



Fixed-Mobile
Convergence Alliance

Convergence Services using SIP over Wi-Fi

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

Network Architecture Document

Release 2.0 – 8th May 2006

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3 How to read this FMCA PRD

This document defines the Network Architecture 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, Technical Handset, April 2006
- Convergence Products using SIP over Wi-Fi PRD, Release 2.0, Access Point & Gateway, 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 Network & Architecture

4.1 FMCA Network and Architecture Positioning Statement

FMCA PRD Release 2.0 and onwards assumes network architecture compliant with:

- (i) 3GPP IMS (part of 3GPP Release 7) or 3GPP2 MMD, and
- (ii) 3GPP VCC between CS and IMS (including I-WLAN) (part of 3GPP Release 7) or 3GPP2 DTF and DRF,
- (iii) ETSI TISPAN NGN (Release 1 and 2).

Where early IMS deployments are delivered prior to the standardisation of above mentioned releases, these early implementations should align with previous IMS releases (3GPP Release 5 and 6) and may cover both IPv4 and IPv6.

These early IMS deployments shall continue to evolve to meet future network architecture requirements.

4.2 Numbering

4.2.1 The end user shall be reachable at the same directory number or using multiple numbers (operator configurable option) whether attached to wireless or cellular network subject to operator enable/disable capability.

Matching PRD Release 1.0 Ref. 5.5.2

4.3 Connectivity

4.3.1 For 3GPP2 networks, the ability to tunnel the Wi-Fi session back to the operator network should be based on Mobile IP. The UE should support protocols such as Mobile IP (as per IS-835), encompassing collocated Care-of-Address mode, IPsec related protocols and protocols related to negotiating NAT traversal such as UDP encapsulation schemes and IKE within NAT environments.

Matching PRD Release 1.0 Ref. 5.5.5

4.3.2 The network shall support handover between Wi-Fi AP and cellular networks, and vice-versa. Voice call continuity shall be supported between CS and IMS network, as defined by the 3GPP TR 23.806 and in the future aligned with 3GPP TS 23.206.

4.3.3 The network shall support a UE to connect to the service without user interaction without compromising security.

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4.3.4 The network shall support the capability for operators to specify call control policies, e.g. list of incoming/outgoing calls not to be accepted and the ability to restrict services to wireless or cellular access.

4.3.5 USSD shall be supported in 3GPP networks according to the spec TS24.090v3.0.0

4.3.6 The network shall support DTMF in cellular mode and in wireless mode (ref RFC 2833)

4.3.7 Users settings of any call diversion methods (such as divert when busy, divert when not reachable) shall be applicable when user is in wireless mode and when user is in cellular mode.

4.3.8 In wireless and cellular modes, the network shall support the ability for customers to withhold the calling line identity on a per call or full time basis using the appropriate prefix/short code in use by the network operator. The prefix/short code to block the call line identity shall be the same in wireless and cellular modes (as per local regulations).

4.3.9 The network shall support short code dialling and translation of calls prefixed with '+' for international country code in both modes (same network behaviour in case of wireless and cellular)

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

4.4 Access Network Requirements

4.4.1 The following access networks shall be possible:

- enabled enterprise site;
- cellular network;
- public wireless hotspot;
- private AP, e.g. home;
- temporary portable APs, e.g. USB dongles for laptops;
- other IP networks.

4.4.2 The network shall support voice call continuity and data session continuity in case of AP-to-AP handover within a public Wi-Fi hotspot.

4.4.3 The network shall support voice call handover between cellular and wireless networks, as specified by 3GPP VCC between CS and IMS (including I-WLAN) (part of

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3GPP Release 7) or 3GPP2 DTF, where the wireless network could be an enterprise, private home or public hotspot network.

4.4.4 In case of a UE to switch between cellular and wireless networks, the network shall support the continuity of a data session and any application that is running shall not be affected from a user's perspective. The user may become aware of speed changes and pauses.

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

4.4.6 The maximum time to complete handover from a cellular network to a wireless network (or vice versa) shall be no more than 300ms.

4.4.7 Upon handover from wireless to cellular, the network shall support a UE to perform a cellular location update.

4.4.8 When roving, the network shall support a UE to perform a cellular location update.

4.4.9 The network shall support alignment of QoS requirements between the network and AP and UE to support end-to-end QoS handling.

4.4.10 APs should work with the core network to support functionality to restrict the maximum number of permitted wireless voice calls to a predetermined limit, so as not to overload fixed backhaul connections. Where an AP delivers voice and data, this should include the capability to partition bandwidth on a static or dynamic basis between real time and non real time traffic.

4.4.11 APs should work with the core network to support functionality to alert the end user when there is insufficient network capacity available to facilitate their call.

4.4.12 Public Wi-Fi Hotspots should support one or more of the following options to facilitate Wi-Fi SIP UE association/authentication. Interaction with core network might be required. Selection of required approach will be operator specific.

- the usage of well defined XML data within in the initial UAM redirect to facilitate the UE to directly post login credentials. The UE will also need to be appropriately specified to ensure it looks for and parses the XML.
- trusted 'walled gardens' for Wi-Fi SIP traffic, bypassing it straight through to the P-CSCF. The P-CSCF would then be responsible for authenticating the end user and all billing and audit functions;
- IEEE 802.1x (shared key authentication and open authentication) and EAP, e.g. EAP-SIM, EAP-AKA, EAP-MD5 and EAP-TTLS;

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- APs shall support IEEE 802.3af.

4.4.13 Wi-Fi SIP services shall support enterprise connectivity through integration with a wide range of existing PBX/LAN infrastructure and secure access to, and protection of, corporate data in all modes.

Matching PRD Release 1.0 Ref. 5.6.1

4.4.14 Wi-Fi SIP services and solutions shall support integration with existing enterprise telephony TDM or IP based PBXs and Centrex services.

Matching PRD Release 1.0 Ref. 5.6.2

4.4.15 Wi-Fi SIP services and solutions shall support integration with existing enterprise networks – IP LANs, IP VPNs, etc.

Matching PRD Release 1.0 Ref. 5.6.3

4.4.16 The Wi-Fi SIP UE shall be able to place/receive calls to/from any subscriber number within a Corporate's telephony network. The call shall be placed/received using appropriate Signalling Gateway/Converters and Media Gateways.

Matching PRD Release 1.0 Ref. 5.6.4

4.4.17 Wi-Fi SIP services and solutions shall support 'local switching' i.e. when the voice call source and destination are on the same geographic site within the corporate network, the voice call (media path) should then be routed entirely within the local site.

Matching PRD Release 1.0 Ref. 5.6.5

4.4.18 Wi-Fi SIP corporate/enterprise solutions and services shall support interworking with common (supplementary) services. For example: – three-party calls; – call screening (Manager/Secretary function); – call transfer; – call re-direction; – call waiting and 'ring-back when free'; – use of short-codes; – caller display if supported by existing corporate voice network.

Matching PRD Release 1.0 Ref. – 5.6.6

4.4.19 The Network shall recognise that emergency calls have priority over other calls.

4.5 Network Architecture to Support Voice Calls

4.5.1 The network shall support incoming and outgoing calls over cellular networks.

4.5.2 The network shall support incoming and outgoing voice calls over wireless networks.

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4.5.3 The network shall always remain receptive to inbound calls and to be able to respond quickly to dialled outgoing call requests.

4.5.4 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 the network should aim to provide PSTN-equivalent voice quality when in wireless mode.

4.5.5 When in Wi-Fi coverage, the network shall provide acoustic echo control that results in voice quality that is comparable to that experienced with cellular networks.

4.5.6 The network 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.

4.5.7 The network shall support switching of codecs on call continuity in case of handover between cellular and wireless modes.

4.5.8 If a 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 network shall support such codec re-negotiation

4.5.9 The network shall be able to trigger the UE that the bandwidth and/or signal quality has fallen below a defined threshold. When triggered, the UE shall be capable of initiating a handover to cellular mode, and the network shall take the required actions.

4.5.10 When the UE initiates a handover to cellular mode / handover to Wi-Fi mode, the network shall take the required actions.

4.5.11 In wireless mode, the network shall support the option for both the SIP user ID and SIP Display Name to be presented to the UE as part of the caller display information for incoming calls.

4.6 Network Architecture to Support Regulatory Service Requirements

4.6.1 The network (wireless or cellular) shall provide the correct location of the user to the correct (PSAP).

Matching PRD Release 1.0 Ref. 5.5.1

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4.6.2 The total time taken for a reselection from wireless to cellular to facilitate an emergency call shall not exceed an operator configurable time setting.

4.6.3 The Network shall provide support for Lawful Intercept, Emergency Service, Malicious Communications Identification and Anonymous Communication ejection in cellular and in wireless mode. All subject to local regulatory and operating requirements.

4.7 Network Architecture to Support Data Connectivity

4.7.1 The network should support a UE to offer data connectivity over both wireless and cellular networks.

4.7.2 The network should support a UE to offer data and voice connectivity simultaneously in both wireless and cellular modes.

4.7.3 The network shall support data rates when in wireless mode that are at least as high as those supported in cellular mode.

4.7.4 The network should support following requirement: when a 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.

4.7.5 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.

4.7.6 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.

4.8 Network Architecture to Support Added Value Service Requirements

4.8.1 Presence: Network presence capabilities as specified by OMA shall be supported by the network when the UE is in wireless or cellular network, depending on operator preference.

4.8.2 The network shall support all UE presence update information after all rove-in/out and hand-in/out mode changes to allow presence based routing. This update should also be used to ensure that the presence and IM servers are updated on the current UE network location. Preferences for Presence implementation option is OMA.

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

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4.8.4 Presence: The network should support the capability to divert calls based on presence information. For example, business calls may be diverted to business voice mail when the UE is on home Wi-Fi.

4.8.5 The network should support diff-xcap to update the presence information in order to save bandwidth

4.8.6 MMS & SMS: The network shall support MMS and SMS in both wireless and cellular modes, irrespective of being in-call/in-session (voice/data) or idle. The network selection shall be enabled or disabled based on individual operator requirements.

4.8.7 MMS & SMS: CLIP on SMS messages sent/received in wireless mode shall be as per the cellular service.

4.8.8 MMS & SMS: Roving or handover shall not cause the sending or receiving of an SMS to fail.

4.8.9 IM: the network should support IM applications:

4.8.10 Corporate services: For mid to high-end enterprise and corporate scenarios, applications should allow users to use a 'click to dial/SMS/email/...' type system to reach the contacts on the corporate directory system. This shall be available in wireless and cellular modes. 'Click to dial' is the ability for a user to access a corporate directory (held in the enterprise network), and scroll or search through this directory to find a contact which can then be dialled with one keystroke. For the network, this requires the introduction of a gateway or VPN towards the corporate directory.

4.8.11 The network should support OMA-Email-Notification (P-IMAP) and OMA-Email-Notification (basic notification).

4.8.12 Value added location based services: The network should offer capabilities to support value added Location Based Services both in wireless as in cellular mode according to OMA-SUPL.

4.8.13 The network should support Video Telephony over wireless and cellular.

4.8.14 Native IP data access including WAP sessions: The network shall provide the required capabilities to support this (security and firewall).

4.9 Security

4.9.1 The network should implement IPsec. Options to be configurable (enable/disable) by operator.

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4.9.2 The network shall support a security solution which provides mutual authentication of UE and wireless network.

4.9.3 Signalling information shall be appropriately secured to protect integrity.

4.9.4 UE keys and passwords shall be secure and not uploadable or retrievable.

4.9.5 The network should support remote management capabilities for personal firewalls and antivirus software, where used on UE

4.9.6 The network shall support LAES.

4.10 Remote Device Management

4.10.1 The network shall support remote device management.

4.10.2 The Wi-Fi SIP service shall support the capability for operators to disable UE services, for example by denying access to SIP servers.

4.10.3 The network provider shall be able to configure the UE to be in any of the following four modes:

- wireless-only;
- wireless-preferred;
- cellular-preferred;
- cellular-only.

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

4.10.5 Remote synchronisation: Via wireless, the UE shall be able to synchronise the own database with the one existing in a remote application server. This is particularly needed for the configuration parameters of wireless profile, SIP profile, firmware upgrade and other network parameters but also for different user applications.

4.10.6 OMA Device Management shall be supported over wireless.

4.11 Roaming

4.11.1 It is FMCA's intention to develop a white paper that describes roaming aspects later in 2006. More details about roaming will be included in that document.

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