



Fixed-Mobile
Convergence Alliance

Convergence Services using SIP over Wi-Fi

Product Requirement Definitions (PRD)
Release 2.0
8th May 2006

Technical Handset Requirements

Release 2.0 – 8th May 2006

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3 How to read this FMCA PRD

This document defines the Technical Handset requirements for the FMCA Convergence Services using SIP over Wi-Fi PRD Release 2.0. This document should be read in conjunction with the following PRD Release 2.0 documents:

- Convergence Products using SIP over Wi-Fi PRD, Release 2.0, Terms and Definitions, April 2006
- Convergence Products using SIP over Wi-Fi PRD, Release 2.0, Service Capabilities, April 2006
- Convergence Products using SIP over Wi-Fi PRD, Release 2.0, Access Point & Gateway, April 2006
- Convergence Products using SIP over Wi-Fi PRD, Release 2.0, Network Architecture, April 2006

Within this PRD the word 'shall' denotes a mandatory requirement and the word 'should' denotes a desirable requirement.

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4 User Equipment

4.1 Hardware Characteristics

4.1.1 UE features shall be similar to those of an equivalent cellular UE, or an equivalent PDA. Examples of these features are: battery level indication, loudspeaker/hands-free capability, accessories, volume and sound control, colour display, etc.

Matching PRD Release 1.0 Ref. 5.3.7.1

4.2 OS

4.2.1 The UE shall feature a real-time OS.

Matching PRD Release 1.0 Ref. 5.3.7.2

4.2.2 The UE shall support multi-threading.

Matching PRD Release 1.0 Ref. 5.3.7.2

4.2.3 The UE shall support real-time applications such as VoIP.

Matching PRD Release 1.0 Ref. 5.3.7.2

4.3 Battery Life and Power Management

4.3.1 As a minimum, the standard UE battery life shall last for 150 hours of standby and five hours' talk time when the UE switches between the two modes any number of times.

Matching PRD Release 1.0 Ref. 5.3.12.1

4.3.2 The UE shall support a mechanism to dynamically adapt power consumption.

Matching PRD Release 1.0 Ref. - 5.3.12.2

4.3.3 The UE shall support a power-save mode

Matching PRD Release 1.0 Ref. 5.3.12.

4.3.4 A connection shall not be dropped because the UE enters power-save mode.

Matching PRD Release 1.0 Ref. 5.3.12.4

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4.4 SIM

4.4.1 The UE should support a 'Dual SIM' capability (one SIM card supporting multiple independent SIM/USIM/ISIM applications with different profiles). Multiple SIM/USIM applications can be active concurrently.

4.4.2 The UE should support a SIM card with a single SIM/USIM profile but with multiple IMSIs. This can be used to provide users with multiple accounts or as an aid to roaming.

4.4.3 Where Dual SIM or multiple IMSIs are supported the UE should support an application to select the appropriate (U)SIM application or IMSI for cellular and wireless access. For example the UE should support the selection of (U)SIM applications or IMSIs based on access mode – cellular or wireless.

4.4.4 The UE should support SIM Application Toolkit (TS151.014), USIM Application Toolkit (TS31.111) and Card Application Toolkit (TS 102 223).

4.4.5 The UE should support an OTA SIM toolkit functionality that allows standardised Remote File Management on the SIM card.

4.5 Interfaces

4.5.1 The UE shall have a USB 2.0 interface and the connector should be a mini USB type.

4.5.2 The UE shall be supplied with either a mini USB to USB A connector cable or a mini USB to USB B connector adapter.

4.5.3 The UE should support the capability to be powered or recharged via a USB connection.

4.5.4 The UE should have a Bluetooth interface

4.5.5 The UE shall have a Wi-Fi interface

Matching PRD Release 1.0 Ref. 5.3.1.1

4.5.6 The UE shall have a cellular radio interface

Matching PRD Release 1.0 Ref. 5.3.1.1

4.5.7 The UE should support the simultaneous connection of both Wi-Fi and cellular radio interfaces. UE receiver sensitivity should be tested, to establish that the operation of the cellular interface does not significantly degrade Wi-Fi receiver sensitivity, e.g. as per emerging Wi-Fi Alliance WMC RF Performance Certification.

Matching PRD Release 1.0 Ref. 5.3.3.6

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4.5.8 The UE should support the capability to be used as a modem, in both cellular and wireless modes, via a 'tethered' data port connection to another device, e.g. a PC.

Matching PRD Release 1.0 Ref. 5.3.1.5

4.5.9 The UE shall have the capability to display to the user the available wireless networks it can connect to.

Matching PRD Release 1.0 Ref. 5.3.2.3

4.5.10 The UE shall support simultaneous operation of Bluetooth accessories (e.g. headset) and Wi-Fi operation.

Matching PRD Release 1.0 Ref. 5.3.13.13

4.6 User Interface

4.6.1 The UE shall provide a common user interface in wireless and cellular modes, which shall be simple and consistent amongst all applications. It should be noted that there may be minor, user and/or operator configurable differences between modes.

Matching PRD Release 1.0 Ref. 5.3.1.3 and 5.3.17.1

4.6.2 User action to make and receive calls shall be the same, regardless of mode.

Matching PRD Release 1.0 Ref. 5.3.17.2

4.6.3 User procedures to activate/de-activate applications such as SMS, MMS, email and internet browsing in both modes shall be harmonised and the same whenever possible, except for mode indication and other differences configurable by the end user or operator.

4.6.4 The UE shall provide a visible indication of mode i.e. wireless or cellular mode. The indication should change automatically when the mode changes, this feature shall be operator configurable.

Matching PRD Release 1.0 Ref. 5.3.17.3

4.6.5 Access to personal content such as address books, agendas, configuration data and stored files shall be mode-independent.

4.6.6 The UE shall provide a user indication of AP connectivity.

Matching PRD Release 1.0 Ref. 5.3.17.4

4.6.7 The UE shall show an indication of SIP registration and service availability, if in wireless mode.

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Matching PRD Release 1.0 Ref. 5.3.17.5

4.6.8 The UE shall indicate which access network is being used for any incoming or outgoing call, if this is not implicit from the mode indication.

Matching PRD Release 1.0 Ref. 5.3.17.6

4.6.9 The UE shall be able to provide either consistent or different ring tones and volumes based upon mode of operation. Selection shall be operator/user configurable.

Matching PRD Release 1.0 Ref. 5.3.17.7

4.6.10 The UE shall provide an indication of both wireless signal strength and cellular signal strength.

Matching PRD Release 1.0 Ref. 5.3.17.8

4.6.11 The UE should support the facility to provide an audible warning that wireless signal quality is deteriorating prior to handover. This is to give users an early indication of a potential network/tariff change.

Matching PRD Release 1.0 Ref. 5.3.17.9

4.6.12 The UE shall be configurable by the user in any of the following four selection mode preference: wireless-only, wireless-preferred, cellular-preferred, cellular-only.

Matching PRD Release 1.0 Ref. 5.3.17.10

4.6.13 An audible indication should be provided to the user when the UE performs a handover to/from the cellular network. The actual indication shall be different depending on the direction of the mode change.

Matching PRD Release 1.0 Ref. 5.3.17.11

4.6.14 Use of the audible indication on handover shall be both user and operator configurable (on/off).

Matching PRD Release 1.0 Ref. 5.3.17.12

4.6.15 UE boot-up time (power on to PIN prompt) should be consistent with the need for a good user experience. Time from successful PIN entry to ability to make or receive call should also be consistent with the need for a good user experience.

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4.7 Wireless LAN (IEEE 802.11) Interface

4.7.1 The UE shall support IEEE 802.11b and be certified by the Wi-Fi Alliance through the existing IEEE 802.11b certification or the emerging Wi-Fi Alliance Device Class certification.

Matching PRD Release 1.0 Ref. 5.3.13.1 and 5.3.13.2

4.7.2 The UE should support IEEE 802.11g and where implemented it shall be certified by the Wi-Fi Alliance through existing IEEE 802.11g certification or the emerging Wi-Fi Alliance Device Class certification.

Matching PRD Release 1.0 Ref. 5.3.13.1 and 5.3.13.2

4.7.3 In addition operators may require that the UE should support IEEE 802.11a and/or IEEE 802.11h. Where implemented these shall be certified by the emerging Wi-Fi Alliance WMC Device-Class Certification.

Matching PRD Release 1.0 Ref. 5.3.13.3 and 5.3.13.4

4.7.4 Depending on regional requirements operators may require that the UE should support IEEE 802.11j.

Matching PRD Release 1.0 Ref. 5.3.13.3

4.7.5 UEs in the future should support emerging wireless LAN standards, e.g. IEEE 802.11n and IEEE 802.11r.

4.7.6 UE Total Radiated Power (TRP) shall be measured according to the emerging Wi-Fi Alliance WMC RF Performance Certification (at the rates and on the channels specified by the RF Performance certification). Future PRD Releases or white papers will recommend target values which the resulting TRP measurement shall meet or exceed.

Replaces PRD Release 1.0 Ref. 5.3.13.5

4.7.7 UE Total Isotropic Sensitivity (TIS) shall be measured according to the emerging Wi-Fi Alliance WMC RF Performance certification (at the rates and on the channels specified by the RF performance certification). Future PRD Releases or white papers will recommend target values which the resulting TIS measurement shall meet or exceed.

Replaces PRD Release 1.0 Ref. 5.3.13.6

4.7.8 The UE shall monitor the signal quality at the wireless layer.

Matching PRD Release 1.0 Ref. 5.3.4.5

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4.7.9 When the UE is in cellular mode, the UE should periodically search for IEEE 802.11 coverage. The interval for probing or scanning should be implementation-specific, depending on power conservation strategies. The interval probe/scan shall be operator and/or user configurable and should be configurable over the air (Wi-Fi and cellular), e.g. through use of OMA Device Management.

Matching PRD Release 1.0 Ref. 5.3.13.8

4.7.10 The UE should use SSID, security settings and RSSI, among other parameters, to select which AP to join.

Matching PRD Release 1.0 Ref. 5.3.13.9

4.7.11 Based on UMA recommendationsⁱ, the UE should be able to (internally) measure RSSI values between -45 dBm and -86 dBm with a step size of 1dB. An Inter-AP 'roaming threshold' should be set such that there is reasonable opportunity to discover other APs when the signal from the current AP drops (before the UE is forced to switch to cellular mode). Roaming threshold shall be operator configurable.

Matching PRD Release 1.0 Ref. 5.3.13.11

4.7.12 Based on UMA recommendationsⁱⁱ, the UE IEEE 802.11 driver shall keep upper layers unaffected by change of AP (provided the IP address does not change). Communication interruption due to change of AP (in the same subnet) shall be kept below 100 ms.

Matching PRD Release 1.0 Ref. 5.3.13.12

4.7.13 The UE shall make the most efficient use of power-save mechanisms in order to maximise battery life whilst allowing other service aspects operate properly (check for incoming traffic periodically, scan periodically, etc).

Matching PRD Release 1.0 Ref. 5.3.13.14

4.7.14 The UE shall be compliant with Wi-Fi Alliance WMM-Power Save Certification.

Matching PRD Release 1.0 Ref. 5.3.13.15

4.7.15 Provision should be made for mitigating against interference from other devices operating in the same wireless spectrum.

Matching PRD Release 1.0 Ref. - 5.3.13.16

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4.8 Bluetooth Interface

4.8.1 The UE should support a Bluetooth v1.2 interface. For headset use the Bluetooth interface should be class 3.

4.8.2 Where implemented, it shall be possible to set the UE bondable/non-bondable (pairable/non-pairable) mode via the user interface.

4.8.3 Where implemented, it shall be possible to set the UE discoverable/non-discoverable mode via the user interface.

4.8.4 Where implemented, the UE shall support Bluetooth security mode level 2 (service level enforced security).

4.8.5 Where implemented, the UE should support Bluetooth security mode level 3 (service level enforced security).

4.8.6 Where implemented, the UE shall support a 128 bits encryption key size. The key size shall be reduced only upon local regulatory and export restriction

4.8.7 Where implemented, the UE shall support a configurable (variable length) Bluetooth PIN code, with a minimum length of four characters. Fixed, built in PIN code shall not be supported.

4.8.8 Where implemented, the UE shall support combination keys in the pairing process. The option to use a unit key shall not be provided.

4.8.9 Besides AFH, UE that support both 802.11b/g and Bluetooth should support additional techniques (e.g. activity coordination between the two transceivers) to improve co-existence of both technologies and allow simultaneous operation of Bluetooth and Wi-Fi with better quality of experience.

4.9 Infra-red Interface

4.9.1 The UE should support an infra-red interface, which is can be switched on/off by the user.

4.9.2 The infra-red interface shall support connectivity between the UE and another device, e.g. a laptop or another UE.

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4.10 Local Synchronisation

4.10.1 The UE shall support UE to PC synchronisation software, e.g. for email, file transfer applications, configuration downloads. Synchronisation should be supported via USB, Wi-Fi, Bluetooth or docking station interfaces.

4.11 Remote Synchronisation

4.11.1 The UE shall support remote UE network synchronisation for applications such as email, file transfer, configuration updates, address books, etc.

4.12 Outgoing Call Routing

4.12.1 The UE shall support out-going call network selection capabilities. For example the ability to route calls on parameters such as network availability, network selection options / UE mode and dialled number.

4.13 Number Management

4.13.1 The UE shall use the same number management facilities, e.g. address book, dialling capability, call history for both modes.

Matching PRD Release 1.0 Ref. 5.3.18.1

4.13.2 The UE shall support short code dialling and translation of calls prefixed with '+' for international country code in both modes.

Matching PRD Release 1.0 Ref. 5.3.18.2

4.13.3 Caller display information for incoming calls in both wireless and cellular modes shall be supported.

Matching PRD Release 1.0 Ref. 5.3.18.3

4.13.4 In wireless mode, the UE should support the option for both the SIP Public User Identity and SIP Display Name to be presented on the UE display as part of the caller display information for incoming calls

Matching PRD Release 1.0 Ref. 5.3.18.4

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4.14 IMS Subscriptions

4.14.1 The UE should support two IMS SIP subscriptions – primary and an alternative and both subscriptions shall be manually selected by the end user and can be enabled simultaneously.

Matching PRD Release 1.0 Ref. 5.3.1.4

4.14.2 P-headers according to RFC3455 shall be supported.

4.14.3 UE should support the capability to provision IMS SIP subscriptions over the air and/or via smart cards. For example use of OMA-CP and OMA-DM.

4.15 Security

4.15.1 The UE shall support the capability to enforce subscriber authentication to the UE at power-on, for example through the use of a PIN.

Matching PRD Release 1.0 Ref. 5.3.2.1

4.15.2 The UE shall support air interface encryption which is at least as secure as cellular ciphering.

Matching PRD Release 1.0 Ref. 5.3.4.4

4.15.3 The UE shall not be vulnerable to unauthorised access to data or services on the UE.

Matching PRD Release 1.0 Ref. 5.3.20.1

4.15.4 The services provided by the network shall not be vulnerable to unauthorised access to data or services on the device, e.g. 'man-in-the-middle' and bogus server attacks.

Matching PRD Release 1.0 Ref. 5.3.20.2

4.15.5 The UE shall support encryption over the air interface to the AP that is at least as good as GSM / IS41 ciphering.

Matching PRD Release 1.0 Ref. 5.3.20.3

4.15.6 The UE shall support IPsec if wireless connectivity is backhauled via the public Internet.

4.15.7 The UE shall be flexible to operator end-to-end security requirements, e.g. ability to secure one or both – signalling and media traffic.

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Matching PRD Release 1.0 Ref. 5.3.20.5

4.15.8 The UE shall support a security solution which provides mutual authentication of UE and the IMS network.

Matching PRD Release 1.0 Ref. 5.3.20.6

4.15.9 The UE should have the capability to support a personal firewall and antivirus software. The UE should also support remote management capabilities for personal firewalls and antivirus software, where used. The UE firewall shall protect all external interfaces - wireless, Bluetooth, etc on the UE.

Matching PRD Release 1.0 Ref. 5.3.20.9

4.15.10 The UE shall support cellular authentication and cellular ciphering when in cellular mode.

Matching PRD Release 1.0 Ref. 5.3.20.10

4.15.11 The UE shall have a valid IMEI/MEID that cannot be manipulated.

Matching PRD Release 1.0 Ref. 5.3.20.11

4.15.12 The UE shall ensure that security keys used to encrypt communications have a cryptographic key strength of at least 128 bits.

Matching PRD Release 1.0 Ref. 5.3.20.12

4.15.13 Where pre-shared keys are used to secure communications between the UE and AP, they shall not be transmitted insecurely over the air interface.

Matching PRD Release 1.0 Ref. 5.3.20.13

4.15.14 Where used, pre-shared keys shall not be exchanged but information derived/computed from them may be exchanged.

Matching PRD Release 1.0 Ref. 5.3.20.14

4.15.15 Protection shall include integrity protection and encryption of the communications data. The protection mechanism shall support the secure traversal of UDP.

Matching PRD Release 1.0 Ref. 5.3.20.15

4.15.16 HMAC MD5 or equivalent shall be used for ensuring message integrity of set-up and secured communications messages.

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Matching PRD Release 1.0 Ref. 5.3.20.16

4.15.17 Signalling information shall be appropriately secured to protect integrity.

Matching PRD Release 1.0 Ref. 5.3.20.17

4.15.18 UE keys and passwords shall be secure and not up-loadable or retrievable.

Matching PRD Release 1.0 Ref. 5.3.20.18

4.16 Quality of Service

4.16.1 For 3GPP2 – UE shall support QoS profiles as per IS-835.4. For 3GPP – UE shall support QoS profiles as per TS 23.107.

Matching PRD Release 1.0 Ref. 5.3.21.1

4.16.2 The UE shall be capable of prioritising traffic based on ‘downstream’ DiffServ code points.

Matching PRD Release 1.0 Ref. 5.3.21.3

4.16.3 The UE shall provide the ability to separately mark voice and signalling traffic (e.g. using DiffServ), in a manner which cannot be altered by the user.

Matching PRD Release 1.0 Ref. 5.3.21.4

4.16.4 The UE shall set the DSCP/ToS bits in the IP header - this refers to the IP header outside the IPsec tunnel - in accordance with RFC 2474. One implication of this is that the DSCP/ToS bits from the IP header inside the IPsec tunnel shall be copied to the outer IP header.

Matching PRD Release 1.0 Ref. 5.3.21.6

4.16.5 The UE should support the option to internally prioritise voice packets ahead of any other data packets that are to be transmitted.

Matching PRD Release 1.0 Ref. 5.3.21.8

4.17 Connection Establishment

4.17.1 The UE shall automatically associate to the best available Wi-Fi network according to user and operator customised preferences and to network quality (e.g. Wi-Fi signal strength, available QoS, bandwidth).

Matching PRD Release 1.0 Ref. 5.3.3.1

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4.17.2 The UE shall automatically attach to a cellular network if it is not in range of a Wi-Fi network, dependent on user's preference of wireless preferred or wireless-only modes.

Matching PRD Release 1.0 Ref. 5.3.3.2

4.17.3 The UE shall automatically attach to a cellular network if it is in cellular-only mode.

Matching PRD Release 1.0 Ref. 5.3.3.3

4.17.4 The UE shall support the capability to configure the preference for connectivity, e.g. cellular or wireless, for both making and receiving calls/data. It is recognised that, in some scenarios, this may result in users being connected to both networks at the same time.

Matching PRD Release 1.0 Ref. 5.3.3.4

4.17.5 If the UE is put into a sleep mode (e.g. no active calls), the UE should maintain wireless and/or cellular interfaces such that an incoming or outgoing event can be quickly established.

Matching PRD Release 1.0 Ref. 5.3.5.2

4.17.6 The UE shall support a de-registration process to detach from the IMS network.

Matching PRD Release 1.0 Ref. 5.3.5.3

4.17.7 The UE shall support SIP session setup and tear-down in wireless mode.

4.18 Wi-Fi Association

4.18.1 The UE shall scan for wireless and cellular coverage at power-on, as per mode settings. For example, if UE is in wireless-only mode then only a wireless scan shall be performed.

Matching PRD Release 1.0 Ref.: 5.3.2.2

4.18.2 The UE shall support connectivity to the following types of Wi-Fi APs: private/home APs and gateways, public Wi-Fi hotspots and enterprise/corporate APs and temporary portable APs, e.g. USB dongle for laptops.

Matching PRD Release 1.0 Ref. 5.3.4.1

4.18.3 The UE shall support the capability for users to gain guest access to Wi-Fi SIP service/networks via wireless APs or gateways that they may be visiting.

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Matching PRD Release 1.0 Ref. 5.3.4.2

4.18.4 The UE shall be capable of initiating an association with an AP which is broadcasting its SSID.

Matching PRD Release 1.0 Ref. 5.3.4.6

4.18.5 The UE shall be capable of initiating an association with an AP which is not broadcasting its SSID.

Matching PRD Release 1.0 Ref. 5.3.4.7

4.18.6 The UE should be able to simultaneously connect to multiple SSIDs, e.g. one for voice and another SSID for data.

Matching PRD Release 1.0 Ref. 5.3.4.8

4.18.7 When the UE successfully associates and authenticates with the AP for the first time, it shall store the association/authentication details within a UE wireless profile. For example the wireless profile could store details such as SSID, encryption (none, WEP, WPA, WPA 2), network authentication, IP configuration.

Matching PRD Release 1.0 Ref. 5.3.4.9

4.18.8 The UE shall be capable of storing a minimum of 32 wireless profiles and differentiate between them based on Wi-Fi parameters such as SSID and MAC address. Operators shall have the ability to restrict the maximum number of WLAN profiles. The user shall have the ability to label the wireless profile; the default shall be the SSID. The UE shall prompt the user when all wireless profiles are used up. UE shall support user configurable options for new profiles when the UE maximum number of wireless associations limit is reached. For example, whether to automatically delete the least used profile, or to alert the user that an existing profile will need to be deleted before the new profile can be added. The user shall have the ability to label the wireless profile; the default shall be the SSID.

Matching PRD Release 1.0 Ref. 5.3.4.10

4.18.9 The UE shall be able to set an order of connection preference for the stored wireless profiles.

Matching PRD Release 1.0 Ref. 5.3.4.11

4.18.10 The UE shall have a simple user interface to allow the user to configure wireless profiles, e.g. addition, deletion. These profiles should ideally be able to be modified over the air. The UE should support the capability to manage wireless profiles over the air, e.g. through the use of OMA-DM or OMA-CP.

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Matching PRD Release 1.0 Ref. 5.3.16.5

4.18.11 The UE shall attempt to associate to Wi-Fi networks in the order determined by the wireless profile priorities.

Matching PRD Release 1.0 Ref. 5.3.4.12

4.18.12 If the UE detects a wireless network that it can use, and with no other higher priority wireless networks available, the UE shall automatically attach to that wireless network - subject to the wireless signal being of sufficient quality to meet the service requirements, and subject to the UE being in wireless-preferred or wireless-only mode.

Matching PRD Release 1.0 Ref.: 5.3.4.14

4.18.13 After the UE has successfully attached for the first time to an AP and stored a wireless profile, for all types of AP, subsequent UE to AP (with same stored Wi-Fi profile) authentication on connection shall be automatic and shall not require any keystroke entry on the UE to attach to the service.

Matching PRD Release 1.0 Ref. 5.3.4.15

4.18.14 If a UE successfully associates to an AP but fails to register successfully to the SIP server after a number of registration attempts, the UE should attempt the registration via another AP. AP association and subsequent SIP registration attempts should be repeated until all available APs have been attempted. The number of AP association attempts, the number of SIP registration attempts per AP, the maximum number of APs to be attempted and the timing intervals shall be operator configurable.

Matching PRD R1.0 Requirement: 5.3.4.16

4.18.15 If the Wi-Fi signal quality falls below an operator defined threshold, measured by the UE, then the UE shall disconnect from the AP, whilst in cellular coverage.

4.18.16 The UE shall only initiate an association attempt to an AP if the Wi-Fi signal quality is above a defined threshold.

4.18.17 The first association between a UE and an AP shall be initiated by the UE user, e.g. via menu selections or a user friendly mechanism. The user friendly mechanism shall provide a secure way to configure WEP / WPA / WPA2 without the need for the user to enter a passphrase into the UE. It shall not be possible for a third party to crack the WPA security by eavesdropping the user friendly mechanism set-up process. The UE may provide a visual or audible prompt configurable by the operator and user. Operator preference shall prevail. This feature should be modifiable over the air, e.g. via OMA-DM.

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4.18.18 The UE should support over the air management of wireless profiles, e.g. through the use of OMA Device Management.

4.18.19 If the UE is in wireless-only mode or wireless-preferred mode, the UE shall have the option not to display a prompt to the user to initiate or accept an association to an AP it has already associated with, i.e. any first association to an AP shall be initiated by the user; subsequent associations to this AP shall not require user intervention. Options shall be operator configurable through remote management, e.g. OMA-DM.

4.18.20 For 3GPP2 networks, UE should provide support for multiple profile slot capability in support of Mobile IP and Simple IP services. Wi-Fi profiles should be in addition to cellular profiles.

Matching PRD Release 1.0 Ref. 5.3.16.6

4.19 Wi-Fi Security and Authentication

4.19.1 The UE shall enforce secure mutual authentication at the wireless level between the device and the access network.

Matching PRD Release 1.0 Ref. 5.3.4.3

4.19.2 The UE shall support WEP (RC4) and WPA (TKIP) Personal at the minimum.

Matching PRD Release 1.0 Ref. 5.3.14.1

4.19.3 The UE shall support WPA 2 Personal or WPA 2 Enterprise as required by the operator.

Matching PRD Release 1.0 Ref. 5.3.14.2

4.19.4 The UE should support one or more operator specified upper layer authentication protocols, e.g. HTTP, HTTPS, SSL/RADIUS, EAP TLS, PEAP, EAP-FAST, EAP-AKA, EAP-SIM, EAP-MD5, EAP-TTLS, XML mini-browser in particular for public hotspot scenarios.

Matching PRD Release 1.0 Ref. 5.3.14.4

4.19.5 The UE shall support open access, i.e. no WEP, no WPA, no WPA 2. This option shall be configurable (enabled/disabled) by the Operator.

Matching PRD Release 1.0 Ref. 5.3.14.5

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4.19.6 The UE shall be compliant with Wi-Fi Alliance WPA2 certification.

Matching PRD Release 1.0 Ref. 5.3.14.6

4.19.7 The UE should be compliant with Wi-Fi Alliance Extended EAP certifications.

Matching PRD Release 1.0 Ref. 5.3.14.7

4.19.8 Pre-shared keys, or derivative of the key, shall be stored on the UE in a way that means it cannot be read from the device, e.g. the key may be encrypted.

Matching PRD Release 1.0 Ref. 5.3.14.8

4.19.9 The WPA, WPA 2 pre-shared key for authentication should be at least 20 characters, pseudo-random and consisting of digits 0-9 and characters a-z. A user friendly mechanism shall be supported for first-time residential association. This shall provide a secure way to configure WPA / WPA 2 without the need for the user to enter a pass phrase into the UE. It shall not be possible for a third party to crack the WPA / WPA2 security by eavesdropping the user friendly set-up process. The user friendly mechanism should be certified against emerging Wi-Fi Alliance Simple Configuration certifications.

Matching PRD Release 1.0 Ref. 5.3.14.9

4.19.10 The UE should provide a user friendly mechanism for entry of scripted based login details onto the UE for use with public hotspots. Scripting requirements to be specified by operator

Matching PRD Release 1.0 Ref. 5.3.14.11

4.20 Wireless QoS

4.20.1 The Wi-Fi air interface shall be optimised for voice and associated signalling traffic, i.e. voice delay shall be minimised and the UE should internally prioritise voice and signalling packets ahead of any other data packets that are to be transmitted.

Matching PRD Release 1.0 Ref. 5.3.15.1

4.20.2 The UE shall prioritise voice over data if it is supporting a voice call and a data session over the Wi-Fi air interface at the same time.

Matching PRD Release 1.0 Ref. 5.3.15.2

4.20.3 The UE shall support Wi-Fi Alliance Wi-Fi Multi Media (WMM) to allow prioritised access for voice packets to the medium. This shall include UE certification for WMM.

Matching PRD Release 1.0 Ref. 5.3.15.3

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4.20.4 The UE shall support the capability to set WMM access categories – voice, video, best effort, background – based on traffic type, e.g. voice, data and signalling. In addition the UE shall support traffic identification functionalities, e.g. DSCP, IP address, port filters, etc.

Matching PRD Release 1.0 Ref. 5.3.15.4

4.21 Mobility and Service Continuity

4.21.1 The UE should support the facility to provide an audible warning that wireless signal quality is deteriorating prior to handover. This is to give users an early indication of a potential network/tariff change. This function should be able to be enabled/disabled by operators and/or users.

Matching PRD Release 1.0 Ref. 5.3.9.9

4.21.2 The UE shall support AP-to-AP handovers within an enterprise site or public Wi-Fi hotspot.

Matching PRD Release 1.0 Ref. 5.3.10.1

4.21.3 The UE shall support voice and data session continuity in case of AP-to-AP handover within an enterprise site or public Wi-Fi hotspot.

Matching PRD Release 1.0 Ref. 5.3.10.2

4.21.4 The user experience of the handover between APs should be seamless with no loss of voice, no perceptible break and, where possible a maximum voice break of no more than 100ms.

Matching PRD Release 1.0 Ref. 5.3.10.3

4.21.5 The UE shall support voice call handover between cellular and wireless networks, where the wireless network could be an enterprise, private home or public hotspot network.

Matching PRD Release 1.0 Ref. 5.3.10.4

4.21.6 The UE shall support data session handover between cellular and wireless networks.

4.21.7 The user experience of the handover between wireless and cellular should be seamless with no loss of voice (call continuity) and, where possible, a maximum voice break of no more than 300ms.

Matching PRD Release 1.0 Ref. 5.3.10.5

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4.21.8 A handover shall not cause an existing data session to be dropped. In addition any data application that is running shall not be affected, by a handover or rove, from a user's perspective. However, it is appreciated that the user may become aware of speed changes and pauses.

Matching PRD Release 1.0 Ref. 5.3.10.6

4.21.9 For handover of a call from cellular to wireless, the UE shall be capable of signalling to the IMS network using wireless while the cellular call is ongoing - if this is required to support handover.

Matching PRD Release 1.0 Ref.: 5.3.10.7

4.21.10 For handover of a call from wireless to cellular, the UE shall be capable of signalling to the IMS network using cellular while the wireless call is ongoing — if this is required to support handover.

Matching PRD Release 1.0 Ref. 5.3.10.8

4.21.11 The UE shall rove to/from wireless and cellular networks, as required.

Matching PRD Release 1.0 Ref. 5.3.10.10

4.21.12 The maximum time to complete roving to/from a cellular network shall be no more than 300ms.

Matching PRD Release 1.0 Ref. 5.3.10.12

4.21.13 The UE shall be capable of initiating a switch to cellular mode based on measurement of downlink wireless signal quality. Measurement of wireless signal strength alone is not sufficient: the UE should also take bit error rate and other relevant factors into account.

Matching PRD Release 1.0 Ref. 5.3.10.13

4.21.14 The UE shall use a hysteresis mechanism at the Wi-Fi level to prevent multiple mode changes at the boundary of Wi-Fi coverage.

Matching PRD Release 1.0 Ref. 5.3.10.15

4.21.15 The UE shall support rove-in and rove-out timers to limit the number of consecutive network changes (e.g. 'ping-pong' effect) and hence reduce network signalling.

Matching PRD Release 1.0 Ref. 5.3.10.16

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4.21.16 The UE shall support hand-in and hand-out timers to limit the number of consecutive network changes (e.g. 'ping-pong' effect) and hence reduce network signalling.

Matching PRD Release 1.0 Ref. 5.3.10.17

4.21.17 The UE shall send a presence and location update immediately after all rove-in/out and handin/out mode changes. This update should also be used to ensure that the presence and IM servers are updated on the current UE network location.

Matching PRD Release 1.0 Ref. 5.3.10.18

4.22 Location Based Services

4.22.1 UE should support value added Location Based Services.

Matching PRD Release 1.0 Ref. 5.3.7.20

4.22.2 UE's should at the minimum be able to present their Cell ID to LBS servers. More information on how this should be realised will be covered in PRD Release 3.

4.22.3 UE should be able to support wireless LAN location capabilities (e.g. feeding access point SSID, access point MAC address back to the network) as required by emergency services and other location services. This is an area which will be expanded on in PRD Release 3.0.

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4.23 Presence Services

4.23.1 The UE shall support presence capabilities in both wireless and cellular modes. The UE should support presence capabilities based on 3GPP, 3GPP2, OMA, ETSI TISPAN and XML document management specifications.

Matching PRD Release 1.0 Ref. 5.3.6.1

4.23.2 The UE should support presence capabilities so that it can update presence servers when in wireless mode.

Matching PRD Release 1.0 Ref. 5.3.6.2

4.23.3 The UE should support presence capabilities so that it can update presence servers when in cellular mode.

Matching PRD Release 1.0 Ref. 5.3.6.3

4.23.4 Mid-tier and high-end UE should support Presence and Contact/Buddy lists that are presence enabled.

Matching PRD Release 1.0 Ref. 5.3.7.4

4.23.5 The UE shall allow a user's status to be reflected in contact information. This shall be available in wireless and cellular modes. The UE shall support the capability for the user to enable/disable this feature.

Matching PRD Release 1.0 Ref. 5.3.7.16

4.24 Applications and Multimedia Services

4.24.1 Mid-tier and high-end UE shall enable the use of productivity applications such as enterprise email, calendaring, and contacts (including speed dialling from the contacts list). For example, the ability to use various email applications on UE and support speed dialling from contact list.

Matching PRD Release 1.0 Ref. 5.3.7.3

4.24.2 Mid-tier and high-end UE should support the synchronisation of data (PIM, enterprise data) with a network server.

4.24.3 It should be possible for all UE applications, firewalls and antivirus software, etc to be installed on the UE during manufacture or post manufacture. Both methods shall be supported.

Matching PRD Release 1.0 Ref. 5.3.7.5

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4.24.4 It should be possible for UE applications, firewalls and antivirus software etc, to be provisioned over the air. It should be possible to restrict over the air provision to just signed applications.

Matching PRD Release 1.0 Ref. 5.3.7.6

4.24.5 The UE should be able to indicate to the application layer the access mechanism (wireless or cellular) in use.

Matching PRD Release 1.0 Ref. - 5.3.7.13

4.24.6 The UE shall support IM applications

Matching PRD Release 1.0 Ref. 5.3.7.23

4.25 Voice Codecs

4.25.1 The codecs in the UE should support VAD (Voice Activity Detector) in wireless and cellular modes. Where implemented, this shall be configurable (enabled/disabled) on an operator specific basis and shall be configurable independently for cellular and wireless modes.

Matching PRD Release 1.0 Ref. 5.3.9.10

4.25.2 The codecs in the UE should support CNG (Comfort Noise Generation) in wireless and cellular modes. This shall be configurable as enabled or disabled on an Operator specific basis.

Matching PRD Release 1.0 Ref. 5.3.9.11

4.25.3 The UE shall support the following codecs – G.711a LAW with PLC, G.729A, G.711 uLAW with PLC and the cellular codecs, subject to exact operator requirements. Operators shall have the capability to enable/disable specific codecs and specify order of preference.

Matching PRD Release 1.0 Ref. 5.3.9.3

4.25.4 The UE shall support switching of codecs on call continuity in case of handover between cellular and wireless modes or between wireless access points.

Matching PRD Release 1.0 Ref. 5.3.9.5

4.25.5 The UE shall use an adaptive de-jitter buffer for IP packets.

Matching PRD Release 1.0 Ref. 5.3.9.6

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4.25.6 If the UE is engaged on a voice call in wireless mode and the bandwidth and/or signal quality needed to ensure a pre-defined voice quality drops below a defined threshold, then the UE should be capable of evoking an adaptive codec mode and maintain the call in wireless mode. The FMCA recognises that certain aspects of this requirement may be met through emerging Wi-Fi Alliance Wireless Mobile Convergence (WMC) certification. More details will follow in subsequent PRD releases.

Matching PRD Release 1.0 Ref. 5.3.9.7

4.25.7 The UE should be able to adapt codec to maintain the highest possible voice quality. It should also be noted that it is conceivable that the codec should adapt up as well as down if the network improves.

4.26 Voice Services

4.26.1 The UE shall support the capability for Voice over IP (VoIP) in wireless mode.

Matching PRD Release 1.0 Ref. 5.3.1.2

4.26.2 Users shall be able use the UE to set any call diversion methods, as per current cellular functionality, such as divert when busy, divert when not reachable.

Matching PRD Release 1.0 Ref. 5.3.7.15

4.26.3 The UE shall support DTMF in cellular mode and in wireless mode (e.g. RFC 2833).

Matching PRD Release 1.0 Ref. 5.3.7.18

4.26.4 The UE shall support incoming and outgoing calls over cellular networks.

Matching PRD Release 1.0 Ref. 5.3.8.1

4.26.5 The UE shall support incoming and outgoing voice calls over wireless networks.

Matching PRD Release 1.0 Ref. 5.3.8.2

4.26.6 The UE shall support Real Time Protocol (RTP) (e.g. RFC1889) for wireless mode voice calls.

Matching PRD Release 1.0 Ref. 5.3.8.4.

4.26.7 The UE shall support configurable voice packet sizes.

4.26.8 The UE should support three way calling/call on hold functionality with one leg in wireless and the other in cellular mode.

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Matching PRD Release 1.0 Ref. 5.3.8.6

4.26.9 Wireless mode voice quality shall be comparable to that obtained with good coverage cellular, including delay and echo. This applies to both incoming and outgoing calls. However, UE should aim to provide PSTN-equivalent voice quality when in wireless mode.

Matching PRD Release 1.0 Ref. 5.3.9.1

4.26.10 The UE shall provide acoustic echo control that results in voice quality that is comparable to that experienced with cellular networks.

Matching PRD Release 1.0 Ref. 5.3.9.2

4.26.11 If the UE receives an indication from the network that the bandwidth and/or signal quality has fallen below a defined threshold, the UE shall be capable of initiating a handover to cellular mode.

Matching PRD Release 1.0 Ref. 5.3.9.8

4.27 Emergency Calls

4.27.1 The national regulator will define the emergency call requirements and emergency calls will be routed to the emergency services in accordance with national regulations for where the subscriber is located. Conformance with 3GPP /3GPP2 emergency call requirements are mandatory e.g. 3GPP TS 22.101, 3GPP TS 22.105.

4.27.2 The UE shall support the functionality for operators to mandate that all emergency calls shall be made using the cellular network, if it is available.

Matching PRD Release 1.0 Ref. 5.3.11.1

4.27.3 Emergency calls shall take precedence over the mode of the UE. This shall apply even if the device is in wireless-only mode or wireless preferred mode and has its cellular radio interface turned off, i.e. if the cellular radio is turned off and the UE is configured to place emergency calls via the cellular network, the UE shall turn it on and proceed with the emergency call via the cellular network.

Matching PRD Release 1.0 Ref. 5.3.11.2

4.27.4 The UE should support the ability to route emergency calls as follows:

- if Home cellular coverage is available then the call shall be routed over the Home Cellular network. The UE shall be registered with the Home Cellular Network (including perform a Location Update if this has not already been performed to the cellular network) when it initiates the emergency call;

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- if Home Cellular coverage is not available then the emergency call shall be routed over the Wi-Fi network if in Wi-Fi coverage;
- this shall apply regardless of the wireless-only, wireless-preferred, mobile-preferred, mobile-only setting on the UE. The UE shall be configurable such that this can override the ECMP setting;
- the UE shall contain a configurable list of country codes for which the above behaviour applies. If a country code is not in the configurable list then the UE shall attempt an emergency call over any cellular network if the Home Cellular Network is not available.

4.27.5 The UE shall recognise all international emergency call codes programmed onto handset/device and/or on the SIM or R-UIM (3GPP2).

Matching PRD Release 1.0 Ref. 5.3.11.3

4.27.6 The UE shall support at least eight emergency call codes from the device or SIM card. The assignment of emergency call codes are subject to regional/in country regulations. Support for emergency calls from devices with/without SIM will be covered further in subsequent PRD releases, although it is acknowledged that some in country operating restrictions may not permit emergency calls from UEs without SIMs.

Matching PRD Release 1.0 Ref. 5.3.11.4

4.27.7 The UE should be updated on emergency call codes when roaming between networks.

4.27.8 UE security mechanisms shall be overridden for emergency calls, e.g. if the SIM PIN has been enabled, the requirement to enter this PIN on power-up shall be waived for emergency calls.

Matching PRD Release 1.0 Ref. 5.3.11.5

4.27.9 The UE shall support any local regulatory requirements regarding total time taken for a reselection from wireless to cellular to facilitate an emergency call.

Matching PRD Release 1.0 Ref. 5.3.11.6

4.27.10 The UE shall support configuration by the operator such that emergency calls will only be routed over wireless if no cellular signal is available.

Matching PRD Release 1.0 Ref. 5.3.11.7

4.27.11 If required by the operator the UE shall support handover out (Wi-Fi to cellular) for emergency calls.

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4.27.12 The UE in an emergency call shall ignore its preferred mode settings and maintain the emergency call in the serving domain and should only handover to another domain when no other cells are available in the serving domain.

Matching PRD Release 1.0 Ref. 5.3.11.8

4.27.13 Emergency calls routed over wireless shall be given the highest priority marking that is available (at the application and wireless network level) and shall be appropriately routed.

Matching PRD Release 1.0 Ref. 5.3.11.9

4.27.14 The UE shall report the current AP information and GERAN/UTRAN or 3GPP2 Cell Information if available when making an emergency call in wireless mode. If no SIM — show network searching.

Matching PRD Release 1.0 Ref. 5.3.11.10

4.27.15 The UE and IMS network should support the appropriate handling of deaf service emergency call numbers. It should be noted that some operators may mandate this requirement as a 'shall' due to local regulatory requirements.

Matching PRD Release 1.0 Ref. 5.3.11.11

4.28 Video Services

4.28.1 UE should support video telephony and video streaming services.

Matching PRD Release 1.0 Ref. 5.3.7.21

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4.29 Data Services

4.29.1 The UE shall support data connectivity over both wireless and cellular networks.

4.29.2 When in cellular mode, the UE shall use cellular data services to provide the same services at the best obtainable performance that is available in wireless mode. It should be noted that operators may require facilities to be in place to manage customer expectations regarding difference in data rates between wireless and cellular modes.

Matching PRD Release 1.0 Ref. 5.3.7.12

4.29.3 The UE shall support USSD in 3GPP networks.

Matching PRD Release 1.0 Ref. 5.3.7.17

4.29.4 The UE should support native IP/data access including WAP sessions. Where a native data capability is implemented it shall be done without compromising security or QoS. Capability should be operator configurable – enable/disable.

Matching PRD Release 1.0 Ref. 5.3.7.24

4.29.5 The UE should support data connectivity over both wireless and cellular networks. The FMCA recognises that certain aspects of this requirement may be met through emerging Wi-Fi Alliance Wireless Mobile Convergence (WMC) certification. More details will follow in subsequent PRD releases.

Matching PRD Release 1.0 Ref. 5.3.19.1

4.29.6 The UE should support data and voice connectivity simultaneously in both wireless and cellular modes. The UE shall be able to multitask voice and data sessions. For example, when engaged on a voice call (in either mode), the user may access directories so the call may be transferred with the ability for a user to access live email at the same time as a voice call.

Matching PRD Release 1.0 Ref. 5.3.19.2

4.29.7 The UE shall support data rates when in wireless mode that are at least as high as those supported in cellular mode and should take advantage of the higher data rates available from the wireless network.

Matching PRD Release 1.0 Ref. 5.3.19.3

4.29.8 When the UE transfers between APs on an enterprise site, hotspot or in a home, data connectivity should not be dropped and an application that is running shall not be affected from a user's perspective.

Matching PRD Release 1.0 Ref. 5.3.19.4

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4.29.9 When the user leaves wireless coverage and enters cellular coverage, data connectivity should be maintained and an application that is running shall not be affected from a user's perspective. This requirement is dependent on similar network resources being available.

Matching PRD Release 1.0 Ref. 5.3.19.5

4.29.10 When the user leaves cellular coverage and enters wireless coverage, data connectivity shall be maintained and an application that is running shall not be affected from a user's perspective. Applications should be notified of a handover between cellular and wireless coverage as they may wish to change their behaviour to exploit the increased network speed.

Matching PRD Release 1.0 Ref. 5.3.19.6

4.29.11 The UE should support CSD capabilities on the wireless network. It should be noted that due to local regulatory requirements or existing services some operators may mandate that the UE shall support CSD capabilities on the wireless network.

Matching PRD Release 1.0 Ref. 5.3.19.7.

4.29.12 A CSD call should not be dropped due to inter AP transfer or handover.

Matching PRD Release 1.0 Ref. - 5.3.19.8

4.30 Messaging Services

4.30.1 The UE shall support Instant Messaging in wireless and cellular modes.

Matching PRD Release 1.0 Ref. 5.3.7.8

4.30.2 The UE shall support MMS and SMS in both wireless and cellular modes, irrespective of being in-call/in-session (voice/data) or idle. These features shall be enabled or disabled based on individual operator requirements.

4.30.3 Matching PRD Release 1.0 Ref. 5.3.7.9

4.30.4 CLIP on SMS messages sent/received in wireless mode shall be as per the cellular service.

Matching PRD Release 1.0 Ref. 5.3.7.10

4.30.5 SMS messages shall be kept until confirmed by the SMS message server.

Matching PRD Release 1.0 Ref. 5.3.7.11

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4.31 Regulatory Requirements

4.31.1 The UE shall meet in-country/region mandatory cellular and Wi-Fi Health and Safety requirements.

Matching PRD Release 1.0 Ref. 5.3.24.1

4.31.2 The UE shall meet relevant in-country/region requirements, e.g. CE marking and the EC WEEE directive

Matching PRD Release 1.0 Ref. 5.3.24.2

4.31.3 The UE shall meet the ICNIRP guidelines

Matching PRD Release 1.0 Ref. 5.3.24.3

4.31.4 The UE shall support LAES encryption aspects.

Matching PRD Release 1.0 Ref. 5.3.24.4

4.31.5 The UE shall support local regulation for TTY in wireless and cellular modes.

Matching PRD Release 1.0 Ref. 5.3.24.5

4.31.6 The UE shall support local regulation regarding disability services, e.g. visual and hearing.

4.32 Management

4.32.1 UE shall support OMA device management capabilities.

4.32.2 It shall be possible for access to the Wi-Fi SIP service from the UE to be disabled remotely by the operator.

Matching PRD Release 1.0 Ref. 5.3.7.7

4.32.3 UE shall support necessary diagnostics, error codes and remote management capabilities. Example 1: a diagnostic log of at least the last 20 events (e.g. SIP signalling messages). Example 2: for failed SIP calls/registration attempts, the UE should support the option to display the relevant numeric SIP failure code on the UE display, along with a text explanation. This failure information should be capable of being suppressed after a period of configurable interval, but should remain available to the user via a status menu option.

Matching PRD Release 1.0 Ref. 5.3.7.22.2

4.32.4 The failure/diagnostic information should be capable of being suppressed after a period of configurable interval, but should remain available to the user via a status menu option.

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4.32.5 UE shall support local diagnostics for both wireless and cellular connectivity, e.g. success/failure of Wi-Fi connection, DNS look-up, secure gateway connection, tunnel setup, SIP registration, IP @, etc.

Matching PRD Release 1.0 Ref. 5.3.7.22.3

4.32.6 UE should support remote diagnostics (when connected and where authorised by the user) and file upload for both modes.

4.32.7 The UE should support upload to customer service centre of a single file containing complete UE configuration data. Any security keys and passwords should be excluded from this file upload.

Matching PRD Release 1.0 Ref. 5.3.7.22.4

4.32.8 Regardless of mode (cellular or wireless) the UE shall feature a software application allowing the download of files from operator back-end systems. The content of these files are data and software programmes allowing: 1) configuration of the UE network parameters and applications (e.g. access profiles, network AS addresses, roaming lists, etc), 2) execute user features and services (e.g. routing tables, phone book, etc). Once download performed, the application should be able to interact with the network and services depending on the context without specific commands from the keypad.

4.33 Roaming

4.33.1 The UE shall provide seamless support for international cellular and Wi-Fi service provider roaming.

Matching PRD Release 1.0 Ref. 5.3.3.5

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5 References

- ⁱ UMA Architecture (Stage 2) R1.0.4 – Appendix B1.1 Recommended 802.11 MS Capabilities
- ⁱⁱ UMA Architecture (Stage 2) R1.0.4 – Appendix B1.1 Recommended 802.11 MS Capabilities

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