Fixed Mobile Convergence – A Compelling Evolution

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Telecom networks are moving toward next-generation end-to-end IP platform to support innovative and higher bandwidth demanding services and applications leading to convergence of communications and entertainment – voice, data, and video. Indian telecom sector is going through a phase of super-natural growth and consolidation. Owing to increasing competition, rising customer demand, and increased affordability and availability of new technologies, the evolution and adoption of mobile technologies has been overwhelming in India and the present customer base stands at more than 900 million subscribers, while the wired connections declined to 30 million, clearly stressing the scarce radio spectrum. These exciting developments are forcing the operators to find efficient ways to use these technologies as well as the radio spectrum effectively.
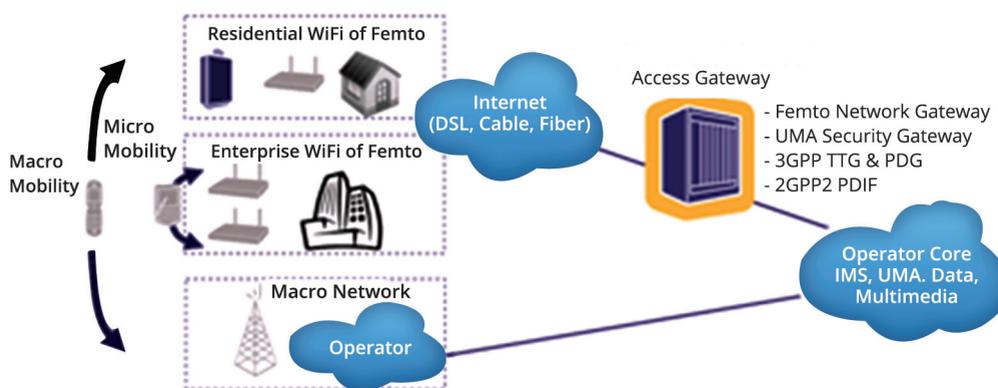
Fixed-Mobile Convergence

FNC is a timely evolution promising seamless connectivity between fixed and wireless networks leading to convergence of access for telephony. As per the convenience of the users a mobile call can be delivered on fixed phone or can be terminated through Fixed/WiFi/Bluetooth broadband network on mobile phone. The main goal of fixed-mobile convergence (FMC) is to optimize transmission of all data, voice, and video communications to and among end-users, no matter what their locations or devices are. It offers a way to connect a mobile phone through fixed infrastructure so that operators can provide services to their users irrespective of their location, access technology, and terminal with minimal use of scarce radio spectrum. However, for availing the FMC facility, the user will require a handset or phone with a dual mode to support both the mobile and fixed wireless (WiFi/Bluetooth) network access. The ability to use WiFi ac-

Terminating a Mobile Call through Fixed Infrastructure

Residential WiFi of Femto

Enterprise WiFi of Femto

Macro Mobility

Micro Mobility

Macro Network

Internet (DSL, Cable, Fiber)

Operator

Access Gateway
- Femto Network Gateway
- UMA Security Gateway
- 3GPP TTG & PDG
- 2GPP2 PDIF

Operator Core IMS, UMA. Data, Multimedia

cess would effectively expand the coverage for the mobile phone, particularly inside buildings, where it can be difficult to get mobile access and optimize spectrum usage to bare minimal.

The main motivation of FMC include licensed spectrum shortage leading to congestion and reduced QoS (70 percent of the time a mobile call recipient is at a fixed location/WiFi-Hot Spot); mobile subscribers' saturation, fixed lines decline (battle for in-building minutes, femto cells); broadband becoming ubiquitous and cost effective; the mobile handset is becoming a multi-purpose, multi-band, multi-mode access device; and the emergence of NGN technologies enabling FMC (IMS, UMA, data-offload).

Solutions

As shown in the figure, a mobile call can be terminated on the receivers handset through fixed infrastructure (WiFi) as an alternative to conventional mobile termination, which consumes scarce licensed spectrum. Some of the solutions for FMC are unlicensed mobile access (UMA) and IP multimedia subsystem (IMS). UMA is also referred to as pre-IMS, which offers access to GSM and GPRS mobile services over unlicensed spectrum technologies like Bluetooth, WiFi, or Ultra Wideband (UWB). IMS is a standard architecture based on SIP that allows multiple real-time applications to run across a single network. It can be used by any type of access method such as fixed line, GSM, CDMA, IMT and wireline broadband access like WiFi or WiMax. It has unified network service delivery architecture with intelligent networking (IN) and advanced intelligent networking (AIN) features. It provides a converged control plane solution for managing near-real-time applications and facilitates seamless mobility across various access network environments.

Framework

The key framework that form the basis of convergence are:

- *Mobility.* Related to users moving with wireless access capability, the key aspects to consider are identifying the user, location, presence, attributes and preference of the user, identification of regis-

trar, and service node.
- *Session.* Related to managing sessions originating and terminating in both the fixed and mobile environments, the key aspects to consider are control over sessions, admission control, charging, transport, connectivity, naming and addressing schemes, and address resolution protocol.
- *QoS.* The aspects to consider are QoS classes, bearer negotiation, interaction between QoS and session control, resource reservation, and QoS assured precondition.
- *Security.* Related to the threat analysis and the counter measures for threats, the aspects to consider are authentication, authorization, and auditing.

Challenges

In India, the FMC is a non-starter due to following show stoppers:

- *Numbering plans and number portability.* Fixed and mobile numbers come from separate blocks and have different lengths. Currently, mobile number portability (MNP) is available but not fixe mobile number portability.
- *Directory services.* Fixed operators provide directory service to their customers. This catalogue contains information on all fixed line customers. Currently, mobile operators do not offer this kind of service and mobile numbers are considered as personal subscriber data.
- *Handset availability.* All mobile handsets are not WiFi enabled, multi-mode handsets, though it is improving.
- *Role of the regulator.* Permitting interconnection of PSTN and Internet (IP) networks; determining IP termination charges in line with mobile termination charges as a part of interconnect usage charge; unifying the numbering system for fixed and mobile, move toward electronic numbering); and establishing the facilitating interconnection rules so that the market forces can control the direction, extent, and pace of FMC.

If the issues are handled on priority basis, the advantage of this emerging evolution of technology can be delivered to end-users and the stressful demand on scarce radio spectrum can be minimized to a great extent. ▪

"With FMC a non-starter in India, issues will need to be addressed and the advantage of this emerging evolution of technology can be delivered."