Technical Specification Group Services and System Aspects
Meeting #11, Palm Springs, CA, USA, 19-22 March 2001

TSGS#11(01) 0059

Source: **SA1**

Title: **Various CRs to 22.121**

Document for: **Approval**

Agenda Item: **7.1.3**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New
22.121	018		Rel-4	Changes to TS 22.121 Release 4 - Update of 097 submitted to S1 Plenary	F	4.0.0	4.1.0
22.121	019		Rel-5	The Virtual Home Environment (Release 5) Addition of User profile requirement and changes for clarification	B	4.0.0	5.0.0

TSG-SA WG 1 (Services) meeting #11
Capetown 6th to 9th Feb 2001

TSG S1 (00) 0085
Agenda Item: 7.3

CR-Form-v3

CHANGE REQUEST

⌘ **22.121** **CR** **018** ⌘ rev **-** ⌘ Current version: **4.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [X] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘ Changes to TS 22.121 Release 4		
Source:	⌘ SA1		
Work item code:	⌘ VHE	***Date:*** ⌘	06/02/2001
Category:	⌘ **F**	***Release:*** ⌘	REL-4

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change: ⌘ At the S1#10 meeting in Orlando it was decided that the R4 document needed clean up, that it should be made clearer which part was descriptive text and which were the requirements. It was decided that no new requirements would be put into R4 spec but only the removal of OSA part and the clean up.

Most of the modifications done to the TS are editorial changes and in some cases changes are made to the text for clarification purposes. Changes were not made to requirements imported from R99

Summary of change: ⌘

1. Scope
Addition of text on main difference to R99 spec i.e removal of OSA into 22.127.
Removal of text on reference to R99.

2. Informative Reference
Update by adding TS and 3G to list. 02 series change to 22 series.
Renumbering and alignment with text

3. Definitions
Removal of CORBA, GSN, LCS, MMI, PLMN, SMS, SSF, USSD
Change OSA definition
Removal of Service execution environment definition. This section no longer applies, its implementation
Replacement of Service capabilities with Service Toolkits
Removal of Service Capability Feature definition since OSA has been removed
Modification of Local services to correspond to definition agreed for Rel-5
Modification of definition of services to correspond with definition agreed in Rel-5

4. General Description
Replaced figure 1 on service provisioning from user's point of view with fig 4 in section 5.1.
Removal of references to R 2000 and text on IM.

5. Replacement of title with "Support of Services within VHE"
Removal of Framework diagram figure 2 and all references to figure including text reference.
Removal of sub clause 5.1 and fig 3.0
Removal of all references to interface and service capability feature text.
Addition of text to state how OSA is related to VHE
Figure 4 moved to replace fig 1
Replacement of service capability with service toolkits and adjustment of text when service capability feature was removed.

6. VASP Relationship to VHE
Moved section 6 user requirement to requirement section. Replaced section 6 with previous section 9 "VASP Relationship to VHE"
Expanded section to describe clearly HE-VASP and VASP.

7. Personal Service Environment.
Addition of text to state that support of User Profile is optional, and will be specified within R5
Removal of figure 5.
Removal of sub-clause 6. 1.5 which is requirement on User Profile.

8. Start of requirement section.
Title changed to indicate that these are requirements for support of VHE.
Requirements on User, Home Environment and serving Network as in R99 have been moved into this section.
One change made to paragraph 4 of 8.3 "serving network requirement"

9. Change of title to "Usage of existing toolkits"
Removal of reference to R99, R2000 and service capability features. Changes OSA to Open System Access

10. Removal of section on Service Execution Environment

11. Clarification that Rel 4 user profile refers to existing methods of storing and using subscriber data, i.e. HLR, SIM, CSE, or non-standardised network databases.

Consequences if not approved:	⌘	Stage 1 is not aligned with stage 2/3 functionality.

Clauses affected:	⌘	All clauses (1, 2, 3, 4, 5, 6, 7, 8, 9, 10,11)		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

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Comprehensive information and tips about how to create CRs can be found at:
http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

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

Virtual Home Environment (VHE) is defined as a concept for personal service environment (PSE) 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.

A key feature to support VHE is the ability to build services using a standardised application interface.

The OSA requirements in release 99 TS 22.121 has been extracted into separate TS 22.127 [9].

~~Requirements not applicable for R99 will be explicitly indicated.~~

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.

2.1 Normative references

[1] 3G TR 21.905 “Vocabulary for 3GPP Specifications (Release 1999) ~~GSM 01.04: "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".~~

[2] 3G TS 22.057 ~~GSM 22.057: "Digital cellular telecommunication system (Phase 2+); “~~3rd Generation Partnership Project; Technical Specification Group Services and System Aspects Mobile Execution Environment (MExE); Service description".

[3] 3G TS 22.078 ~~GSM 02.78: "Digital cellular telecommunication system (Phase 2+); “~~Customised Applications for Mobile network Enhanced Logic (CAMEL); Service definition - Stage 1".

[4] 3G TS 22.038: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; USIM/SIM Application Toolkit (USAT/SAT); Service description; Stage 1"

~~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] 3G~~PP~~ TS 22.101: “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects ~~"Universal Mobile Telecommunications System (UMTS): ~~Service Aspects; Service Principles".

[6] 3G~~PP~~ TS 22.105: “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects ~~"Universal Mobile Telecommunications System (UMTS); ~~Services and ~~Service Capabilities~~Service Toolkits".

[7] ITU-T Recommendation Q.1701: "Framework for IMT-2000 networks".

[8] ITU-T Recommendation Q.1711: "Network Functional Model for IMT-2000".

~~[9] 3GPP TS 22.00: "UMTS phase 1".~~

[10] 3GPP TS 23.127 "Virtual Home Environment/Open Service Architecture"

.[9] 3G TS 22.127: “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects Open Services Access (OSA)”

2.2 Informative references

[1] 3GPP TR 22.70: "Universal Mobile Telecommunications System (UMTS); Virtual Home Environment".

[102] World Wide Web Consortium Composite Capability/Preference Profiles (CC/PP): A user side framework for content negotiation (www.w3.org).

[11] 3G TS 22.115: “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects charging and billing”

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

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

Local Service: service, which can be exclusively provided in the current serving network (home or visited network) by a Value added Service Provider.

Service CapabilitiesService Toolkits: bearers defined by parameters, and/or mechanisms needed to realise services. These are within networks and under network control.

Service Capability Feature: functionality offered by service capabilities that are accessible via the standardised application interface.

Services: services are user experience provided by more than one application. made up of different service capability features.

Service Execution Environment: service execution environment is a platform on which an application or programme is authorised to perform a number of functionalities; examples of service execution environments are the user equipment, integrated circuit card and a network platform or any other server.

Applications / Clients: these are services, which are designed using service capability features.

Application Interface: standardised Interface used by application/clients to access service capability features.

Personal Service Environment: contains personalised information defining how subscribed services are provided and presented towards the user. The Personal Service Environment is defined in terms of one or more User Profiles.

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

User: is a logical entity, which uses UMTS PLMN services.

User Interface Profile: contains information to present the personalised user interface within the capabilities of the terminal and serving network.

User Services Profile: contains identification of subscriber services, their status and reference to service preferences.

User Profile: ~~this is a label identifying a combination of one user interface profile, and one user services profile.~~refers to various entities storing user related data (e.g. HLR, SIM, CSE, non-standardized databases.)

Note: Concept of user profile will be enhanced significantly in following 3GPP releases.

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

Virtual Home Environment: concept for personal service environment portability across network boundaries and between terminals.

Further ~~UMTS related~~ definitions are given in ([1], [5])~~3G TS 22.101.~~

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

API	Application Programming Interface
CAMEL	Customised Application ~~f~~For Mobile ~~n~~Network Enhanced Logic
CAP	CAMEL~~amel~~ Application Part
CDR	Call Detail Record
~~CORBA~~	~~Common Object Request Broker Architecture~~
CSE	Camel Service Environment
FFS	For Further Study
~~GSN~~	~~GPRS Support Nodes~~
HE	Home Environment
HE-VASP	Home Environment Value Added Service Provider
HLR	Home Location Register
~~LCS~~	~~LoCation Services~~
MAP	Mobile Application Part
ME	Mobile Equipment
MExE	Mobile Execution Environment
~~MMI~~	~~Man Machine Interface~~
MS	Mobile Station
MSC	Mobile Switching Centre
OSA	Open Service Access~~rchitecture~~
PLMN	Public Land Mobile Network
PSE	Personal Service Environment
SAT	SIM Application Tool ~~K~~kit
SIM	Subscriber Identity Module
~~SMS~~	~~Short Message Service~~
~~SSF~~	~~Service Switching Function~~
USIM	User Service Identity Module
~~USSD~~	~~Unstructured Supplementary Service Data~~
VASP	Value Added Service Provider
VHE	Virtual Home Environment

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

4 General Description of the VHE

Virtual Home Environment (VHE) is defined as a concept for personal service environment 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 key requirements of the VHE are to provide a user with a personal service environment which consist of:

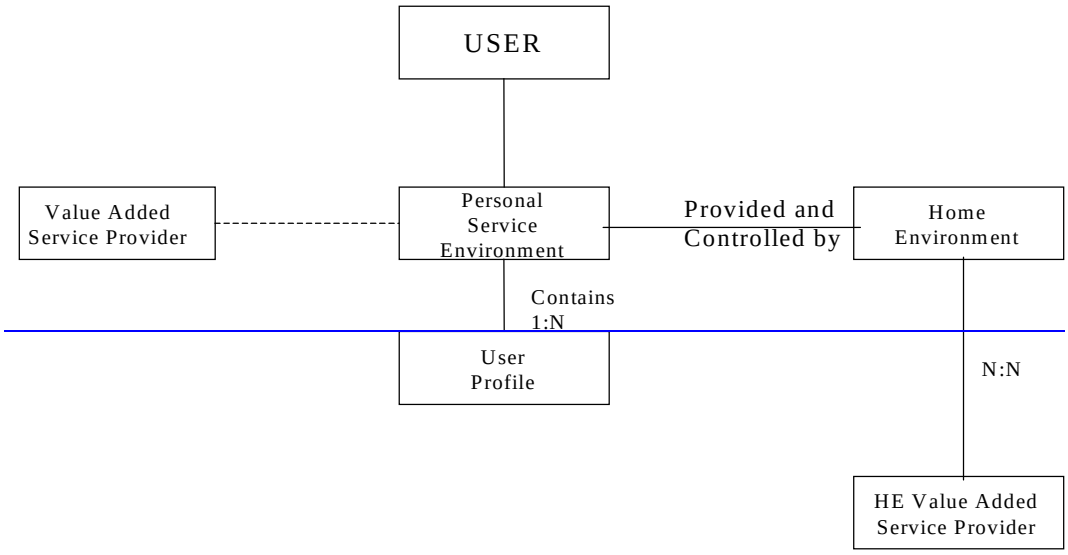
- personalised services;
- personalised User Interface (within the capabilities of terminals);
- consistent set of services from the user's perspective irrespective of access e.g. (fixed, mobile, wireless etc. Global service availability when roaming.

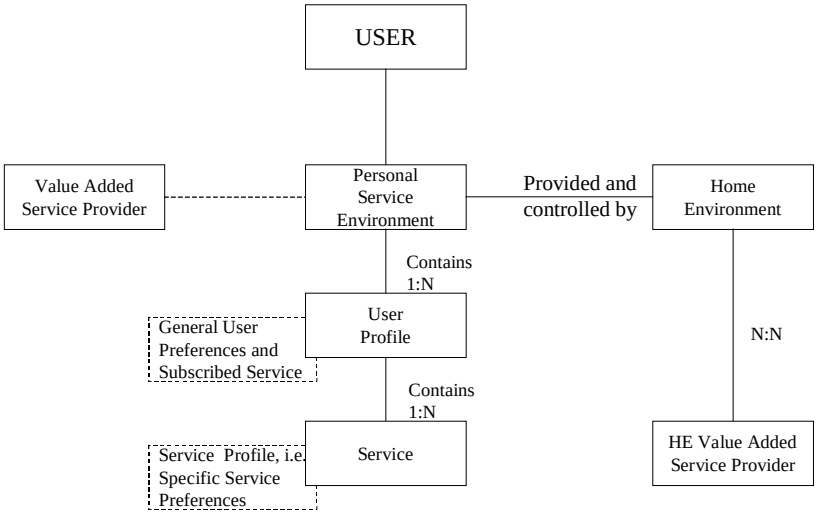
The standards supporting VHE requirements should be flexible enough such that VHE can be applicable to all types of future networks as well as providing a framework for the evolution of existing networks. Additionally the standards should have global significance so that user's can avail of their services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

- provide a common access for services in future networks;
- enable the support of VHE by future networks;
- enable the creation of services;
- enable personal service environment to be recoverable (e.g in the case of loss/damage of user equipment).

Roles and components involved in realisation of VHE consist of the following (also see figure 1):

- home environment;
- user identifiers;
- users;
- terminals (simultaneous activation of terminals providing the same service per single subscription is not allowed);
- serving networks;
- subscriptions;
- possibly value added service providers;
- personal service environment;
- user profiles.





The set of services from the Users point of view

Figure 1: Service Provisioning From User's point of View

The Home Environment provides and controls services to the user in a consistent manner. The User's personal service environment is a combination of services and personalisation information ~~(described in the user profile). 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~~. Services provisioned to the user may allow or require personalisation by the user.

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, see chapter 6.2. ~~The Home Environment does not manage services obtained directly from VASPs. 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 the present document.~~

Services ~~in from release 2000 and beyond~~ can be created from enhanced version of existing ~~service capabilities~~Service Toolkits. (e.g CAMEL, MExE, OSA and SAT) plus any new ~~service capabilities~~Service Toolkits with possible addition of IP capabilities.

The following option~~s~~ shall be available in the standards to enable service delivery in the ~~new~~ architecture:

~~- capability toolkits enhanced to control IP multimedia services, which will allow applications to be deployed in a vendor independent manner~~

~~- the VHE concept that enables toolkits not standardised by 3GPP to be used to deliver services (e.g. adoption of IP recommendations to facilitate the IP applications)~~

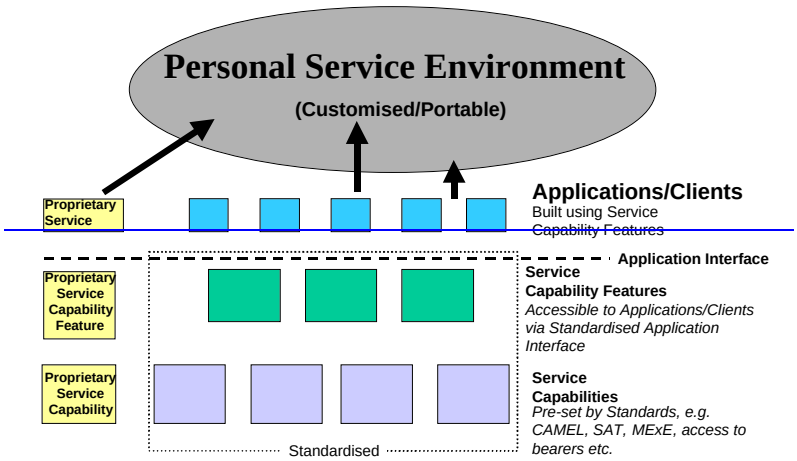
- mechanisms [2] which allow the network to understand the limitations of the terminal and thereby take appropriate actions .

5 Support of services within the VHE

~~Framework for Services~~

VHE shall support VHE services from previous releases and new services built on service toolkits . Later 3GPP releases~~developments~~ will provide support for a wider range of services ~~in later releases~~.

~~The implementation of VHE in UMTS release 00 shall support VHE in UMTS release 99 services as applied in 3GPP TS 22.121 and new services built by service capability features. Later UMTS developments will provide support for a wider range of services in later releases.~~



~~Figure 2: Framework for Services~~

~~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 capability features see figures 2 and 3. 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.~~

3GPP 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 can be built using network and/or terminal functions offered via service toolkits ~~capability features~~ (~~[1]~~, [2], [3], [4], ~~[9],~~ [~~9~~10],). The set of services available to a user within the VHE is personalised by a set of user profiles unique to that user.

~~, which are accessed via a standardised interface. An example of how a service can be built on service capability features could be "call to nearest restaurant", this will make use of call set-up, authorisation, location and database lookup.~~

~~The available service capability features are visible to applications through the standardised application interface. The application interface can be realised in such a way that applications may or may not have knowledge of the underlying mechanisms used.~~

~~For example, in the case where the applications have knowledge of the underlying mechanisms as an example, the User Location service capability features can be provided by a location server (e.g HLR, LCS) and in the case where application may not have knowledge of underlying mechanisms the application will only see a single User Location service capability feature and does not know which location server provides it.~~

~~The standardised application interface shall be:~~

- ~~Independent of vendor specific solutions;~~
- ~~Independent of programming languages, operating systems etc used in the service capabilities;~~
- ~~Secure scalable and extensible.~~
- ~~independent of the location where service capabilities are implemented;~~
- ~~independent of supported service capabilities in the network; and~~
- ~~Access to Service Capability Features shall be realised using modern state of the art access technologies, e.g. distributed object oriented technique might be considered.~~

5.1 Ways to realise services

The information contained in this clause is only to aid understanding and is not an extensive list.

Figure 3 illustrates how the concept of VHE makes use of the standardised application interface and how that fits to the service capability features and service capabilities for release 99. Note that the Service Capabilities (SCx) shown below are representatives of the different possible capabilities. It is not to be implied as the agreed architecture as this is a stage 2 issue.

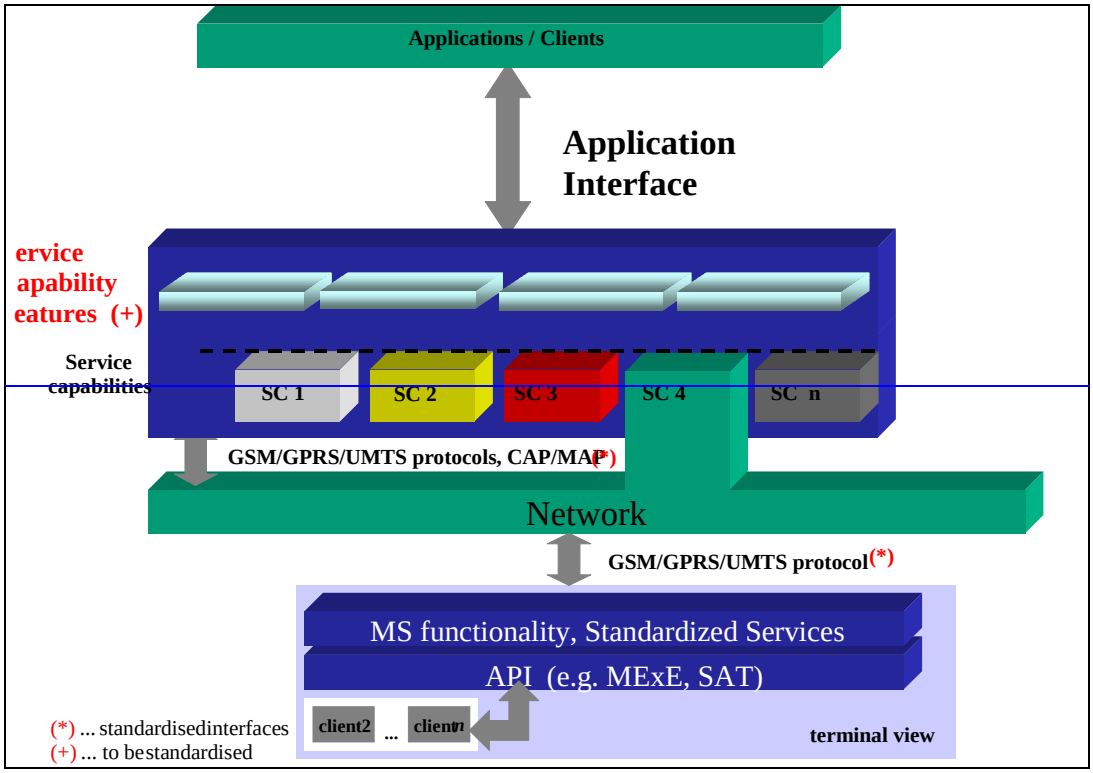


Figure 3: Possible realisation of Framework for Services

The following are examples of services offered through VHE:-

STANDARDISED SERVICES (Supplementary Services, Tele-Services, etc.) are implemented on existing PLMN 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.

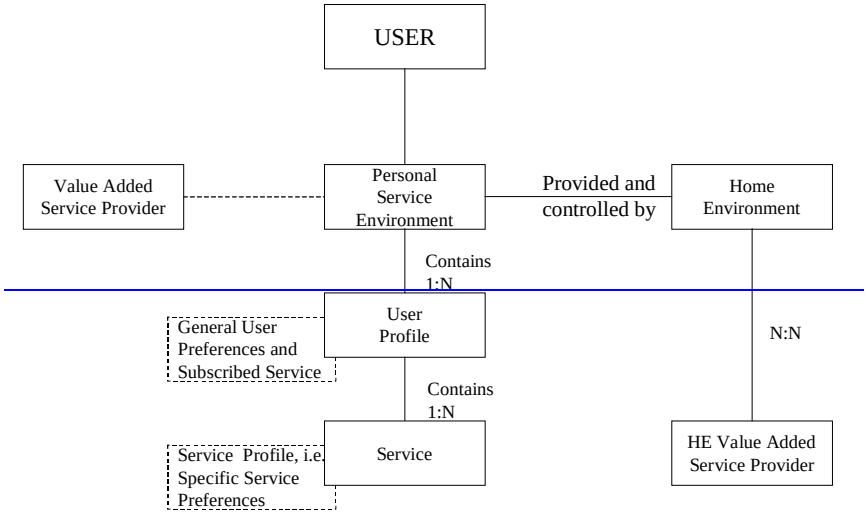
OPERATOR SPECIFIC SERVICES (OSS) are not standardised and could be implemented at the GSM/UMTSPLMN entities (e.g. HLR) on a vendor specific basis or using GSM ph 2+ mechanisms (CAMEL, SAT, MExE). These tool-kits use standardised interfaces to the underlying network (e.g. CAP, MAP) or use GSM Bearers to transport applications and data, for example, from the MExE service environment of SAT server to the MS/SIM. The implementation of these operator specific services on the different platforms (CSE, MExE service environment /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 CapabilitiesService Toolkits (Bearers, Mechanisms). The functionality offered by the different Service CapabilitiesService Toolkits are defined by them directly Service Capability Features. These Service Capability Features will be standardised and can be used by the application designers to build their applications.

Within the network Service Toolkits are accessible via standardised APIs, for example, OSA APIs.

Within the terminals Service CapabilitiesService Toolkits are accessible via APIs, for example, MExE and SAT APIs., i.e. there will be no service capability features within the terminal.

The terminal can communicate, using ~~GSM/UMTS~~ bearer~~s~~ services, with applications in the network via the service ~~capability~~ toolkits ~~features which~~features, which may be optionally realised for MExE service environment and SAT-servers.



The set of services from the Users point of view

~~Figure 4~~

6 VASP Relationship to VHE

6.1 Home Environment VASP (HE-VASP)

The Home Environment may allow HE-VASPs access to its service toolkits in the network, the USIM and in the ME for the execution of services provided by the HE-VASP. The Home Environment provides mechanisms to support identical services provided by HE-VASPs when the user moves across network boundaries and between UEs.

There may be some information, which is shared between the Home Environment and the HE-VASP (for example current capabilities), however this is outside the scope of standardisation.

6.2 Value Added Service Provider (VASP)

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. Mechanisms may be provided which allow the user to discover those services obtained directly from VASPs and personalise those services. These mechanisms are outside of the scope of VHE.

There are no VASP requirements to support VHE. It is noted that with mechanisms such as CC/PP, VASPs may indirectly implement VHE stored user profiles during Capability Negotiation (e.g. using HTTP next generation), however this is outside the scope of standardisation.

~~with mechanisms~~

6 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 user service and user interface settings;
- select a particular User Profile;
- indicate (on a session by session basis if necessary) to which subscription charges are to be applied to;
- recover MS resident User Profile information to protect against loss or damage of user equipment.

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

76.1 Personal Service Environment

The Personal Service Environment describes how the user wishes to manage and interact with their communications services. The PSE is a combination of a list of subscriptions (detailing provisioned services), preferences associated with those services, terminal interface preferences and other information related to the user's experience of the system. Within the PSE the user can manage multiple subscriptions e.g. both business and personal, multiple terminal types and express location and temporal preferences. The Personal Service Environment is defined in terms of one or more User Profiles.

Note: Concept of user profile will be enhanced significantly in following 3GPP releases.

The support of the User Profile is optional, and will be specified within release 5.

67.1.1 User Profiles

A combination of different preferences is described by a User Profile. The user can define one or more User Profiles according to their needs.

Each User Profile consists of two kinds of information:

1)**User data profile**.

The User Profile consists of the following type of information:

- menu settings, e.g. menu items shown, menu structure, the placement of icons;

- terminal settings, e.g. ringing tone and volume, font type and size, screen and text colour, language, content types and sizes accepted;

- Network related preferences e.g. language used for announcements. (editor's note: for clarification)

2)User Service Profile

The User Service Profile consist of the following type of information:

- A list of services subscribed to

- References to Service Preferences for each of the services subscribed to if applicable. Service Preferences could be information such as redirection numbers, redirection conditions, caller screening lists, time-of-day variations etc;

- Service status (active/deactive)

The user may define one or more User Data Profiles and many User Services Profiles, but a given User Profile consists of a single combination of these. In this way a user could for example have a different User Profile to suit each of the three different terminals she owns. The User Services Profile is the same in each case but the User Data Profile is different to suit the display capabilities of each terminal. User Profiles could also exist which use the same User Data Profile but different User Services Profiles. This might simply imply that business calls are forwarded to an answering service when the user leaves the office because a new User Profile is now active.

Where the user has more than one User Profile the activation of a particular one could be done in the following ways:

- *Statically*: the user explicit selects one of the User Profiles as the active one;

- *Dynamically*: the appropriate User Profile is selected automatically based upon some criteria such as time of day, location, terminal used or many other possibilities.

Each User Profile must have a uniquely addressable identity.

For UMTS Release '99 the information in the User Profiles enables the service capabilities SAT, MExE and CAMEL toolkits in R'99 and existing GSM services to support the user's PSE across network boundaries and between different terminals.

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

76. 21.2 User Profiles and Multiple Subscriptions

The user may wish to manage more than one subscription in their PSE. This would allow them to have a single USIM but specify different preferences for the services provisioned in each subscription. In this case the User Services Profile will need to detail all of the services provided per subscription and provide references to the service preferences for each service. When initiating a chargeable event the user will need to indicate which subscription the charges should be applied to.

76. 1.3 Management of the user profile

Figure 5 shows a data model for a user profile, which consist of user service profile and user data profile.

Some terminal related data are contained within the data profile such as menu settings and terminal settings. This data profile are stored in the terminal and/or USIM and may be made available to application in the terminal and USIM according to their respective security models conforming to the levels of authorisation of these tools. Detailed definition of terminal related user data profile is within terminal capabilities group such as MExE, WAP or USAT.

Some network related data is contained within the data profile such as language used for announcements, encryption, security and authentication. Some user data, which are to be used by more than one application need to have standardised format and schematics. User service profile is made available to the network and the terminal. Service profiles relating to terminals are defined under terminal capabilities TS xx.xx. Service profiles relating to network are defined under network capabilities TS xx.xx.

Service profile is generally not subject to standardisation as this are changeable, however it is necessary for the user profile to to include a minimum set of standardised data such as user id.

The user and the home environment may modify the user's characterisation of the Personal Service Environment as described in the User Profiles at any time, and changes become effective at the earliest possible opportunity. The home environment shall be able to update distributed User Profiles to reflect any user or home environment modification of the user's Personal Service Environment. A synchronisation mechanism to update the user profile when it is distributed shall be supported, to ensure that components of the user profile are consistent, wherever they are located.

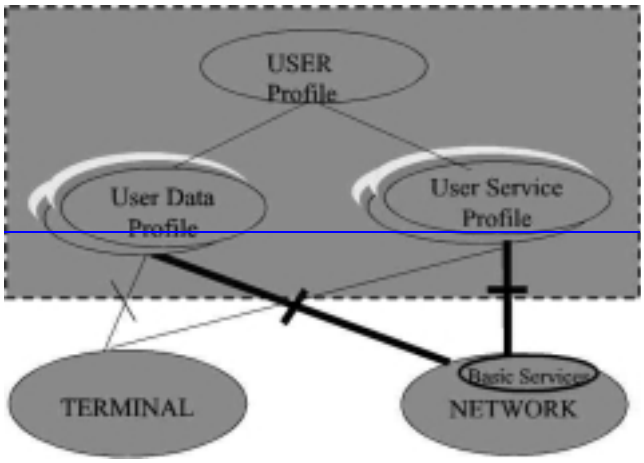


Figure 5 Data Model for a User Profile

67.1.4 Location of User Profiles

The User Profiles may be partly stored in the Mobile Station (the USIM or the ME), and/or the home environment or elsewhere (which is outside the scope of standardisation). The information in User Services Profiles is distributed between the home environment and the MS. In the event of loss/damage of mobile station (USIM or ME), the User Profiles must be fully recoverable and be used to reconfigure a new mobile station.

The user profile information in the Home Environment should be kept constant with any changes in Mobile Station.

User profile associated with external VASP is not stored within the Mobile Station or HE, this may be stored with the external VASP, details of this is outside 3GPP scope. There is no requirement for backup and recovery of this data.

Some aspects of the User Profiles such as aspects related to terminal configuration, must be stored in a standardised format to support VHE.

NOTE: To ensure that User Profiles are applicable to as wide a community of terminal and network types as possible, existing work on this topic in other standards fora should be considered. One possibility is the work of the World Wide Web Consortium on the Composite Capability/Preference Profile [102].

Editors note: There will be levels of authorisation

6. 1.5 Requirements for Standardisation

To facilitate the provision of PSE and User Profiles the standard shall allow a minimum set of requirements that can be used to identify a user. This will consist of:

- User ID;
- HE ID;
- Equipment ID (IMEI);
- Basic set of services e.g emergency call, voice call and text call.

8 Requirements for Support of VHE

Note that many of the~~below~~ requirements below are fulfilled without VHE specific 3GPP stage 2/3 specifications support in release 4. The ~~Below~~ requirements below may generally be supported e.g. by:

- general standardised protocols functionalities (e.g. MAP);
- functionality provided by the existing toolkits;
- roaming agreements between operators and GSM association recommendations;
- non-specified application level functionality.

8.1 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 provided by the Home Environment;
- modify a user profile(for example to include new services) from any location, within the technical limitations;
- activate or deactivate user services;
- discover which local services are available;
- access local services in a secure manner;
- interrogate current user service and user interface settings;
- ~~select a particular User Profile;~~
- ~~; recover MS resident User Profile information to protect against loss or damage of user equipment.~~

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

8~~7~~. 2~~3~~ Home Environment Requirements for VHE Provision

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 e.g subject to subscription;
- control access to services depending on available ~~service capabilities~~Service Toolkits 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~~Service Toolkits supported in the serving network, and terminals;

- define the scope for management of services by the user, for services provided by the HE, supported by a standardised method for accessing uniquely addressable user profiles (FFS~~ffs~~);
- handle charging for services~~; (as defined in clause 11);~~
- inform the serving network of the type of charging (i.e. prepaid or/and postpaid) for any required service;
- inform the serving network of the threshold set for a given service required by the user and charged on a prepaid account;
- inform the serving network how to manage a service for which the threshold has been reached;
- manage the prepaid accounts (e.g. increase, decrease the credit, or pass the information to any application which manages the credit);
- deploy services to users or groups of users;
- manage provision of services to users or groups of users.

8.3~~8~~ Serving Network Requirements for VHE Provision

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~~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~~, supported by a standardised method for accessing uniquely addressable user profiles~~;
- the serving network shall provide the necessary ~~service capabilities~~Service Toolkits to support the services from the home environment as far as possible;
- dynamically provide information on the available ~~service capabilities~~Service Toolkits in the serving network;
- provide transparent communication between clients and servers in terminals and networks;
- exchange ~~request~~ the charging information (type of charging, threshold for prepaid services and behaviour if the threshold is reached) for any service possibly required by the user;
- handle the call according to the instructions received by the home environment regarding charging activities;
- inform the home environment of the chargeable events (e.g. send CDRs, …).

~~9 VASP Relationship to 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 the present document.~~

~~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 to support VHE. It is noted that with mechanisms such as CC/PP, VASP's may indirectly implement VHE stored user profiles during Capability Negotiation (e.g. using HTTP next generation), however this is outside the scope of standardisation.~~

910 Usage of existing ~~Applicability of~~ toolkits

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

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

~~Reuse of~~ Existing 3GPP toolkits (such as ~~already implemented applications and services are also important.~~ CAMEL, MExE, USAT and OSA), and non-3GPP toolkits shall be used when available.~~are service capabilities in the VHE for Release 99 and will also be supported in Release 2000.~~

~~VHE Release 2000 shall include new (if required) and enhanced service capabilities to support IP multimedia services.~~

910. 1 CAMEL

Release ~~20004~~ shall ~~will~~ be able to use CAMEL plus any improvements for CAMEL release 4~~-~~ [3]~~following Release 99 (e.g. Phase 4), plus previous versions. cf TS22.078~~

VHE~~he~~ requirements on CAMEL:

- Users shall be able to use their existing CAMEL services in a consistent manner with ~~both~~ CS services ~~and IP multimedia services. This shall occur in a transparent fashion and the user need not be aware of whether the service is either circuit switched or packet switched.~~ The same look and feel of the service shall be maintained.

~~Operators shall be able to reuse their existing CAMEL services for IP multimedia.~~

910. 2 MExE

Release ~~4~~2000 shall ~~will~~ be able to use MExE improvements following Release 99 plus previous versions of [2] ~~TS22.057~~

~~Vhe requirement on MExE:~~

> ~~There needs to be hamonisation between the MExE user profile and VHE user profile. This could also require a mechanism to interogate the terminal about its user terminal profile.~~

910. 3 USAT

Release 4 ~~2000~~ shall ~~will~~ be able to use USAT improvements following Release 99 plus previous versions of [4]

~~TS22.0XX~~

~~Vhe requirement on USAT:~~

> ~~There needs to be hamonisation between the USAT user profile and VHE user profile.~~
>
> ~~USAT terminals interact with the USIM using capability negotiation, and it shall be possible to continue usage of the capability negotiation for IP multimedia services.~~

910. 4 Open Service Access ~~rchitecture~~ (OSA)

Release 4 ~~2000~~ shall be ~~will be~~ able to use OSA [9].

~~VHE requirement on OSA:~~

~~11 Service 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 one or more of the following shall provide the execution environments:~~

- ~~MExE;~~
- ~~SIM Application Tool kit (SAT);~~
- ~~CAMEL.~~

10~~2~~ 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 [11] ~~UMTS 22.15~~ for further details.

Other charging requirements may be identified and are ~~for~~ FFS.

11~~3~~ 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):
Service examples to be considered in VHE

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

Table A.1

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 ~~-~~toolkits~~capability features~~.

Annex B (informative): Change history

TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New
SA#04			22.121							3.0.0
SP-05	SP-99442	S1-99809	22.121	002		R99	B	Virtual Home Environment.	3.0.0	3.1.0
SP-05	SP-99442	S1-99845	22.121	003		R99	B	Addition of IP4 Addressing	3.0.0	3.1.0
SP-05	SP-99442	S1-99535	22.121	004		R99	B	Charging capabilities	3.0.0	3.1.0
SP-07	SP-000067	S1-000107	22.121	005		R99	F	Clarification of service capabilities	3.1.0	3.2.0
SP-07	SP-000067	S1-000156	22.121	006		R99	C	Information Transfer service capability feature	3.1.0	3.2.0
SP-08	SP-000204	S1-000267	22.121	007		R99	F	Modification of section 10.2.6 on reducing the scope of the VHE/OSA reqirements	3.2.0	3.3.0
SP-08	SP-000204	S1-000283	22.121	008		R99	F	Removal of section 10.2.3 Address Translation SCF	3.2.0	3.3.0
SP-08	SP-000204	S1-000285	22.121	009		R99	F	Modification of section 10.2.9 to reduce scope of User Profile Management service capabilities	3.2.0	3.3.0
SP-08	SP-000204	S1-000334	22.121	010		R99	F	Alignment of VHE Stage 1 top VHE/OSA Stage 2 and stage 3	3.2.0	3.3.0
SP-09	SP-000387	S1-000566	22.121	011		R4	C	VHE in R00 User Profile	3.3.0	4.0.0
SP-09	SP-000387	S1-000565	22.121	012		R4	C	VHE in R00	3.3.0	4.0.0
SP-09	SP-000381	S1-000640	22.121	013		R4	D	Change of MExE name	3.3.0	4.0.0
SP-09	SP-000387	S1-000564	22.121	014		R4	D	Realisation of Application interface	3.3.0	4.0.0
SP-09	SP-000387	S1-000569	22.121	015		R4	B	Synchronisation of distributed user profiles	3.3.0	4.0.0
SP-09	SP-000387	S1-000570	22.121	016		R4	B	Uniquely addressable user profiles	3.3.0	4.0.0
SP-09	SP-000387	S1-000571	22.121	017		R4	D	VASP indirect support of VHE	3.3.0	4.0.0

TSG-SA WG 1 (Services) meeting #11
Capetown 6th to 9th Feb 2001

TSG S1 (00) 0169
Agenda Item: 7.3

CR-Form-v3

CHANGE REQUEST

⌘ **22.121** **CR** **019** ⌘ rev **a-** ⌘ Current version: **4.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [X] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Addition of User profile requirement and changes for clarification
Source:	⌘	SA1
Work item code:	⌘	VHE1
Date:	⌘	06/02/2001
Category:	⌘	**B,**
Release:	⌘	REL-5

Use one of the following categories:
- ***F*** *(essential correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(Addition of feature),*
- ***C*** *(Functional modification of feature)*
- ***D*** *(Editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change: ⌘ CR to rel-4. This Rel-5 TS contains addition of User profile requirement and changes for clarification.

Summary of change: ⌘

1. Scope
Removal of Rel-4 Text and addition of Rel-5 scope on User Profile

2. Informative Reference
Update by adding TS and 3G to list. 02 series change to 22 series.
Renumbering and alignment with text

3. Definitions
Removal of MS. Addition of UE and USAT

4. General Description
Replace serving with Visited to align with S2 terminology. Addition of Fig 1 VHE role model from User's view and Fig 2, VHE Role Model Operator's view. Addition of descriptive text on User profile, HE, HE-VASP and VASP.

5. Replacement of title with "Support of Services within VHE"
Terminology correction

6. High level requirement
Replacement of clause 6 with "High Level Requirement".
Modifications to User requirement, HE requirement and Visited network requirement. Changed title of Serving to Visited (S2 terminology). Addition of requirement from HE-VASP. Addition of new headings on relationship with VHE includes text on HE-VASP relationship, VASP relationship and Local service relationship to VHE.

7. Personal Service Environment.

		Addition of clause on User Profile. **8. Components of VHE** Addition of text on components required in support VHE. **9. Usage of existing toolkits** Modification of text to reflect support of Rel-5 changes in existing toolkits. **10. Charging Requirement.** Additional text on charging to reflect addition of User Profile.
Consequences if not approved:	⌘	Stage 1 is not aligned with stage 2/3 functionality.

Clauses affected:	⌘	All clauses (1, 2, 3, 4, 5, 6, 7, 8, 9, 10)		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at:
http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Contents

Foreword

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

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

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the content of the ~~stage one~~Stage 1 requirement for realisation of VHE.

Virtual Home Environment (VHE) is defined as a concept for ~~personal service environment~~Personal Service Environment (PSE) 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.

~~A key feature to support VHE is the ability to build services using a standardised application interface.~~

~~The OSA requirements in release 99 TS 22.121 has been extracted into separate TS 22.127 [9].~~

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.

2.1 Normative references

[1] 3G TR 21.905: “Vocabulary for 3GPP Specifications (Release 1999) [2] 3G TS 22.057~~“3rd Generation Partnership Project; Technical Specification Group Services and System Aspects~~ Mobile Execution Environment (MExE); Service ~~description".~~description”.

[3] 3G TS 22.078: “Customised Applications for Mobile network Enhanced Logic (CAMEL); Service definition - Stage ~~1".~~1”.

[4] 3G TS ~~22.038: "3~~rd22.038: “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; USIM/SIM Application Toolkit (USAT/SAT); Service description; Stage ~~1"~~1”.

[5] 3G TS 22.101: “~~3rd Generation Partnership Project; Technical Specification Group Services and System Aspects~~ Service Aspects; Service ~~Principles".~~Principles”.

[6] 3G TS 22.105: ~~“3rd Generation Partnership Project; Technical Specification Group Services and System Aspects Services and Service Toolkits".~~“Services and Service Capabilities”.

[7] ITU-T Recommendation Q.1701: ~~"Framework~~“Framework for IMT-2000 ~~networks".~~networks”.

[8] ITU-T Recommendation Q.1711: ~~"Network~~“Network Functional Model for ~~IMT-2000".~~

~~–~~IMT-2000”.

[9] 3G TS ~~22.127: “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects Open Services Access (OSA)”~~

~~2.2 Informative references~~22.100: “UMTS phase 1”.

[10] 3G TS 23.127: “Virtual Home Environment/Open Service Architecture”.

[11] 3G TS 22.127: “Open Services Access (OSA) ”.

2.2 Informative references

~~[10]~~[12] World Wide Web Consortium Composite Capability/Preference Profiles (CC/PP): A user side framework for content negotiation (www.w3.org).

~~[11] 3G TS 22.115: “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects charging and billing”~~

[13] 3G TS 22.115 “Charging and Billing”

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Applications / Clients: these are services, which are designed using service capability features.

Home Environment: responsible for overall provision and control of the Personal Service Environment of its subscribers.

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

Local Service: services, which are provided by current serving network (home or visited network).

Personal Service Environment: contains personalised information defining how subscribed services are provided and presented towards the user. The Personal Service Environment is defined in terms of one or more **User Profile**s.

Services: services are the user experience provided by more or one applications.

Service Toolkits : bearers defined by parameters, and/or mechanisms needed to realise services.

User: is a logical entity, which uses PLMN services.

User Services Profile: contains identification of subscriber services, their status and reference to service preferences.

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

User Profile: A set of information necessary to provide a user with a consistent, personalised service environment, irrespective of the user location or the terminal used (within the limitations of the terminal and the serving network).

Virtual Home Environment: concept for personal service environment portability across network boundaries and between terminals.

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

~~**Local Service:** service, which can be exclusively provided in the current serving network (home or visited network) .~~

~~**Service Toolkits:** bearers defined by parameters, and/or mechanisms needed to realise services. These are within networks and under network control.~~

Services: services are user experience provided by more than one application.

Applications / Clients: these are services, which are designed using service capability features.

Application Interface: standardised Interface used by application/clients to access service capability features.

Personal Service Environment: contains personalised information defining how subscribed services are provided and presented towards the user. The Personal Service Environment is defined in terms of one or more User Profiles.

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

User: is a logical entity, which uses PLMN services.

User Profile: refers to various entities storing user related data (e.g. HLR, SIM, CSE, non-standardized databases.)

Note: Concept of user profile will be enhanced significantly in following 3GPP releases.

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

Virtual Home Environment: concept for personal service environment portability across network boundaries and between terminals.

Further definitions are given in ([1], [5])[5]

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

API	Application Programming Interface
CAMEL	Customised Application for Mobile networkNetwork Enhanced Logic
CAP	CAMEL Application Part
CDR	Call Detail Record
CSE	CamelCAMEL Service Environment
FFS	For Further Study
HE	Home Environment
HE-VASP	Home Environment Value Added Service Provider
HLR	Home Location Register
MAP	Mobile Application Part
ME	Mobile Equipment
MExE	Mobile Execution Environment
MS	Mobile Station
MSC	Mobile Switching Centre
OSA	Open Service Access
PLMN	Public Land Mobile NetworkPSE Personal Service Environment
SAT	SIM Application Toolkit
SIM	Subscriber Identity Module
UE	User Equipment
USAT	Universal SIM Application Toolkit
USIM	User Service Identity Module
VASP	Value Added Service Provider
VHE	Virtual Home Environment

4 General Description of the VHE

Virtual Home Environment (VHE) is defined as a concept for personal service environment 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 key requirements of the VHE are to provide a user with a personal service environment which consist of:

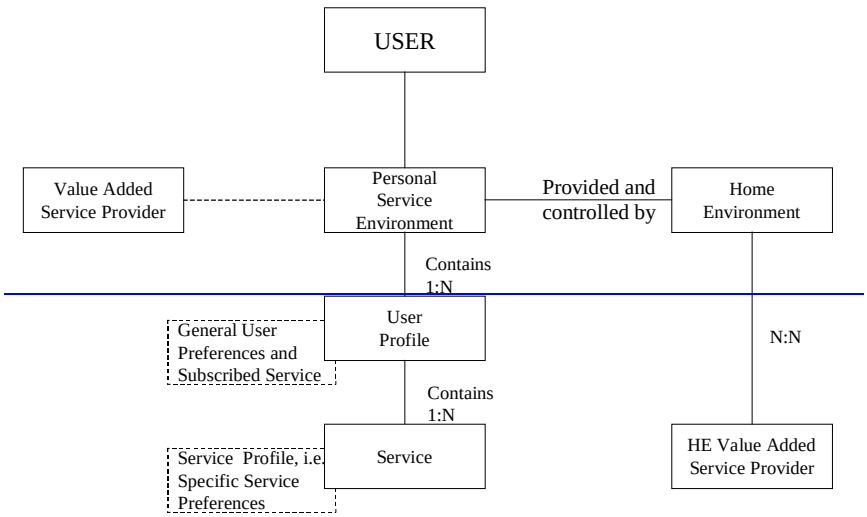
- personalised services;
- personalised User ~~Interface~~data (within the capabilities of terminals);
- consistent set of services from the user's perspective irrespective of access e.g. (fixed, mobile, wireless etc. Global service availability when roaming.

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 access for services ~~in future networks~~;
- enable the support of VHE ~~by future networks~~;
- enable the creation of services;
- enable personal service environment to be recoverable (e.g. in the case of loss/damage of user equipment).

Roles and components involved in realisation of VHE consist of the following ~~(~~also see figure 1~~)~~:

- **home environment;**
- ~~user identifiers;~~
- **users;**
- terminals (simultaneous activation of terminals providing the same service per single subscription is not allowed);
- ~~serving~~visited networks;
- subscriptions;
- **possibly value added service providers;**
- ~~personal service environment;~~
- ~~user profiles.~~



The set of services from the Users point of view

- ~~Figure 1: Service Provisioning From User's point of View~~**personal service environment; (set of User Profiles)**

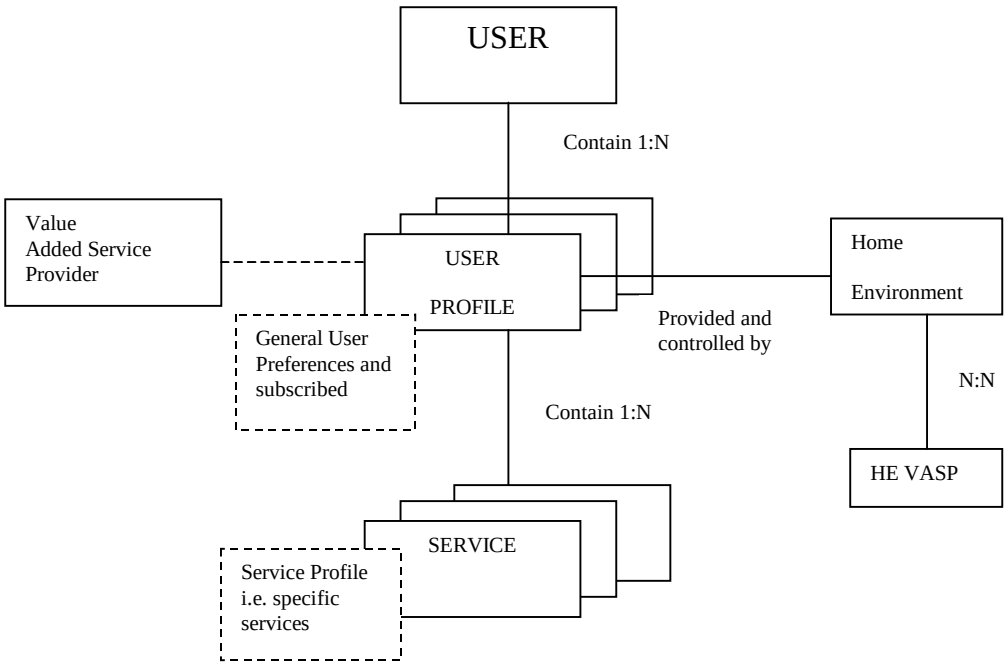


Figure 1: VHE Role Model User's View

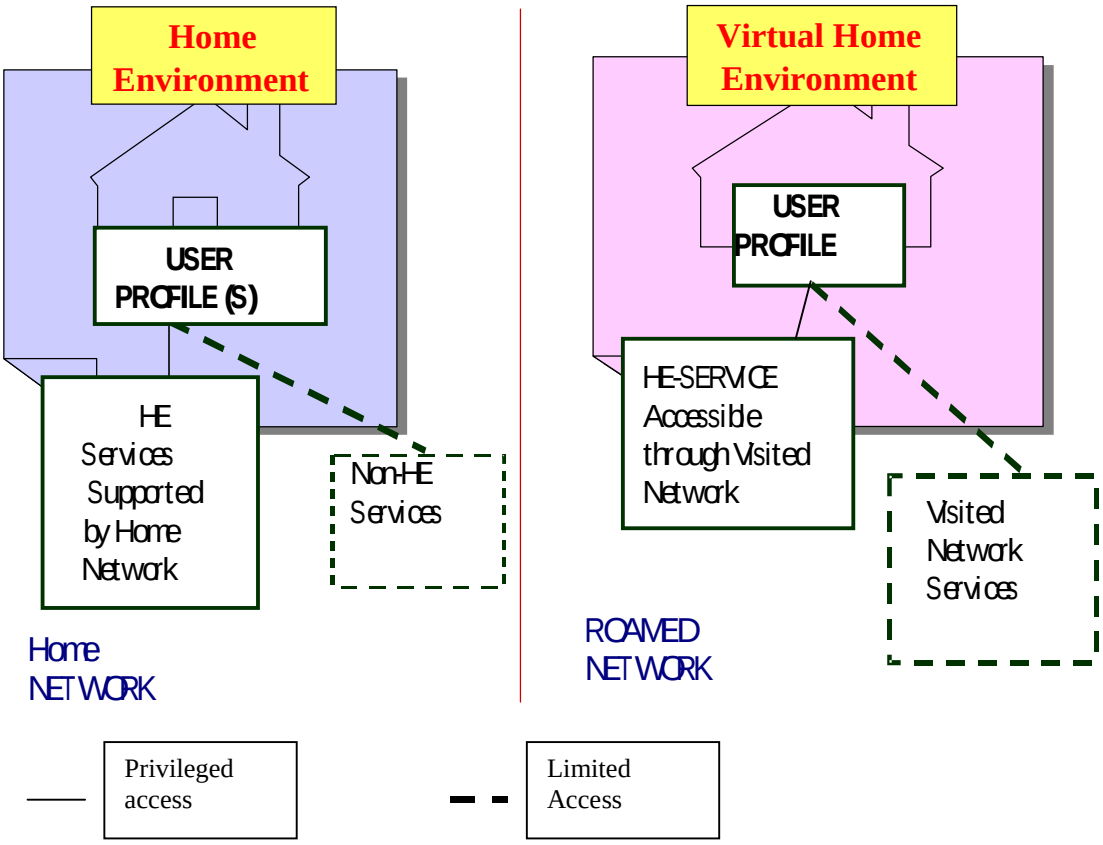


Figure 2: VHE Role Model Operator's View

A set of one or more user profiles is defined for the user in the HE. Within the HE, the user may activate one of its user profiles. The service behaviour of the services depends on the active User profile. Services provisioned to the user may allow or require personalisation by the user. It is the activated User Profile, which personalises the user's services in the HE. 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.

Figure 2 shows the operator's view of the Virtual Home Environment concept.

The Home Environment provides and controls services to the user in a consistent manner. ~~The User's personal service environment is a combination of services and personalisation information. Services provisioned to the user may allow or require personalisation by the user.~~

- It provides the necessary means to create and maintain a set of user profile.
- The Home Environment also may support – through its Service Toolkits in the network, the USIM and in the ME – the execution of services..
- The user's Home Environment uniquely identifies the user in the telecommunication networks supported by the Home Environment.

Home-Environment Value added Service Providers (HE-VASPs): 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.

Value Added Service Providers: Additionally, but not subject to standardisation, the user may access local services directly from Value Added Service ~~Providers, see chapter 6.2.~~

Providers and serving network. The Home Environment does not support services obtained directly from VASPs or serving network outside home network. VASP has no service agreement with the Home Environment.

User Profile: The user can define one or more User Profiles according to their needs. The user's Home Environment manages the User Profile(s).

Services can be created from enhanced version of existing Service Toolkits. (e.g. CAMEL, MExE, OSA and USAT) plus any new ~~Service Toolkits~~service toolkits with possible addition of IP capabilities.

The following options shall be available in the standards to enable service creation and delivery in the new architecture:

- Toolkits enhanced to control IP multimedia services, which will allow applications to be deployed in a vendor independent manner
- the VHE concept that enables toolkits not standardised by 3GPP to be used to deliver services (e.g. adoption of IP recommendations to facilitate the IP applications)
- ~~mechanisms [2]~~Mechanisms which allow the network to understand the limitations of the terminal and thereby take appropriate actions~~.~~.

5 Support of services within the VHE

VHE shall support VHE services from previous releases and new services built on ~~service toolkits . Later 3GPP releases~~Service Toolkits. Later 3GPP developments will provide support for a wider range of services in later releases.

3GPP 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 can be built using network and/or terminal functions offered via ~~service toolkits (, [2], [3], [4], [9],).~~Service Toolkits ([2], [3], [4], [9], [10], [11]). The set of services available to a user within the VHE is personalised by a set of ~~user profiles~~**User Profile**s unique to that user.

The following are examples of services offered through VHE:~~-~~

STANDARDISED SERVICES (Supplementary Services, Tele-Services, etc.) are implemented on existing PLMN 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 PLMN entities (e.g. HLR) on a vendor specific basis or using GSM ph 2+ mechanisms (CAMEL, USAT, MExE). These tool-kits use standardised interfaces to the underlying network (e.g. CAP, MAP) or use GSM Bearers to transport applications and data, for example, from the MExE service environment of USAT server to the ~~MS/SIM.~~UE/USIM. The implementation of these operator specific services on the different platforms (CSE, MExE service environment /USAT Server, ~~MSs)~~UEs) 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 Toolkits (Bearers, Mechanisms). The functionality offered by the different Service Toolkits ~~are~~is defined by them ~~directly~~ directly, and can be used by the application designers to build their applications.

Within the network Service Toolkits are accessible via standardised APIs, for example, OSA APIs.

Within the terminals ~~Service Toolkits are~~functionality is accessible via APIs, for example, MExE and ~~SAT APIs..~~USAT APIs.

The terminal can communicate, using bearers services, with applications in the network via ~~the service toolkits features, which may be~~functionality optionally realised for MExE service environment and USAT-servers.

6 VASP Relationship to VHE

6.1 Home Environment VASP (HE-VASP)

The Home Environment may allow HE-VASPs access to its service toolkits in the network, the USIM and in the ME for the execution of services provided by the HE-VASP. The Home Environment provides mechanisms to support identical services provided by HE-VASPs when the user moves across network boundaries and between UEs.

There may be some information, which is shared between the Home Environment and the HE-VASP (for example current capabilities), however this is outside the scope of standardisation.

6.2 Value Added Service Provider (VASP)

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. Mechanisms may be provided which allow the user to discover those services obtained directly from VASPs and personalise those services. These mechanisms are outside of the scope of VHE.

There are no VASP requirements to support VHE. It is noted that with mechanisms such as CC/PP, VASPs may indirectly implement VHE stored user profiles during Capability Negotiation (e.g. using HTTP next generation), however this is outside the scope of standardisation.

7 Personal Service Environment

The Personal Service Environment describes how the user wishes to manage and interact with their communications services. The PSE is a combination of a list of subscriptions (detailing provisioned services), preferences associated with those services, terminal interface preferences and other information related to the user's experience of the system. Within the PSE the user can manage multiple subscriptions e.g. both business and personal, multiple terminal types and express location and temporal preferences.

Note: Concept of user profile will be enhanced significantly in following 3GPP releases.

8 Requirements for Support of VHE

Note that many of the requirements below are fulfilled without VHE specific 3GPP stage 2/3 specifications support in release 4. The requirements below may generally be supported e.g. by:

- general standardised protocols functionalities (e.g. MAP);
- functionality provided by the existing toolkits;
- roaming agreements between operators and GSM association recommendations;
- non-specified application level functionality.

8.1 User Requirements of VHEThe above example list of services is not exhaustive.

6 High Level VHE Requirements

6.1 User Requirements

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~~personalise User data (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;~~Home Environment;
- use services in a consistent manner irrespective of serving network and terminal, within the technical limitations;
- access new services ~~provided by~~in the Home Environment;
- modify a ~~user profile(for~~**User Profile** (for example to include new services) from any location, within the technical limitations~~;~~
- activate or deactivate user services;
- ~~discover which local services are available;~~
- ~~access local services in a secure manner;~~
- interrogate current user service and user interface settings;
- select a particular User Profile;
- indicate (on a session by session basis if necessary) to which subscription charges are to be applied ;
- recover UE resident User Profile information to protect against loss or damage of user equipment. -
- not be restricted from discovering and accessing local services;
- ~~Be~~be aware of limitations of services, which may result from different terminals and or serving network capabilities.

~~8. 2~~6.2 Home Environment Requirements ~~for VHE Provision~~

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 e.g subject to subscription;
- control access to services depending on available Service Toolkits 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 Toolkits supported in the serving network, and terminals;

- define ~~the scope for management of services by the user, for services provided by the HE, supported by a standardised method for accessing uniquely addressable user profiles (FFS);~~

~~handle charging for services;~~

~~inform the serving network of the type of charging (i.e. prepaid or/and postpaid) for any required service;~~

~~inform the serving network of the threshold set for a given service required by the user and charged on a prepaid account;~~

~~inform the serving network how to manage a service for which the threshold has been reached;~~

~~manage the prepaid accounts (e.g. increase, decrease the credit, or pass the information to any application which manages the credit);~~network support of User Profile management (e.g. activate, modify) in a standardised manner.

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.

- ~~8.3 Serving Network Requirements for VHE Provision~~recover UE resident User Profile information to protect against loss or damage of user equipment

6.3 HE-VASP Requirements

The Home Environment Value Added Service Provider offers services to a user within the Virtual Home Environment. The HE-VASP may store user related, service specific information in application servers outside the Home Environment. This information can be requested by authorised HE-Services using references in the User Profile (e.g. in the form of an URL), managed by the Home Environment (cp. clause 7).

The Home Environment Value Added Service Provider shall be able to:

- manage references in User Profiles related to its service specific data outside the Home Environment;

- request user terminal capability information via standardised mechanisms subject to limitation of what is known in the HE

- offer dynamically new services to a user;

- have secure access to User Profile data as authorised by the Home Environment;

- manage access to HE-VASP Services;

- process HE-VASP services chargeable events at the discretion of the HE (cf. clause 10);

- refresh current HE-VASP User Profile information on request from HE

6.4 Visited Network Requirements

The ~~serving network should not need~~visited network is not required to be aware of the services offered via the ~~home environment.~~Home Environment.

The ~~user/home environment may request~~user/Home Environment may request information on capabilities, which are necessary to support, ~~home environment~~the Home Environment services.

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

- ~~the serving network shall~~ support user access to services in the ~~home environment;~~Home Environment.

~~- the serving network shall provide the necessary Service Toolkits to support the services from the home environment as far as possible;~~

- dynamically provide information on the available Service Toolkits in ~~the serving~~its network;

- provide transparent communication between clients and servers in terminals and networks;

- ~~exchange~~ exchange the charging information (type of charging, threshold for prepaid services and behaviour if the threshold is reached) for any service possibly required by the user~~;~~

- handle the ~~call~~service according to the instructions received by the ~~home environment~~Home Environment regarding charging activities;

- inform the ~~home environment~~Home Environment of the chargeable events (e.g. send CDRs, …).

6.5 Relationships within VHE

6.5.1 Home Environment VASP (HE-VASP)

The Home Environment may allow HE-VASPs access to its Service Toolkits in the network, the USIM and in the ME for the execution of services provided by the HE-VASP. The Home Environment provides mechanisms to support identical services provided by HE-VASPs when the user moves across network boundaries and between UEs.

There may be some information, which is shared between the Home Environment and the HE-VASP (for example current capabilities), however this is outside the scope of standardisation.

6.5.2 Value Added Service Provider (VASP)

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. Mechanisms may be provided which allow the user to discover those services obtained directly from VASPs and personalise those services. These mechanisms are outside of the scope of VHE.

There are no VASP requirements to support VHE. It is noted that with mechanisms such as CC/PP, VASPs may indirectly implement VHE stored User Profiles during Capability Negotiation (e.g. using HTTP next generation), however this is outside the scope of standardisation.

6.5.3 Local Service Relationship to VHE

Local services are not supported by VHE, however VHE should not preclude discovery and access to local services.

7 Personal Service Environment

The Personal Service Environment describes how the user wishes to manage and interact with their communications services. The PSE is a combination of a list of subscriptions (detailing provisioned services), preferences associated with those services, terminal interface preferences and other information related to the user's experience of the system. Within the PSE the user can manage multiple subscriptions e.g. both business and personal, multiple terminal types and express location and temporal preferences.

7.1 User Profiles

The User Profile is the collection of all subscriber data, including both Personalised data (e.g UE interface preferences set within the capabilities of the UE and serving network) and User Services Profile (preferences associated with subscribed services)

The User Profile data may be either by indirect reference and/or direction inclusion in the User Profile, namely:-

- a set of one or more references (e.g. URLs) in the User Profile where the User Profile data may be found; this method represents the indirect referencing model
- directly contained in the User Profile identifying services data; this method represents the direct referencing model

The User Profile may consist of both static and dynamic data, including status information.

Standardised User Profile data may be located in one or more entities, e.g.

- in the Home Subscriber Services (HSS)
- in the Call State Control Function (CSCF)
- in the user's (U)SIM application on the UICC
- on the mobile equipment (ME)
- in application-specific databases
- etc.

however the location or format of such data is will be replaced in stage 2 and 3 documents . Access to the User Profile shall be supported in a secure standardised way.

The following aspects of the User Profile, subsequently defined, shall be supported: -

- Classification
- Location and distribution
- Management, provisioning and access
- Default policies
- Synchronisation
- Security and privacy
- Format

It is the support of the services and personalisation information in the User Profile, which enables the concept for the user.

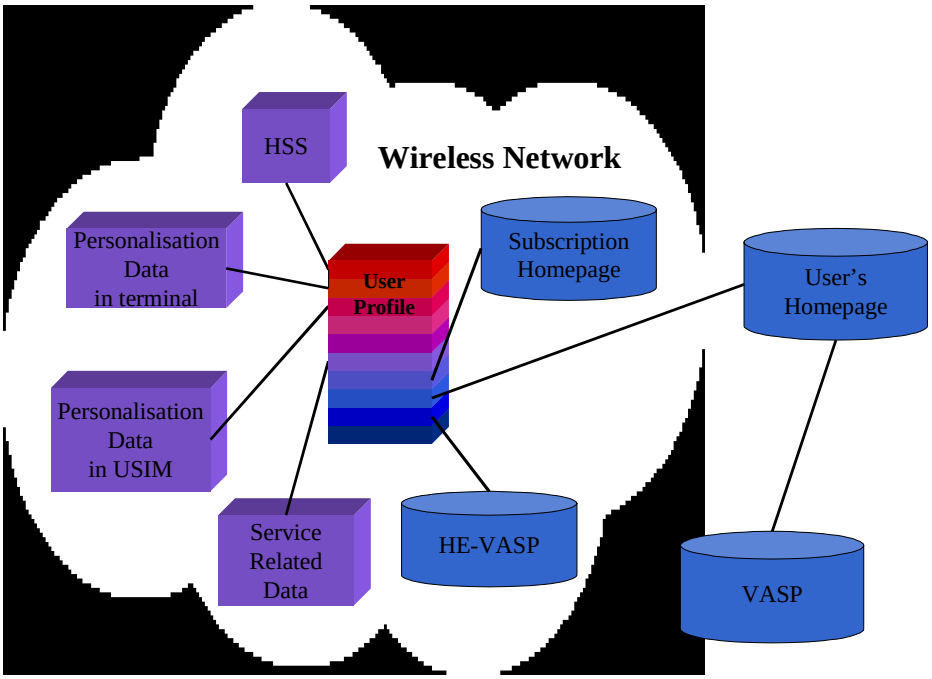


Figure 3: Distribution Model of the User Profile

Editor's note: This diagram has to be changed.

7.2 Classification of User Profile data

The User Profile shall support the following types of data

- Personalised data (e.g UE interface preferences set within the capabilities of the UE and serving network)
- User Service Profile (preferences associated with subscribed services)

7.3 Selection and activation of User Profiles

It shall be possible, per user, for the network operator, HE-VASP and user to:

- activate a User profile
- deactivate a User profile
- select a default User profile

Where the user has more than one User Profile the selection/activation of a particular User profile shall be supported in the following ways:

- *Statically*: the user explicitly selects one of the User Profiles as the active one;
- *Dynamically*: the appropriate User Profile is selected automatically (e.g. selection is based upon some criteria such as time of day, location, terminal used etc.).

Each User Profile shall have a uniquely addressable identity.

7.4 Location and distribution of User Profiles

The User Profile information may be partly stored in the UE ((U)SIM and ME), the Home Environment (e.g. HSS) and in the HE-VASP. The HE must be able to recreate all parts of the User Profile at all times. Hence in the event of loss/damage of the UE (USIM or ME), the User Profiles must be fully recoverable and be used to reconfigure a new UE.

There maybe some User Profile information stored outside the User Profile e.g. with VASP or in the UE (user's homepage), however this is outside the scope of standardisation. There is no requirement for backup and recovery of this data by the Home Environment.

Location and distribution of the User Profile shall be supported between the following entities:-

- (U)SIM
- Mobile Equipment (ME)
- Home Environment (e.g. HSS, CSCF, location servers, application servers etc.).

NOTE: To ensure that User Profiles are applicable to as wide a community of terminal and network types as possible, existing work on this topic in other standards fora should be considered. One possibility is the work of the World Wide Web Consortium on the Composite Capability/Preference Profile [12].

7.5 Management, provisioning and access to User Profiles

It shall be possible, per user, to permit secure authorised access by the network operator, HE-VASP and user to

- create one or more User Profiles
- request information contained in a User Profile
- delete a User Profile
- modify a User Profile
- define the default User Profile
- define the criteria for automatically selecting User Profiles

7.6 Default policies for User Profiles

It shall be possible, per user, to permit secure authorised access by the network operator, HE-VASP and user to support policy management for User Profiles, enabling definition of the following for User Profiles

- feature interaction policy
- QoS policy
- Rating plan policy
- Content filter policy

7.7 Synchronisation of the User profile

Mechanism(s) shall be standardised to support the synchronisation of the User Profile information stored in the ME, ((U)SIM), and Home Environment. The user shall have the overall authority when synchronisation of User Profile is

required. It shall be possible for the user to pre-define when synchronisation of the User Profile should take place (e.g. when services data is modified).

Editors note: who invokes Synchronisation

Synchronisation of the User Profile shall be supported between the following entities:-

- (U)SIM
- Mobile Equipment (ME)
- Home Environment (e.g. HSS, CSCF, location servers, application servers etc.).

Synchronisation of User profiles with VASP (i.e. not owned by the HE) is outside the scope of these TS.

7.8 Format of the User profile

The format of the User profile data will be handled in stage 2 and 3 document, , and shall be standardised in stage 2 and 3 specification.

The semantics and syntax of User Profiles shall be standardised to support access, interoperability and synchronisation, and to ensure access to User Profile data independently of which toolkit was used to create the service. Standardised access to User Profiles data shall be available to enable:-

- management (e.g. by the network operator)
- provisioning (e.g. by the user, network operator, services etc.)

and shall be supported from the following entities:-

- (U)SIM
- Mobile Equipment (ME)
- Home Environment (e.g. HSS, CSCF, location servers, application servers etc.)

7.9 Security of the User profile

Secure mechanisms shall be available for the transfer of User Profile data to, from or between authorised entities. Access to User Profile data shall only be permitted in an authorised and secure manner. The secure mechanisms to be applied shall be appropriate to the level of confidentiality of the data, the endpoints of the transfer and the routes that are available for the transfer of the data. The owner of the data, normally the body storing the master copy of the data, shall be responsible for applying the appropriate level of security to the transfer of the data.

The secure mechanisms available shall include the following:

- Before any user data transfer takes place, it shall be possible for the sender of the data to verify the identity of the recipient.
- It shall be possible for the recipient of data to identify the sender.
- It is permissible for either the sender or recipient of data to employ the services of a third party, known to, and trusted by, both in order to provide authentication of identity.
- The validity of an authentication of identity shall, if required, be subject to a maximum time limit.
- It shall be possible for the sender of data to render the data to be unreadable by any party not authorised to receive it.
- It shall be possible for the recipient of data to detect whether the sender has made any change to the data subsequent to its transmission.

- The security mechanisms shall provide verification that the data has been sent by the sender and received by the recipient (non-repudiation).
- It shall be possible for the sender and/or the recipient to create an audit log of all data transfer transactions of a specified type, provided that this requirement is made known before any transfer takes place.

8 Components of VHE

The user's services in the Virtual Home Environment shall be enabled by support of: -

- the User Profile

  together with any combination of:-

- the generic bearers (defined by QoS)
- call control (e.g. IP multimedia or circuit switched)
- and any combination of the Service Toolkits (i.e. MExE[2], CAMEL[3], USAT [4], OSA[11]) on which the services are built

Additionally, non-3GPP standardised Service Toolkits from the IT and IP world may be used to enhance VHE services.

9 Usage of existing toolkits

Improvements for VHE to support IP multimedia services shall be supported, e.g. improvements to service toolkits, service capability servers and User Profile etc. This will give operators and 3rd party service developers the opportunity to create IP multimedia applications and services for networks supporting IP services.

Existing 3GPP toolkits (such as CAMEL, MExE, USAT and OSA), and non-3GPP toolkits shall be used when available.

~~9. 1~~VHE shall include new (if required) and enhanced service toolkits to support IP multimedia services.

9.1 CAMEL

Release ~~4~~5 shall be able to use CAMEL plus any improvements for CAMEL [3]

VHE shall be able to use CAMEL improvements on previous CAMEL releases (e.g. Phase 4) of TS22.078

~~release 4 [3]~~The VHE requirements on ~~CAMEL:~~CAMEL are FFS

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

9.-2 MExE

Release ~~4~~5 shall be able to use MExE improvements ~~following Release 99 plus previous versions of [2]~~ on previous MExE releases [2]

- ~~9. 3~~There needs to be harmonisation between the MExE user profile and **User Profile**. This could also require a mechanism to interrogate the terminal about its user terminal profile.

9.3 USAT

Release 45 shall be able to use USAT improvements ~~following Release 99 plus previous versions of~~ on previous USAT releases [4]

- There needs to be harmonisation between the USAT user profile and **User Profile**.
- USAT terminals interact with the USIM using capability negotiation, and it shall be possible to continue usage of the capability negotiation for IP multimedia services.

9.4 Open Service Access (OSA)

Release 45 shall be able to use OSA improvements on previous OSA releases [9].

10 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.~~Home Environment. It shall be possible for the ~~home environment~~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~~UE or USIM may be subject to charge.
- service upgrading:
  - the upgrading of previously transferred services to the user's ~~MS~~UE 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:~~

- roaming:

  - the usage of VHE services when roaming may be subject to additional charges.

~~Refer to [11] for further details.~~- inform the serving network of the type of charging (i.e. prepaid or/and postpaid) for any required service;

- inform the serving network of the threshold set for a given service required by the user and charged on a prepaid account;

- inform the serving network how to manage a service for which the threshold has been reached;

- manage the prepaid accounts (e.g. increase, decrease the credit, or pass the information to any application which manages the credit);

- access of the **User Profile**.

Refer to [13]

Other charging requirements may be identified and are FFS.

11 Security requirements

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

The specific security requirements are FFS.

For User Profile security requirement refer to sub clause 7.9.

Annex A (informative): Service examples to be considered in VHE

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

Table A.1

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 servicetoolkits.

Annex B (informative): Change history

Version	Date	Comment
0.1.0	Dec 2000	Initial Draft at Vienna
0.2.0	Jan 2001	Initial Draft at Uxbridge Meeting
0.3.0	Feb 2001	Initial Draft at Capetown

TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New
~~SA#04~~			~~22.121~~							~~3.0.0~~
~~SP-05~~	~~SP-99442~~	~~S1-99809~~	~~22.121~~	~~002~~		~~R99~~	~~B~~	~~Virtual Home Environment.~~	~~3.0.0~~	~~3.1.0~~
~~SP-05~~	~~SP-99442~~	~~S1-99845~~	~~22.121~~	~~003~~		~~R99~~	~~B~~	~~Addition of IP4 Addressing~~	~~3.0.0~~	~~3.1.0~~
~~SP-05~~	~~SP-99442~~	~~S1-99535~~	~~22.121~~	~~004~~		~~R99~~	~~B~~	~~Charging capabilities~~	~~3.0.0~~	~~3.1.0~~
~~SP-07~~	~~SP-000067~~	~~S1-000107~~	~~22.121~~	~~005~~		~~R99~~	~~F~~	~~Clarification of service capabilities~~	~~3.1.0~~	~~3.2.0~~
~~SP-07~~	~~SP-000067~~	~~S1-000156~~	~~22.121~~	~~006~~		~~R99~~	~~C~~	~~Information Transfer service capability feature~~	~~3.1.0~~	~~3.2.0~~
~~SP-08~~	~~SP-000204~~	~~S1-000267~~	~~22.121~~	~~007~~		~~R99~~	~~F~~	~~Modification of section 10.2.6 on reducing the scope of the VHE/OSA reqirements~~	~~3.2.0~~	~~3.3.0~~
~~SP-08~~	~~SP-000204~~	~~S1-000283~~	~~22.121~~	~~008~~		~~R99~~	~~F~~	~~Removal of section 10.2.3 Address Translation SCF~~	~~3.2.0~~	~~3.3.0~~
~~SP-08~~	~~SP-000204~~	~~S1-000285~~	~~22.121~~	~~009~~		~~R99~~	~~F~~	~~Modification of section 10.2.9 to reduce scope of User Profile Management service capabilities~~	~~3.2.0~~	~~3.3.0~~
~~SP-08~~	~~SP-000204~~	~~S1-000334~~	~~22.121~~	~~010~~		~~R99~~	~~F~~	~~Alignment of VHE Stage 1 top VHE/OSA Stage 2 and stage 3~~	~~3.2.0~~	~~3.3.0~~
~~SP-09~~	~~SP-000387~~	~~S1-000566~~	~~22.121~~	~~011~~		~~R4~~	~~C~~	~~VHE in R00 User Profile~~	~~3.3.0~~	~~4.0.0~~
~~SP-09~~	~~SP-000387~~	~~S1-000565~~	~~22.121~~	~~012~~		~~R4~~	~~C~~	~~VHE in R00~~	~~3.3.0~~	~~4.0.0~~
~~SP-09~~	~~SP-000381~~	~~S1-000640~~	~~22.121~~	~~013~~		~~R4~~	~~D~~	~~Change of MExE name~~	~~3.3.0~~	~~4.0.0~~
~~SP-09~~	~~SP-000387~~	~~S1-000564~~	~~22.121~~	~~014~~		~~R4~~	~~D~~	~~Realisation of Application interface~~	~~3.3.0~~	~~4.0.0~~
~~SP-09~~	~~SP-000387~~	~~S1-000569~~	~~22.121~~	~~015~~		~~R4~~	~~B~~	~~Synchronisation of distributed user profiles~~	~~3.3.0~~	~~4.0.0~~
~~SP-09~~	~~SP-000387~~	~~S1-000570~~	~~22.121~~	~~016~~		~~R4~~	~~B~~	~~Uniquely addressable user profiles~~	~~3.3.0~~	~~4.0.0~~
~~SP-09~~	~~SP-000387~~	~~S1-000571~~	~~22.121~~	~~017~~		~~R4~~	~~D~~	~~VASP indirect support of VHE~~	~~3.3.0~~	~~4.0.0~~