



Building the Internet of Things



Sierra Wireless Device requirements

Version 3.0

Table of Contents

| | | |
|------------|--|-----------|
| 1. | Introduction | 4 |
| 2. | Lite SIM | 5 |
| 2.1 | List of used Envelope Events | 5 |
| 2.1.1 | ENVELOPE (EVENT DOWNLOAD - Location Status) | 5 |
| 2.1.2 | ENVELOPE (SMS-PP DOWNLOAD) | 5 |
| 2.1.3 | ENVELOPE (Timer Expiration) | 5 |
| 2.2 | List of used Proactive Toolkit Commands | 5 |
| 2.2.1 | Set Up Event List | 5 |
| 2.2.2 | Refresh | 6 |
| 2.2.3 | Timer Management | 6 |
| 2.2.4 | Send USSD | 6 |
| 2.3 | List of SIM Elementary Files expected to be updated by the Terminal | 6 |
| 2.4 | List of Terminal Profile facilities checked by the Applet | 7 |
| 2.5 | List of AT commands expected to be supported by device | 7 |
| 3. | Advanced SIM | 8 |
| 3.1 | List of used Envelope Events | 8 |
| 3.1.1 | ENVELOPE (EVENT DOWNLOAD - Location Status) | 8 |
| 3.1.2 | ENVELOPE (SMS-PP DOWNLOAD) | 8 |
| 3.1.3 | ENVELOPE (Timer Expiration) | 8 |
| 3.1.4 | ENVELOPE (EVENT DOWNLOAD - Call Connected) | 8 |
| 3.1.5 | ENVELOPE (EVENT DOWNLOAD - Call Disconnected) | 8 |
| 3.2 | List of used Proactive Toolkit Commands | 8 |
| 3.2.1 | Set Up Event List | 9 |
| 3.2.2 | Refresh | 9 |
| 3.2.3 | Timer Management | 9 |
| 3.2.4 | Send USSD | 10 |
| 3.3 | List of SIM Elementary Files expected to be updated by the Terminal | 10 |
| 3.4 | List of Terminal Profile facilities checked by the Applet | 10 |

| | | |
|-----|--|----|
| 3.5 | List of AT commands expected to be supported by device | 10 |
| 4. | eSIM (eUICC) | 12 |
| 4.1 | Functional Device Requirements | 12 |
| 5. | Firmware and application logic | 14 |
| 6. | References | 15 |

1. Introduction

This document gives a detailed description of the proactive commands and events used for the Sierra Wireless UICC and eUICC (SIM and eSIM) and the associated Sierra Wireless applets. This specification can be used to determine the interoperability of the SIM and eSIM on different hardware platforms.

Commands that are not tagged as “optional” must be supported by the device in order for the Sierra Wireless UICC and eUICC to function properly. Devices that do not support commands tagged as ‘optional’ in this document can be considered as interoperable with the applet. These commands are used for debug purpose only.

The document also states what the device is allowed to do regarding the UICC/eUICC file system and the use of AT-commands towards the UICC/eUICC.

2. Lite SIM

2.1 List of used Envelope Events

Envelope commands defined by the ETSI TS 102 223 [3] release 6 document.

2.1.1 ENVELOPE (EVENT DOWNLOAD - Location Status)

- Check tag: **TAG_LOCATION_STATUS (0x1B)**: only value 0x00 (Normal Service) triggers the state machine of the Applet.
- Check tag: **TAG_LOCATION_INFORMATION (0x13)**: only valid in case of Normal Service.
- Check length of LOCATION INFORMATION.

2.1.2 ENVELOPE (SMS-PP DOWNLOAD)

- Enable the Applet to receive (binary) SMS in order to subsequently execute an action (register to another network, update the IMSI and register to the same network, etc....).

2.1.3 ENVELOPE (Timer Expiration)

- Check tag: **TAG_TIMER_IDENTIFIER (0x24)** to retrieve the expired timer id.

2.2 List of used Proactive Toolkit Commands

Proactive commands sent from the SIM Card to the Terminal.

The structure of Proactive commands is described by the ETSI TS 102 223 [3] release 6 document and the coding of the command details data object is specified in section 8.6.

2.2.1 Set Up Event List

The Proactive command SET-UP-EVENT-LIST is defined in section 6.6.16 with command details set to '8103010500'.

The Event list data object contains the following values:

- Location Status = '03'
- Data available = '09'



- Channel status = '0A'

2.2.2 Refresh

The Proactive command REFRESH is defined in section 6.6.13 with command details set to '81030101mm' where 'mm' represents the refresh mode.

The Applet uses the following modes of refresh (byte mm):

- 02: NAA Initialization and File Change Notification for the access technology GERAN (2G).
- 06: NAA Session Reset for access technologies UTRAN (3G) and EUTRAN (4G).
- 04: UICC Reset otherwise.

2.2.3 Timer Management

The Proactive command TIMER-MANAGEMENT is defined in section 6.6.21 with command details set to '81030127cc' where 'cc' represents the command type.

The Applet uses the following types of command (byte cc):

- 00: Start Timer
- 01: Stop Timer

The 'Timer Identifier' data object is set to 'A40101' (identifier = 1).

The 'Timer Value' data object is set to '001000' (value = 1 minute).

2.2.4 Send USSD

The Proactive command SEND-USSD is defined by the ETSI TS 131 111 [56] release 6 document, section 6.6.11, with command details set to '8103011200'.

The USSD string is coded as described in the section 8.17.

2.3 List of SIM Elementary Files expected to be updated by the Terminal

If it actually uses the SIM file system, the Terminal is expected to update the following Elementary Files:

- MF/GSM/LOCI (when registered for CS services)



- MF/GSM/LOCIGPRS (when registered for PS services)

If it actually uses the USIM file system, the Terminal is expected to update the following Elementary Files:

- USIM/LOCI (when registered for CS services)
- USIM/PSLOCI (when 2G/3G Terminal is registered for PS services)
- USIM/EPSLOCI, if present (when 4G Terminal is registered for EPS services)

Updates of the SIM EF shall be done according related clauses of the specification 3GPP 24.008 and 23.122

2.4 List of Terminal Profile facilities checked by the Applet

The Applet checks that the following SIM Card Application Toolkit are supported by the Terminal:

- Proactive UICC command REFRESH
- Proactive UICC command SEND-USSD

2.5 List of AT commands expected to be supported by device

The Device shall support from the [35] the following commands for all generic purposes:

- AT+CRSM (Restricted SIM access)
- AT+CSIM

3. Advanced SIM

3.1 List of used Envelope Events

Envelope commands are defined by the ETSI TS 102 223 [3] release 6 document.

3.1.1 ENVELOPE (EVENT DOWNLOAD - Location Status)

- Check tag: **TAG_LOCATION_STATUS (0x1B)**: only value 0x00 (Normal Service) triggers the state machine of the Applet.
- Check tag: **TAG_LOCATION_INFORMATION (0x13)**: only valid in case of Normal Service.
- Check length of LOCATION INFORMATION.

3.1.2 ENVELOPE (SMS-PP DOWNLOAD)

- Enable the Applet to receive (binary) SMS in order to subsequently execute an action (register to another network, update the IMSI and register to the same network, etc....).

3.1.3 ENVELOPE (Timer Expiration)

- Check tag: **TAG_TIMER_IDENTIFIER (0x24)** to retrieve the expired timer id.

3.1.4 ENVELOPE (EVENT DOWNLOAD - Call Connected)

- No data is read: This event triggers the state machine of the Applet.

3.1.5 ENVELOPE (EVENT DOWNLOAD - Call Disconnected)

- No data is read: This event triggers the state machine of the Applet.

3.2 List of used Proactive Toolkit Commands

Proactive commands sent from the SIM Card to the Terminal.

The structure of Proactive commands is described by the ETSI TS 102 223 [3] release 6 document and the coding of the command details data object is specified in section 8.6.

3.2.1 Set Up Event List

The Proactive command SET-UP-EVENT-LIST is defined in section 6.6.16 with command details set to '8103010500'.

The Event list data object contains the following values:

- Call Connected = '01'
- Call Disconnected = '02'
- Location Status = '03'
- Data available = '09'
- Channel status = '0A'

3.2.2 Refresh

The Proactive command REFRESH is defined in section 6.6.13 with command details set to '81030101mm' where 'mm' represents the refresh mode.

The Applet uses the following modes of refresh (byte mm):

- 02: NAA Initialization and File Change Notification for the access technology GERAN (2G).
- 06: NAA Session Reset for access technologies UTRAN (PS / 3G) and EUTRAN (4G).
- 04: UICC Reset otherwise.

3.2.3 Timer Management

The Proactive command TIMER-MANAGEMENT is defined in section 6.6.21 with command details set to '81030127cc' where 'cc' represents the command type.

The Applet uses the following types of command (byte cc):

- 00: Start Timer
- 01: Stop Timer

The 'Timer Identifier' data object is set to 'A40101' (identifier = 1).

The 'Timer Value' data object is set to '001000' (value = 1 minute).

3.2.4 Send USSD

The Proactive command SEND-USSD is defined by the ETSI TS 131 111 [56] release 6 document, section 6.6.11, with command details set to '8103011200'.

The USSD string is coded as described in the section 8.17.

3.3 List of SIM Elementary Files expected to be updated by the Terminal

If the Terminal uses the SIM file system, it is expected to update the following Elementary Files:

- MF/GSM/LOCI (when registered for CS services)
- MF/GSM/LOCIGPRS (when registered for PS services)

If the terminal uses the USIM file system, it is expected to update the following Elementary Files:

- USIM/LOCI (when registered for CS services)
- USIM/PSLOCI (when 2G/3G Terminal is registered for PS services)
- USIM/EPSLOCI, if present (when 4G Terminal is registered for EPS services)

Updates of the SIM EF shall be done according related clauses of the specification 3GPP 24.008 and 23.122

3.4 List of Terminal Profile facilities checked by the Applet

The SIM Applet checks that the following SIM Card Application Toolkit are supported by the Terminal:

- Proactive UICC command REFRESH
- Proactive UICC command SEND-USSD

3.5 List of AT commands expected to be supported by device

The Device shall support from the [35] the following commands for all generic purposes:

- AT+CRSM (Restricted SIM access)
- AT+CSIM

4. eSIM (eUICC)

4.1 Functional Device Requirements

| Functional Device Requirements No. | Requirement |
|------------------------------------|---|
| DEV1 | <p>For connectivity the Device shall support:</p> <ul style="list-style-type: none"> • At least one of the network access technologies defined by 3GPP in the non-exhaustive following list: <ul style="list-style-type: none"> ○ GERAN, ○ UTRAN ○ E-UTRAN. • UDP over IP [32] (subject to the right support of access network technology) • TCP over IP [33] (subject to the right support of access network technology) |
| DEV2 | <p>For Network connection control the Device shall support:</p> <ul style="list-style-type: none"> • RPLMN details (LAC/TAC, NMR). • QoS (failures, duration, power, location). • SMS management. • New network selection after SIM/USIM update. |
| DEV3 | <p>For reporting to a server the Device shall support:</p> <ul style="list-style-type: none"> • SMS-PP MO as defined in [3] and SMS-PP MO as defined [33] or [29] BIP as defined in DEV4 <p>The Device should support:</p> <ul style="list-style-type: none"> • USSD |
| DEV4 | <p>For Profile and Platform Management the Device shall support:</p> <ul style="list-style-type: none"> • SMS-PP MT as defined in [3], and SMS-PP MT as defined [33] or [29] • BIP (subject to the support of the right network access technology) as defined in [3] including support of commands: <ul style="list-style-type: none"> ○ OPEN CHANNEL (UPD and TCP over IP) ○ CLOSE CHANNEL ○ RECEIVE DATA ○ SEND DATA ○ GET CHANNEL STATUS ○ ENVELOPE (EVENT DOWNLOAD - Data available) ○ ENVELOPE (EVENT DOWNLOAD – Channel status) |
| DEV5 | <p>The Device shall contain a unique IMEI (International Mobile Equipment Identity) value compliant with the format defined in ETSI TS 123 003 [31].</p> |

| | |
|------|---|
| | The value of IMEI shall be directly copied from TERMINAL RESPONSE of the Provide Local Information command (see ETSI TS 102 223 [3] and ETSI TS 124 008[20]). |
| DEV6 | <ul style="list-style-type: none"> • The Device shall support, as a minimum, the following set of commands (in addition to BIP commands) as defined in ETSI TS 102 223 [3] and 3GPP TS 31.111 [27]. Basic SAT commands (TERMINAL PROFILE, FETCH, TERMINAL RESPONSE) • PROVIDE LOCAL INFORMATION (location information, IMEI, NMR, date and time, access technology, at least) • SEND SHORT MESSAGE • POLL INTERVAL, POLLING OFF, TIMER MANAGEMENT [at least one timer], ENVELOPE (TIMER EXPIRATION) • SET UP EVENT LIST and ENVELOPE (EVENT DOWNLOAD – location status, call connected, call disconnected, Access Technology Changed, Network Rejection) • ENVELOPE (SMS-PP DOWNLOAD) • REFRESH Command (At least mode 4 - “UICC reset”) |
| DEV7 | The Device shall comply with the GSMA-EICTA document “Security Principles Related to Handset Theft” [30] |
| DEV8 | <p>The Device may retrieve the EID (defined in section 2.2.2 of references document [57]) from the eUICC and shall support the following commands as described in [35]:</p> <ul style="list-style-type: none"> • AT+CCHO (Open Logical Channel) • AT+CCHC (Close Logical Channel) • AT+CGLA (Generic UICC Logical Channel Access) |
| DEV9 | <p>The Device shall support from the [35] the following commands for all generic purposes:</p> <ul style="list-style-type: none"> • AT+CRSM (Restricted SIM access) |

5. Firmware and application logic

The device firmware and the application logic on the customer device are not allowed to modify any files on the SIM or the eSIM except from those explicitly mentioned as allowed in this document. It is not allowed to modify or control the network selection process, this is handled by the provided SIM applet.

The device must be set to “automatic” network selection mode. And auto-GPRS attachment mode must be enabled for data failure prevention functionality when using the Advanced SIM.

6. References

| References Ref | Document Number | Title |
|----------------|---|---|
| [3] | ETSI TS 102 223 | Smart Cards; Card Application Toolkit (CAT) ; Release 6 |
| [20] | ETSI TS 124 008 | Mobile radio interface Layer 3 specification; Core network protocols; Release 9 |
| [27] | 3GPP TS 31.111 | Universal Subscriber Identity Module (USIM) Application Toolkit (USAT) ; Release 9 |
| [29] | 3GPP TS 24.341 | Support of SMS over IP networks; Release 9 |
| [30] | GSMA Security Principles Related to Handset Theft | GSMA Doc Reference: Security Principles Related to Handset Theft 3.0.0 EICTA CCIG Doc Reference: EICTA Doc: 04cc100 |
| [31] | ETSI TS 123 003 | Universal Mobile Telecommunications System (UMTS); Numbering, addressing and identification; Release 9 |
| [32] | RFC 768 | User Datagram Protocol, Aug 1980. |
| [33] | RFC 793 | Transmission Control Protocol, DARPA Internet Program, Protocol specification, Sept 1981. |
| [35] | 3GPP TS 27.007 | Technical Specification Group Core Network and Terminals; AT command set for User Equipment (UE) ; Release 9 |
| [56] | ETSI TS 131 111 | Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Universal Subscriber Identity Module (USIM) Application Toolkit (USAT) |
| [57] | SGP.02 - Remote Provisioning Architecture for Embedded UICC Technical Specification | GSMA Remote Provisioning Architecture for Embedded UICC Technical Specification Version 3.1 |