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# 3G TR 22.976 V0.54.0 (2000-01)

*Technical Specification*

**3rd Generation Partnership Project;  
Technical Specification Group Services and System Aspects;  
Study on PS domain services and capabilities  
(3G TR 22.976 version 0.54.0)**



Reference

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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;

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# 1 Scope

This Technical Report provides background information, motivations, descriptions of service drivers, and concepts regarding general service requirements and service features of the All-IP network option. ~~the PS domain.~~ The All-IP network option will be developed in a phased approach. The scope of the first phase of the All-IP network option (as part of 3GPP Release 2000) ~~will be also be explicitly identified described. It is expected that t~~ This TR will act as a provides the basis for the detailed Stage 1 specification work.

The focus of the TR is:

- High level vision
  - Potential Service Drivers
- New service capabilities and end user benefits
- Case study of realisation of a some services e.g. CFU
- Evaluation of what does and does not need to be standardised
- Release roadmap
  - Feature List
  - Time of delivery expectations for standards and products (now indented)
- 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 the All IP network option, 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.

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# 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; Public Land Mobile Network (PLMN)"

Editor's note: Update spec name ...

- [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: "; Mobile Station Application Execution Environment (MExE); Service description, Stage 1"
- [10] TS 22.078: "; Customised Applications for Mobile network Enhanced Logic (CAMEL); Service definition - Stage 1"
- [11] GSM 11.14: "Digital cellular telecommunication system (Phase 2+); Specification of the SIM Application Toolkit for the Subscriber Identity Module - Mobile Equipment; (SIM - ME) interface"

Editor's note: Stage 1 required

- [12] > *reference to 22.001...*
- [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 transport of all user data and signaling

Editor's note: may need this to elaborate from an IP services point of view (i.e. support of IP addresses and IP clients in the terminal)

Editor's note: change all "~~CS domain~~" text to "~~Circuit switched domain~~"

**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: change all "~~CS domain~~" text to "~~Circuit switched domain~~"

**Circuit services:** the services enabled by the ~~CS Domain~~circuit switched domain

Editor's note: CS domain and PS domain may require further elaboration

**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

**IP telephony:** a voice call that uses IP for transport of all user data and signalling

**Multimedia service:** multimedia services are services that handle one or more media simultaneously such as speech (e.g. IP telephony), audio, video and data 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

**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

**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) and also 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](with respect to Release 2000) services identified in 22.004 [7] with changes as proposed in this TR. (A supplementary service modifies or supplements a basic Telecommunication service.)~~

Editor's note: replace SS definition and replace with definition in 22.004

**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 and IP based control

## 3.2 Abbreviations

For the purposes of this TR the following abbreviations apply:

CAMEL	Customised Application for Mobile Enhanced Logic
CS	Circuit Switched
HLR	Home Location Register
IP	Internet Protocol
IPT	IP Telephony
MExE	Mobile Station Execution Environment
OSS	Operator specific services
PS	Packet Switched
QoS	Quality of Service
SAT	SIM Application Toolkit
VHE	Virtual Home Environment
WAP	Wireless Application Protocol
WTA	WAP Telephony Application

---

## 4 High level vision

### 4.1 The IP vision

The communication industry is going through a period of explosive change, which is both enabling and driving the convergence of services. Data is becoming a more significant proportion of traffic compared to voice. 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 will lead to applications and new opportunities that are more

difficult to replicate using a standard switched centralized solution. Thus, the main drivers for IP services are new services as the plain voice telephony is gradually moving to multimedia. IPT is seen as very important step forward to the mobile information society.

All IP offers the operators a complete solution for IP Telephony (IPT) and multimedia. 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.

## 4.2. Network evolution to an All IP network

Operators may want to migrate towards an IP based network architecture. Since the transition to an All IP network will not happen overnight, both traditional mobile circuit switched telephony and IP based services need to be supported by a single network simultaneously. It is believed that circuit switching will live for many years together with IP services. Also 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 3GPP release 2000 shall be based on an evolved Release 1999.

## 4.3 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 which allow deployment of these services is transparent to the user. This is shown in Figure 1 below.



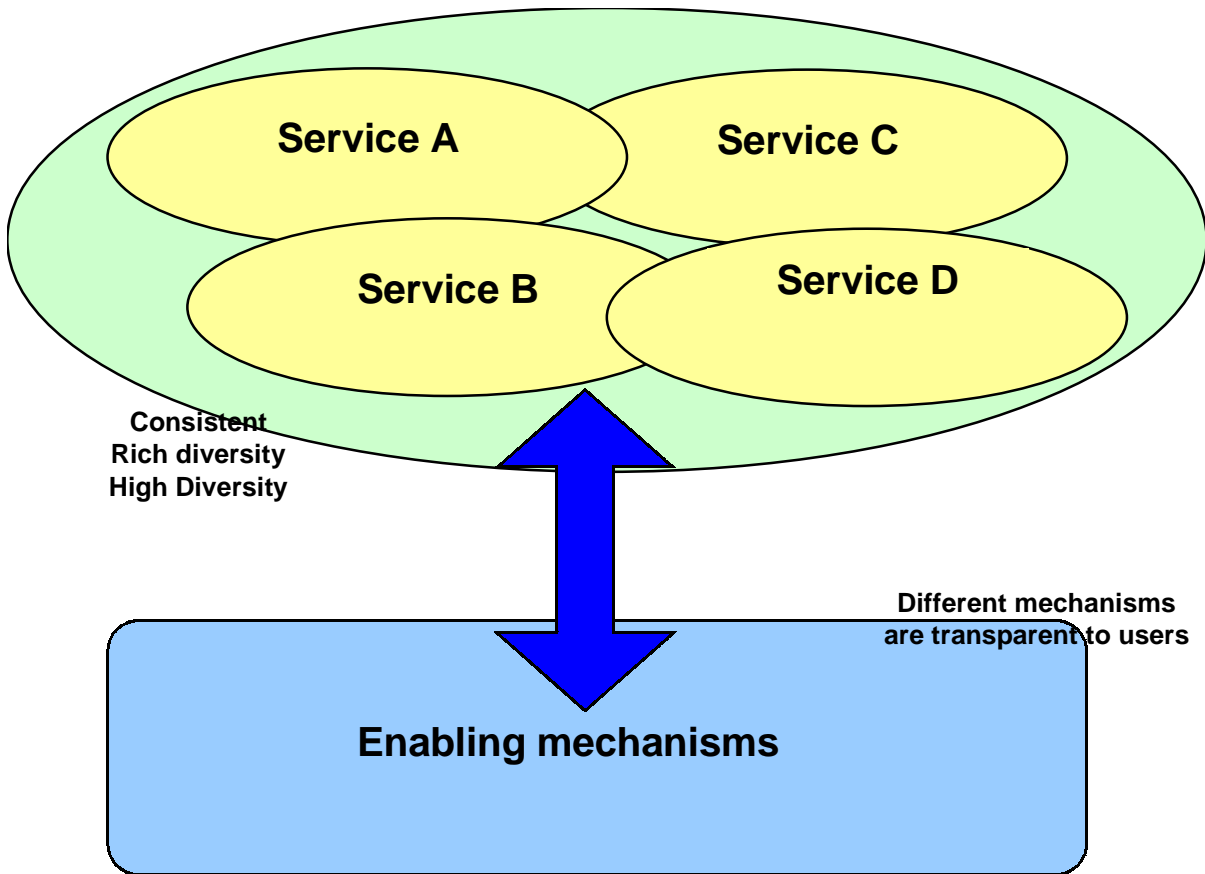


Figure 1. Transparent pProvision of sServices

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

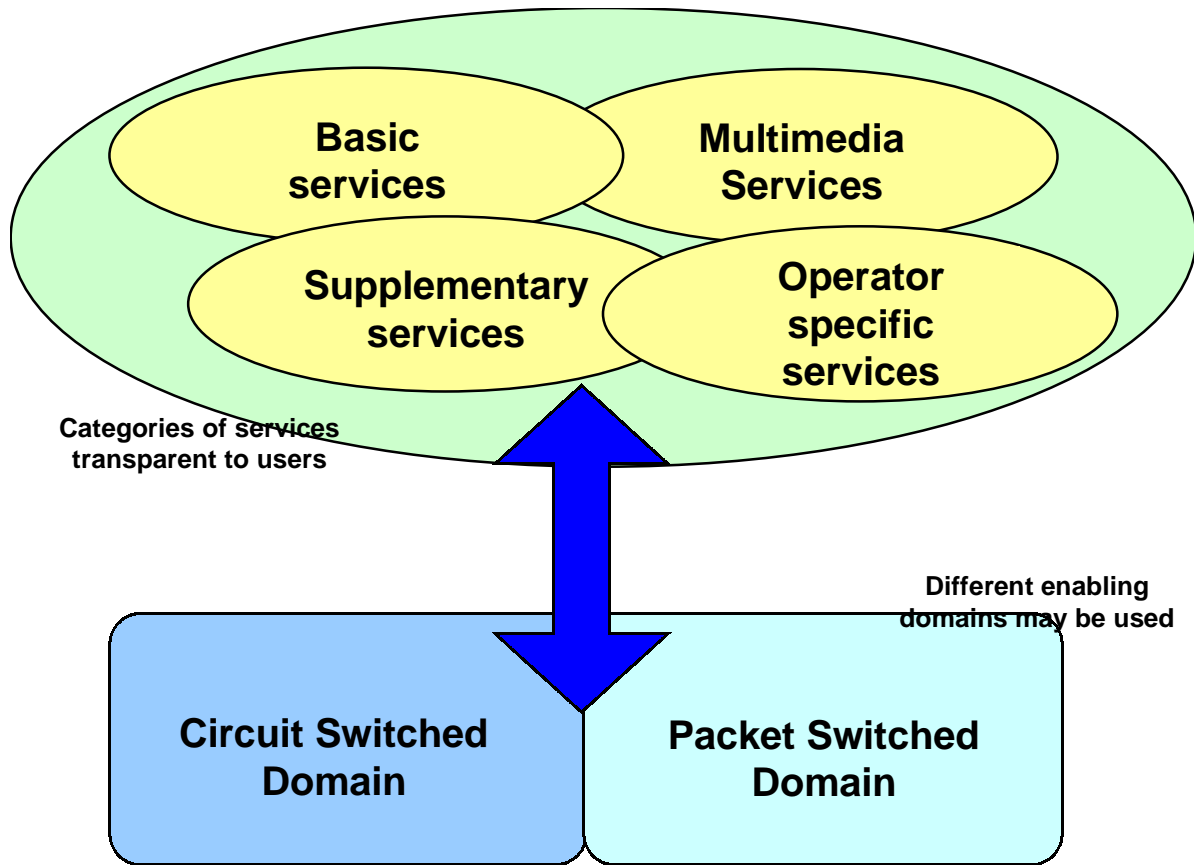
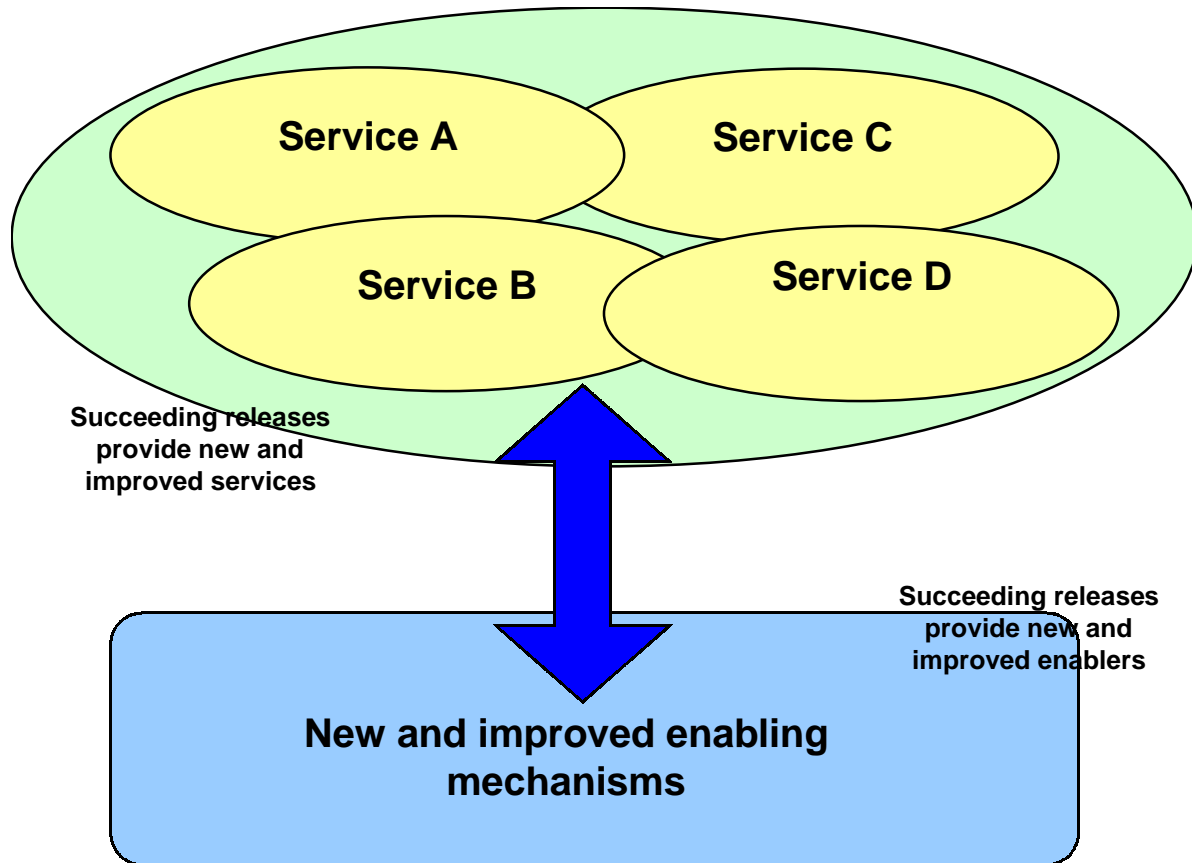


Figure 2: Different Types of Services and Enabling domains

Editor's note: MC to represent MM, B and OS services differently (subsequent figures also...); replace "different enabling mechanisms" with "enabling doemains"; replace CS and PB with domain names...

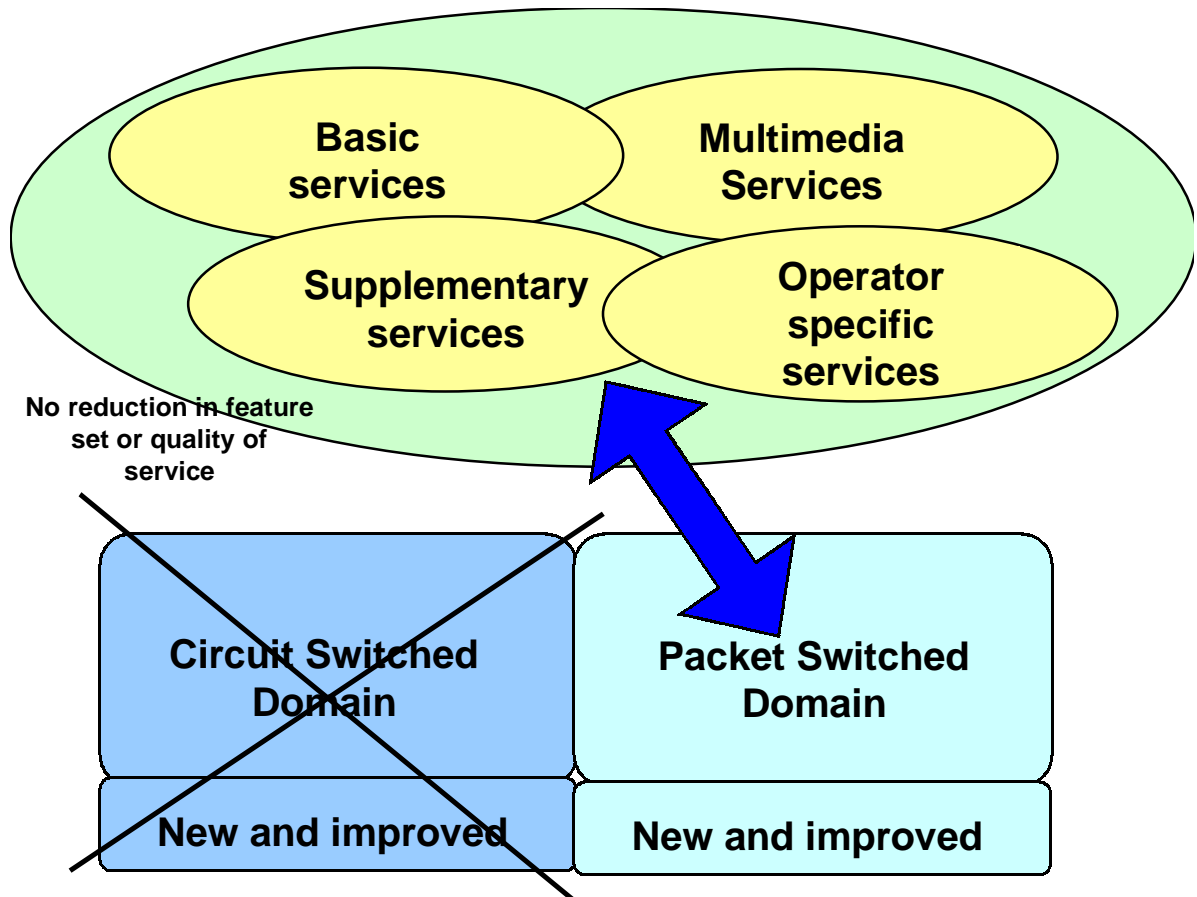
With succeeding releases, new and improved services and enabling mechanisms are developed and deployed. In general, most users not experience a reduction in the available service set, or degradation in the quality of the offered services. This is depicted in Figure 3.



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

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

Editor's note: some operators prefer identification of a minimum set of CS services in the PS domain, whereas others preferred support of all Release 99 services. Requires agreement and consensus.



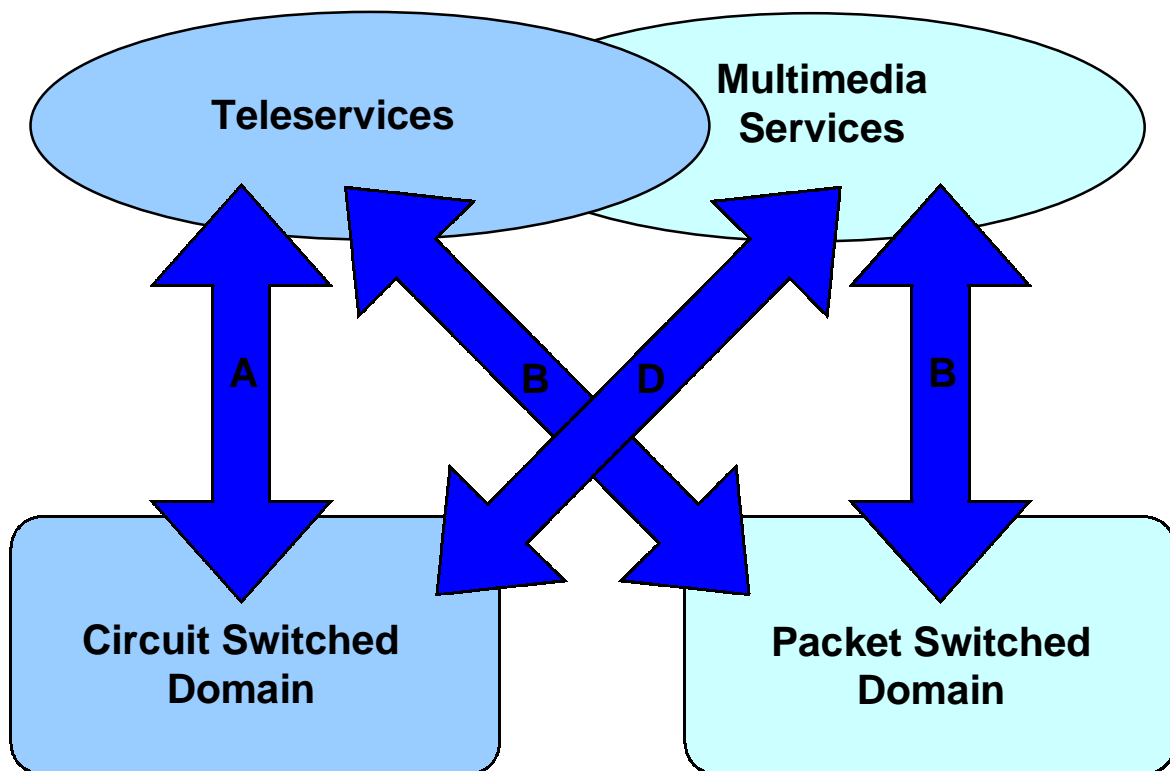
No reduction in feature set or quality of service

**Figure 4: All-IP nNetwork oOption**

Editor's note: also cross out "new and improved" under CS box.

## 4.4 Teleservices and multimedia services

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



editor's note: replace CS and PD with new terms

**Figure 5: Teleservices and multimedia services**

The logical relationship between the teleservices and multimedia services to the circuit and packet domains is subsequently described.

The "A" relationship refers to the existing relationship between the teleservices and the circuit switched based domains.

The "B" relationship refers to the support of teleservices in a packet domain. 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.

Editor's note: to verify from S2 that circuit services may be provided by the PS domain (e.g. offered by MSC servers)

The "C" relationship refers to the relationship between the multimedia services and packet domain. 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 of the "A" and "B" relationships across the "C" relationship, although some comparable services (e.g. emergency services) may be required. 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 should 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.

The "D" relationship refers to the relationship between the multimedia services and circuit domain (e.g. H.324 supported in Release 99).

## 4.5 PS Domain Network Requirements

The PS domain shall support both transparent and non-transparent bearer services. Account shall be taken of the need for efficiency (e.g. over the air interface, potential use of header stripping/compression techniques) in the all IP network architecture.

The PS domain shall support simultaneous realtime multimedia services and non-realtime packet services.

Editor's note: the relationship to existing solutions (e.g. in GRPS) needs to be identified

In defining PS domain requirements, alignment with multimedia developments in the wired networks should be taken into consideration, including the provision of Voice over IP, making use of the same definitions and approaches wherever possible.

In many cases, the PS domain will need to interwork with ~~CS domain~~ circuit switched domain, PSTN and the ISDN. These interworking requirements (including end to end quality of service issues) should be identified.

Editor's note: reference to 22.060 for existing bearer service requirements, are they sufficient?

A single call control protocol for the PS domain is recommended.

## 4.6 High level service requirements

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

The following high level service requirements need to be incorporated for successful deployment of services based on an all-IP network. These should be considered when identifying more specific requirements.

All-IP networks shall:-

1. In general, provide backwards compatibility with the services offered by the Release 99 standard (including teleservices, supplementary services, and operator specific services)
  - a) The "C" relationship in Figure 5 should provide sufficient capabilities to allow a Service Provider to develop and implement Release 99 services that would be transparent to the end user. However, 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 existing Release 99 services need to be supported in the PS domain (see Annex A). Some exceptions may exist, as identified in the provided feature list. A minimum set of PS domain service capabilities should be defined to enable roaming.

Editor's note: DeWayne Sennet (AWS) to provide rephrasing of above text

~~Editor's note: need reference to feature list...~~

- c) To enable service compatibility and access independence, it shall be possible to implement mainstream IP based multimedia (supplementary) services to be compatible with the same services when used via other types of accesses, e.g. via fixed lines (see Annex A).

~~Editor's note: need reference to feature list...~~

2. Enable provision of services with the same (or greater) quality of service as circuit switched services.
  - a) It shall be possible to offer services over an All-IP network with a quality of service that is no less than that already experienced by users of existing circuit switched networks.

~~Editor's note: look at replacing term "customer" with "user"...~~

- b) The enabling mechanisms (transport technology, etc.) should be transparent to the ~~customer~~user.
- c) The All IP network shall have the ability to provide, on an end to end basis, when interworking with other All IP networks, other access networks (e.g. non-All IP), PLMNs or PSTNs, a Quality of Voice at least as good as that achieved by the Release 2000 circuit-switched (e.g. AMR codec based) wireless systems.

Editor's note: need to rework phrasing of above...

Editor's note: will need to separate these requirements in the feature list...

3. Shall provide the same (or greater) degree of privacy, security, and authentication as Release 2000 circuit switched services
4. Support roaming between All-IP networks and non-All-IP networks. The specific roaming scenarios required are identified in the feature list.

Editor's note: will need to elaborate roaming, handover and cell reselection...

Editor's note: will need to elaborate this in the feature list...

5. Support the possibility to offer a set of Release 99 services to Release 99 terminals

Editor's note: text to be provided by Tomas Ahnberg (Telia)

## 5 Applicability of existing toolkits

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

### 5.1 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 should 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 should be maintained.

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

Operators shall be able to re-use their existing CAMEL services in the All IP network (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 the packet switched and circuit switched domains in a seamless fashion.

Editor's note: CAMEL/multimedia interaction needs to be considered...

### 5.2 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 will require that it shall be possible for applications, service logic and content downloaded in Release 99, shall 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.

Editor's note: MExE/multimedia interaction needs to be considered...

## 5.3 SAT

Editor's note: input awaited...

## 5.4 VHE/OSA/??????????????????

Editor's note: input awaited from Tomas Ahnberg (Telia)

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# 6 New service capabilities and end user benefits

~~Editor's note: To be provided: introductory text explaining how Release 99 services may be provided in a Release 2000 environment using (possibly new and improved) toolkit enabling mechanisms instead of the traditional MSC based approach. (Mark)~~

By analysing and categorising existing circuit switched domain services, this clause concludes that these services shall not be re-standardised in the PS domain. This results in a basic set of services which must be available in the PS domain, with the remaining services offered in the PS domain in non-standardised ways using the service capabilities.

This clause:-

1. groups the main circuit switched domain supplementary services into several main categories of services
2. analyses each main category of services
3. identifies which services can be provided in a non-standardised way by the CAMEL, MExE and SAT toolkits
4. identifies which services (such as authentication, CAMEL call triggers etc.) which will require to be standardised

In conclusion only a minimum set of services requires to be standardised in the PS domain, 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.

Editor's note: further contributions/comments/analysis welcomed...

## 6.1 Main categories of services

An analysis of the broad classes of existing services results in the following list of example categories:

- Basic Call
- Call Barring (includes advice of charge, prepaid)
- Call Diversion
- Call Manipulation (Call hold, transfer etc)
- Addressing (includes number translation, number portability, emergency call)

This is not a complete list of supplementary services, which is elaborated in the feature list. The above categories are further elaborated below and are then mapped into service classes.

### 6.2+ Basic Call

This category of services provides the ability to make voice, emergency and data calls to other terminals, even when roaming. This includes interworking with existing voice and data networks for both fixed and mobile users, addressed using the standard E.164 phone numbers. This category of services must also include capabilities for Mobile Number



Portability and Lawful Interception (voice and data). Implicitly, Tandem Free Operation is also included. This list is not exhaustive.

Editor's note: further clarification required, and application to the roaming case need to be clarified.

## 6.32 Call Barring

This category of services performs two basic functions ~~which both relate to cost control~~:

- restricting the user to subscribed services (e.g. no roaming, no long distance, session barring, bearer barring, QoS etc.)
- subscriber cost control

~~Tremendous growth of pre-paid service in the GSM marketplace have taken place recently. One of the reasons for its success is the transparent cost control aspect, which is useful to users, subscribers and network operators. The benefits of cash flow, no need for offline billing statements, settlement etc. helps both parties. As GPRS is deployed and 3<sup>rd</sup>-party services are offered, it can be expected that prepaid accounts will handle more than just basic voice services, but data transport and service transactions too. Service providers will be keen to ensure that all services are available to any user provided they have the means to fund it. Whether the risk of default of payment is underwritten by the subscriber's bank, the service provider or another party is perhaps more of what's at stake here.~~

~~Therefore~~ the requirements for call barring are oriented less at limiting those teleservices which a subscribed is subscribed to, and more at simple filtering of defining which services are made available to users (by defining their menu options on the terminal) and blocking of specific teleservices to number ranges.

Specifying which services are available to users can be done through WAP, MExE, SAT and CAMEL toolkits. Outbound call barring for teleservices can be implemented using SIM Toolkit based on the number dialled, serving network (e.g. CAMEL), and MExE applications (e.g. MExE services, WAP WTA applications etc.). Therefore, by using service capabilities there is no requirement for a specific call barring service ~~other than the capabilities offered by the initial authentication/access control and the toolkits offered~~ to be standardised in Release 2000.

## 6.43 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 3<sup>rd</sup> party).

~~Therefore the advice of charge may originate from the (mostly IN-based) pre-pay system and delivered to the user by various means. A method of displaying the received charging information to the user could be WAP/MExE, which may typically use WAP/MExE to present the information to the user.~~

## 6.54 Call Diversion

This category of services include immediate call diversion, call diversion on no reply, call diversion on not reachable, call diversion on busy and call completion to busy subscriber.

~~The growth of unified messaging services to replace simple voicemail services is already commencing in networks, with most of the current voicemail suppliers presenting long term unified messaging solutions based on an evolution of their existing voicemail platforms. These effectively operate as service nodes, to which all traffic is initially directed, and then filtered (e.g., messages taken), converted (e.g., email to voice etc), or routed onward to the users' terminal. An alternative solution would be to allow all calls to be directed to the terminal and for it to filter inbound calls based on known preferences (e.g. caller ID, location etc), and invoking diversion as appropriate. This is currently implemented in some vendors' terminals to allow, for example, diversion of all business callers when out-of-hours.~~

With terminals becoming more sophisticated, they should be capable of receiving alerts about incoming calls even when already engaged in a call, allowing terminals to signal how to process with the call. Therefore the requirement for call diversion features within the serving network is substantially reduced.

The features, ~~which would be needed~~ are required in the serving network (e.g. provided by CAMEL/HLR), are:

1. immediate call diversion
2. call diversion on no reply
3. 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

~~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), and the home network/serving network to handle call diversion when the terminal is unreachable (using HLR/CAMEL).~~

Therefore no basic call divert features other than those proposed above are required to be standardised (through HLR/CAMEL).

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 can also provide capability to offer call waiting, hold and transfer features. Which should be accessible through the MExE toolkit.

## 6.65 Conferencing

A solution for basic 3-way voice conferencing supported in the network is likely to be required, since this is the most likely service to be used with the greatest gains. Although, H.323 terminals (PCs) currently offer multimedia conferencing on the terminal, it requires one terminal to "anchor" the session and provide the mixing of sessions. A more sophisticated multimedia conferencing solution may be required, but this will be dependent on the codecs used etc. It may be more appropriate to provide this as a native IP service internal or external to the network.

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 service should allow multicast connections to be made outside of the cellular part of the core network.

## 6.76 Number Portability

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 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.

## 6.87 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.

## 6.98 Summary of required service primitives

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 which are available for access from the terminal, together with call handling for those cases where the terminal is offline or unreachable. These are:

1. Authentication (as per GSM/GPRS via SIM Card)
2. Basic Call (including implicit Mobile Number Portability, Lawful Intercept and Tandem Free Operation). Shall allow interworking as voice only call with legacy networks.

Editor's Note: need to restructure document to identify all the required services in one common subclause...

3. Internet Access (i.e., standard GPRS service)
4. Call Diversion Immediate Call Diversion on unreachable (i.e. when terminal does not respond to paging)
5. Call manipulation primitives from the terminal:
  - a) set-up outbound basic call
  - b) notify/accept/answer incoming call
  - c) hold
  - d) transfer
  - e) divert
6. Call triggers (CAMEL) to monitor and manipulate multimedia calls from the home network:
  - incoming call arrival (similar to CAMEL in ~~CS domain~~ circuit switched domain)

~~In addition to the HLR/CAMEL support in the serving network, the minimum terminal requirements to support these features include:~~ The PS domain shall use the following minimum service capabilities to build and support all other services:-

- HLR/CAMEL support in the serving network
- SIM Toolkit (minimum terminal requirement, Class FFS)
- MEExE Classmark 1 (minimum terminal requirement)

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## 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 2<sup>nd</sup> generation mobile communications systems to stay with their existing operator while moving into the 3<sup>rd</sup> 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 that any exception explicitly identified.

Note: To enable service continuation, the existing Release 99 supplementary services (refer to [7]) shall be supported also in Release 2000 for circuit services.

## 7.2 No new standardised supplementary services

Operators and service providers are expected to offer new (supplementary) services to their users. If those new services would be standardised then they would have to be implemented also in all visited networks, as the existing way of implementing these services have been by downloading profiles and/or CAMEL triggers to the visited network. This creates dependencies to the visited networks which makes it more difficult to deploy new services, especially operator specific ones. We have seen in GSM that this can take time which would lead to inflexibility and delays in service offerings.

To avoid such limitations the Release 99 principle of not adding more 3GPP standardised supplementary services shall be kept. Operator specific services shall instead be implemented using VHE service capabilities, as stated for Release 99.

New supplementary services shall, as a principle, not be standardised, but instead be implemented using VHE.

## 7.3 Service compatibility with mainstream IP based services

It is important that Release 2000 supports evolving main stream IP based 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 if the access is made via 3G networks or a fixed line.

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 main stream IP based services or with existing GSM standardised supplementary services, the service compatibility with main stream IP based services must be a first priority.

Editor's note: should it be an operator or customer choice to choose "classic" service compatibility? The above paragraph may require to be revisited

## 7.4 Support of Release 99 supplementary services in Multimedia ServicesPS Release 2000

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

This requirement allows the Release 99 services requirements to be fulfilled using the VHE service capabilities of Release 2000.

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# 8 Case study of realisation of some services

*e.g. CFU*

Editor's note: contributions invited

## 9 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 extensions to these standards.

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.

To promote access independence for IP based services Release 2000 shall support and follow main stream IP-based multimedia standards, such as H.323 and SIP. No mobile specific extensions to such standards shall be standardised by 3GPP. Where today's IP based standards have to be modified to suit the mobile environment of 3G, such modifications shall instead be done by enhancing those IP based standards themselves.

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## 10 Interoperability requirements

Editor's note: contribution expected from Telia

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## 11~~0~~ 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	Feb 9-11,2000	<ul style="list-style-type: none"> <li>• Work on TR22.976 so it is suitable for v1.0.0 at SA#7</li> <li>• Liase TR22.976 to S2#12.</li> </ul>
S1#8	April 10-14, 2000	<ul style="list-style-type: none"> <li>• Prepare TR22.976 for approval at SA#8</li> <li>• Liase TR22.976 to S2#13.</li> <li>• Work on of any new Stage 1's required so they are suitable for v1.0.0 at SA#8.</li> <li>• Produce initial CR's to the existing 22-series</li> </ul>
S1#9	July 17-21, 2000	<ul style="list-style-type: none"> <li>• Prepare any new Stage 1's for approval at SA#9.</li> <li>• Complete CR's to the 22-series.</li> </ul>
S1#10	November 13-17, 2000	<ul style="list-style-type: none"> <li>• Revise Stage 1's in line with feedback from other TSG's and WG's.</li> <li>• Begin TR on R2001.</li> </ul>

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

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

### Key to Table

E = Essential for release 00, launch of a commercial all-IP network is not viable with these missing or required in R00 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)

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

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

<u>Feature Name</u>	<u>Short description</u>	<u>R99</u>	<u>E R00</u>	<u>D R00</u>	<u>R01+</u>	<u>No</u>	<u>Comments/Notes</u>
<b><u>Facsimile service</u></b>							
<u>Store and forward</u>	<u>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.</u>						<u>Support of bearer service is, however, necessary to allow customised solutions to be implemented (based on T.37 and/or T.38).</u>
<u>End-to-end</u>	<u>End-to-end fax between a PSTN/ISDN fax machine and a mobile terminal.</u>						
<u>Services independence from transport technology</u>	<u>Possibility to operate in different transport environments (e.g. all IP or other different from IP)</u>						
<b><u>IP bearer services</u></b>							
<u>Point-to-Point</u>	<u>As in 22.060</u>			X			<u>No additional standardisation work required for S1</u>
<u>Point-to-Multipoint</u>	<u>PTM services such as PTM-Multicast, PTM Group Call, IP Multicast, IP Distribution Services (MDS)</u>						<u>Implementation of PTM services for example as defined within GPRS specifications</u>
<b><u>Asymmetric bearers</u></b>	<u>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)</u>			X			<u>No additional standardisation work required for S1</u>



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

<u>Feature Name</u>	<u>Short description</u>	<u>R99</u>	<u>E R00</u>	<u>D R00</u>	<u>R01+</u>	<u>No</u>	<u>Comments/Notes</u>
<u>Interworking with intranets (including VPNs)</u>	<u>VPN functionality (firewall bypass) shall be supported</u>						<u>May possibly be supported at the application layer.</u>
<b><u>Roaming</u></b>	<u>Editor's note: Roaming section not reviewed</u>						
<u>CS/PS GSM/UMTS R99 to R00 PS</u>							<u>(U)SIM and Multimode terminal Roaming.</u> <u>Roaming should be possible for both R99 and pre R99 GSM/GPRS networks.</u> <u>(Note: roaming to R00 CS is included but not within the scope)</u>
<u>R00 PS to GSM/GPRS</u>							<u>(U)SIM and Multimode terminal roaming.</u> <u>Roaming should be possible for both R99 and pre R99 GSM/GPRS networks.</u>
<u>ANSI-41 to R00 PS</u>							
<u>R00 PS to ANSI-41</u>							
<b><u>Handover</u></b>	<u>Editor's note: Handover section not reviewed</u>						
<u>Speech from PS Domain to CS-GSM /UMTS</u>							
<u>Speech from CS-GSM /UMTS to PS Domain</u>							
<u>Handover of parallel sessions/calls (with different QoS)</u>							
<u>Multimedia handover between R00 UTRAN and GERAN</u>							<u>To include real-time services in addition to R99 "best effort"</u>

<u>Feature Name</u>	<u>Short description</u>	<u>R99</u>	<u>E R00</u>	<u>D R00</u>	<u>R01+</u>	<u>No</u>	<u>Comments/Notes</u>
<u>Multimedia services to/from alternative access technologies (e.g. HIPERLAN/2)</u>							<u>Alternative access technologies to include HIPERLAN/2</u>
<b><u>Supplementary Services (PS Domain)</u></b>							<p><u>IP Multimedia / IP Telephony aware supplementary services to be considered only from end-user need view point. (Standardization, service capabilities and implementation FFS).</u></p> <p><u>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).</u></p> <p><u>The H.450 standards defines supplementary services for H.323, and SIP provides tools to build supplementary services.</u></p>
<u>Multimedia Call Barring</u>	<u>Enables mobile subscriber to have barring of certain categories of outgoing multimedia calls.</u>						<u>Also includes incoming multimedia calls and barring when roaming.</u>
<u>Network Barring</u>	<u>Editor's note: Description and justification to be supplied by Horst Rauch (T-Mobil)</u>						<u>FFS</u>
<u>Session Barring</u>	<u>Editor's note: Description and justification to be supplied by Horst Rauch (T-Mobil)</u>						<u>FFS</u>
<u>Bearer Barring</u>	<u>Editor's note: Description and justification to be supplied by Horst Rauch (T-Mobil)</u>						<u>FFS. Might be based on the QoS parameters.</u>

<u>Feature Name</u>	<u>Short description</u>	<u>R99</u>	<u>E R00</u>	<u>D R00</u>	<u>R01+</u>	<u>No</u>	<u>Comments/Notes</u>
<u>Multimedia Call Forwarding</u>	<u>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.</u>						<u>Conditions require to be evaluated.</u>
<u>Multimedia Call Transfer</u>	<u>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.</u>						
<u>Multimedia Call Deflection Service</u>	<u>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.</u>						
<u>Multimedia Call Holding</u>	<u>Allows served mobile subscriber to interrupt communication on an existing active multimedia call and then subsequently re-establish communication</u>						
<u>Multimedia Call Waiting</u>	<u>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.</u>						
<u>Advice of Charge</u>	<u>Supply user sufficient information to allow real-time estimate of the call charge.</u>						
<u>Caller Identification and restriction</u>	<u>Similar to CLIP, CLIR, CNAP and CNAR.</u>  <u>Editor's note: add to abbreviations</u>						<u>Could include additional IP related information such as IP address.</u>  <u>Need to support European, FCC and other regulatory requirements.</u>

<u>Feature Name</u>	<u>Short description</u>	<u>R99</u>	<u>E R00</u>	<u>D R00</u>	<u>R01+</u>	<u>No</u>	<u>Comments/Notes</u>
<u>Connected Line Identification and restriction</u>	<p>Similar to COLP and COLR</p> <p>Editor's note: add to abbreviations</p>						<p>Could include additional IP related information such as IP address.</p> <p>Need to support European, FCC and other regulatory requirements.</p>
<u>Multimedia conferencing</u>	Similar to Multiparty but is applicable to multimedia calls.						
<u>Multimedia call-back when free / CCBS</u>	Editor's note: definition required in the MM case						
<u>Closed user group (CUG) / community of interest</u>	Editor's note: definition required in the MM case						
<u>Precedence and Pre-emption service</u>	Editor's note: definition required in the MM case						
<b><u>Network Services</u></b>							
<u>Operator Determined Barring (ODB)</u>	<p>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.</p>						
<u>CAMEL Support for Multimedia Services</u>	Provides mechanisms to support multimedia services consistently & independently of the serving network.						<p>CAMEL enhancements, but additionally needs to support multimedia calls. Implementation is FFS.</p> <p>Editor's note: DeWayne Sennet (AWS) to WIN support proposal</p>

<u>Feature Name</u>	<u>Short description</u>	<u>R99</u>	<u>E R00</u>	<u>D R00</u>	<u>R01+</u>	<u>No</u>	<u>Comments/Notes</u>
<u>(U)SIM Toolkit</u>	<u>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.</u>						
<u>OSA for new elements</u>	<u>Provision of an API for controlled, secure and accountable access to multimedia service capability features by applications, based on the user profile</u>						<u>E.g. H.323/SIP CSCF.</u>
<u>LCS for GPRS/PS domain</u>	<u>Support of LCS on the PS domain required to meet regulatory and commercial requirements (e.g., 3GPP 22.071)</u>						<u>Exact work required is for FFS.</u> <u>Need to support European, FCC and other regulatory requirements.</u>
<u>SoLSA</u>	<u>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).</u>						
<u>Lawful Surveillance / Intercept</u>							<u>Need to support European, FCC and other regulatory requirements.</u>
<u>Number Portability</u>	<u>Ability for subscriber to change service providers while retaining the original directory number. Includes mobile to mobile, mobile to landline, &amp; landline to mobile number portability scenarios.</u>						<u>Need to support European, FCC and other regulatory requirements.</u>
<u>Mobile Station Application Execution Environment (MExE)</u>	<u>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.</u>						

<u>Feature Name</u>	<u>Short description</u>	<u>R99</u>	<u>E R00</u>	<u>D R00</u>	<u>R01+</u>	<u>No</u>	<u>Comments/Notes</u>
<u>Personalization of Mobile Equipment (ME)</u>	<u>Storage of information in the ME which limits the SIMs which will operate with the ME.</u>	X					<u>No standardisation work required for R99</u>
<u>Advanced Addressing</u>	<u>Support of symbolic and advanced addressing</u>						<u>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.</u>
<u>System Selection</u>	<u>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.</u>						<u>Similar to ANSI-136 Intelligent Roaming.</u>
<u>Over-the-Air Service Provisioning</u>	<u>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.</u>						<u>Similar to ANSI-136 OTASP and OTAPA.</u>
<b><u>Charging</u></b>							
<u>Implementation of on-line charging mechanisms for the support of Pre-paid services</u>	<u>Definition of charging mechanisms for the support of IP multimedia pre-paid services</u>						
<u>Event/transaction based charging mechanisms (e.g. content based)</u>	<u>Definition of charging mechanisms for the provisioning of IP based Value Added Services</u>						

<u>Feature Name</u>	<u>Short description</u>	<u>R99</u>	<u>E R00</u>	<u>D R00</u>	<u>R01+</u>	<u>No</u>	<u>Comments/Notes</u>
	<u>Charging aspects – need to charge for each PDP context (PS sessions) independently</u>						



## History

<b>Document history</b>		
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