

# 3G TS 22.121 1.2.0 (1999-04)

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*Technical Specification*

**3rd Generation Partnership Project;  
Technical Specification Group Services and System Aspects  
Service aspects;  
The Virtual Home Environment  
(3G TS 22.121 version 1.2.0)**

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Reference

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DTS/TSGS-0122121U

Keywords

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<keyword[, keyword]>

**3GPP**

Postal address

3GPP support office address

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650 Route des Lucioles - Sophia Antipolis  
Valbonne - FRANCE  
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

---

<http://www.3gpp.org>

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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 document specifies the content of the stage one requirement for realisation of VHE.

This Technical Specification defines the stage one description of the Virtual Home Environment (VHE). Stage one is an overall service description, primarily from the point of view of the User in her Home Environment.

Virtual Home Environment (VHE) is defined as a concept for personalised service portability across network boundaries and between terminals. The concept of the VHE is such that users are consistently presented with the same personalised features, User Interface customisation and services in whatever network and whatever terminal (within the capabilities of the terminal and the network), wherever the user may be located.

Requirements not applicable for R99 will be explicitly indicated.

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# 2 References

References may be made to:

- a) Specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) All versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) All versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) Publications without mention of a specific version, in which case 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.

## 2.1 Normative references

- [1] GSM 01.04 (ETR 350): "Digital cellular telecommunication system (Phase 2+); Abbreviations
- [2] GSM 02.57: "Digital cellular telecommunication system (Phase 2+); Mobile Station Application Execution Environment (MExE); Service description"
- [3] GSM 02.78: "Digital cellular telecommunication system (Phase 2+); Customised Applications for Mobile network Enhanced Logic (CAMEL); Service definition - Stage 1"
- [4] 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"
- [5] UMTS TS 22.01: "Universal Mobile Telecommunications System (UMTS): Service Aspects; Service Principles"
- [6] UMTS TS 22.05: "Universal Mobile Telecommunications System (UMTS); Services and Service
- [7] ITU-T Recommendation Q.1701, Framework for IMT-2000 networks
- [8] ITU-T Recommendation Q.1711, Network Functional Model for IMT-2000
- [9] UMTS TS 22.00 UMTS phase 1

## 2.2 Informative references

- [1] UMTS TR 22.70: "Universal Mobile Telecommunications System (UMTS); Virtual Home
- [2] World Wide Web Consortium Composite Capability/Preference Profiles (CC/PP): A user side framework for content negotiation ([www.w3.org](http://www.w3.org))

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of this TS, the following definitions apply:

**HE-VASP:** Home Environment Value Added Service Provided. This is a VASP that has an agreement with the Home Environment to provide services.

**Local Service:** A service exclusively provided in the current serving network by a Value added Service Provider.

**Service Capabilities:** Bearers defined by QoS parameters and/or mechanisms needed to realise services.

**Service Capabilities Server:** Network functionality providing open interfaces towards the functionality offered by UMTS service capabilities. Reflect the service capabilities in UMTS phase 1 i.e access to bearers, CAMEL, MeXe and SIM Application Toolkit.

**Service Capability Feature:** Functionality offered by a service capability that is accessible via open standardised interfaces.

**Service Feature:** Functionality that a UMTS system shall offer to enable provision of services.

Services are made up of different service features.

**Service Personalisation:** Modification and behaviour that may involve the service feature or data of a service, within the limitations set by the provider of the service.

**Personal Service Environment:**

**Home Environment:** responsible for overall provision of services to users

**User Interface Personalisation:** Modification of the user interface within the capabilities of the terminal and serving network.

**Value Added Service Provider:** provides services other than basic telecommunications service for which additional charges may be incurred.

**Virtual Home Environment:** A concept for personalised service portability across network boundaries and between terminals.

Further UMTS related definitions are given in UMTS TS 22.01.

### 3.2 Abbreviations

For the purposes of this TS the following abbreviations apply:

API	Application Programming Interface
CAMEL	Customised Application For Mobile Network Enhanced Logic
CORBA	Common Object Request Broker Architecture
FFS	For Further Study
IN	Intelligent Network
ME	Mobile Equipment

MExE	Mobile Station (Application) Execution Environment
MMI	Man Machine Interface
MS	Mobile Station
MSC	Mobile Switching Centre
HLR	Home Location Register
GSN	GPRS Support Nodes
SSF	Service Switching Function
SCS	Service Capability Servers
PLMN	Public Land Mobile Network
HE	Home Environment
SAT	SIM Application Tool-Kit
SIM	Subscriber Identity Module
SMS	Short Message Service
USIM	User Service Identity Module
USSD	Unstructured Supplementary Service Data
VASP	Value Added Service Provider
VHE	Virtual Home Environment
CAP	Camel Application Part
MAP	Mobile Application Part
CSE	Camel Service Environment
OSA	Open Service Architecture

Further GSM related abbreviations are given in GSM 01.04. Further UMTS related abbreviations are given in UMTS TS 22.01.

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## 4 General description of the VHE

Virtual Home Environment (VHE) is defined as a concept for personalised service portability across network boundaries and between terminals. The concept of the VHE is such that users are consistently presented with the same personalised features, User Interface customisation and services in whatever network and whatever terminal (within the capabilities of the terminal and network), where ever the user may be located.

The full scope of VHE might not be supported within release 99. Requirements not applicable for R99 will be explicitly indicated.

Roles and components involved in realisation of VHE consist of the following also see fig 1:

- Home Environment
- One or more unique Identifiers
- One User
- One or more terminals (simultaneous activation of terminal providing the same service is not allowed)
- One or more Serving Network Operator
- One Subscription
- Possibly one or more Value added service providers.

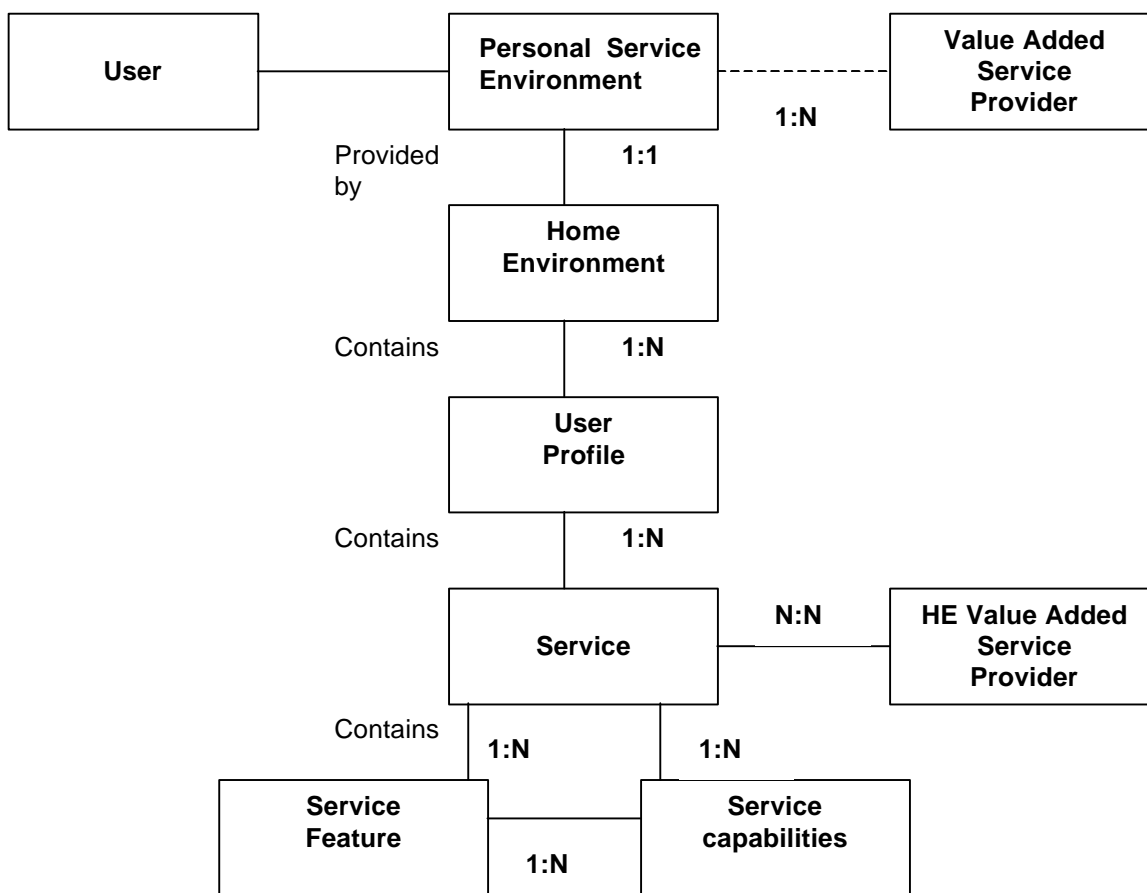


Fig 1: Role of Components involved in Realisation of VHE

The Home Environment is responsible for providing services to the user in a consistent manner. The user may have a number of user profiles which enable her to manage communications according to different situations or needs, for example being at work, in the car or at home. The User's personal service environment is a combination of services and profiles (which contain personalisation information). The Home Environment provides services to the user in a managed way, possibly by collaborating with HE-VASPs, but this is transparent to the user. The same service could be provided by more than one HE-VASP and HE-VASP can provide more than one service.

Additionally, but not subject to standardisation, the user may access services directly from Value Added Service Providers. Services obtained directly from VASPs are not managed by the Home Environment. A mechanism may be provided which allows the user to automate access to those services obtained directly from VASPs and personalise those services. However such a mechanism is outside of the scope of this specification.

The key requirements of the VHE are to provide a user with a personal service environment which consist of:

- Personalised services;
- Personalised User Interface (within the capabilities of terminals);
- Consistent set of services from the user's perspective irrespective of access e.g. (fixed, mobile, wireless etc. Global service availability when roaming)

The standards supporting VHE requirements should be flexible enough such that VHE can be applicable to all types of future networks as well as providing a framework for the evolution of existing networks. Additionally the standards should have global significance so that user's can avail of their services irrespective of their geographical location. This implies that VHE standards should:

- provide a common framework for accessing services in future networks;
- represent a common development for all types of network (i.e. not form part of a specific network development);
- be supported by future networks.



- Enable the creation of services,

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## 5 Framework for Services

This framework for services will provide the scope for the users to personalise to some degree the way in which services operate.

VHE in release 99 shall support both GSM phase 2+ release 99 teleservices, bearer services and supplementary services as applied in TS 22.00 and new services built by service capabilities.

The goal of standardisation in UMTS with respect to services is to provide a framework within which services can be created based on standardised service capabilities. UMTS services will generally not rely on the traditional detailed service engineering (evident for supplementary services in second-generation systems), but instead provides services using generic toolkits.

Services are realised based on a number of service features or service capabilities features [2.1 [2],[3],[4],[9], [10]]. Service features in turn are realised based on service capabilities features, with standardised interfaces between them (see figure 2). Figure 2 does not impose specific implementation techniques of the interfaces shown.

Service Features are not required in release 99.

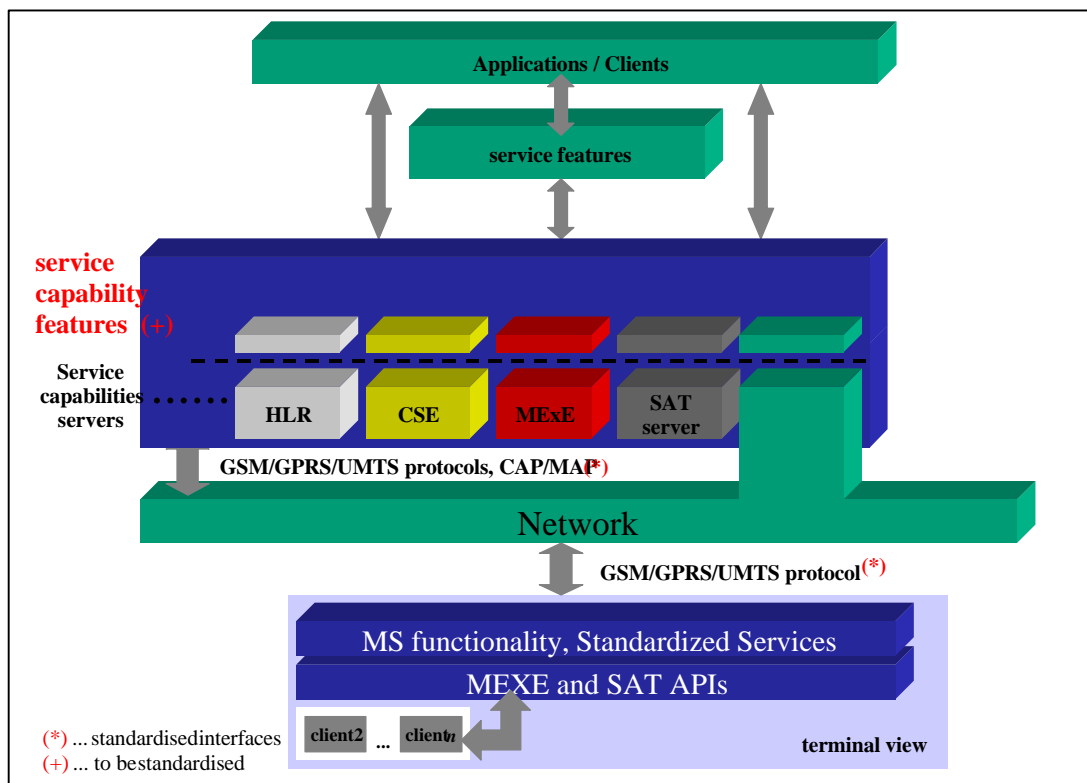
VHE enables the creation of services by providing access to service features and service capabilities features by means of standardised interfaces. Personalisation of services and user interface will be supported across network and terminal boundaries by providing the services to users with the same “look and feel” irrespective of the network type and within the limitations of the network and terminal.

In addition to services implemented on top of service capabilities (OSS), a generic interface towards the service capabilities shall be provided.

The generic interface shall be:

- Independent of vendor specific solutions,
- Independent of the location where service capabilities are implemented,
- independent of supported server capabilities in the network and,
- independent of programming languages of service capabilities.

In addition to that, the same kind of service capability features shall be made visible by a single, generic interface. The generic interfaces in the VHE concept is encapsulated and made visible through the Service Capability Features. The interface between Service Capability Features and the Service Capabilities could be implemented using a middleware layer. Further studies are requested in this area.



Applications / Clients:

These are services, which make use of generic interface by the service capability features.

Service Capability Features:

Text as proposed in chapter 12.

Service Features:

Service Features provides sets of service capability features. Such sets – especially in the area of call handling - may serve as building blocks for more complex applications provided by third parties.

The above idea should be used to improve Service Features descriptions.

It is assumed to refer to service capabilities as CSE, HLR, MExE, SAT server and network entities. The latter in the list needs more considerations for the forthcoming meetings.

The figure 2.0 above shows the different possibilities to implement services as existed in a GSM network and proposed for a UMTS network.

**Guidance on the implementation of services:**

**STANDARDISED SERVICES** (Supplementary Services, Tele-Services, etc.) are implemented on existing GSM/UMTS entities (e.g. HLR , MSC/VLR and terminal) on a vendor specific basis, using standardised interfaces (MAP, etc.) for service communication (e.g. downloading of service data). Availability and maintenance of these Services is also vendor dependent.

**OPERATOR SPECIFIC SERVICES** (OSS) are not standardised and could be implemented at the GSM/UMTS entities (e.g. HLR) on a vendor specific basis or using GSM ph 2+ mechanisms (CAMEL, SAT, MExE). These tool-kits use standardised interfaces to the underlying network (CAP, MAP) or use GSM Bearers to transport applications and data from the MExE/SAT server to the MS/SIM. The implementation of these operator specific services on the different platforms (CSE, MExE/SAT Server, MSs) is done in a completely vendor specific way and uses only proprietary interfaces.

Other **APPLICATIONS** are like OSS not standardised. These applications will be implemented using standardised interfaces to the Service Capabilities (Bearers, Mechanisms). The functionality offered by the different Service Capabilities will be defined by a set of so-called Service Capability Features. This set will be standardised and can be used by the application designers to build their applications.

Within the terminals Service Capabilities are accessible via the existing MExE and SAT APIs, i.e. there will be no service capability features and thus no service features within the terminal. The terminal can communicate, using GSM/UMTS bearers, with applications in the network via the service capability features defined for MExE- and SAT-servers.

The implementation of the Service Capability Features on the different Service Capabilities is still manufacturer specific, i.e. each manufacturer has to implement the functionalities of these standardised interfaces (Service Capability Features) on his platform.

Service Features offer high level functionality via standardised interfaces by combining individual Service Capability Features. Service Features are fully based upon Service Capability Features themselves.

This would leave it to the application designers to use either the Service Features to build their applications or base them directly on the Service Capability Features.

NOTE: Within the Open Service Architecture Work Item it is assumed to apply open standardised interfaces to GSM/Bearer, MExE and SAT Servers although these servers are not yet defined. These parts of the above figure are indicated as grey squares and arrows (Further clarifications requested)

## 6 Open Service Architecture (OSA)

The objective to invent open service architecture is to allow secure access to core and advanced capabilities embedded in the UMTS network.

From a service designer point of view, the most important goal to be achieved is to provide a generic interface to the network as described in sub-clause “chapter 5”

Access to these Features and Capability Features shall be realised using distributed object oriented access technologies.

The access to Features and Capability Features shall be independent of vendors technology used. It shall be secure, scaleable and extensible.

### Model for Implementation of Open Interfaces (APIs)

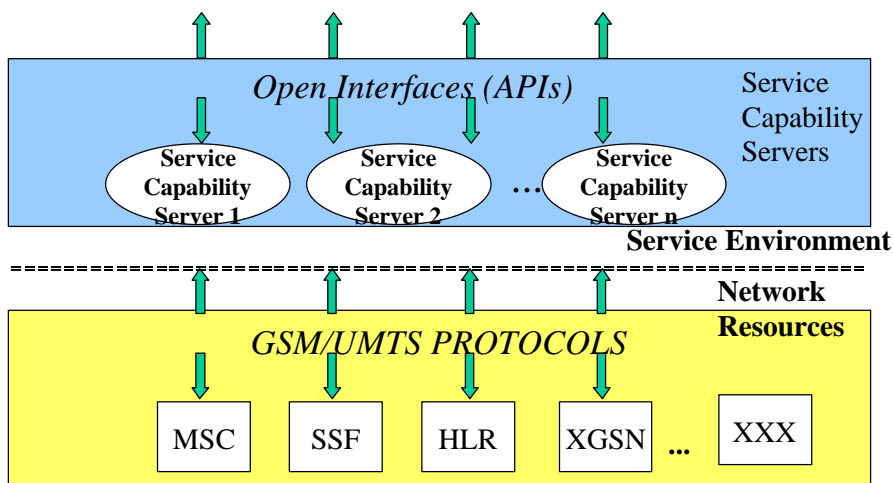


Fig 4.0 Open Service Architecture principle (to be redrafted)

## 6.1 Service Capability Servers

The Service Capability Servers reflect the service capabilities in UMTS phase1, i.e. access to bearers, call control, mobility management, tele services or supplementary services. CAMEL-, MExE- and SIM-Toolkit-capabilities may also be accessed. The functionality of these can further be subdivided into server components.

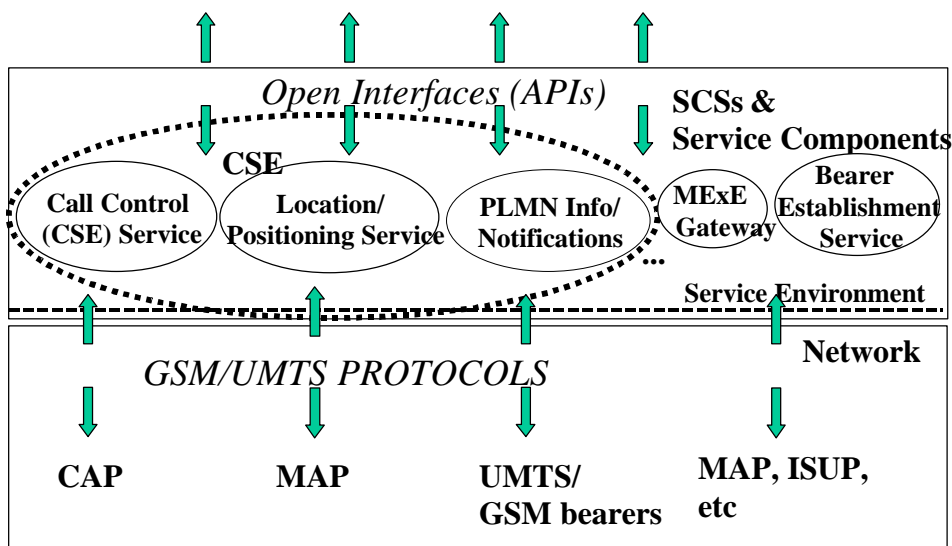


Fig. 5.0 UMTS service capabilities (to be redrafted)

A service capability server consists of one or several service components. Taking CAMEL Services as an example, the service components could be Call and session Control, Location/Positioning, PLMN Information & Notifications.

The same kind of capability of service components implemented in one or several service components is encapsulated and made visible using a service capability feature.

Access to service capability features is implemented independent of technologies and defined by standardised interface.

Service capability Features will have access to service components over non-standardised, platform dependent procedures.

The communication between service components and the core network is implemented by using GSM/UMTS protocols.

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## 7 User Requirements of VHE

The user shall have the possibility to manage services as well as the appearance of the services. It shall be possible for the user to:

- Personalise services.
- Personalised User Interface (within the capabilities of terminals)
- Access services from any network or terminal subject to network capabilities, terminal capabilities and any restrictions imposed by the home environment.
- Use services in a consistent manner irrespective of serving network and terminal, within the technical limitations.

- Access new services in the Home Environment.
- Modify a user profile(for example to include new services) from any location
- Activate or deactivate user services.
- Discover which local services are available
- Access local services in a secure manner.
- Interrogate current service settings

Be aware of limitations of services, which may result from different terminals and or serving network capabilities.

## 7.1 User Profiles

This section describes the function of the user profile and lists some typical profile information. For a definition of the user profile see UMTS 22.01 [5].

The function of the profile is to define the personal service environment for a user in terms of their general service preferences, user terminal interface preferences, location specific preferences and any other parameters that are important to that user. A user may choose to have more than a single profile according to her needs. A user could have a profile specifically for business use, one for personal use, a family profile and so on. The user can explicitly choose a profile to use or applications may be provided that allow automatic selection of appropriate profile based upon the time of day, location, the CLI of an incoming call or whole range of other options. Each profile associated with the user must have an identity, this requirement relates to the need to identify and link profiles but also with the need to associate charges with different profiles.

Each profile could consist of a set of sub-profiles as follows:-

- Identification of subscribed services

e.g. list of subscribed services etc.

- Service personalisation

generic application personalisation is stored as part of the user profile menu settings, icons, additional menu items, phone setting etc.. Other personalisation of a specific application shall be stored as part of the service itself.

- User Interface personalisation

e.g. language, screen colour etc.

The information available in the user profile enables the service capabilities SAT, MExE and CAMEL toolkits in R99 and existing GSM services to support the user's virtual home environment across network boundaries and different terminals. It is through the user profile that the user has access to personalised services and user interface across a virtual home environment.

It shall be possible for the service capabilities to access the user profile information from the home environment.

### 7.1.1 Management of the user profile

The user is able to set up or receive calls/connections associated with different user profiles simultaneously by activating a user profile (with each user profile being associated with at least one unique address).

The user and the home environment may modify the user's characterisation of the VHE in the user profile at any time, and changes affected at the earliest possible opportunity.

The user profile maybe stored in the MS (the SIM or the ME), and/or the home environment.

The home environment shall be able to update the user profile to reflect any user or home environment modification of

the user's VHE.

Some aspects of the user profile must be stored in a standardised format to support VHE. A possible format for the definition of the user profile is the Composite Capability/Preference Profile being drafted by the World Wide Web Consortium (W3C) [2], and will be fully identified by the VHE stage 2.

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## 8 Home Environment Requirements on VHE

It shall be possible for the home environment to:

- Control access to services depending on the location of the user, and serving network.
- Control access to services on a per user basis.
- Control access to services depending on available service capabilities in the serving network, and terminals
- Manage service delivery based on for example end to end capabilities and/or user preferences
- Request version of specific services supported in serving network and terminal
- Request details (e.g. protocol versions and API versions) of available service capabilities supported in the serving network, and terminals.
- Define the scope for management of services by the user, for services provided by the HE.
- Handle charging for services (as defined in clause 11)
- Deploy services to users or groups of users
- Manage provision of services to users or groups of users

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## 9 Requirements of the Serving Network to Support the VHE

The serving network should not need to be aware of the services offered via the home environment.

The user/home environment may request capabilities, which are necessary to support, home environment services.

It shall be possible for the serving network to perform the following:

- The serving network shall support user access to services in the home environment;
- The serving network shall provide the necessary service capabilities to support the services from the home environment as far as possible;
- Dynamically provide information on the available service capabilities in the serving network;
- Provide transparent communication between clients and servers in terminals and networks;

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## 10 VASP Requirements on VHE

The user may access services directly from Value Added Service Providers. Services obtained directly from VASPs are not managed by the Home Environment and therefore are not part of the VHE offered by the Home Environment. A mechanism should be provided which allows the user to automate access to those services obtained directly from VASPs and personalise those services. However such a mechanism is outside of the scope of this specification.

VASPs, which are not HE-VASPs, do not generate requirements for VHE.

There may be some information, which is shared between the Home Environment and the HE-VASP (for example

current capabilities).

The Home Environment may grant the HE-VASP access to standardised service capabilities in order to allow the development and deployment of services on behalf of the Home Environment.

There are no VASP requirements on VHE.

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## 11 Service Capability Features

Services Capability Features are open, technology independent and extensible interface. This interface shall be applicable for a number of different business and applications domains (including beside the telecommunication network operators also service provider, third party service providers, etc.).

All of these businesses have different requirements, ranging from simple telephony and call routing, virtual private networks, fully interactive multimedia and using MS based applications.

This interface shall provide an secure and open access to service capabilities (e.g. CSE, MExE, etc) of the underlying UMTS network.

It is proposed that two categories of access should be defined:

- Service interfaces, which offers the applications the access to a range of network capabilities.
- Framework interface, shall be commonly used providing "surround" capabilities necessary for the Service interfaces to be open, secure, resilient and manageable.

### 11.1 Framework interface

These Service capability Features offered by this interface will be used e.g. for authentication, registration, notification, etc..

Other commonly used service capabilities has to be defined (FFS).

#### 11.1.1 Authentication

This capability shall provide the authentication of a application by the network. i.e. before any application can interact with the network a service agreement will have to be established or an existing agreement will need modification or indeed termination if it is superseded.

Once an application has been authorised to use one, more or all service capability features, no further authorisation is required as long as the "allowed" service capability features are used.

#### 11.1.2 Registration

This capability deals with the registration of functionality that a services provides. After the registration of functionality of a service this functionally could be used by authenticated applications.

#### 11.1.3 Notification

This capability provide the functionality to the applications to enable, disable and receive notifications of service related events that have occurred in the underlying UMTS network, e.g. indication that a new call is set-up or a message is received.

A Notification is defined as an event which occurs in the UMTS network. It is monitored by the Notification Capability and reported to the application / client.

### 11.1.5 FFS

There might be other capability, e.g. for charging and billing of services, for logging or fault management. This is currently for further study.

## 11.2 Service interface

These service capability features provide the application the access to network capabilities. The set of service capabilities features will be defined in such a generic way to hide the network specific or Service components specific implementation.

To provide such a generic interface it is necessary to identify the specific functionality offered by the different service component and to generalise functionality which is offered by more then one server component e.g. Call control, messaging services etc.

In the following sections it is proposed to define such generic service capabilities e.g. for call control, messaging services etc. and to show how this generic functionality could be mapped to the specific server components

### 11.2.1 Call Control Service

This section details the requirements for the service capabilities for the Call Control service which will be used by the applications. The Call Control service capabilities shall offer the functionality to establish, maintain, modify and release calls.

To define the necessary service capabilities it is proposed to use a generic a call model (including also the call leg handling).

The following call control service capabilities were identified:

- Create call
- release call
- route call to destination
- establish new call leg
- release call leg
- attached call leg
- detach call leg
- request call status information
- define call duration
- supervise call

The mapping to service capabilities server components is for further study. (It shall be investigated to which extend the requirements above fit to CAMEL, MEXE and other service capabilities.)

The sections below are deleted due to the description shall follow the above one. It is not intended to delete the content, but to seek for a more generic description model.

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## 12 Service Features

The purpose of service features is to provide a service capability independent set of functionality which can be used by application developers to create services.



The service features are not required in release 99.

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## 13 VHE execution environment

The following service execution environments shall be standardised and could be used to provide a VHE for the user:

- User equipment execution environment
  
- IC card execution environment
  
- Network execution environment not required for R99

For UMTS release 99 the execution environments shall be provided by one or more of the following:

- MExE
  
- SIM Application Tool kit (SAT)
  
- CAMEL

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## 14 Charging requirements

Services, which are provided as part of the VHE, may be subject to charge at the discretion of the home environment

There are several forms of charging which shall be available to the home environment. It shall be possible for the home environment to charge in the following instances:-

- Subscription;  
the user's registration to use services may be subject to charge;
  
- Service transfer;  
the transfer of services and/or information to the user MS or USIM may be subject to charge;
  
- Service upgrading;  
the upgrading of previously transferred services to the user's MS or USIM may be subject to charge (automated upgrading of services may be subject to a different charge);
  
- Service usage;  
the usage of services by a user may be subject to a charge;
  
- Roaming  
the usage of VHE services when roaming may be subject to additional charges;

Refer to UMTS 22.15 for further details.

Other charging requirements may be identified and are for FFS.

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## 15 Security requirements

The mechanisms supporting VHE shall maintain a secure environment for the user and home environment.

The specific security requirements are FFS.

## Annex A (Informative)

The following table shows the service examples to be considered in VHE

Benchmark Services	Abb	Priority
Abbreviated Dialling	ABD	A
Account Card Calling	ACC	B
Automatic Alternative Billing	AAB	A
Call Distribution	CD	A
Call Forwarding	CF	A
Call Hold	CH	A
Call Rerouting Distribution	CRD	A
Call Transfer	TRA	A
Call Waiting	CW	A
Completion of Call to Busy Subscriber	CCBS	A
Conference Calling	CON	A
Credit Card Calling	CCC	B
Destination Call Routing	DCR	A
Follow-Me Diversion	FMD	A
Freephone	FPH	A
Global Virtual Network Service	GVNS	A
Hot Line	HOT	A
International Telecommunication Charge Card	ITCC	B
Internetwork Freephone	IFPH	A
Internetwork Mass Calling	IMAS	A
Internetwork Premium Rate	IPRM	A
Internetwork Televoting	IVOT	A
Malicious Call Identification	MCID	A
Mass Calling	MAS	A
Message store and forward	MSF	A
Multimedia	MMD	B
Originating Call Screening	OCS	A

Premium Rate	PRM	A
Security Screening	SEC	A
Selective Call Forward on Busy / Dont' answer	SCF	A
Split Charging	SPL	A
Televoting	VOT	A
Terminating Call Screening	TCS	A
Terminating Key Code Protection	TCKP	B
Universal Access Number	UAN	B
Universal Personal Telecommunication	UPT	A
User-Defined Routing	UDR	B (FFS)
Virtual Private Network	VPN	A

Benchmark services listed above could be realised by service capability features.

## History

<b>Document history</b>		
<b>Date</b>	<b>Version</b>	<b>Comment</b>
Sep 1998	0.0.0	Initial Draft at Ipswich
Oct 1998	0.1.0	Initial Draft at Uxbridge Meeting
Nov 1998	0.2.0	Draft at Newbury Meeting
Jan 1999	0.3.0	Draft after Stockholm meeting
Jan 1999	0.4.0	Draft to include requirement for R99
Feb 1999	0.5.0	Draft to include corrections from Ericsson and TTC requirements
Feb 1999	0.6.0	Draft to include changes made after adhoc meeting in Vienna
March 1999	0.7.0	Change to include text to fig 2 and 3 and for presentation to v1.0
March 12/99	1.0.0	Input text to state the inclusion of OSA requirements
March 17/99	1.1.0	Addition of Annex B, OSA text
April 30/99	1.2.0	Modification after Dublin Meeting
Rapporteur: Jumoke Ogunbekun Fujitsu Europe Telecom Email: j.ogunbekun.co.uk Telephone: +44-181-606-4671		