3GPP TSG-T (Terminals) Meeting #17
Biarritz, France 4 – 6 September 2002

Tdoc TP-020213

Source: T3

Title: Change Requests to TS 31.113

Document for: Approval

This document contains several change requests as follows:

T3 Doc	Spec	CR	Rv	Rel	Cat	Subject
T3-020686	31.113	018	-	Rel-5	F	Reference to non existing local pages
T3-020687	31.113	019	-	Rel-6	A	Reference to non existing local pages
T3-020688	31.113	020	-	Rel-5	F	Clarification of Execute USAT Command
T3-020689	31.113	021	-	Rel-6	A	Clarification of Execute USAT Command
T3-020690	31.113	022	-	Rel-5	F	Handling of operational pull messages and post mode
T3-020691	31.113	023	-	Rel-6	A	Handling of operational pull messages and post mode
T3-020685	31.113	024	-	Rel-6	B	Terminal Response Handler Modifier exception mechanism enhancement.

3GPP T3 (USIM) Meeting #24
Seattle, USA, 19 – 22 August 2002

Tdoc ⌘T3-020686

CR-Form-v7

CHANGE REQUEST

⌘ **31.113** **CR** **018** ⌘ **rev** **-** ⌘ Current version: **5.3.0** ⌘

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

Proposed change affects: UICC apps⌘ [X] ME [ ] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Reference to non existing local pages
Source:	⌘	T3
Work item code:	⌘	USAT1-Interpr
Date:	⌘	21/08/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(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)*
Rel-6	*(Release 6)*

Reason for change:	⌘	According to TS 31.114 it is possible to remove a local page without removing links from the event- and menu-system to that page. In TS 31.113 it is not specified, how to handle events and menu entry selections referring to a non existing local page.
Summary of change:	⌘	If an event or a menu selection tries to access a local page which does not exist, a "jump to undefined" error shall be generated by the USAT Interpreter.
Consequences if not approved:	⌘	Possibly different implementations of error handling.

Clauses affected:	⌘	4.4

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

4.4 Activation

Activation of USAT Interpreter depends on USAT Interpreter current state. The USAT Interpreter state corresponds to the presence or the origin of proactive session generated by USAT Interpreter. A state can be:

- Idle (i.e. no proactive session is running);
- Rendering a page (i.e. proactive session issued from byte code command);
- Wait state (see section 4.2.3).

The USAT Interpreter can be activated in different ways:

- locally from the UE using menu selection;
- locally from the UE as the result of an event;
- by an incoming page as a result of a previous page request from the USAT Interpreter;
- by an incoming page initiated by an external system entity ("push"); or
- optionally by an internal application using a proprietary interface.

The rendering of a page shall be independent of the means of activation.

With respect to activation locally from the UE using menu selection, the SETUP MENU command as described in 3GPP TS 31.111 [1] can contain one or more links to a Page Identification TLV which identifies a locally stored page. When one of these identifiers is selected, and when USAT Interpreter is in idle state, the USAT Interpreter is activated and renders the referenced page. If the referenced local page does not exist the USAT Interpreter shall generate a "Jump to undefined" error (see chapter 12). Registering of pages to the main menu is up to administrative means.

An event (as specified in 3GPP TS 31.111 [1] or proprietary events defined by the card issuer) is linked to a Page Identification TLV which identifies a locally stored page. When the UE sends an ENVELOPE command containing an event, and when USAT Interpreter is in idle state, the USAT Interpreter is activated and renders the referenced page. If an event is received not referencing to a page, the event shall be ignored by the USAT Interpreter. If the referenced local page does not exist the USAT Interpreter shall generate a "Jump to undefined" error (see chapter 12). For security reasons, setting up events is up to administrative means.

If an event occurs while the USAT Interpreter is not in idle state, the USAT Interpreter shall queue the event and shall postpone executing the event until the USAT Interpreter enters idle state again.

The USAT Interpreter shall be able to queue at least one event. Events shall be executed in the order the events have been occurred.

If the USAT Interpreter is not able to store an event (e.g. because the event queue is full already), it is up to the implementation of the USAT Interpreter to handle this situation.

3GPP T3 (USIM) Meeting #24
Seattle, USA, 19 – 22 August 2002

Tdoc ⌘T3-020687

CR-Form-v7

CHANGE REQUEST

⌘ **31.113** **CR** **019** ⌘ **rev** **-** ⌘ Current version: **6.0.0** ⌘

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

Proposed change affects: UICC apps⌘ [X] ME [ ] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Reference to non existing local pages
Source:	⌘	T3
Work item code:	⌘	USAT1-Interpr
Date:	⌘	21/08/2002
Category:	⌘	**A**
Release:	⌘	Rel-6

Use one of the following categories:
F *(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)*
Rel-6	*(Release 6)*

Reason for change:	⌘	According to TS 31.114 it is possible to remove a local page without removing links from the event- and menu-system to that page. In TS 31.113 it is not specified, how to handle events and menu entry selections referring to a non existing local page.
Summary of change:	⌘	If an event or a menu selection tries to access a local page which does not exist, a "jump to undefined" error shall be generated by the USAT Interpreter.
Consequences if not approved:	⌘	Possibly different implementations of error handling.

Clauses affected:	⌘	4.4

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

4.4 Activation

Activation of USAT Interpreter depends on USAT Interpreter current state. The USAT Interpreter state corresponds to the presence or the origin of proactive session generated by USAT Interpreter. A state can be:

- Idle (i.e. no proactive session is running);
- Rendering a page (i.e. proactive session issued from byte code command);
- Wait state (see section 4.2.3).

The USAT Interpreter can be activated in different ways:

- locally from the UE using menu selection;
- locally from the UE as the result of an event;
- by an incoming page as a result of a previous page request from the USAT Interpreter;
- by an incoming page initiated by an external system entity ("push"); or
- optionally by an internal application using a proprietary interface.

The rendering of a page shall be independent of the means of activation.

With respect to activation locally from the UE using menu selection, the SETUP MENU command as described in 3GPP TS 31.111 [1] can contain one or more links to a Page Identification TLV which identifies a locally stored page. When one of these identifiers is selected, and when USAT Interpreter is in idle state, the USAT Interpreter is activated and renders the referenced page. If the referenced local page does not exist the USAT Interpreter shall generate a "Jump to undefined" error (see chapter 12). Registering of pages to the main menu is up to administrative means.

An event (as specified in 3GPP TS 31.111 [1] or proprietary events defined by the card issuer) is linked to a Page Identification TLV which identifies a locally stored page. When the UE sends an ENVELOPE command containing an event, and when USAT Interpreter is in idle state, the USAT Interpreter is activated and renders the referenced page. If an event is received not referencing to a page, the event shall be ignored by the USAT Interpreter. If the referenced local page does not exist the USAT Interpreter shall generate a "Jump to undefined" error (see chapter 12). For security reasons, setting up events is up to administrative means.

If an event occurs while the USAT Interpreter is not in idle state, the USAT Interpreter shall queue the event and shall postpone executing the event until the USAT Interpreter enters idle state again.

The USAT Interpreter shall be able to queue at least one event. Events shall be executed in the order the events have been occurred.

If the USAT Interpreter is not able to store an event (e.g. because the event queue is full already), it is up to the implementation of the USAT Interpreter to handle this situation.

3GPP T3 (USIM) Meeting #24
Seattle, USA, 19 – 22 August 2002

Tdoc ⌘T3-020688

CR-Form-v7

CHANGE REQUEST

⌘ **31.113** **CR** **020** ⌘ **rev** **-** ⌘ Current version: **5.3.0** ⌘

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

Proposed change affects: UICC apps⌘ [X] ME [ ] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Clarification of Execute USAT Command
Source:	⌘	T3
Work item code:	⌘	USAT1-Interpr
Date:	⌘	21/08/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(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)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The handling of output variables of the Execute USAT Command byte code needs further explanation.
Summary of change:	⌘	Clear and consistent terms for the output variables of the Execute USAT Command byte code. Explanation of the content of the output variables.
Consequences if not approved:	⌘	Possibly incompatible implementations of the Execute USAT Command.

Clauses affected:	⌘	8.7, 8.7.1, 8.7.5, 8.7.5.1, 8.7.5.2

Other specs affected: ⌘	Y	N	
		X	Other core specifications
		X	Test specifications
		X	O&M Specifications

Other comments: ⌘

8.7 Execute USAT Command

This byte code executes an USAT command using the provided arguments.

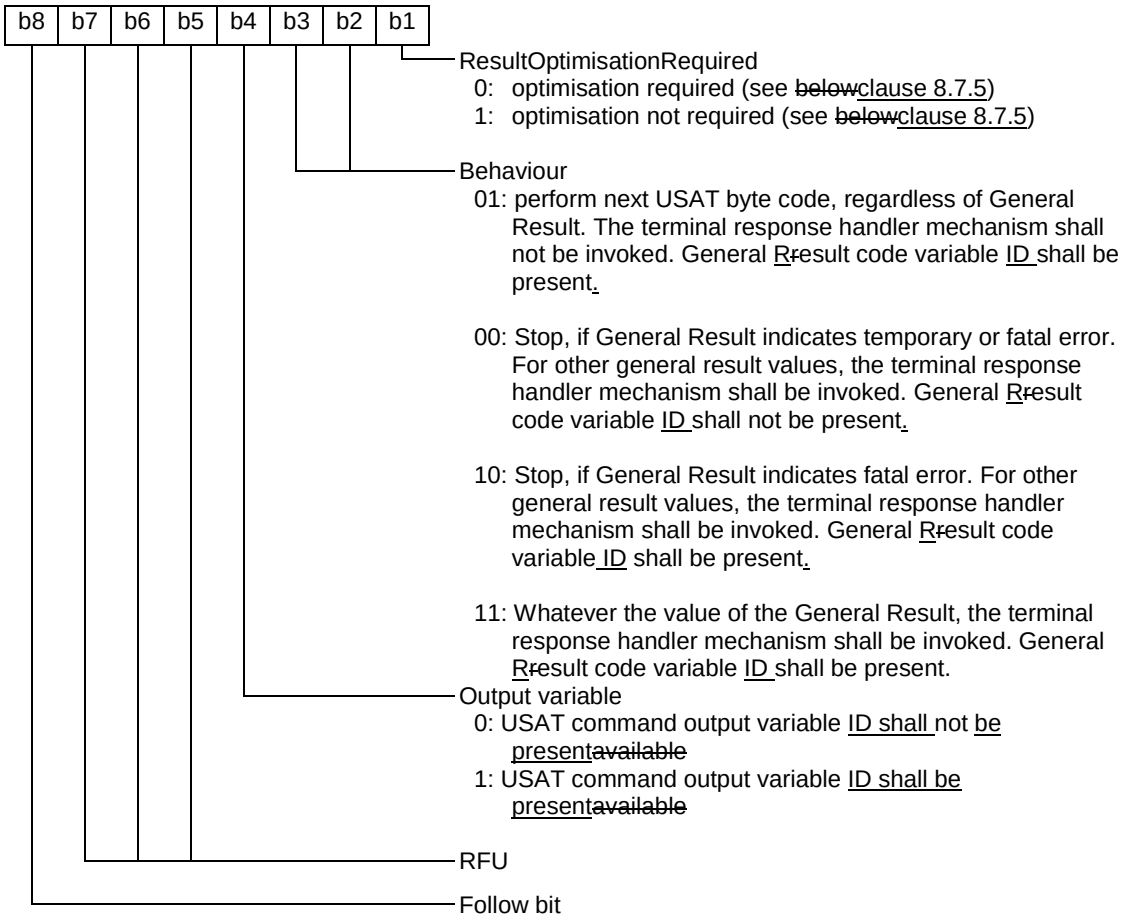
Length	Value	Description	M/O/C
1	'46' / 'C6'	Execute USAT Command Tag	M
1	A+5+B+C+3+D	Length	M
A	Data	Attributes	O
1B	Variable IDData	General Result code variable ID. The variable referenced by this variable ID isVariable used to hold the General Result code extracted from the -Terminal Response of the executed USAT command. This variable ID shall be present if and only if indicated in , depending on the "Behaviour" bits of the attribute byte.	C
1C	Variable IDData	USAT command output variable ID. The variable referenced by this variable ID is used toVariable to hold the output of the USAT command according to clause 8.7.5. The content of the USAT command output variable depends on the "ResultOptimisationRequired" bit of the attribute byte. This variable ID shall be present if and only (only available, if indicated in the "Output variable" bit of the attribute sbyte.)	C
1	Cmd type	Command type value according to 3GPP TS 31.111 [1]	M
1	Cmd qual.	Command qualifier value according to 3GPP TS 31.111 [1]	M
1	Dest dev.	Destination device according to 3GPP TS 31.111 [1]	M
BD	TLVs and Simple TLV Indicators	Sequence of - simple TLVs of the proactive command as defined in 3GPP TS 31.111 [1] - and / or Simple TLV Indicators	O

Possible errors:

Error Code	Description	Action
No error	OK	Continue
Reference to undefined	Reference to undefined	Stop
Problem in memory management	Memory problem in the preparation of the USAT command	Stop
Syntax error	Try to initialise a text element	Stop
USAT command failed	USAT Command could not be delivered to UE	Stop
USAT command not allowed	due to configuration of the USAT Interpreter	Stop

Explanation of used arguments:

8.7.1 Attributes



[...]

8.7.5 Result of an Execute USAT Command

The result of executing an USAT command is a Terminal Response structure containing a list of Simple TLVs as defined in 3GPP TS 31.111 [1].

If the General Result code variable ID is available the USAT Interpreter shall extract the General Result byte from the Result TLV of the Terminal Response structure and shall store the General Result byte into the variable referenced by the given General Result code variable ID. The extracted General Result (a single byte according to 3GPP TS 31.111 [1]) can be used e.g. for error handling on application byte code level.

~~-~~If the General Result code variable ID is not available the USAT Interpreter does not extract the General Result byte from the Result TLV of the Terminal Response structure.

~~The General Result of the USAT command shall be stored in the variable to hold the General Result code from the Terminal Response if indicated by the Behaviour bits of the attribute byte~~

If the Output variable attribute bit in the attributes indicates that the USAT command output variable ID is present~~T~~ the Terminal Response structure itself is processed by the USAT Interpreter as specified in the following 2 clauses (8.5.5.1 and 8.7.5.2).

If the Output variable attribute bit in the attributes indicates that the USAT command output variable ID is not present the USAT Interpreter does not store the Terminal response structure. The ResultOptimisationRequire attribute bit shall be ignored by the USAT Interpreter in that case.

8.7.5.1 Optimisation not Required

If the ResultOptimisationRequired bit in the attributes is set to "optimisation not required", ~~T~~the complete Terminal Response structure as specified in 3GPP TS 31.111 [1] ~~proactive command specific response data (Terminal Response structure according to 3GPP TS 31.111 [1])~~ is stored in the USAT command output variable as referenced by the given USAT command output variable ID.~~result variable.~~The stored Terminal Response structure starts with the tag of the Command Details as specified in 3GPP TS 31.111 [1].

The Get TLV Value byte code can be used in this case to extract specific information from the Terminal Response structure.

8.7.5.2 Optimisation Required

Only the first TLVs after the Result Simple TLV within a Terminal Response (see 3GPP TS 31.111 [1]) shall be processed by the USAT Interpreter as follows:

- If the first TLV after the Result Simple TLV is a Text String TLV according to 3GPP TS 31.111 [1], the value part without the DCS byte is assigned to the variable referenced by the USAT command output variable ID~~result variable~~. The DCS is removed from the V field of the Text String TLV, but used for variable management internally by the USAT Interpreter.

- In all other cases, the value part of the first TLV after the Result Simple TLV is assigned to the variable referenced by the USAT command output variable ID~~result variable~~. The type "unknown" shall be used for variable management internally by the USAT Interpreter.

3GPP T3 (USIM) Meeting #24
Seattle, USA, 19 – 22 August 2002

Tdoc ⌘T3-020689

CR-Form-v7

CHANGE REQUEST

⌘ **31.113** **CR** **021** ⌘ **rev** **-** ⌘ Current version: **6.0.0** ⌘

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

Proposed change affects: UICC apps⌘ [X] ME [ ] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Clarification of Execute USAT Command
Source:	⌘	T3
Work item code:	⌘	USAT1-Interpr
Date:	⌘	21/08/2002
Category:	⌘	**A**
Release:	⌘	Rel-6

Use one of the following categories:
F *(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)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The handling of output variables of the Execute USAT Command byte code needs further explanation.
Summary of change:	⌘	Clear and consistent terms for the output variables of the Execute USAT Command byte code. Explanation of the content of the output variables.
Consequences if not approved:	⌘	Possibly incompatible implementations of the Execute USAT Command.

Clauses affected:	⌘	8.7, 8.7.1, 8.7.5, 8.7.5.1, 8.7.5.2

Other specs affected: ⌘	Y	N	
		X	Other core specifications
		X	Test specifications
		X	O&M Specifications

Other comments: ⌘

8.7 Execute USAT Command

This byte code executes an USAT command using the provided arguments.

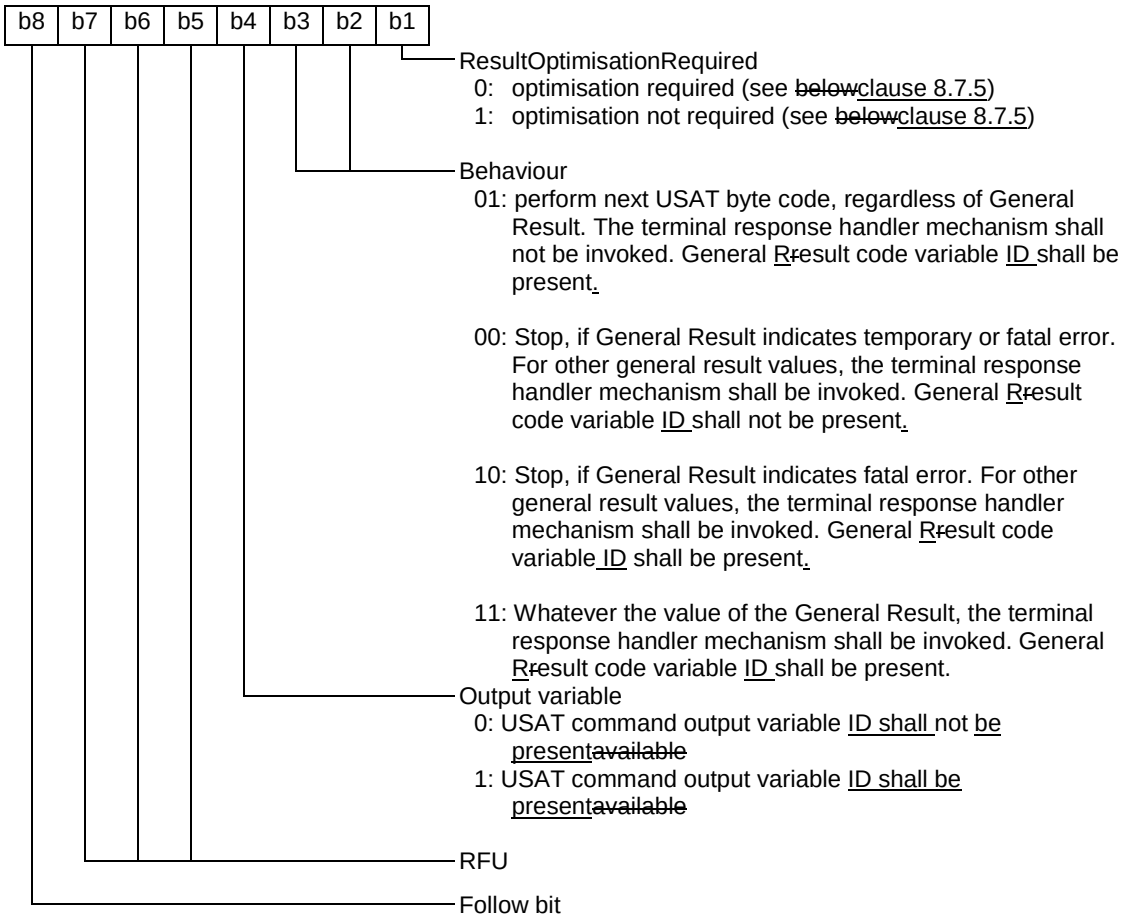
Length	Value	Description	M/O/C
1	'46' / 'C6'	Execute USAT Command Tag	M
1	A+5+B+C+3+D	Length	M
A	Data	Attributes	O
1B	Variable IDData	General Result code variable ID. The variable referenced by this variable ID isVariable used to hold the General Result code extracted from the Terminal Response of the executed USAT command. This variable ID shall be present if and only if indicated in , depending on the "Behaviour" bits of the attribute byte.	C
1C	Variable IDData	USAT command output variable ID. The variable referenced by this variable ID is used toVariable to hold the output of the USAT command according to clause 8.7.5. The content of the USAT command output variable depends on the "ResultOptimisationRequired" bit of the attribute byte. This variable ID shall be present if and only (only available, if indicated in the "Output variable" bit of the attribute sbyte.)	C
1	Cmd type	Command type value according to 3GPP TS 31.111 [1]	M
1	Cmd qual.	Command qualifier value according to 3GPP TS 31.111 [1]	M
1	Dest dev.	Destination device according to 3GPP TS 31.111 [1]	M
BD	TLVs and Simple TLV Indicators	Sequence of - simple TLVs of the proactive command as defined in 3GPP TS 31.111 [1] - and / or Simple TLV Indicators	O

Possible errors:

Error Code	Description	Action
No error	OK	Continue
Reference to undefined	Reference to undefined	Stop
Problem in memory management	Memory problem in the preparation of the USAT command	Stop
Syntax error	Try to initialise a text element	Stop
USAT command failed	USAT Command could not be delivered to UE	Stop
USAT command not allowed	due to configuration of the USAT Interpreter	Stop

Explanation of used arguments:

8.7.1 Attributes



[...]

8.7.5 Result of an Execute USAT Command

The result of executing an USAT command is a Terminal Response structure containing a list of Simple TLVs as defined in 3GPP TS 31.111 [1].

If the General Result code variable ID is available the USAT Interpreter shall extract the General Result byte from the Result TLV of the Terminal Response structure and shall store the General Result byte into the variable referenced by the given General Result code variable ID. The extracted General Result (a single byte according to 3GPP TS 31.111 [1]) can be used e.g. for error handling on application byte code level.

If the General Result code variable ID is not available the USAT Interpreter does not extract the General Result byte from the Result TLV of the Terminal Response structure.

~~The General Result of the USAT command shall be stored in the variable to hold the General Result code from the Terminal Response if indicated by the Behaviour bits of the attribute byte~~

If the Output variable attribute bit in the attributes indicates that the USAT command output variable ID is present~~T~~ the Terminal Response structure itself is processed by the USAT Interpreter as specified in the following 2 clauses (8.5.5.1 and 8.7.5.2).

If the Output variable attribute bit in the attributes indicates that the USAT command output variable ID is not present the USAT Interpreter does not store the Terminal response structure. The ResultOptimisationRequire attribute bit shall be ignored by the USAT Interpreter in that case.

8.7.5.1 Optimisation not Required

If the ResultOptimisationRequired bit in the attributes is set to "optimisation not required", ~~T~~the complete Terminal Response structure as specified in 3GPP TS 31.111 [1] ~~proactive command specific response data (Terminal Response structure according to 3GPP TS 31.111 [1])~~ is stored in the USAT command output variable as referenced by the given USAT command output variable ID.~~result variable.~~The stored Terminal Response structure starts with the tag of the Command Details as specified in 3GPP TS 31.111 [1].

The Get TLV Value byte code can be used in this case to extract specific information from the Terminal Response structure.

8.7.5.2 Optimisation Required

Only the first TLVs after the Result Simple TLV within a Terminal Response (see 3GPP TS 31.111 [1]) shall be processed by the USAT Interpreter as follows:

- If the first TLV after the Result Simple TLV is a Text String TLV according to 3GPP TS 31.111 [1], the value part without the DCS byte is assigned to the variable referenced by the USAT command output variable ID~~result variable~~. The DCS is removed from the V field of the Text String TLV, but used for variable management internally by the USAT Interpreter.

- In all other cases, the value part of the first TLV after the Result Simple TLV is assigned to the variable referenced by the USAT command output variable ID~~result variable~~. The type "unknown" shall be used for variable management internally by the USAT Interpreter.

3GPP T3 (USIM) Meeting #24
Seattle, USA, 19 – 22 August 2002

Tdoc ⌘T3-020690

CR-Form-v7

CHANGE REQUEST

⌘ **31.113** **CR** **022** ⌘ **rev** **-** ⌘ Current version: **5.3.0** ⌘

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

Proposed change affects: UICC apps⌘ [X] ME [ ] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Handling of operational pull messages and post mode
Source:	⌘	T3
Work item code:	⌘	USAT1-Interpr
Date:	⌘	21/08/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
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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)*
Rel-6	*(Release 6)*

Reason for change:	⌘	In clauses 4.2.3 and 4.4 it is not specified, how the USAT Interpreter handles incoming operational pull messages after a message was send in post mode and the USAT Interpreter is in idle again. The post mode as specified in TS 31.112 has not been precisely specified in TS 31.113.
Summary of change:	⌘	The USAT Interpreter shall accept pages received in operational pull mode only, if in wait state. That has been clarified in chapter 4.2.3 and 4.4.
Consequences if not approved:	⌘	Possibly incompatible implementations of the USAT Interpreter.

Clauses affected:	⌘	2, 4.2.3, 4.4

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	Corresponding CR to TS 31.114 in Tdoc T3-020692.
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

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 TS 31.111: "USIM Application Toolkit (USAT)".

[2] 3GPP TS 31.114: "USAT Interpreter protocol and administration".

[3] 3GPP TS 23.038: "Alphabets and language-specific information".

[4] ETSI TS 102 221: "Smart cards; UICC-Terminal interface; Physical and logical characteristics".

[5] ISO/IEC 7816-6 (1995): "Identification cards – Integrated circuit(s) cards with contacts - Part 6: Inter-industry data elements".

[6] ISO 8731-1 (1987): "Banking – Approved algorithms for message authentication – Part 1: DEA".

[7] IETF RFC 1738: "Uniform Resource Locators (URL)"

[x] 3GPP TS 31.112: "USAT Interpreter Architecture Description; Stage 2"

[...]

4.2.3 Wait State

When rendering a Page Reference TLV containing a Submit Configuration TLV having the "ProcessingBehaviour" attribute set (post mode, not expecting a related answer from the external system entity, see 3GPP TS 31.112 [x]), the USAT Interpreter shall perform the following actions:

- provide the Submit TLV to the protocol layer to be transmitted to the external system entity (see clause 4.2.2);
- If the transport layer successfully executed the given information
  - process next byte code.
- If the transport layer could not execute the given information successfully
  - enter the exception case of the terminal response handler mechanism.

When rendering a Page Reference TLV containing a Submit Configuration TLV having the "ProcessingBehaviour" attribute not set, the USAT Interpreter shall perform the following actions:

- Generate a new RequestID value, by incrementing the RequestID value. If the Request ID value reaches its maximum value, the RequestID value shall start at 0 again.

- Provide the RequestID to the protocol layer to be incorporated into the transport protocol (refer to 3GPP TS 31.114 [2]).

- Provide the Submit TLV to the protocol layer to be transmitted to the external system entity (see clause 4.2.2).

If the transport layer successfully executed the given information

- enter the wait state.

If the transport layer could not execute the given information successfully

- enter the exception case of the terminal response handler mechanism.

In the wait state, the USAT Interpreter shall keep the proactive session alive. Therefore, a DISPLAY TEXT USAT command shall be issued by the USAT Interpreter to notify the user that the USAT Interpreter has entered the wait state.

The text to be used for the text string of the DISPLAY TEXT command shall be taken from the Inline Value TLV of the Submit Configuration TLV requesting the wait state.

If this Inline Value TLV is not available in the Submit Configuration TLV when entering the wait state, then a default text shall be taken by the USAT Interpreter. This default text can be personalised and later on changed by administrative means.

For the DISPLAY TEXT USAT command the command qualifier option:

- "clear message after delay".

shall be used.

The USAT Interpreter shall handle the wait state according to figure 4.1.

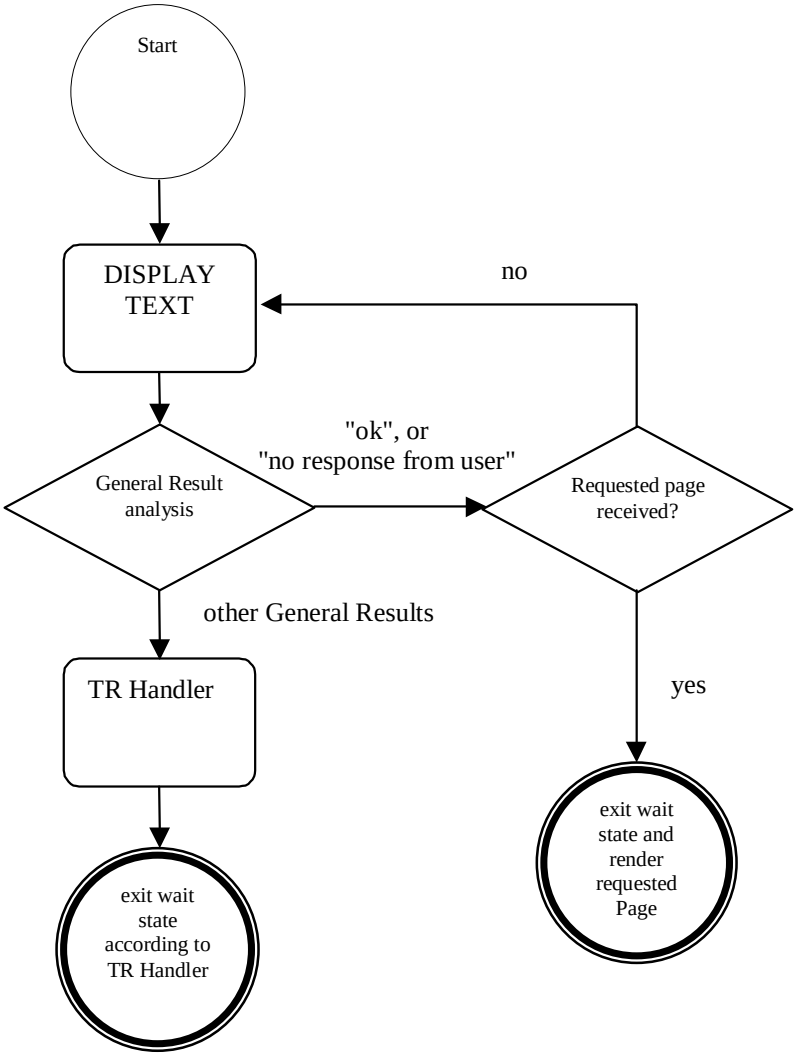


Figure 4.1: State diagram

The terminal response handler is activated by the USAT Interpreter, when the general result range of the DISPLAY TEXT command is not '00 0F' ("ok") and not '12 12' ("no response from user"). The terminal response handler shall use the current terminal response handler configuration (i.e. the configuration of the current navigation unit).

Incoming pages shall be handled as follows.

When getting a page during the wait state being active, the protocol layer shall check the received RequestID:

- If the provided RequestID does not match the expected RequestID, the page is discarded and the wait state remains active. The current page is not affected by the discarded page.

- If the provided RequestID does match the expected RequestID, the wait state is terminated by the USAT Interpreter and the received page is rendered.

If the wait state has been terminated before the expected RequestID has been received (e.g. the wait state was cancelled by the user, the UE was switched off...), the protocol layer shall discard pages from the external system entity, which have been received as operational pull messages (see 3GPP TS 31.114 [2] and 3GPP TS 31.112 [x]).~~all incoming PULLed pages (see clause 11).~~

[…]

4.4 Activation

Activation of USAT Interpreter depends on USAT Interpreter current state. The USAT Interpreter state corresponds to the presence or the origin of proactive session generated by USAT Interpreter. A state can be:

- Idle (i.e. no proactive session is running);
- Rendering a page (i.e. proactive session issued from byte code command);
- Wait state (see section 4.2.3).

The USAT Interpreter can be activated (i.e. be caused to leave the idle state and start rendering a page) in different ways:

- locally from the UE using menu selection;
- locally from the UE as the result of an event;
- ~~by an incoming page as a result of a previous page request from the USAT Interpreter;~~
- by an incoming page initiated by an external system entity ("push" mode according to 3GPP TS 31.112 [x]); or
- optionally by an internal application using a proprietary interface.

The rendering of a page shall be independent of the means of activation.

In idle state of the USAT Interpreter, the protocol layer (see 3GPP TS 31.114 [2]) shall discard pages from the external system entity, which have been received as operational pull messages (see 3GPP TS 31.114 [2] and 3GPP TS 31.112 [x]).

With respect to activation locally from the UE using menu selection, the SETUP MENU command as described in 3GPP TS 31.111 [1] can contain one or more links to a Page Identification TLV which identifies a locally stored page. When one of these identifiers is selected, and when USAT Interpreter is in idle state, the USAT Interpreter is activated and renders the referenced page. Registering of pages to the main menu is up to administrative means.

An event (as specified in 3GPP TS 31.111 [1] or proprietary events defined by the card issuer) is linked to a Page Identification TLV which identifies a locally stored page. When the UE sends an ENVELOPE command containing an event, and when USAT Interpreter is in idle state, the USAT Interpreter is activated and renders the referenced page. If an event is received not referencing to a page, the event shall be ignored by the USAT Interpreter. For security reasons, setting up events is up to administrative means.

If an event occurs while the USAT Interpreter is not in idle state, the USAT Interpreter shall queue the event and shall postpone executing the event until the USAT Interpreter enters idle state again.

The USAT Interpreter shall be able to queue at least one event. Events shall be executed in the order the events have been occurred.

If the USAT Interpreter is not able to store an event (e.g. because the event queue is full already), it is up to the implementation of the USAT Interpreter to handle this situation.

3GPP T3 (USIM) Meeting #24
Seattle, USA, 19 – 22 August 2002

Tdoc ⌘T3-020691

CR-Form-v7

CHANGE REQUEST

⌘ **31.113** **CR** **023** ⌘ **rev** **-** ⌘ Current version: **6.0.0** ⌘

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

Proposed change affects: UICC apps⌘ [X] ME [ ] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Handling of operational pull messages and post mode
Source:	⌘	T3
Work item code:	⌘	USAT1-Interpr
Date:	⌘	21/08/2002
Category:	⌘	**A**
Release:	⌘	Rel-6

Use one of the following categories:
F *(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)
Rel-6 (Release 6)

Reason for change:	⌘	In clauses 4.2.3 and 4.4 it is not specified, how the USAT Interpreter handles incoming operational pull messages after a message was send in post mode and the USAT Interpreter is in idle again. The post mode as specified in TS 31.112 has not been precisely specified in TS 31.113.
Summary of change:	⌘	The USAT Interpreter shall accept pages received in operational pull mode only, if in wait state. That has been clarified in chapter 4.2.3 and 4.4.
Consequences if not approved:	⌘	Possibly incompatible implementations of the USAT Interpreter.

Clauses affected:	⌘	2, 4.2.3, 4.4			
		Y	**N**		
Other specs affected:	⌘	**X**		Other core specifications	⌘ Corresponding CR to TS 31.114 in Tdoc T3-020692.
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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 TS 31.111: "USIM Application Toolkit (USAT)".

[2] 3GPP TS 31.114: "USAT Interpreter protocol and administration".

[3] 3GPP TS 23.038: "Alphabets and language-specific information".

[4] ETSI TS 102 221: "Smart cards; UICC-Terminal interface; Physical and logical characteristics".

[5] ISO/IEC 7816-6 (1995): "Identification cards – Integrated circuit(s) cards with contacts - Part 6: Inter-industry data elements".

[6] ISO 8731-1 (1987): "Banking – Approved algorithms for message authentication – Part 1: DEA".

[7] IETF RFC 1738: "Uniform Resource Locators (URL)"

[x] 3GPP TS 31.112: "USAT Interpreter Architecture Description; Stage 2"

[...]

4.2.3 Wait State

When rendering a Page Reference TLV containing a Submit Configuration TLV having the "ProcessingBehaviour" attribute set (post mode, not expecting a related answer from the external system entity, see 3GPP TS 31.112 [x]), the USAT Interpreter shall perform the following actions:

- provide the Submit TLV to the protocol layer to be transmitted to the external system entity (see clause 4.2.2);
- If the transport layer successfully executed the given information
  - process next byte code.
- If the transport layer could not execute the given information successfully
  - enter the exception case of the terminal response handler mechanism.

When rendering a Page Reference TLV containing a Submit Configuration TLV having the "ProcessingBehaviour" attribute not set, the USAT Interpreter shall perform the following actions:

- Generate a new RequestID value, by incrementing the RequestID value. If the Request ID value reaches its maximum value, the RequestID value shall start at 0 again.

- Provide the RequestID to the protocol layer to be incorporated into the transport protocol (refer to 3GPP TS 31.114 [2]).

- Provide the Submit TLV to the protocol layer to be transmitted to the external system entity (see clause 4.2.2).

If the transport layer successfully executed the given information

- enter the wait state.

If the transport layer could not execute the given information successfully

- enter the exception case of the terminal response handler mechanism.

In the wait state, the USAT Interpreter shall keep the proactive session alive. Therefore, a DISPLAY TEXT USAT command shall be issued by the USAT Interpreter to notify the user that the USAT Interpreter has entered the wait state.

The text to be used for the text string of the DISPLAY TEXT command shall be taken from the Inline Value TLV of the Submit Configuration TLV requesting the wait state.

If this Inline Value TLV is not available in the Submit Configuration TLV when entering the wait state, then a default text shall be taken by the USAT Interpreter. This default text can be personalised and later on changed by administrative means.

For the DISPLAY TEXT USAT command the command qualifier option:

- "clear message after delay".

shall be used.

The USAT Interpreter shall handle the wait state according to figure 4.1.

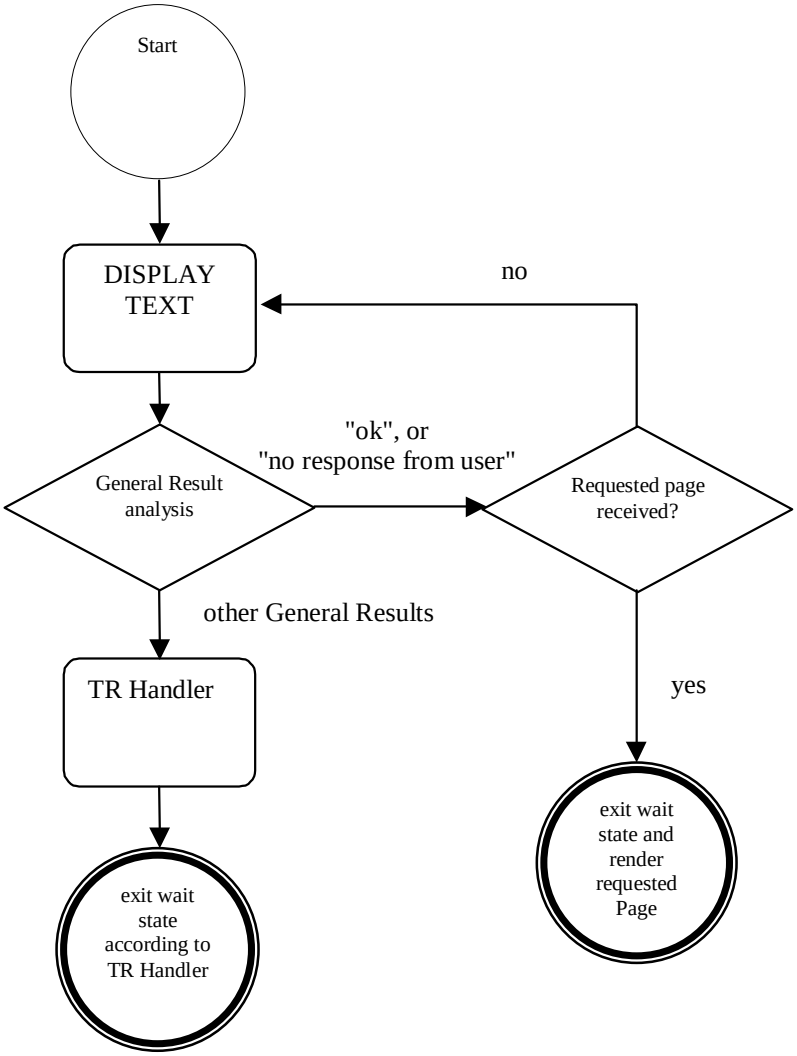


Figure 4.1: State diagram

The terminal response handler is activated by the USAT Interpreter, when the general result range of the DISPLAY TEXT command is not '00 0F' ("ok") and not '12 12' ("no response from user"). The terminal response handler shall use the current terminal response handler configuration (i.e. the configuration of the current navigation unit).

Incoming pages shall be handled as follows.

When getting a page during the wait state being active, the protocol layer shall check the received RequestID:

- If the provided RequestID does not match the expected RequestID, the page is discarded and the wait state remains active. The current page is not affected by the discarded page.

- If the provided RequestID does match the expected RequestID, the wait state is terminated by the USAT Interpreter and the received page is rendered.

If the wait state has been terminated before the expected RequestID has been received (e.g. the wait state was cancelled by the user, the UE was switched off...), the protocol layer shall discard pages from the external system entity, which have been received as operational pull messages (see 3GPP TS 31.114 [2] and 3GPP TS 31.112 [x]).~~all incoming PULLed pages (see clause 11).~~

[…]

4.4 Activation

Activation of USAT Interpreter depends on USAT Interpreter current state. The USAT Interpreter state corresponds to the presence or the origin of proactive session generated by USAT Interpreter. A state can be:

- Idle (i.e. no proactive session is running);
- Rendering a page (i.e. proactive session issued from byte code command);
- Wait state (see section 4.2.3).

The USAT Interpreter can be activated (i.e. be caused to leave the idle state and start rendering a page) in different ways:

- locally from the UE using menu selection;
- locally from the UE as the result of an event;
- ~~by an incoming page as a result of a previous page request from the USAT Interpreter;~~
- by an incoming page initiated by an external system entity ("push" mode according to 3GPP TS 31.112 [x]); or
- optionally by an internal application using a proprietary interface.

The rendering of a page shall be independent of the means of activation.

In idle state of the USAT Interpreter, the protocol layer (see 3GPP TS 31.114 [2]) shall discard pages from the external system entity, which have been received as operational pull messages (see 3GPP TS 31.114 [2] and 3GPP TS 31.112 [x]).

With respect to activation locally from the UE using menu selection, the SETUP MENU command as described in 3GPP TS 31.111 [1] can contain one or more links to a Page Identification TLV which identifies a locally stored page. When one of these identifiers is selected, and when USAT Interpreter is in idle state, the USAT Interpreter is activated and renders the referenced page. Registering of pages to the main menu is up to administrative means.

An event (as specified in 3GPP TS 31.111 [1] or proprietary events defined by the card issuer) is linked to a Page Identification TLV which identifies a locally stored page. When the UE sends an ENVELOPE command containing an event, and when USAT Interpreter is in idle state, the USAT Interpreter is activated and renders the referenced page. If an event is received not referencing to a page, the event shall be ignored by the USAT Interpreter. For security reasons, setting up events is up to administrative means.

If an event occurs while the USAT Interpreter is not in idle state, the USAT Interpreter shall queue the event and shall postpone executing the event until the USAT Interpreter enters idle state again.

The USAT Interpreter shall be able to queue at least one event. Events shall be executed in the order the events have been occurred.

If the USAT Interpreter is not able to store an event (e.g. because the event queue is full already), it is up to the implementation of the USAT Interpreter to handle this situation.

3GPP T3 (USIM) Meeting #24
Seattle, USA, 19 – 22 August 2002

Tdoc T3-020685

CR-Form-v3

CHANGE REQUEST

⌘ **31.113 CR 024** ⌘ rev **-** ⌘ Current version: **6.0.0** ⌘

*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 [ ] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Terminal Response Handler Modifier exception mechanism enhancement.
Source:	⌘	T3
Work item code:	⌘	USAT1-Interpr
Date:	⌘	21 August 2002
Category:	⌘	**B**
Release:	⌘	REL-6

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:	⌘	A diversification of the exception types performed by the Terminal Response Handler would allow application providers to “adapt” the USAT Interpreter behaviour when an error occurs.
Summary of change:	⌘	Add the possibility to modify single exception cases in clause 4.3.1.2. Provide the list of the different exception cases in clause 7.1.8.2. Throw a dedicated exception action instead of the general exception for the following cases: • Problem during the submission of an outgoing message (clause 4.2.3); • History list empty, or bottom of the list reached (clause 4.6); • No more byte code when process next byte code (e.g. end of navigation unit) (clause 7.2.1); • The execution of a plug-in during the rendering of the "Execute Native Command" byte code generates an error (clause 8.8). Modify the annex C.5 to specify that the modification applies to the general exception case. Append the annex C.6 to clarify the modification of a single exception case.
Consequences if not approved:	⌘	

Clauses affected:	⌘	4.2.3, 4.3.1.2, 4.3.2, 4.6, 7.1.8.2, 7.2.1, 8.8, annex C, C6 and C7
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] O&M Specifications
Other comments:	⌘	

[...]

4.2.3 Wait State

When rendering a Page Reference TLV containing a Submit Configuration TLV having the "ProcessingBehaviour" attribute set, the USAT Interpreter shall perform the following actions:

- provide the Submit TLV to the protocol layer to be transmitted to the external system entity (see clause 4.2.2);
- If the transport layer successfully executed the given information
  - process next byte code.
- If the transport layer could not execute the given information successfully
  - ~~enter~~ execute the "Transport error while submitting data" exception case of the terminal response handler mechanism.

When rendering a Page Reference TLV containing a Submit Configuration TLV having the "ProcessingBehaviour" attribute not set, the USAT Interpreter shall perform the following actions:

- Generate a new RequestID value, by incrementing the RequestID value. If the Request ID value reaches its maximum value, the RequestID value shall start at 0 again.
- Provide the RequestID to the protocol layer to be incorporated into the transport protocol (refer to 3GPP TS 31.114 [2]).
- Provide the Submit TLV to the protocol layer to be transmitted to the external system entity (see clause 4.2.2).

If the transport layer successfully executed the given information

- enter the wait state.

If the transport layer could not execute the given information successfully

- ~~enter~~ execute the "Transport error while submitting data"exception case of the terminal response handler mechanism.

[...]

4.3 Terminal response handler mechanism

For any general result of an USAT command, the USAT Interpreter shall branch to the terminal response handler. The terminal response handler shall handle the general result according to the following rules.

4.3.1 Operation of the Terminal Response Handler

[...]

4.3.1.2 Operation

The execution of any USAT command generates a general result (GR). The behaviour of the USAT Interpreter after the execution of a USAT command is determined by the generated general result and the current terminal response handler configuration as follows:

While the USAT Interpreter is in execution there is always one active terminal response handler configuration called the *current terminal response handle configuration*.

Let the generated general result be GR. The USAT Interpreter shall check the current terminal response handler configuration for the corresponding A_{GR} for that GR. By definition, for each GR an A_{GR} shall exist. As specified in 4.3.1.1 an A_{GR} might have no, one or more actions (a) applied to it.

If the A_{GR} contains only one action (a), then the single action (a) in A_{GR} shall be performed by the USAT Interpreter without user confirmation. If there are several actions in the A_{GR}, then the USAT Interpreter shall issue a SELECT ITEM command to let the user select one action (a) out of A_{GR} that shall be used by the USAT Interpreter. The handling of the SELECT ITEM command is described in clause 7.1.8.4.4.

~~If there is no action (a) in A_{GR} the exception action shall be performed by the USAT Interpreter.~~

Besides the actions assigned to general results received after USAT commands execution, the TRH modifier allows also to change the USAT Interpreter behavior when an exception occurs. In case of an exception, the corresponding exception action will apply. ~~This~~ Each exception action can be changed by using the terminal response handler modifier with the reserved general result range 'FF ~~FF~~'xx' (with xx between '00' and 'FE'). The reserved general result range 'FF xx' are called exception range. It is also possible to change all the exception actions using the "general exceptions" ('FF FF'). In the default terminal response handler table (clause 4.3.2, table 4.1), ~~this~~ the range 'FF FF' is called "general exceptions".

Exception examples:

- ~~—~~no more byte code when process next byte code (e.g. end of navigation unit);
- After the execution of a USAT command, there is no action (a) in A_{GR}.
- ~~other exception cases of the USAT Interpreter not covered currently in the present document.~~

4.3.2 Default Terminal Response Handler configuration

A default terminal response handler configuration is defined in the present document (see table 4.1). The proposed default terminal response handler configuration may be modified at personalization stage by the card issuer.

The possibly modified resulting terminal response handler configuration is called the system terminal response handler configuration, which shall be used by the USAT Interpreter. The system terminal response handler configuration can be the same as the default terminal response handler configuration or it can differ from it, depending on the decision of the card issuer.

NOTE: A service should take into account, that the system terminal response handler configuration might be different from the default terminal response handler configuration. The service might need to have knowledge of the system terminal response handler configuration in order to behave as intended.

The system terminal response handler configuration can be modified temporarily by the terminal response handler modifier (see clause 7.1.8).

If the USAT Interpreter branches to another page due to the terminal response handler configuration, the standard inter page variable management shall apply (see clause 6.1.3.1).

Default terminal response handler configuration.

Table 4.1

		Action ID	General result range								
			'FF FF' General exceptions	'14 14' USSD/SS transaction terminated	'00 0F' ok	'13 13' help request	'12 12' no response from user	'11 11' backward move requested	'10 10' quit	'20 2F' worth to re-try	'30 3F' not worth to re-try
System actions	process next byte code	'00'			X						
	quit USAT Interpreter	'01'	X	X			X		X	X	X
	go back one entry in history list	'02'						X			
	retry last proactive command within current USAT Interpreter navigation unit	'03'				X				X (note)	
NOTE: In the case of SET UP CALL, the system action "retry last proactive command within current USAT Interpreter navigation unit" should be deactivated by the service.											

The USAT Interpreter may support storage of texts for user notification for the general result ranges of the system terminal response handler configuration. If texts for user notification are available, the texts shall be used according to clause 7.1.8.3.

For each of the system actions a text shall be assigned and shall to be used in the SELECT ITEM if more than one action is assigned to a general result (see clause 4.3.1.2). These texts shall be specified by the card issuer and shall be provided by personalisation.

[...]

4.6 History list

The history list is a list of anchor references. This history list also owns an anchor reference pointer which points to a specific entry in the history list. When a navigation unit is completely rendered (i.e. when the USAT Interpreter starts to render another navigation unit), its anchor reference is added on the top of the history list, and the anchor pointer points on it. A navigation unit is not added to this list in following cases:

- If an appropriate attribute flag is set in the navigation unit;
- if the navigation unit does not have any anchor name.

The maximum number of entries in the history list is N (anchor references) where N is greater than or equal to zero. If N=0, the history list mechanism and related navigation actions become deactivated.

If the history list is full, the bottom-most entry is removed from the list in order to free space for a new top-most entry.

The history is reset (is emptied) whenever the USAT Interpreter is initialised.

The USAT Interpreter allows navigation based on the history list and the anchor reference pointer. The history navigation action "go back one entry in history list" means that the navigation unit corresponding to the pointed anchor reference shall be rendered, and the anchor reference pointer is immediately moved down in the list. The origin of this action can be either the system action '02' in terminal response handler configuration, or the Go Back byte code command.

The moving of this anchor reference pointer in the history list does not modify the history list itself.

If the anchor reference pointer reaches the bottom of the history list or the history list does not contain any entry, and if a "go back" history navigation action has to be performed in this situation, then the "History list empty, or bottom of the list reached" exception case of the terminal response handler mechanism shall be performed..

Retry-last-proactive-command, system action '03' of the terminal response handler configuration shall not modify the history list.

If, at any time, the anchor reference pointer does not point to the top-most anchor reference in the history list, and if a navigation action other than the "go back" history navigation action (e.g. Assign and Branch byte code command) is performed, then any anchor references between the anchor reference pointer and the top-most entry are deleted from the history list, that means the entry referenced by the anchor reference pointer becomes the top-most entry in the history list.

If the USAT Interpreter does not find the requested anchor locally while processing a "go back" history navigation action, an outgoing message shall be sent to the external system entity to retrieve the page the requested anchor reference belongs to. The Submit TLV shall be formatted in the same way as the previously used Submit TLV to retrieve this page and the USAT Interpreter shall start to render the navigation unit the anchor reference points to.

NOTE: Service providers should take care of that the "go back" history navigation action on remote pages could generate security issues.

[...]

7.1.8 Terminal response handler modifier

[...]

7.1.8.1 Attribute

[...]

7.1.8.2 General result range

A general result range defines subsequent values of the general result in the terminal response to an USAT command.

- A range consisting of only one value of the general result is coded by setting both bytes to the desired value.
- A range is coded by setting the first byte to the lowest value of the range and the second byte to the highest value of the range.

For example:

- general result '10' shall be coded: '10 10';
- general result '1X' shall be coded: '10 1F';
- general result 'XX' shall be coded: '00 FF';
- general result between '11' and '13' shall be coded: '11 13'.

The general result range specifies the general results for which the modification applies: for every general result within the general result range, corresponding operations shall be taken into account by the USAT Interpreter

For exception handling, the following rules apply:

- A range coded 'FF xx' (with xx between '00' and 'FE') is used to change a single exception action (e.g. no more byte code).
- A range coded 'FF FF' is used to change all the exception actions.

Each exception range is linked to an exception case as follows:

Exception range	Exception case	Description
'FF 00'	TRH no matching GRR	After the execution of a USAT command, there is no action (a) in A_{GR}
'FF 01'	No more byte code	No more byte code when process next byte code (e.g. end of navigation unit)
'FF 02'	Transport error while submitting data	Failure during the submission of an outgoing message
'FF 03'	History list empty, or bottom of the list reached	A “go back into history list” system action '02' or a "Go Back" byte code command happen and the History List is empty, or the anchor pointer reaches the bottom of the list
'FF 04'	Error during plug-in execution	The execution of a plug-in during the rendering of the "Execute Native Command" byte code generates an error
'FF 05' to 'FF FE'	-	RFU - reserved for other exception not covered currently in the present document

[...]

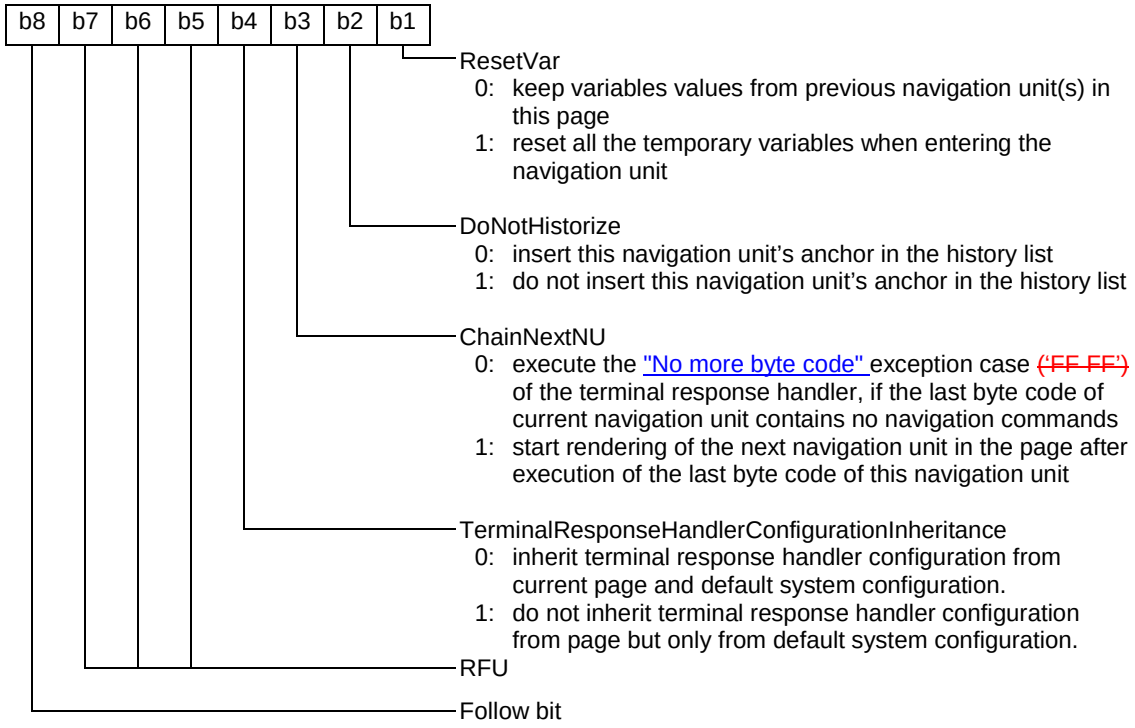
7.2 Navigation Unit

A navigation unit is a component of a page. It is named using an anchor. A navigation unit is referenced using an anchor reference.

Length	Value	Description	M/O
1	'0A' / '8A'	Navigation Unit Tag	M
1-3	A+B+C+D	Length	M
A	Data	Attributes	O
B	TLV	Anchor (name of a navigation unit)	O
C	TLVs	Terminal response handler modifier - one or more TLVs	O
D	TLVs	USAT Interpreter Byte Codes – one or more TLVs	O

The following clauses specify the attributes and TLVs used in the navigation unit TLV.

7.2.1 Attributes



[...]

8.8 Execute Native Command

This byte code is used to execute an operating system call, "plug-in" or an application external to the USAT Interpreter.

The attribute indicates if the execution returns to the USAT Interpreter or not. Arguments are passed for input and output. The output is stored in a list of variables.

Length	Value	Description	M/O
1	'47' / 'C7'	Execute Native Command Tag	M
1	A+2+B+C	Length	M
A	Data	Attributes	O
2	Data	NCI of application or plug-in	M
B	TLV	Input List TLV containing arguments	O
C	TLV	Variable Identifier List TLV for output of application or plug-in	O

The NCI (Native Code Identifier) has a size of 2 bytes and is binary coded, most significant byte first. The values '0000' to '7FFF' are defined in clause 9. Other values may be used for proprietary implementations.

Possible errors:

Error Code	Description	Action
No error	OK	Continue
Reference to undefined	Reference to undefined	Stop
Jump to undefined	Execute element does not exist	Stop
Problem in memory management	Memory problem in the preparation of the structure	Stop
User Abort	Execute was aborted by user	Exception (NOTE1)
Syntax Error	Incorrect number of arguments passed to the execute element.	Exception (NOTE1)
Execution Error	Execute element generated an internal error.	Exception (NOTE1)
Type mismatch	Error in variables management	Stop
NOTE1: In case of error generated by the plug-in execution, the USAT interpreter shall execute the "Error during plug-in execution" exception case of the Terminal Response Handler.		

[...]

Annex C (informative):
Terminal Response Handler Modifier examples

This annex provides examples for the operations of the terminal response header modifier. Starting point for the examples is the partly shown system terminal response handler configuration, which is in this case the unmodified default terminal response handler configuration as specified in table 4.1 with an assumed text for user notification for the general exception cases ("Error")..

The first row in the following tables shows the text for user notification assigned to a general result. A terminal response handler modifier can provide such a text for a whole range of general results. "--" indicates, that no user notification text is assigned to a general result.

The second row in the following tables shows the single action(s) assigned to a general result. For general results without an assigned action (indicated by "--" in the tables), the USAT Interpreter uses the "TRH no matching GRR" exception case, which is indicated with the exception~~general result~~ range 'FF ~~FF~~'00'. If more than one action is assigned to a general result, the USAT Interpreter issues a SELECT ITEM command, using the action description texts of the actions as items to let the user choose between the options. A terminal response handler modifier can provide such a set of actions for a whole range of general results. $a_{'xx'}$ indicates an action a with the assigned Action ID 'xx'. For one general result, the Action ID uniquely identifies an action. For different general results, the same action ID in the service defined range (Action ID '20' to 'FF') could identify different actions. To distinguish between different actions with the same Action ID, the Action ID index is appended with a character. E.g. $a_{'20a'}$ represents a different action than $a_{'20b'}$, even if the Action ID '20' is the same.

The third row the following tables shows the general result values to which the user notification texts and actions are assigned to.

Starting configuration, partly reflection the default terminal response handler configuration as specified in table 4.1:

Table C.1

Text for user notification assigned to a general result	--	--	--	--	--	--	--	--	--	--	--	...	--	--	--	...	"Error"
Single action(s) for a general result; the index indicates the assigned Action ID	$a_{'00'}$	$a_{'00'}$	...	$a_{'00'}$	$a_{'01'}$	$a_{'02'}$	$a_{'01'}$	$a_{'03'}$	$a_{'01'}$	--	--	...	$a_{'01'}$ $a_{'03'}$	$a_{'01'}$ $a_{'03'}$	$a_{'01'}$ $a_{'03'}$	...	$a_{'01'}$
general result value	'00'	'01'	...	'0F'	'10'	'11'	'12'	13'	'14'	'15'	'16'	...	'20'	'21'	'22'	...	'FF'

[...]

C.6 Special case: No text for user notification

For the operations add/append, replace and remove, the text for user notification is optional. If no text for user notification is given in the terminal response handler modifier, the text for user notification is remains unchanged for the respective general results.

E.g. for an add/append operation:

Table C.12

Text for user notification assigned to a general result range																--
Single action(s) for a general result range; the index indicates the assigned Action ID																$a_{'34'}$ $a_{'35'}$
General result value	'00'	'01'	...	'0F'	'10'	'11'	'12'	13'	'14'	'15'	'16'	...	'20'	'21'	'22'	...	'FF'

This terminal response handler modifier is applied to the general exception case 'FF FF'. The text for user notification for ~~the~~ all exception cases remains unchanged as no text for user notification TLV is provided. Actions with Action IDs '34' and '35' are to be added to ~~the~~ all exception cases. The result of an add/append operation of table C.12 on table C.11is shown in the following table:

Table C.13

Text for user notification assigned to a general result	--	--	--	--	--	--	--	--	--	--	--	...	--	--	--	...	"Error"
Single action(s) for a general result; the index indicates the assigned Action ID	$a_{'00'}$	$a_{'00'}$	...	$a_{'00'}$	$a_{'01'}$ $a_{'20'}$ $a_{'21'}$ $a_{'22'}$	$a_{'02'}$ $a_{'20'}$ $a_{'22'}$	$a_{'01'}$	$a_{'03'}$	$a_{'01'}$	--	--	...	$a_{'01'}$ $a_{'03'}$	$a_{'01'}$ $a_{'03'}$	$a_{'01'}$ $a_{'03'}$	...	$a_{'01'}$ $a_{'34'}$ $a_{'35'}$
General result value	'00'	'01'	...	'0F'	'10'	'11'	'12'	13'	'14'	'15'	'16'	...	'20'	'21'	'22'	...	'FF'

C.7 Special case: Modify a single exception case

For all Terminal Response Handler operations, it is possible to modify the action linked to a single exception case using the general result range 'FF xx' (with xx between '00' and 'FE').

E.g. for an add/append operation:

Table C.14

Text for user notification assigned to a general result range																	"End of page"	--
Single action(s) for a general result range; the index indicates the assigned Action ID																	$a_{'40'}$	
General result value	'00'	'01'		...	'0F'	'10'	'11'	'12'	13'	'14'	'15'	'16'	...	'20'	'21'	'22'	'FF'	'FF'
Exception type																	No more byte code	Other exceptions

This terminal response handler modifier is applied to the "No more byte code" exception case 'FF 01'. The new text for user notification for that exception case is "End of page". The set of actions for that exception case are one system action ('Action ID '01': process next byte code) and three service defined actions with the Action IDs '34' and '35' to '40'. The result of an add/append operation of table C.14 on table C.13is shown in the following table:

Table C.15

Text for user notification assigned to a general result	--	--	--	--	--	--	--	--	--	--	--	...	--	--	--	...	"End of page"	"Error"
Single action(s) for a general result; the index indicates the assigned Action ID	$a_{'00'}$	$a_{'00'}$	...	$a_{'00'}$	$a_{'01'}$ $a_{'20'}$ $a_{'21'}$ $a_{'22'}$	$a_{'02'}$ $a_{'20'}$ $a_{'22'}$	$a_{'01'}$	$a_{'03'}$	$a_{'01'}$	--	--	...	$a_{'01'}$ $a_{'03'}$	$a_{'01'}$ $a_{'03'}$	$a_{'01'}$ $a_{'03'}$	...	$a_{'01'}$ $a_{'34'}$ $a_{'35'}$ $a_{'40'}$	$a_{'01'}$ $a_{'34'}$ $a_{'35'}$
general result value	'00'	'01'	...	'0F'	'10'	'11'	'12'	13'	'14'	'15'	'16'	...	'20'	'21'	'22'	...	'FF'	'FF'
Exception type																	No more byte code	Other exceptions