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Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Terminals;
Application and User interaction in the UE -
Principles and specific requirements
(Release 5)**

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Contents

Foreword

This Technical Specification 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.

Introduction

The present rapid development of a diversity of new applications and application environments for mobile usage creates a complexity of previously unseen proportions that the UE has to handle. These applications and application environments co-exist and execute independently in the UE, and thus have the potential to interact with each other in a way that could be detrimental to the positive user experience and sense of user control of the UE. There is a need to control and manage the total applications/interfaces environment and MT resources so as to produce a conceptually consistent and logically whole and integrated user experience.

The present document outlines a generic model for the interaction between these applications. It further specifies a set of basic principles and requirements for these applications to co-exist on the UE. This specification may also result in presenting to the user a coherent user experience.

The present document's purpose is *not* to categorise the applications peripherals, but to try to structure the events that are internal and external to, and has to be handled by, the MT Core Functions. This means that the structure or grouping of the events should be made from a *MT centric* perspective. Some applications run on the UE side have counterparts in the network. The present document addresses the interactions within the UE.

The User Equipment functional model used in this specification is defined by the model included in 23.101 [8].
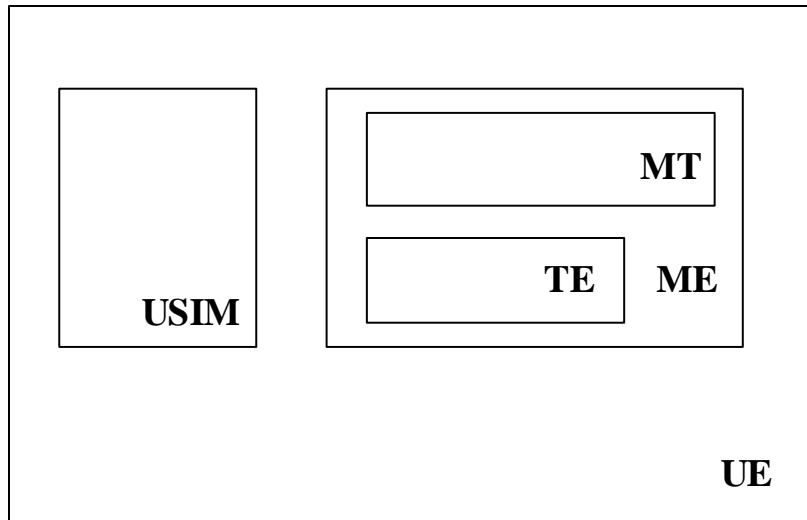
Figure 1: Functional Model for the User Equipment

1 Scope

The present document defines the principles for scheduling UE resources and controlling UE interactions and resolving conflicts between independently running applications in different application execution environment (e.g. MExE, USAT etc.) and internal and external peripherals (e.g. infra-red, Bluetooth, USIM, radio interface, MMI, memory etc.).

The present document is divided in two parts: clause 4 defines a framework for event handling. Clause 5 addresses some specific issues.

Annex A contains an informative background to the problem area.

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"

[2] 3GPP TS 23.057: "Mobile Execution Environment (MExE); Functional description; Stage 2".

[3] WAP, WAP Forum, "WAP Technical Specifications Suite" (http://www.wapforum.com/)

[4] 3GPP TS 31.101: "UICC-Terminal Interface; Physical and Logical Characteristics".

[5] 3GPP TS 31.102: "Characteristics of the USIM Application".

[6] 3GPP TS 31.111: "USIM Application Toolkit (USAT)".

[7] 3GPP TS 22.038: "USIM/SIM Application Toolkit (USAT/SAT); Service description; Stage 1".

[8] 3GPP TS 23.101: "General UMTS Architecture"

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the referred documents and the following apply:

call: voice and data calls, USSD, SMS, fax, GPRS calls, supplementary services, etc.

preferences: includes authorisations, priorities, options, etc.

authorisation: permission to set up and or receive any call or only certain types of call and access rights to user data

MT Core Functions: software functions that contain the central logic for the MT, including for instance the scheduling of events

3.2 Abbreviations

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

ME: Mobile Equipment
MExE: Mobile Execution Environment
MM: Mobility Management
MT: Mobile Termination
RR: Radio Resource
UE: User Equipment
USAT: USIM Application Toolkit
WAP: Wireless Application Protocol

4 Principles for the Framework

The model presented in annex A defines a framework specifying *principles* for event handling, with the focus on issues related to application interaction. Principles for the framework are given below, using the stated definitions. The list is not necessarily complete.

4.1 Basic principles

1. Irrespective of the principles given below, emergency calls shall override all other calls.

2. The MT is the central resource and schedules internal and external entities according to the user's preferences and external environment.

4.2 User requirements

1. The user shall have the capability to make the ultimate decisions as elaborated below. Additionally, in the case where an UE is unmanned, none of the issues below shall render the UE inoperable such that it requires manual intervention locally at the UE to restore its use.

2. The user shall have the capability of selecting preferences interactively and/or via prior set-up in one or more user profiles. These shall be valid on a global or on a per application basis. The user's preferences shall be retained even in the event of loss of power.
   Preferences can be selected for an application when it is installed, or at any other time thereafter.
   Preferences, notably but not exclusively the priorities, can be modified at any time and this shall have effect at the earliest possible opportunity thereafter.

3. The user shall have the capability to modify authorisations assigned to applications. These shall be valid on a global or on a per application basis in one or more user profiles.

4. The user shall have the option to be advised to what extent an application has been authenticated at installation-time, and prevent the application from being installed based on this advice.
   The user shall have the option to be advised about the integrity of an application at installation-time, and prevent the application from being installed based on this advice.

5. The user shall have the capability to abort or suspend any on-going call that has been set up automatically by an application.

6. The user shall have the capability to require that the UE request permission from the user for individual calls, sets of calls (for instance all calls by a certain application) or all calls. The user shall have the capability to request the UE to record information on individual calls, sets of calls or all calls.

7. The user shall have the capability to distinguish which entity/application caused a specific event. The UE uses this information to support the user's preferences. The UE shall be able to inform the network of entity/application at set up time to support trace-ability when a call is set up.

8. The user's privacy shall be protected. Access to user data (including user profiles and any personal information in the UE) and audio functions (this would prevent for instance a mechanism that allows eavesdropping) shall not be possible without the user's prior permission.

9. The user shall have the capability to request from the UE which applications are present in the MExE environment and the (U)SIM, and whether they are running. The user shall also have the capability to request from the UE the status of other interfaces as shown in Figure 1, where implemented.

4.3 Specific requirements on applications

1. An application shall not assume that it is the only one active. For example where several applications use the same interface the application and/or the protocols used over the interface must be able to handle contention.

2. An application shall not interfere (terminate, suspend or degrade) with on-going calls set up by another application without authorisation from the user. For certain combinations of call (e.g., voice/data and USSD messages), interference can happen resulting in a level of degradation.

3. An application shall not assume that it has priority over another application, and shall comply with the user's currently selected preferences.

4.4 Specific requirements on the UE

1. The UE shall have the capability to authenticate the source of the application.

2. The UE shall have the capability to assure the integrity of an application.

5 Specific Interaction Requirements

The following clauses detail specific interaction requirements.

5.1 Bearer Independent Data Transfer: Radio Access bearers

Bearer Independent Data Transfer, using bearers over the Uu reference point, is a (U)SAT feature that allows a (U)SAT application to request the MT to set up and manage a data channel over a CSD, GPRS, SMS or USSD bearer using information provided by the (U)SAT application. Once the call is established, data may be transferred through that data call. The details for the (U)SIM-(U)SAT/ME interface are specified in 3GPP TS 31.101 [4], 31.102 [5], and 31.111 [6]. The Service Requirements for this are specified in 3GPP TS 22.038 [7].

5.1.1 Interaction between Core MT functions and Bearer Independent Data Transfer Service using Radio Access bearers

When a Bearer Independent Data Transfer Service is requested by a (U)SAT application, the MT shall:

- If the MT is idle, set up the data channel as requested, indicating to the user by appropriate means, e.g., with an icon, that one or more calls are in progress and confirming to the (U)SAT application.

- If the MT is not idle and can not service the request without negative impact on ongoing services, then the MT shall indicate to the (U)SAT application that the data channel can not be set up. However, if the user has indicated a preference for servicing such requests despite the negative impact then the MT may proceed as in the bullet point above.

- If the user requests that the call be terminated via MMI or other interface, then the call shall be terminated and the (U)SAT application shall be informed.

- If an external device (TE, Bluetooth device etc.) requests the same resource then that request shall be denied.

The above behaviour may be modified by a change of user preferences, for example the user may request the MT to deny access by the (U)SAT application to a data channel, or the user may request the MT to prioritise a particular external device such that a call set up by a (U)SAT application is cleared in order for the external device to be able to make a call.

5.2 Bearer Independent Data Transfer: local bearers

Bearer Independent Data Transfer, using local bearers, is a (U)SAT feature that allows a (U)SAT application to request the MT to set up and manage a data channel over local links such as Bluetooth, IrDA, RS232 or USB, using information provided by the (U)SAT application. Once the channel is open (local link), data may be transferred through the open channel. The details for the (U)SIM- (U)SAT/ME interface are specified in 3GPP TS 31.101 [4], 31.102 [5], and 31.111 [6]. The Service Requirements for this are specified in 3GPP TS 22.038 [7].

5.2.1 Interaction between Core ME functions and Bearer Independent Data Transfer Service using local bearers

When a Bearer Independent Data Transfer Service over a local link is requested by a (U)SAT application, the MT shall:

- If the MT can set up the local channel as requested, the user shall be notified by appropriate means, e.g., with an icon, that one or more channels are in progress and confirming to the (U)SAT application.

- If the MT cannot service the request without negative impact on ongoing services, then the MT shall indicate to the (U)SAT application that the data channel cannot be opened. However, if the user has indicated a preference for servicing such requests despite the negative impact then the MT may proceed as in the bullet point above.

- If the user requests that the channel be closed via MMI or other interface, then the channel shall be closed and the (U)SAT application shall be informed.

The above behaviour may be modified by a change of user preferences, for example the user may request the MT to deny access by the (U)SAT application to a data channel over a local link, or the user may request the MT to prioritise a particular external device such that a channel open by a (U)SAT application is cleared in order for the external device to be able to make open a channel.

5.2.2 Security requirements on (U)SAT Bearer Independent Data Transfer using local bearers

The local link connection, via Bluetooth, IrDA, USB or RS232, set up from a (U)SAT application shall follow the same security requirements as if the link were established by an application in the MT.

It is important that the requirements stated in 5.3 "Services and applications external to the MT" are fulfilled when a Bearer Independent Data Transfer via local link bearer is controled by a (U)SAT application.

The secret key and the authentication algorithm cannot be transferred out from the UICC, where the (U)SAT application resides, over the established local link.

5.3 Services and applications external to the MT

In the tele- and datacom community there exist today use cases for moving internal interfaces out of the MT; they are required to fulfil user expectations of what services and features 3G MTs should offer.

However, discussions on security clearly show that services should be terminated in the MT, while applications can, as today, terminate in the TE. A possible UE functionality split should not allow internal interfaces (including USIM) to be moved to external interfaces, neither using USAT local link nor other interfaces.

This is a precaution that shall be taken until suitable procedures against misuse have been found and standardised.

Annex A (informative):
Interaction handling

In the present document we illustrate possible types of interaction handling for a MT that already can be required or that currently are being developed in standards and industry fora. Although it is probable that only a subset of these entities will exist at the same time, there is no way of knowing the particular combination of applications or a particular users needs relative to this in advance; *a general way to handle the co-existence must still be defined*.

A framework, defining general rules for handling this co-existence of several external functions is outlined in the present document. The framework states requirements for the behaviour of the external functions as well as principles for the co-existence as such. As an example, several of the external functions below, or protocols used by them (e.g., the AT-commands) assume a one-to-one relation between them and the MT Core Functions, implying a lack of specified mechanisms to handle a multitask environment.

A.1 The model approach

The model below proposes a *conceptual* split, meaning that the entities and their interfaces are *logical* and need not correspond to any physical division. Before the figure is presented some clarifications and general comments are needed:

- The *MT Core Functions* should be understood as the (collection of) software functions that contain the central logic for the MT, including for instance the scheduling of events.

- With *external event* is meant interaction that an application/peripheral wants (requests/commands), as well as necessary handling of network signalling, user request via the keys, etc. External does not imply whether an external interface is used or not.

- Some *network signalling* is easy to refer to basic network functions, such as Location Update, while other signalling has been invoked by an application.

- The user can interact intervene *directly* via keys, etc. This is indicated with the *Manual User Interaction* entity. The user can of course do the same via, e.g., a PC or a MExE application, but the events that such actions create is here viewed like the other events that these entities can create.

- The *USIM* general *Smart Card Functions* are split into several logical entities: the Transport Layer Security, meaning "basic" 2G/3G security; the USIM Application Toolkit; USIM Application Toolkit Run AT-command; and other functions, such as the WIM, the WAP Identity Module, that is being specified.

- The *TE*, Terminal Equipment, is a PC or another piece of equipment that can run applications independently.

- An *Intelligent Peripheral* could be an advanced charger or a car hands-free installation.

- The *MExE* entities are as defined in [2].

- *Other* includes MT resident applications and allows for future applications, and, if that is needed for the model, could correspond to other external devices such as a microphone.

- The interfaces as shown in the figure are logical. In practice the applications run in the MT, a TA or on its own separate platform, and the interfaces are then MT internal or external via a physical connector, IrDA, or Bluetooth.
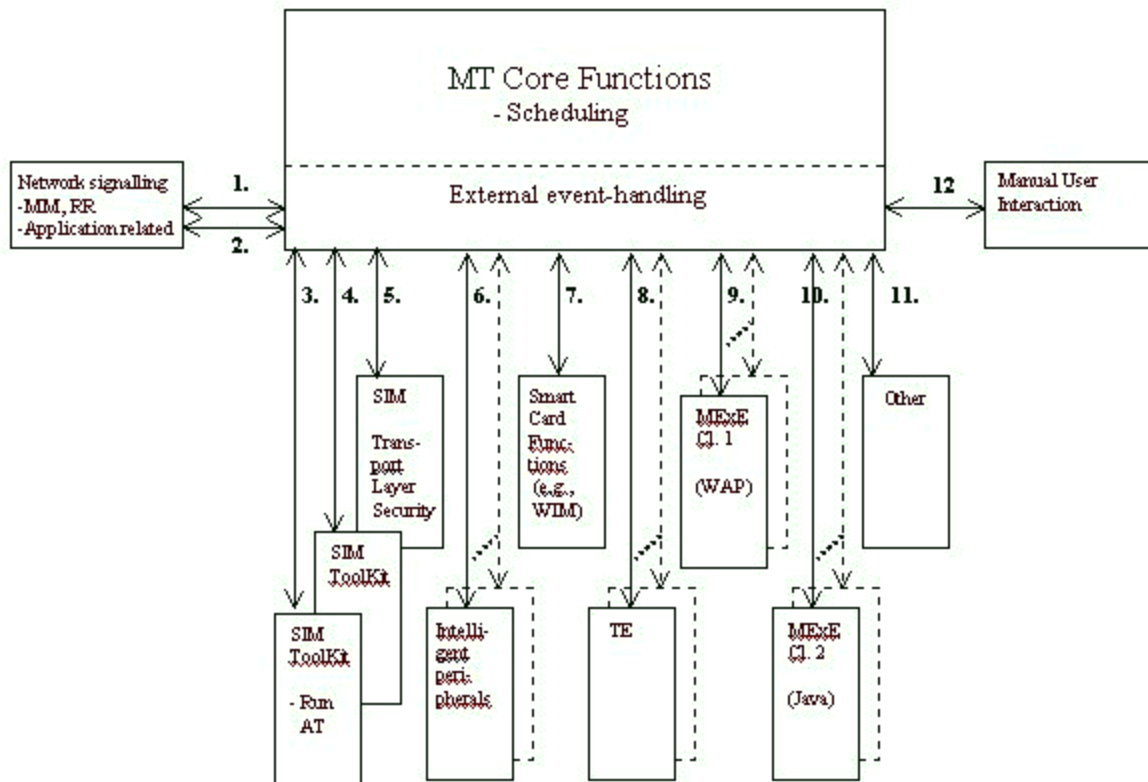
Figure A.1 Example of External events that the MT Core Functions should handle

The figure shows the extent of the complexity that the MT will be expected to handle. It is obvious that a generic framework for conflicts, error handling and interactions is needed. In particular, the following issues can be noted:

1. Priorities of the event handling – the MT does the scheduling and this should be according to the user's preferences.

2. User control – the user's wanted / required interaction; his/her knowledge and control of the events; user integrity for instance for personal data, the MT position, etc.

3. Trace-ability – which entity / application has caused a particular event. This information is required input to solve several of the other issues.

4. Consistency - in the actions of the MT Core Functions relative to the specific application. Several applications and priority levels interact.

5. The validity of commands – for instance call validity when the MT is in the Home PLMN or roaming.

6. Network signalling aspects – how does for instance a dual mode MT treat applications specific to only one of the standards.

7. It might be necessary to look into mechanisms for rejection and termination by the MT Core Function (upon user choice) for applications, calls etc.

8. Testability – the MT manufacturer must be able to as far as possible verify the behaviour of the product, and this should be taken into consideration when the framework is specified. Conformance testing, however, is only relevant to the extent that already is tested.

9. Security aspects – for the protection of the MT and the network mechanisms like authentication of the applications might be required.

Further, the entities have different characteristics; this can possibly be used by the framework definitions. The following can for instance be noted:

1. Several of the entities work together with network nodes, some as slaves (e.g., SIM) and others invoking commands (e.g., WAP). Others, like the intelligent peripherals, only communicate "locally".

2.   The entities can be active or passive. In the latter case the MT has more knowledge about the expected behaviour, since they only execute functions upon request and cannot issue commands independently.

3.   Some events refer to "basic" network handling, some to manual user interaction, and others relate to application invoked functions. "Basic" network interaction should then have priority if such a distinction can be made. Consideration should be given to incoming calls.

Annex B (informative):
Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2001-03	T#11	TP-010030	-		Approval of first version	1.0.0	4.0.0
2001-12	T#14	TP-010269	002		Correction in WAP Forum Reference	4.0.0	4.1.0
2001-12	T#14	TP-010269	003		Text added to Figure A.1	4.0.0	4.1.0
2001-12	T#14	TP-010269	001		Expansion of introduction and clarifications of scope	4.1.0	5.0.0
2001-12	T#14	TP-010269	004		Add the interaction requirements for USAT bearer indepenedent protocol via local links	4.1.0	5.0.0
2002-03	T#15	TP-020014	006		Alignment of UE architecture with 23.101	5.0.0	5.1.0