


S@T 01.50 v4.0.0 (Release 2009)

S@T Browser Behavior Guidelines

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1 TERMINOLOGY

1.1 Abbreviations

MO	Mobile originated
MT	Mobile terminated
SBC	S@T Byte Code
SSP	S@T Session Protocol
S@T	SIM Alliance Toolkit
STK	SIM Application Toolkit
TL[A]V	TLV with optional attribute bytes
TLV	Tag Length Value encoding
URL	Unified Resource Location

2 LIST OF DOCUMENTS

/51.014/	3GPP TS 51.014: "Specification of the SIM Application Toolkit (SAT) for the Subscriber Identity Module - Mobile Equipment (SIM-ME) interface".
/23.040/	3GPP TS 23.040: "Technical realization of Short Message Service (SMS)".
/23.048/	3GPP TS 23.048: "Security mechanisms for the (U)SIM application toolkit; Stage 2".
/SBC/	SBC, S@T Byte Code (Technical Specification S@T 01.00)
/SSP/	SSP, S@T Session Protocol (Technical Specification S@T 01.20)
/Admin/	S@T Administration Commands (Technical Specification S@T 01.21)
/Pull/	S@T Operational Commands (Technical Specification S@T 01.22)
/Push/	S@T Push Commands (Technical Specification S@T 01.23)

This document is part of a specification set, please refer to "S@T Release Note" for a comprehensive document list, including document versions.



3 OVERVIEW

This document describes the S@T browser behavior and gives guidelines for its implementation.

The objective is to define all aspects of the browser and its implementation that have impacts on the interoperability between different suppliers of the S@T browsing system.



4 BROWSER BEHAVIORS

4.1 Deck Management

4.1.1 Resident Deck Management

The resident decks buffer is located in non-volatile memory.

There is no limitation concerning the minimum and the maximum size of the resident decks buffer.

If installation of a new resident deck fails, there is no access to this deck or parts of it. There is no impact on previously installed resident decks.

If a resident deck is not found, the S@T browser shall generate “Jump to undefined” error (as defined in /SBC/).

NOTE: Some deck Ids of resident decks are related to specific internal functionality of the browser.

4.1.2 Reserved Deck Ids

Following Deck Ids are reserved for the special functionality.

<i>Deck Id</i>	<i>Description</i>
/s/home	Navigate to the deck with ‘/s/home’ deck Id. Target deck of the system contextual menu item ‘Go to home deck’ (see /SBC/).
/s/bookmarks	Navigate to the bookmark list
/s/resident	RFU
/s/push	RFU
/s/prev	RFU
/s/next	RFU
/s/history	RFU

4.2 Variable Management

4.2.1 Temporary Variables

The minimum memory size for allocation of temporary variables is 512 bytes. There is no maximum limitation for the memory size.



4.3 Waiting for Response State

When the browser is waiting for a response from the gateway or receiving a concatenated response, the browser shall keep the proactive session alive by issuing DISPLAY TEXT commands to inform the user about progress. For the DISPLAY TEXT commands the command qualifier "clear message after delay" shall be used.

It shall be possible to configure different text for the waiting for response state at the personalisation stage.

When browser leaves the card it shall be added to the history (if DoNotHistorize flag is not set).

On backward move in the waiting for response state, the browser shall perform "go back" history navigation (as defined in history management). No contextual menu shall be generated in this case. When the proactive session is terminated by the user, the browser shall go to the idle and disconnected state (see /SSP/).

If REPLY_RSP command is received during the waiting for response state but its data part does not contain a deck TL[A]V, the browser shall generate "Syntax error".

If the gateway refuses to open session or disconnects the current session during waiting for response state, the browser must go to the idle and disconnected state (without any error).

4.4 Contextual Menu Management

On exit (i.e. the proactive session terminated by the user) or backward move on the contextual menu the S@T browser shall reissue the last bytecode command (i.e. the command which has triggered the contextual menu).

It shall be possible to configure different text for the contextual menu title and items at the personalisation stage.



4.5 Bookmark Management

Bookmarks allow quick access to an online deck. When the current online deck has to be bookmarked, the browser sends a request to the gateway with the deck Id and the bookmark index. The gateway then stores this association. When the user wants to go to a previously bookmarked deck, the browser sends a Pull request with the bookmark index.

Special deck Id '/s/bookmarks' is used to navigate to the bookmark list. Bookmark support is optional. Browser not supporting bookmarks shall treat deck Id '/s/bookmarks' as not found.

4.5.1 Bookmark List

'/s/bookmarks' deck Id is used to access the bookmark list. S@T browser can jump to bookmark list from:

- the main menu;
- the contextual menu;
- a S@T bytecode command. In this case the current card shall be added to the history if DoNotHistorized flag is not set in the card attribute.

Bookmark list contains list of already stored bookmarks and special items for bookmark management:

- "Add bookmark" item shall be present in the first position of the bookmark list only if the browser has jumped to the bookmark list during online deck execution and pull session is opened.
- "Remove bookmark" item shall be present in the last position of the bookmark list only if there is at least one stored bookmark.

When a user selects one of the stored bookmarks, the browser shall send Pull request the bookmark index as defined in /Pull/ and enter the waiting for response state.

If list of stored bookmarks is empty and "Add bookmark" item is not present then display text "Bookmark list empty" shall be generated instead of the bookmark list.

After the user presses Back on the bookmark list or Ok/Back on display text "Bookmark list empty" the browser shall:

- go to the idle state if the bookmark list was invoked from the main menu;
- return to the contextual menu if the bookmark list was invoked from the contextual menu;
- perform history navigation action "go back" (as defined in History Management in /SBC/) if the bookmark list was invoked from a S@T bytecode command.

4.5.2 Add Bookmark

When "Add bookmark" item is selected and there is enough memory to store bookmark, a user shall be asked to enter bookmark name. If the user has entered a name that is already used for another bookmark, the browser shall notify the user by displaying "Name already used, enter another name".

After the user has entered the bookmark name, a bookmark request (as defined in /Pull/) shall be sent to the gateway. Only if the browser gets successful response from the gateway, the bookmark with the entered name shall be added to the bookmark list. Otherwise display text "Bookmark refused" shall be generated and no bookmark shall be stored.

When "Add bookmark" item is selected and there is not enough memory to store bookmark, display text "Memory full" shall be generated.

After bookmark creation browser shall return to the bookmark list.

Bookmarks shall be stored in non-volatile memory.



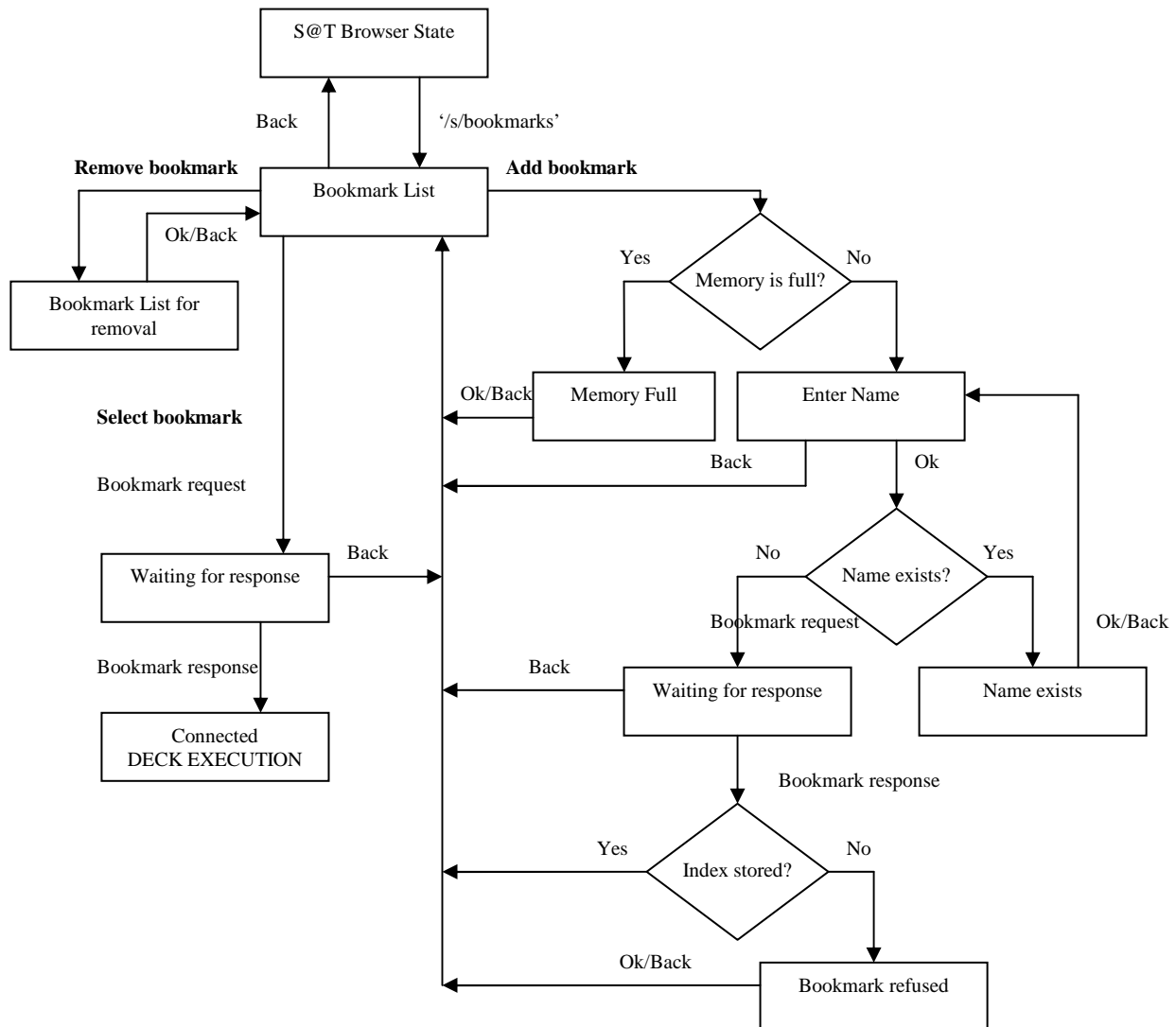
4.5.3 Remove Bookmark

When “Remove bookmark” item is selected, the browser shall generate list of all existing bookmarks so that user can select one of them to be removed.

After item removal the browser shall return to the bookmark list or “Bookmark list empty” prompt.

4.5.4 Navigation

The basic navigation rules are presented in the following diagram:



No contextual menu shall be generated for navigation through the bookmark interface. If a user presses Cancel on any screen of the bookmark interface, the browser shall exit.

If a user selects a bookmark from the bookmark list then Pull request with the bookmark index is sent and bookmark list becomes not accessible for backward navigation. In this case common history navigation shall be performed.

4.5.5 Text Configuration

It should be possible to configure different text strings for the bookmark interface at the personalisation stage.



5 S@T PROTOCOL IMPLEMENTATION OVER SMS

5.1 SMS Header parameters

To ensure interoperability on low level transport protocol, the following fields of the 03.40 header should be set as specified below for mobile originated short messages:

<i>TPDU parameter</i>	<i>Value</i>
TP-Message-Type-Indicator (TP-MTI)	SMS-SUBMIT
TP-User-Data-Header-Indicator (TP-UDHI)	User data header present
TP-Data-Coding-Scheme (TP-DCS)	0xF6 (Class 2: SIM specific, 8 bit data)

5.2 SMS Concatenation

The S@T browser shall support outgoing and incoming SMS concatenation: at least 2 parts for outgoing SMS and 7 parts for incoming SMS. The maximum number of parts in the concatenated message shall be defined by the operator.

5.3 EVENT_FORMATTED_SMS_PP_UPD Support

It is not mandatory for the browser to support EVENT_FORMATTED_SMS_PP_UPD triggered by Update Record EFsms.

5.4 SMS Error Handling

If a SMS message contains bad parameters, the message should not be treated and no user notification is used.

List of the possible errors of the SMS header:

- TP-UDHI set to 0;
- Bad DCS (others than specified above) ;
- Bad header tag (others than concatenated header or 03.48 header);
- Bad header format (others than concatenated header or 03.48 header);

Errors in the concatenation header:

- SMS number higher than the SMS maximum number;
- SMS number set to 0.



5.5 3GPP TS 23.048 Parameters

5.5.1 TAR Management

The following TARs shall be used for the S@T protocols:

<i>S@T Protocol Name</i>	<i>TAR</i>
Pull	0x534054 (S@T)
Administration	0x534054 (S@T)
High Priority Push	0x534054 (S@T)
Low Priority Push	0x505348 (PSH)

5.5.2 Security Levels

The following security levels shall be supported by the S@T browser:

<i>SPI</i>	<i>KIc</i>	<i>KID</i>	<i>DESCRIPTION</i>	<i>NOTES</i>
0x0000	0x00	0x00	No security applied	Shall be supported for incoming (MT) and outgoing (MO) messages. This security level is not recommended for Administration protocol.
0x1200	0x00	0xX5	Triple DES Cryptographic Checksum (8-byted MAC); counter higher	Shall be supported for incoming (MT) messages. This security level is not recommended for Pull protocol.

5.5.3 Security Error Handling

The message should not be treated and no user notification is used if the 03.48 packet cannot be parsed or contains bad data.

List of the possible errors of the 03.48 packet:

- Algorithm not supported;
- Key not found;
- Bad counter value;
- Bad MAC;
- Bad data length.



6 ERROR MANAGEMENT

When an error happens, the S@T browser shall notify the user by displaying an error message. For the DISPLAY TEXT command, the command qualifier "wait for use to clear message" shall be used.

The text of the errors shall be able to be modified by the operator at the personalisation stage.

After having displayed the error message, for ANY general result of the terminal response, the S@T browser shall exit (go to the idle state).

NOTE: Errors happened during the execution of an administrative command shall be sent to the gateway in the browser response, i.e. no user notification shall be displayed.

Browser behaviour versus terminal response (TR) error codes:

		Proactive Command																				
		REFRESH	MORE TIME	POLL INTERVAL	POLLING OFF	SETUP EVENT LIST	SET UP CALL	SEND SS	SEND USSD	SEND SMS	SEND DTMF	LAUNCH BROWSER	PLAY TONE	DISPLAY TEXT	GET INKEY	GET INPUT	SELECT ITEM	SET UP MENU	PROVIDE LOCAL INFO	TIMER MANAGEMENT	SETUP IDLE MODE TEXT	
TR result		0x01	0x02	0x03	0x04	0x05	0x10	0x11	0x12	0x13	0x14	0x15	0x20	0x21	0x22	0x23	0x24	0x25	0x26	0x27	0x28	
0x00 – 0x0F		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
0x10							E*				E*		E*	E*	E*	E*	E*					
0x11														B*	B*	B*	B*					
0x12														E	E	E	E					
0x13															R	R	R					
0x14							E	E	E													
0x20 - 0x2F		F	F	F	F	F	F	F	R**	R**	F	F	F	F	F	F	F	F	F	C	F	F
0x30 – 0x3F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	C	F	F

Legend:

C: command successfully executed; continue execution

B: backward move

E: exit browser (go to the idle state)

F: command failed; 'STK use failed' error

R: repeat command

*: branch to the contextual menu if a proactive command issued from a S@T bytecode command

** : try to reissue proactive command 2 more times

NOTE: In case of error in terminal response on PROVIDE LOCAL INFO the browser shall not generate any error but treat this result as indication that local info is not accessible at the moment.



7 HISTORY

Document history		
Release	Approved by	Comment
1.0.0	SIM Alliance TDG	First internal release
1.0.1	SIM Alliance TDG	TDG Meeting #M30 Editorial changes for publication
2.0.0	SIM Alliance TDG	Section 7.4: CR 2004-014 Section 4.3.1: CR 2004-031 Section 5.3: CR 2004-032 Section 6.4: CR 2004-034 Section 4.3.1: CR 2004-036 Some minor editorial changes
3.0.0	SIM Alliance TDG	Section 9.2: added CR_Axalto-S@T Number 007
3.0.1	SIM Alliance TDG	Section 4.3.2 and section 5.2.2: <i>PRISM-DEC-2007 #001</i>
4.0.0	SIM Alliance TDG	S@T Task Force: Review of Spec: Major editorial modifications for clarification: <ul style="list-style-type: none"> - Defined minimum requirement for SMS concatenation - EVENT_FORMATTED_SMS_PP_UPD is not mandatory for S@T browsers - Removed requirement "A list of server addresses is available on the card and the S@T browser checks the TP-OA of incoming SMS" - Defined Bookmarks interface

7.1 ANNEX: LIST OF CHANGE REQUESTS [informative]

CR Number	CR Identifier	Subject	Document Reference	Status / Meeting No.
2004-014	GEMPLUS-FEBRUARY-2004#3	Home page identification	S@T 1.50 V2.0.0	Accepted (email vote 9 th March 2004)
2004-031	G&D 02.2004 #9	4.3.1 error on deleted temp variable	S@T 1.50 V2.0.0	Accepted (email vote 9 th March 2004)
2004-032	G&D 02.2004 #10	5.3 error handling temp variable	S@T 1.50	Accepted (email vote 9 th)



			V2.0.0	March 2004)
2004-034	G&D 02.2004 #12	6.4 specify which contextual menu	S@T 1.50 V2.0.0	Accepted (email vote 9 th March 2004)
2004-036	G&D 02.2004 #14	4.3.1 variable space incl. admin data	S@T 1.50 V2.0.0	Accepted (email vote 9 th March 2004)
2006-007	CR_Axalto-TDG S@T Number 007	9.2 Outgoing concatenate SMS Management	S@T 1.50 V3.0.0	Accepted (email vote 9 th Feb. 2006)
	PRISM-Dec-2007 #001	Clarifications for certification	S@T 1.50 V3.0.1	Accepted at WG meeting Jan 2008
	PRISM-Jun-2008 #002	Clarifications for certification Sections 5.2.3.1, 6.5, 6.7, 6.8	S@T 1.50 V3.0.2	Accepted (email vote 26 June 2008)