparent fashion and the user need not be aware of whether the service is either circuit switched or packet switched. The same look and feel of the service shall be maintained.

Users shall be able to indicate their service preferences (e.g. ring tone for specific callers) only once and the service shall again be provided irrespective of network domain.

Operators shall be able to re-use their existing CAMEL services for IP multimedia services (cf. 21.978 [13]).

The development of new CAMEL services shall be supported independently of the network domain. Thus applications developed on CAMEL platforms shall be provisioned to users and be supported in both packet switched and circuit switched domains in a seamless fashion.

CAMEL phase 4 shall include enhanced capabilities to support multimedia services. The enhancements may have an additional impact on the underlying network.

Note: CAMEL additions for Release 2000 have to be collected urgently in order to implement them in the relevant specifications. CAMEL features left over from Release 99 form requirements for CAMEL 4.

6.2 MExE

Release 2000 shall incorporate improvements made in MExE Release 2000 (see 22.057 [9]), building on the (U)SIM certificate support, security and QoS management advances made in MExE Release 99. MExE supports both WAP and Java classmark devices.

MExE Release 99 provides the ability for operators, handset manufacturers and third parties to download applications, service logic and content into MExE terminals from servers. These entities shall require that applications, service logic and content downloaded in Release 99, may also be downloadable and executable in a consistent manner in a Release 2000 environment. Further, it shall be possible to do so, without the need to redevelop the MExE services in order for them to be supported in the packet domain.

MExE terminals interact with the servers using capability negotiation, and it shall be possible to continue usage of the capability negotiation in the packet domain.

MExE Release 2000 shall include enhanced capabilities to support IP multimedia services.

6.3 USAT

Release 2000 USIM Application Toolkit (USAT) shall incorporate improvements made in USAT Release 99 (see [11]).

USAT Release 99 provides the ability for operators to download applications to USIMs from servers, and remotely control the content of USAT USIMs. SAT Release 99 also allows the Toolkit Applications to display additional menus to the user, for Toolkit related services, and allow call control of user dialled digits.

USAT terminals interact with the USIM using capability negotiation, and it shall be possible to continue usage of the capability negotiation for IP multimedia services.

Release 2000 shall include enhanced USAT capabilities to support IP multimedia services.

6.4 VHE and Open Service Architecture

The Virtual Home Environment [8] is a concept to offer services to users wherever they are and whatever terminal they use, i.e. independently of terminals and networks used within the limitations of the networks and terminals.

The Open Service Architecture is defined to enable applications and services to use service features of 2G and 3G networks through an open interface. The applications and services may be implemented in standard programming languages (e.g. JAVA, C++) and on standard platforms.

R2000 shall incorporate improvements for VHE and OSA to support multimedia services, e.g. improvements to service capability features, service capability servers, user profile etc. This will give operators and 3rd party service developers the opportunity to create applications and services for Release 2000 networks.

Reuse of already implemented applications and services are also important. Since CAMEL, MExE and SAT, which are service capabilities in the VHE for Release 99 also will be supported in Release 2000 networks, applications and services using these components may be also be offered in Release 2000 networks.

VHE/OSA Release 2000 shall include enhanced capabilities to support IP multimedia services.

7 Service continuity and new services

7.1 Service continuation

Service continuation from an end user perspective is understood to be an important driver for established users of 2nd generation mobile communications systems to stay with their existing operator while moving into the 3rd generation. It is therefore important to enable operators to offer such service continuation into Release 2000. Existing Release 99 services must as a principle be supported also in Release 2000, and any exception shall be explicitly identified.

7.2 Support of evolving IP multimedia services

It is important that Release 2000 supports evolving IP multimedia services and applications. The requirement for access independence implies that such multimedia services, e.g. an IP web based Call Forwarding service where a user could access a web page to manipulate her Call Forwarding settings based on any number of input parameters, also have to be compatible with the same IP web based service supported via other accesses such as, e.g., fixed lines. The end user shall thus experience the same service behaviour irrespective of the access methods for services that are common to all the access networks..

Many similar (supplementary) services applicable for the evolving IP based multimedia services are as a principle different from the existing GSM standardised supplementary services, see the example of the web based Call Forwarding service above.

If a choice has to be made for the Release 2000 IP based multimedia services, between being compatible either with IP based services or with existing GSM standardised supplementary services, in principle the service compatibility shall be with the evolving IP multimedia services but must be evaluated case by case.

7.3 Support of supplementary services

Having established the requirement of supplementary services for IP multimedia services, it is required to clarify how these services are supported. Release 2000 shall not specify in detail how Release 99 services are implemented, but solely identify the requirement for their support.

To enable service continuation, the existing Release 99 supplementary services in CS domain shall be supported as specified in [7].

New supplementary services shall, as a principle, not be standardised, but instead be implemented using VHE. Operator specific supplementary services shall instead be implemented using VHE service capabilities, as stated for Release 99 [3].

7.4 Roaming Requirements

The scope of this chapter is restricted to general, non-technical requirements for a mobile user to register and obtain services on the roamed-to network. Whether this is through use of the same terminal, SIM etc. is not discussed, with the point being that the home network subscription is used on the roamed-to network in some way. Handover is not included in the chapter, nor is any technical detail on how the roaming should be implemented.

The following lists the scenarios as meriting further investigation:

Home Network	Roamed-to Network
3GPP Release 2000	3GPP Release 2000
3GPP Release 2000	Release 99 (incl GPRS)
3GPP Release 2000	IS-136 (incl. EGPRS)
3GPP Release 2000	Wired IP
Release 99 (incl. GPRS)	3GPP Release 2000
IS-136 (incl. EGPRS)	3GPP Release 2000
Wired IP	3GPP Release 2000

A number of issues have been identified which need to be dealt with in detail, these are as follows:-

- **“Optimised PSTN call routing”**
It should be possible for a PSTN user calling a mobile user in the same country, or two mobiles in the same network, to communicate without incurring the quality loss which happens through two international call legs.
- **Provision of Home Services**
A User roaming to a visited PLMN (R00) must be able to use services as provided in the home PLMN (Virtual Home Environment).
- **Home Environment awareness of roamed-to network capability**
The home network might need to change the technical deliver mechanism according to the capability of the far end network in order to provide VHE. This is needed e.g. to ensure that Handling of Incoming Multimedia Calls when roaming in CS network are handled appropriately from the subscriber and operator point of view.
- **Supplementary Service Co-ordination between R00 and legacy networks**
Investigate the capabilities of the legacy services and try to map these capabilities between R00 and legacy networks. Some IP multimedia services will not be supported in certain legacy networks.
- **Time to acquire “correct” roamed-to network**
Especially if this involves selection based on the services offered (e.g. camp on one network, check services offered, skip to another network).

7.5 Handover Requirements

Editor's note: support of handover and services between technologies and between operators. An e-mail discussion will be taking place to formulate requirements in time for the next TSG-S1 Release 2000 ad-hoc.

7.6 Subscription Requirements

Editor's note: a decision requires to be reached on whether it is desirable to have separate/simultaneous subscriptions for circuit switched services and IP multimedia services. Separate subscriptions would imply that the user would only be active on any one subscription at a time, and therefore restricted to the services offered by the particular subscription (i.e. circuit switched services only or IP multimedia services only). This issue has an impact on call routing too.

8 Service capabilities to support existing and new services

This subclause investigates the support of existing GSM/UMTS services as equivalent IP multimedia services. The aim is to identify areas subject for standardisation in the set of Release 2000 specifications. Existing services are investigated to what extent they can be supported by the Release 2000 toolkits without additional specification work. As a reference the appearance of the existing services to a user is taken. As an example, Call forwarding on no answer for speech calls appears to a user as every incoming speech call is forwarded when it is not answered within a defined time period to the same destination regardless the time of day or the calling number.

This clause does not attempt to compare the IP multimedia service capabilities against "GSM/UMTS unknown" additional features, however, any value added addition to existing services shall not be prevented but is not treated within this subclause. Extensions to the range of circuit switched services may also be considered for Release 2000, however they are not considered in this clause.

By analysing and categorising existing GSM/UMTS Release 99 supplementary services, this clause concludes that these services shall not be re-standardised and identifies the new service capabilities which shall be standardised to allow the creation of these services.

This clause:-

1. groups the main Release 99 supplementary services into several main categories of services
2. analyses each main category of services
3. identifies which services can be provided without standardisation by using the standardised service capabilities, given that these capabilities are enhanced to control IP Multimedia services (CAMEL, MExE and SAT toolkits)
4. identifies which functions (such as authentication, CAMEL call triggers etc.) shall require to be standardised

In conclusion only a minimum set of services requires to be standardised as IP multimedia services, with the Virtual Home Environment's CAMEL, MExE and SAT toolkits using basic primitives to create alternative, personalised call handling services tailored to the user requirements.

The following subclauses are not a complete list of supplementary services, which is elaborated in the feature list.

8.1 Basic Call

This category of services provides the ability to make and receive (where applicable) voice, emergency and data calls, even when roaming. This includes interworking with existing voice and data networks for both fixed and mobile users, addressed using the standard phone numbers, e.g. E.164. This category of services must also include capabilities for the support of roaming, Mobile Number Portability, Optimal Routing, and Lawful Interception (voice and data). Implicitly, Tandem Free Operation is also included. This list is not exhaustive.

8.2 Barring Services

This category of services performs two basic functions:-

- limiting the user's usage of subscribed services (e.g. no roaming, no long distance, session barring, bearer barring, QoS etc.)

- bar calls to control the cost of the calls
- bar incoming calls

The requirements for barring services are oriented less at limiting those basic services which a subscriber is subscribed to, and more at simple filtering of defining which services are made available to users (e.g. by defining their menu options on the terminal, network application etc.) and blocking of specific basic services to number ranges.

Specifying which services are available to users can be done through WAP, MExE, SAT and CAMEL toolkits. Outgoing barring services for basic services can be implemented using SIM Toolkit applications based on the number dialled, CAMEL and HLR (e.g. serving network applications), and MExE applications (e.g. MExE services, WAP WTA applications etc.). Incoming call barring services for basic services can be implemented using the network (e.g. CAMEL and HLR), and MExE applications (e.g. MExE services, WAP WTA applications etc.). Operator Determined Barring may also be supported using these toolkits. The barring of specific basic services with toolkits requires further investigation. Therefore, by using service capabilities there is no requirement for a specific call barring service to be standardised in Release 2000.

8.3 Advice of Charge

A related feature in 2G networks is advice of charge, which is based on the serving network being aware of the teleservice in use, the price for it and the mark-up used in the home network.

In future, the price charged to a subscriber may bear little relation to the charges imposed by the serving network because there may be special offers/discounts, or the service may include elements charged elsewhere (e.g., content charged by a 3rd party). Charging related information may also be made possible to users in advance of the call being made, in order to give an indication of the potential call costs.

Therefore the advice of charge may originate from the (mostly IN-based) charging services and delivered to the user by various means. Displaying of the received charging information to the user could be with MExE, as well as re-using capabilities to transport the Advice of Charge Information to the terminal and executing an AoC application in the terminal (as defined in 22.024). Different methods may also exist.

8.4 Call Diversion

This category of services include immediate call diversion, call diversion on no reply, call diversion on not reachable, call diversion on busy, call diversion on user initiation and call completion to busy subscriber. Further, the diversion may also be applied depending on the type of service (e.g. speech, data, multimedia, by media type etc.).

The features which are required in the network (e.g. provided by CAMEL) are:

1. immediate call diversion per medium type
2. call diversion on no reply per medium type
3. call diversion on not reachable per medium type
4. a set of primitives that allows the terminal to:
 - a) be notified of incoming calls (including when already engaged in a call)
 - b) hold/transfer/accept any of the incoming calls to another destination
 - c) be notified of success or failure of these actions

Therefore no basic call diversion features other than those proposed above are required to be standardised.

This allows terminals to be capable of providing the call diversion features when reachable (with the service logic securely downloaded using MExE, building on WAP's WTA where available), and the home network/serving network to handle call diversion when the terminal is unreachable (using HLR/CAMEL).

The basic primitives may also provide the capability to offer call waiting, hold and transfer features through the MExE toolkit. For the case where the terminal is reachable, the selection of the terminal or the network to process the call diversion may be an option.

8.5 Conferencing

Support for a service similar to the CS domain Multiparty service shall be required as an IP multimedia service.

As a new enhancement, Multicast and broadcast support may also be offered, using IP multicast. The benefits of this approach are most likely to occur where many users are receiving the same feed on the same cell, and the commercial benefits for this are yet to be fully understood. Any IP multimedia service shall allow multicast connections to be made outside of the cellular part of the core network.

In conclusion, the Multiparty service feature as an IP multimedia service where calls may consist of multiple media each possibly requiring specific handling) may at best be difficult to provide. It is therefore recommended that the circuit switched Multiparty service is supported by a new IP multimedia Conferencing service in the PS domain.

8.6 Number portability and addressing

This category of services is one of many aspects of addressing and routing which must interwork with the existing fixed and mobile 2G network schemes already deployed. Essentially number portability can be implemented within , for example the HLR, as part of the initial inbound call-processing query. More sophisticated schemes, which resolve one or more identities to actual routing codes may overlay these 2G schemes. Parallels may be seen in the e-mail world, where e-mail addresses appear to be portable between computers with different IP addresses, and where multiple e-mail addresses per user and per device are supported.

Release 2000 shall extend the means of addressing subscribers as follows:-

- enable support of other addressing schemes (e.g. IP addresses, name, URL etc.) for new IP multimedia services (cf. 22.975)
- enable interworking with existing circuit services through the allocation of E.164 numbers to IP Multimedia users by:-
 1. allocating a new E.164 number for IP multimedia services
 2. allocating a new (single) E.164 number for IP multimedia services and circuit services
 3. reallocating an existing users' circuit services E164 number for use by the same user for IP multimedia services
 4. reallocating an existing users' Circuit Services E164 number for use by the same user for IP multimedia services and circuit services
 5. allocating a user different E164 numbers for IP multimedia services and circuit services.

8.7 Call identification

Editor's note: input awaited on CLI, CNAP, etc ...

8.8 Service provisioning

The range of new services created in 3G will require provisioning and configuration by users and service providers. Since the range of services and the services themselves are not standardised in 3G, the specific feature codes to provision, enable and configure them cannot be standardised either. Instead, it is expected that service capabilities, personalised Internet web pages or direct access to customer helpdesk by voice telephone will be used to allow (self)provisioning, configuration and enabling of VHE services.

Editor's note: the above text requires further revision

8.9 Summary of required services

In order to build a set of supplementary services (suitable for service provider differentiation) in the VHE, a basic set of service primitives is required. These are presented in clause 9.

9 Case study of services realisation

9.1 Call Diversion

One of the most important requirements for the control of multimedia services in an all IP based network is that the necessary protocol actions are performed using functional peer-to-peer signalling. The protocol has to be designed in such a manner that the functional entities communicate with their peer entities (servers, clients or gateways (in case of interworking)) directly without assuming any network intervention.

Other requirements are e.g.:

- use of an open, standardised, extendible protocol to enable service differentiation in multi-vendor networks
- independence from vendor specific solutions and platforms
- support of interworking with public networks (e.g. ISDN networks)
- standardised and extendible service capabilities instead of standardised services
- support of client/server service models.

9.2 Case study on the support of Call Diversion services

This category of services include any kind of call diversion services (e.g. immediate call diversion, call diversion on no reply, call diversion on not reachable, call diversion on busy, call deflection etc.).

9.2.1 Requirements

The main requirements of this category of services are:

- provide the functionality to re-route the entire incoming call, or individual media of the incoming call
- allow the re-routing on defined criteria (e.g. context of called party or calling party, time, location, call set-up indication, user indication, service type, etc.)
- be able to differentiate the service type of the incoming call (e.g. speech, data, multimedia, etc.)
- provide sufficient capabilities to select where re-routing shall take place (e.g. in the network, in a third party, in the terminal etc.)
- user controlled administration, activation, de-activation and interrogation from different points (e.g. via the terminal, in the network, via a third party, user's web-based service personalisation etc.)
- the ability to inform the involved parties (calling, served, forwarded-to) that call diversion was invoked.

9.2.2 Needed service capabilities

3G defines the service capabilities on which the services shall be built rather than defining the services themselves. This section identifies the functional support required from service capabilities which shall then be combined to build the required service.

The following functional support shall be provided by the service capabilities to fulfil the above defined requirements for the call diversion services:-

- monitor for an incoming call
- provide user and/or terminal status (e.g. context of the calling or called parties)
- create a call to a (forwarded-to) destination for one or more media of an incoming call
- connect one or more media of an incoming call to one or more media of a (forwarded-to) destination
- identification of the service type of the incoming call
- administration (e.g. settings, modifications, interrogations, etc.) of the service data (e.g. forwarded-to destinations, trigger criteria, activation state, etc.) in the network, in a third party, in the terminal etc.

- definition of the functionality (service logic) for the execution of the service
- inform the involved parties about the invocation of a service.

9.2.3 Functional description

In traditional telephony a user is provided with only a limited number of forwarding services (e.g. unconditional, in case of busy, etc.). With the introduction of service capabilities it shall be possible for forwarding services to be made dependent on a variety of conditions. Examples for these conditions are the state of the called party (e.g. absent, busy, no reply, location, context etc.), the kind of service type (e.g. speech, multimedia, data etc.), the caller identification, the time of day or day of week etc.

For each of the above mentioned scenarios it is required that the user can program the forwarding of incoming calls (or media of incoming calls) to different destination addresses. It shall be possible that the programming of the destination can be done locally at the home client (terminal, gatekeeper, proxy server), or by remote programming via connection to the home client (e.g. via WAP/Web access).

The following different possible locations for the execution of the service (service logic) may be considered:

- the **client** (terminal, server/gatekeeper) maintains the states of the calls it is handling. Therefore many of the services, like call forwarding are suitable for implementation in a client. Services which are personalised/customised or interact with the user to the user's own specific requirements (e.g. calendar etc.) are best implemented in a client. The user may control the call handling requirements for the cases when he is available, and by defining his forwarding requirements as part of his profile he may also control his call handling requirements when he is unavailable. Such a profile could, for example, be webpage-based allowing fine-grain handling of each medium within his multimedia call. Further, the user's personalisation may also be accessed by the application/feature servers to provide continuity of service when the client is unavailable.
- an **application/feature server** implements services that are not suitable for client implementation (e.g. when the client is not reachable), but in general it is also possible to implement many services at application/feature servers. For example services which interfaces with a group of clients (e.g. with the first available agent with a specific skill) are maybe best implemented in a server.

This application/feature server can also be used as a proxy or secondary client for those clients that are non-operational (e.g. powered-down, not registered, not reachable). Upon detection of the operational failure of a primary client, the gatekeeper notifies and routes all calls destined for the non-operational client to the server, which could then provide such services as call forwarding and messaging (for voice, facsimile and email).

A special case of such an application/feature server could be a **conference server** which maintains also the state of the calls that it is handling and which can provide n-way conferencing services.

9.2.4 Call flows

The following two examples show how a call diversion service could be realised within an all IP based network. The message names used only indicate the function behind the signalling (the mapping of this functional flows to protocols such H.323 signalling or SIP messages is outside of the scope of this document).

Also the service capabilities supporting the function (e.g. usage of CAMEL, MExE, SAT), as well as the functional entity in which the service logic is executed (e.g. application/feature server, client) are not identified in this study. The "served party" entities in figure 6 and Figure 7 represent the network and/or the terminal capabilities. The box "An application..." in Figure 6 and Figure 7 depicts service logic which is processing the call, and information on the calling/called party's context is potentially obtained from several sources (e.g. calling/called party, the network, user profile, user's webpage etc.).

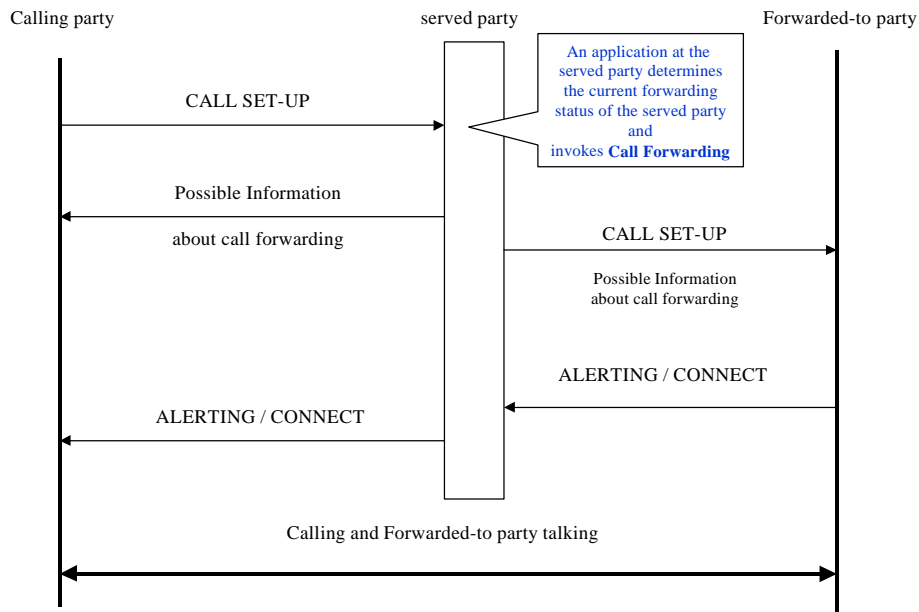


Figure 6: Example for call forwarding at the served party

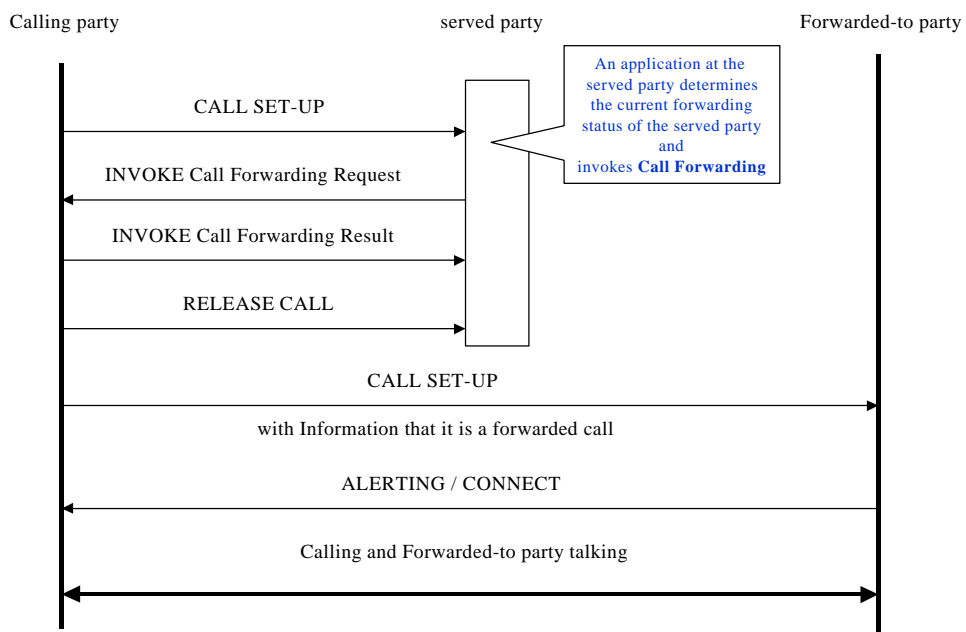


Figure 7: Example for call forwarding with new call set-up between calling and forwarded-to party

Editor's note: It is intending to further elaborate the case study on services, and their implications on terminal and network requirements.

9.3 Pre-paid Service

Pre-Paid service allows the subscriber to pay for telecommunication services prior to usage.

A Pre-Paid service subscriber establishes an account with the service provider to access telecommunications services in home and roamed networks. Charges for telecommunication services are applied to the Pre-Paid service account by decrementing the account in real time. The Pre-Paid service subscriber may be notified about the account information at the beginning, during, or at the end of the telecommunications service. When the account balance is low the subscriber may be notified so that the subscriber may refill the account. When the account balance is below a pre-defined threshold, the subscriber's use of telecommunications services may be barred.

The support required from the toolkits to support the pre-paid service requires to be identified.

Editor's note: contributions invited

9.4 Required services

In order to build a set of supplementary services (suitable for service provider differentiation) in the VHE, a basic set of service primitives is required. These are:

1. Authentication
2. Basic Call (including Mobile Number Portability, Lawful Intercept and Tandem Free Operation, Optimal Routing) shall allow interworking as voice only call with legacy networks.
3. Internet Access (e.g. standard GPRS service, etc.)
4. Call Diversion Immediate Call Diversion on unreachable (i.e. when terminal does not respond to paging)
5. Call manipulation primitives:
 - a) set-up outbound basic call
 - b) notify/accept/answer incoming call
 - c) hold
 - d) transfer
 - e) diversion
6. Call triggers (CAMEL) to monitor and manipulate multimedia calls from the home network:
 - incoming call arrival (similar to CAMEL in circuit switched domain)

The following minimum service capabilities shall be available, provided they are enhanced to control IP multimedia services to build and support all other services:-

- CAMEL support in the network
- SIM Toolkit (minimum UE requirement, Classification and capabilities to be determined)
- MExE Classmark 1 (minimum UE requirement)

Editor's note: the above conclusions require to be agreed. . It was noted that the level of home network control of services (e.g. if CC terminates at HPLMN or at VPLMN) impacts which protocols/services need to be standardised

10 Evaluation of what does and does not need to be standardised by 3GPP

To promote this access independence for IP based services it is necessary for Release 2000 to support and follow main stream IP-based multimedia standards, such as H.323 and SIP. This also means that 3GPP shall not standardise any mobile specific variants of these standards in 3GPP.

There are cases where today's IP based standards have to be modified to suit the mobile environment of R2000. Such modifications shall then be done by enhancing those IP based standards themselves in their relevant standardisation fora. As users can be expected to require access independence to have their services available anywhere and anytime, and as mobile communications are becoming more and more important, such mobile specific modifications in main stream standards should be achievable.

11 Release workplan

In order to clearly state the TSG-S1 Service Requirements to other TSG's and WG's in a timely fashion the following Work Plan is proposed.

<i>SI</i>	<i>Dates</i>	<i>Actions</i>
S1#7	February 9-11, 2000	<ul style="list-style-type: none"> • Work on TR22.976 so it is suitable for v1.0.0 at SA#7 • Liase TR22.976 to S2#12.
S1 R2000 adhoc	February 29-March 2, 2000	<ul style="list-style-type: none"> • Scope widened to encompass all of Release 2000 • Forward TR22.976 as v1.0.0 to TSG-SA for information
S1#8	April 10-14, 2000	<ul style="list-style-type: none"> • Prepare TR22.976 for approval at SA#8 • Liase TR22.976 to S2#13. • Work on of any new Stage 1's required so they are suitable for v1.0.0 at SA#8. • Produce initial CR's to the existing 22-series
S1 R2000 adhoc	3 rd -5 th May, 2000	<ul style="list-style-type: none"> • Progress and finalise work on the TR
S1#9	July 17-21, 2000	<ul style="list-style-type: none"> • Prepare any new Stage 1's for approval at SA#9. • Complete CR's to the 22-series.
S1#10	November 13-17, 2000	<ul style="list-style-type: none"> • Revise Stage 1's in line with feedback from other TSG's and WG's. • Begin TR on R2001.

Editor's note: need to also consider workplan for subsequent releases

12 Summary of required changes to TSG-S1 specifications for Release 2000

This clause identifies the modifications and additions required to the TSG-S1 specifications in order to specify support of Release 2000 requirements.

Editor's note: the format of this clause needs agreement. This could be a list of modified and additional requirements, or possibly even identify the specifications and the changes required therein.

Annex A PS Domain feature list evaluation for release 2000 (Normative)

Key to Table

E = Essential for release 2000, launch of commercial IP multimedia services is not viable with these missing or required in Release 2000 terminal specifications to enable forward compatibility to future releases

D= Desirable for Release 2000, important features to enable a competitive and successful service launch, but could be slipped to Release 2001

R99 = Features already supported in Release 99, shall also be supported as part of Release 2000

R01+ = could wait for these features, but hooks are required in Release 2000 to enable them to be added later

No = Not needed in the PS domain

Note: Circuit switched domain services are not considered at this annex. S1 has agreed to maintain the existing Release 99 requirements in Release 2000, allowing full service continuity.

Note: All Release 99 features shifted by any reason to Release 2000 shall be included as E R'00 (to be verified feature by feature)

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
DTAP CC							i.e. 04.08 based CC. Seamless support for existing GSM services This set of requirements means 04.08/04.80 CC and SS in PS domain
Rel 99 CS terminal and circuit service support by circuit switched domain (cf. Relationship A in figure 5).	Support of R99 TS11, TS12, BS20, call offering SS, call completion SS, call restriction SS, CCBS SS, number identification SS etc.	X					How this requirement is supported (e.g. IP Transport, MSC servers, etc) in the circuit switched domain is out of S1 scope.
Rel 99 CS terminal and circuit service support by PS Domain (cf. Relationship B in figure 5)..	Support of R99 TS11, TS12, BS20, call offering SS, call completion SS, call restriction SS, CCBS SS, number identification SS etc.						How this requirement is supported (e.g. IP Transport, MSC servers, etc) in the PS domain is out of S1 scope.

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
IP CC							e.g. H.323 / SIP related IP multimedia services.
IP multimedia services							
IP telephony	Single medium IP voice call (using H.323 or SIP) with end user perceived quality equal or better than 2G GSM voice call						It must be possible for the MMI to be identical to the standard telephony MMI (dialed digit, off hook, connection, on hook). Including end to end QoS support.
Multimedia IP Call	Includes IP telephony, all real time calls single and multi-media, processed by IP CC						Including end to end QoS support. It is desirable to limit the standard to one protocol only. S2 should decide on the standard protocol. The usage of any additional protocol may be based on the network transport function (bearer service).
Emergency Voice Call	Basic emergency voice call over IP						This must use the existing emergency numbering schemes (22.101). Must be compliant with FCC mandates, European and other regulatory requirements.
Group calling	This requirement covers various group call services (e.g. PMR/ASCI type of services)						Service requirements FFS
Short message service (CBS)	As specified by 23.041.	X					No additional standardisation work required for S1
Short message service (SMS PTP)	As specified by 23.040.	X					No additional standardisation work required for S1
Multimedia messages (MMS)	Support of multimedia messaging in PS domain	?					Currently supported in R99 for MS/MS. Need to consider messaging to and from other access.

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
Facsimile service							
Store and forward	Transfer of text or images from a MS to a store and forward unit for subsequent delivery to a fax machine. Faxes from PSTN/ISDN to mobile terminals are stored in a store-and-forward unit.						Support of bearer service is, however, necessary to allow customised solutions to be implemented (based on T.37 and/or T.38).
End-to-end	End-to-end fax between a PSTN/ISDN fax machine and a mobile terminal.						
Services independence from transport technology	Possibility to operate in different transport environments (e.g. all IP or other different from IP)						
IP bearer services							
Point-to-Point	As in 22.060	X					No additional standardisation work required for S1
Point-to-Multipoint	PTM services such as PTM-Multicast, PTM Group Call, IP Multicast, IP Distribution Services (MDS)						Implementation of PTM services for example as defined within GPRS specifications
Asymmetric bearers	Separate parameters at the User Interface for the uplink and downlink data rate and QoS. This feature is already within R99 (e.g. TS 23.107)	X					No additional standardisation work required for S1

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
Support of QoS mechanisms for real time services		?					QoS is also part of R99, but the features for real time conversational services might be delayed
Multicall capability	Support of multiple active PS sessions (TS 22.060)	X					No additional standardisation work required for S1
Interworking							Including end to end QoS support
IPv4 interworking		X					Same reqs as Rel 99 GPRS
IPv6 interworking		X					Same reqs as Rel 99 GPRS(?)
Speech to/from PSTN / ISDN / 2G CS mobile / 3G CS mobile	Full interoperability between corresponding services in PSTN/GSM environment and UMTS rel00 environment						
Multimedia to/from Internet-H.323	H.323 protocol interworking						Incl. Intranet.
Multimedia to/from Internet – SIP	SIP protocol interworking						Incl. Intranet.
Modem and ISDN interworking	Access to PSTN / ISDN dial up –data services						Removed from R99 at SA1#6
Interworking with ISDN multimedia applications	Service compatibility between real time single/multimedia N-ISDN applications and single/multimedia UMTS rel 00 applications including H.324						
Interworking with other access networks (e.g. cable)							
Interworking with intranets (including VPNs)	VPN functionality (firewall bypass) shall be supported						May possibly be supported at the application layer.

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
Roaming	Editor's note: Roaming section not reviewed, and roaming clause is under construction						
CS/PS GSM/UMTS R99 to R00 PS							(U)SIM and Multimode terminal Roaming. Roaming should be possible for both R99 and pre R99 GSM/GPRS networks. (Note: roaming to R00 CS is included but not within the scope)
R00 PS to GSM/GPRS							(U)SIM and Multimode terminal roaming. Roaming should be possible for both R99 and pre R99 GSM/GPRS networks.
ANSI-41 to R00 PS							
R00 PS to ANSI-41							
Handover	Editor's note: Handover section not reviewed, and handover clause is under construction						
Speech from PS Domain to CS- GSM /UMTS							
Speech from CS-GSM /UMTS to PS Domain							
Handover of parallel sessions/calls (with different QoS)							

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
Multimedia handover between R00 UTRAN and GERAN							To include real-time services in addition to R99 "best effort"
Editor's note What about HO towards GPRS? Release 99 GPRS might offer similar capabilities (without the QoS for real time) as Release 2000							
Multimedia services to/from alternative access technologies (e.g. HIPERLAN/2)							Alternative access technologies to include HIPERLAN/2
Supplementary Services (PS Domain)							<p>IP Multimedia / IP Telephony aware supplementary services to be considered only from end-user need view point. (Standardization, service capabilities and implementation FFS).</p> <p>S2 choice of MM CC protocol may support some MM services implicitly. Some of the following services can be provided at the application level (i.e. no standardisation required).</p> <p>The H.450 standards defines supplementary services for H.323, and SIP provides tools to build supplementary services.</p>
Multimedia Call Barring	Enables mobile subscriber to have barring of certain categories of outgoing multimedia calls.						Also includes incoming multimedia calls and barring when roaming.
Network Barring	Editor's note: Description and justification to be supplied by Horst Rauch (T-Mobil)						It shall be possible for the subscriber to have the ability to bar access to certain networks (e.g. cost reasons)

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
Session Barring	Editor's note: Description and justification to be supplied by Horst Rauch (T-Mobil)						It might be valuable to limit the number of simultaneous sessionsFFS
Bearer Barring	Editor's note: Description and justification to be supplied by Horst Rauch (T-Mobil)						.Might be based on the QoS parameters (e.g. barring of bearers with high QoS for cost reasons).
Multimedia Call Forwarding	Forwarding of multimedia call (e.g. triggered by conditions of Unconditional, Busy, No Reply, Not Reachable etc). Triggers/activation will be different and more detailed in a MM environment for the different media components.						Conditions require to be evaluated.
Multimedia Call Transfer	Enables served mobile subscriber who has a multimedia call, to connect the other parties in the multimedia call and release the served mobile subscriber's own connection.						
Multimedia Call Deflection Service	Enables the served mobile subscriber to respond to an incoming multimedia call offered by the network by requesting redirection of this multimedia call to another address or location.						
Multimedia Call Holding	Allows served mobile subscriber to interrupt communication on an existing active multimedia call and then subsequently re-establish communication						
Multimedia Call Waiting	Permits mobile subscriber to be notified of an incoming multimedia call while the mobile subscriber is engaged in other multimedia call(s). Subscriber can either accept, reject, ignore, or deflect the incoming multimedia call.						

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
Advice of Charge	Supply user sufficient information to allow real-time estimate of the call charge.						
Caller Identification and restriction	Similar to CLIP, CLIR, CNAP and CNAR.						Could include additional IP related information such as IP address. Need to support European, FCC and other regulatory requirements.
Connected Line Identification and restriction	Similar to COLP and COLR						Could include additional IP related information such as IP address. Need to support European, FCC and other regulatory requirements.
Multimedia conferencing	Similar to Multiparty but is applicable to multimedia calls.						
Multimedia call-back when free / CCBS	Editor's note: definition required in the MM case						
Closed user group (CUG) / community of interest	Editor's note: definition required in the MM case						
Precedence and Pre-emption service	Editor's note: definition required in the MM case						
Network Services							
Operator Determined Barring (ODB)	Allows service providers to regulate subscriber access to services by the barring of certain categories of outgoing or incoming multimedia calls and packet services. ODB could terminate ongoing multimedia calls and could bar future multimedia calls and packet services.						?

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
CAMEL Support for Multimedia Services	Provides mechanisms to support multimedia services consistently & independently of the serving network.						CAMEL enhancements, but additionally needs to support multimedia calls. Implementation is FFS. Editor's note: DeWayne Sennet (AWS) to WIN support proposal
(U)SIM Toolkit	Feature provides a set of facilities which allow the (U)SIM to interact with external entities (e.g. the network, the Mobile Equipment, or the user) to enable value-added multimedia applications to exist in the (U)SIM.						
OSA for new elements	Provision of an API for controlled, secure and accountable access to multimedia service capability features by applications, based on the user profile						E.g. H.323/SIP CSCF.
LCS for GPRS/PS domain	Support of LCS on the PS domain required to meet regulatory and commercial requirements (e.g., 3GPP 22.071)						Exact work required is for FFS. Need to support European, FCC and other regulatory requirements.
SoLSA	SoLSA shall facilitate user-dependent radio resource selection based on LSA (e.g. when user is located at his office, radio coverage provided with indoor radio solutions should be preferred).						
Lawful Surveillance / Intercept							Need to support European, FCC and other regulatory requirements.
Number Portability	Ability for subscriber to change service providers while retaining the original directory number. Includes mobile to mobile, mobile to landline, & landline to mobile number portability scenarios.						Need to support European, FCC and other regulatory requirements.

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
Mobile Station Application Execution Environment (MExE)	Provides standardized execution environment in an MS, and an ability to negotiate its supported capabilities with a MExE service provider, allowing applications to be developed independently of any MS platform.						
Personalization of Mobile Equipment (ME)	Storage of information in the ME which limits the SIMs which will operate with the ME.	X					No standardisation work required for R99
Advanced Addressing	Support of symbolic and advanced addressing						Addressing depends on applications, e.g. e-mail addresses are used for e-mail, E.164 is used for telephony, ICQ uses IP addresses. This does not require standardisation by 3GPP.
System Selection	Ability for the mobile equipment to choose a preferred service provider, based upon geographic location, frequency band preferences, available operators, etc. Also the ability to force a mobile station to "disallow" service from a "forbidden" service provider, and to force a mobile station to use "home" services. Service provider lists must be downloadable over-the-air. The possibility for operators with multimode networks, e.g. with GSM and UMTS radio access networks, to control which RAN a user accesses.						Similar to ANSI-136 Intelligent Roaming.
Over-the-Air Service Provisioning	Ability to download parameters to either the SIM or ME for provisioning of services. This includes both subscription parameters as well as operator-specific parameters.						Similar to ANSI-136 OTASP and OTAPA.
Charging							

Feature Name	Short description	R99	E R00	D R00	R01+	No	Comments/Notes
Implementation of on-line charging mechanisms for the support of Pre-paid services	Definition of charging mechanisms for the support of IP multimedia pre-paid services						
Event/transaction based charging mechanisms (e.g. content based)	Definition of charging mechanisms for the provisioning of IP based Value Added Services						
Charging aspects – need to charge for each PDP context (PS sessions) independently							

Annex B Release 2000 document structure (Informative)

Release 2000 introduces a set of new requirements and service descriptions mainly related to IP multimedia telephony. The IP based architecture offers an extended set of services, and may support services differentiating from services offered by circuit switched network.

Additional new specifications for IP multimedia services should be created when needed.

The following table presents the TSG-S WG1 document structure, with initial comments on their applicability for Release 2000 .

New	Name	Release 2000 notes
22.001	Principles of Circuit Telecommunication Services Supported by a Public Land Mobile Network(PLMN)	Not relevant for PS Domain.
22.002	Circuit Bearer Services Supported by a PLMN	Not relevant for PS Domain.
22.003	Circuit Teleservices supported by a PLMN	Not relevant for PS Domain.
22.004	General on Supplementary Services	Not relevant for PS Domain.
22.011	Service Accessibility	No major changes seen.
22.016	International Mobile Equipment Identities (IMEI)	Relevant for both CS and PS domains. No major changes seen.
22.024	Description of Charge Advice Information (CAI)	See 22.004
22.030	Man-Machine Interface (MMI) of the Mobile Station (MS)	FFS
22.034	High Speed Circuit Switched Data (HSCSD) – Stage 1	Not relevant for PS Domain.
22.038	SIM application toolkit (SAT); Stage 1	Should be applicable to both sides as part of VHE. Further study for IP multimedia telephony needed.
22.041	Operator Determined Call Barring	Only applicable to CS domain. Further study for rel 2000 needed.
22.042	Network Identity and Time Zone (NITZ), stage 1	Only applicable to CS domain. Further study for rel 2000 needed.
22.043	Support of Localised Service Area (SoLSA) - Stage 1	Relevant for both CS and PS domains. Further study for rel 2000 needed.
22.057	Mobile Station Application Execution Environment (MExE); Stage 1	Should be applicable to both sides as part of VHE. Further study for IP multimedia telephony needed.
22.060	General Packet Radio Service (GPRS); Stage 1	Not relevant for CS domain. Detailed review needed.
22.066	Support of Mobile Number Portability (MNP); Stage 1	IP multimedia telephony related changes FFS.
22.067	Priority Set-up Service(PSUS); Stage 1(ASCI spec)	See 22.004
22.071	Location Services (LCS); Stage 1	Applicable to both domains, GPRS status not clear . Further study for rel 2000 needed.
22.072	Call Deflection (CD); Stage 1	See 22.004
22.078	CAMEL; Stage 1	IP multimedia telephony support need to be studied.
22.079	Support of Optimal Routing; Stage 1	Only applicable to CS domain. Similar requirement needed for rel 2000.

New	Name	Release 2000 notes
22.081	Line Identification Supplementary Services; Stage 1	See 22.004
22.082	Call Forwarding (CF) Supplementary Services; Stage 1	See 22.004
22.083	Call Waiting (CW) and Call Hold (HOLD) Supplementary Services; Stage 1	See 22.004
22.084	MultiParty (MPTY) Supplementary Service; Stage 1	See 22.004
22.085	Closed User Group (CUG) Supplementary Services; Stage 1	See 22.004
22.086	Advice of Charge (AoC) Supplementary Services; Stage 1	See 22.004
22.087	User-to-user signalling (UUS); Stage 1	See 22.004
22.088	Call Barring (CB) Supplementary Services; Stage 1	See 22.004
22.090	Unstructured Supplementary Service Data (USSD); Stage 1	See 22.004
22.091	Explicit Call Transfer (ECT) Supplementary Service; Stage 1	See 22.004
22.093	Call Completion to Busy Subscriber (CCBS); Stage 1	See 22.004
22.094	Follow Me; Stage 1	See 22.004
22.096	Calling Name Presentation (CNAP); Stage 1 (T1P1)	See 22.004
22.097	Multiple Subscriber Profile (MSP); Stage 1	PS domain FFS.
22.100	UMTS phase 1 capabilities	Not applicable to rel 2000.
22.101	UMTS service principles	Applicable to both domains. No major changes seen. Introduction to IP multimedia services and IP multimedia telephony might be good.
22.105	Services and service capabilities	Applicable to both domains. IP multimedia services are FFS
22.115	Service aspects: charging and billing	Applicable to both domains. IP multimedia services are FFS
22.121	Virtual home environment	Applicable to both domains. IP multimedia services are FFS
22.129	Handover requirements between UMTS and GSM or other radio systems	Applicable to both domains. IP multimedia services are FFS
22.135	Multicall	Applicable to CS domain only. GERAN applicability studied with EDGE.
22.140	Multimedia Messaging Service Stage 1	Applicable to both domains. IP multimedia services are FFS
22.960	Mobile multimedia services including mobile intranet and internet services	No impact identified.
22.971	Automatic establishment of roaming relations	No impact identified.
22.975	Advanced addressing	No impact identified.
22.976	Study on PS domain services and capabilities	Basis for S1 rel 2000 IP multimedia services work.

Annex C Regional Regulatory Requirements (Informative)

Release 2000 shall enable compliance for IP multimedia services with regional regulatory mandates. The following list is neither exhaustive nor complete, and requires further elaboration in this annex.

US regional regulatory mandates services may include (and are not limited to):-

- emergency services (e.g. in the U.S., the FCC Phase 2 Emergency Services mandate which requires provision of geographic location information).
- lawfully authorized surveillance
- number portability
- text telephone services (e.g. TTY in the U.S.)
- priority services for Critical Communications (e.g. ITU-T Study Group 2 recommendation E.ieps (International Emergency Preference Scheme to support the need for telecommunications among essential users of public telecommunications networks in crises situations)).

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