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Foreword

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Contents

Foreword

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

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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].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.

For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.* [1] 3GPP TR 21.905 “Vocabulary for 3GPP Specifications (Release 1999) .

[2] 3GPP TS 22.057 “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects Mobile Execution Environment (MExE); Service description".

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

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

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

[6] 3GPP TS 22.105: “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects Services and 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 22.127: “3rd Generation Partnership Project; Technical Specification Group Services and System Aspects Open Services Access (OSA)”

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

[11] 3GPP 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).

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]).

3.2 Abbreviations

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

API	Application Programming Interface
CAMEL	Customised Application for Mobile network Enhanced Logic
CAP	CAMEL Application Part
CDR	Call Detail Record
CSE	Camel 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 Network
PSE	Personal Service Environment
SAT	SIM Application Toolkit
SIM	Subscriber Identity Module

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:

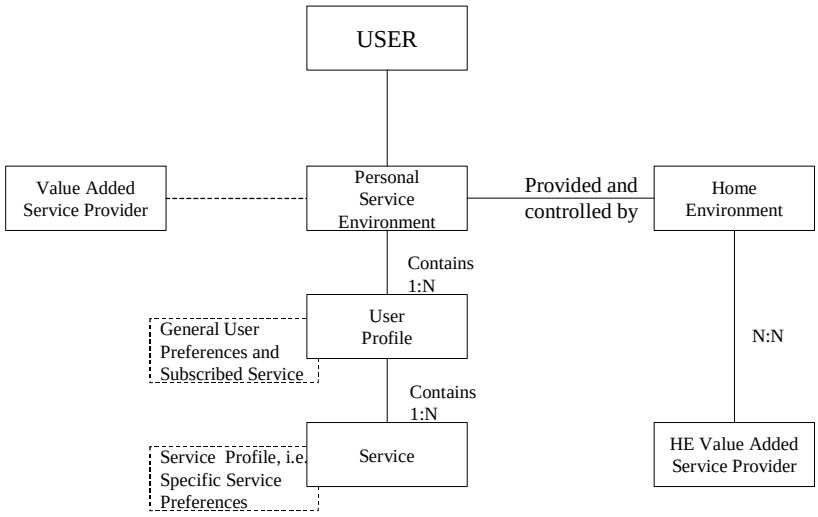
- personalised services;
- personalised User Interface (within the capabilities of terminals);
- consistent set of services from the user's perspective irrespective of access e.g. (fixed, mobile, wireless etc. Global service availability when roaming.

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. 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.

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

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

- 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

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

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]). The set of services available to a user within the VHE is personalised by a set of user profiles 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, SAT, MExE). These toolkits 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 Toolkits (Bearers, Mechanisms). The functionality offered by the different Service Toolkits are defined by them 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 accessible via APIs, for example, MExE and SAT APIs.

The terminal can communicate, using bearer services, with applications in the network via the service toolkits features, which may be optionally realised for MExE service environment and SAT-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 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;
- be aware of limitations of services, which may result from different terminals and or serving network capabilities.

8.2 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);
- 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

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

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

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

- the serving network shall support user access to services in the home environment;
- the serving network shall provide the necessary Service Toolkits to support the services from the home environment as far as possible;
- dynamically provide information on the available Service Toolkits in the serving network;
- provide transparent communication between clients and servers in terminals and networks;
- 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 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 Usage of existing toolkits

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

9.1 CAMEL

Release 4 shall be able to use CAMEL plus any improvements for CAMEL release 4 [3] VHE requirements on CAMEL:

- Users shall be able to use their existing CAMEL services in a consistent manner with CS services the same look and feel of the service shall be maintained.

9.2 MExE

Release 4 shall be able to use MExE improvements following Release 99 plus previous versions of [2].

9.3 USAT

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

9.4 Open Service Access (OSA)

Release 4 shall be able to use OSA [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. 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] for further details.

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.

Annex A:
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.

Annex B:
Change history

TSG SA#	SA Doc.	SA1 Doc	Spec	CR	Rev	Rel	Cat	Subject/Comment	Old	New	Work Item
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	
SP-11	SP-010059	S1-010085	22.121	018		Rel-4	F	Changes to TS 22.121 Release 4 - Update of 097 submitted to S1 Plenary	4.0.0	4.1.0	VHE1
SP-16	SP-020235		22.121			R99		Converted to TR	4.1.0	4.1.1	

History

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