



## **Multi Layered Mobility White Paper**

**Abstract:**

This white-paper presents an innovative approach to IP-PBX Fixed Mobile Convergence (FMC) in the global market utilizing Multi-Layered Mobility. Enterprises in every field will be interested in increasing efficiency, productivity and end-user satisfaction utilizing Multi-Layered Mobility

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## 1 Market Trends

The telecom industry is moving towards IP in a way that is irreversible. In recent years, enterprise customers have come under increasing pressure to provide new services while continuing to exploit their legacy investments.

The increasing demand among enterprise end users for advanced telephony services is evident through the significant increase in IP-PBX revenues. As a global trend, sales of IP-PBX solutions are exceeding those of traditional TDM solutions.

One of the main challenges for the enterprise in the competitive market is to increase productivity and ensure the availability of their employees.

Enterprise telephony vendors are required to offer solutions rather than pushing boxes into the market. Solutions should be presented as application platform for multiple services according the enterprise needs.

According to some **market researches and analysts**, we can anticipate that IP-PBX will be part of the IMS (IP Multimedia Subsystem) architecture. This concept provides an open platform for adding virtually unlimited features and capabilities to that can meet enterprise needs. Enterprises will be looking for the capability of making applications seamlessly usable from any location. Multi-Layered Mobility will provide this.

## 2 Mobility Layers

There are several mobility layers that can be used in conjunction with a powerful IP-PBX:

**IP network**- An IP phone or Softphone connected from any location to the IP PBX, can be registered and identified as an extension (on-net terminal).

**Cellular Network** – The 3<sup>rd</sup> generation Cellular networks (UMTS and CDMA2000) present the ability to access an IP networks utilizing high-speed wireless links.

A Session Initiation Protocol User Agent Client (SIP UAC) which resides in the cellular phone can be registered at the IP PBX to become an on-net extension. Push-To-Talk is already an widely-implemented popular capability.

**Wireless LAN- IEEE 802.11** is a set of standards for wireless local area network (WLAN) communication, developed by the IEEE LAN/MAN Standards Committee in the 5 GHz and 2.4 GHz public spectrum bands.

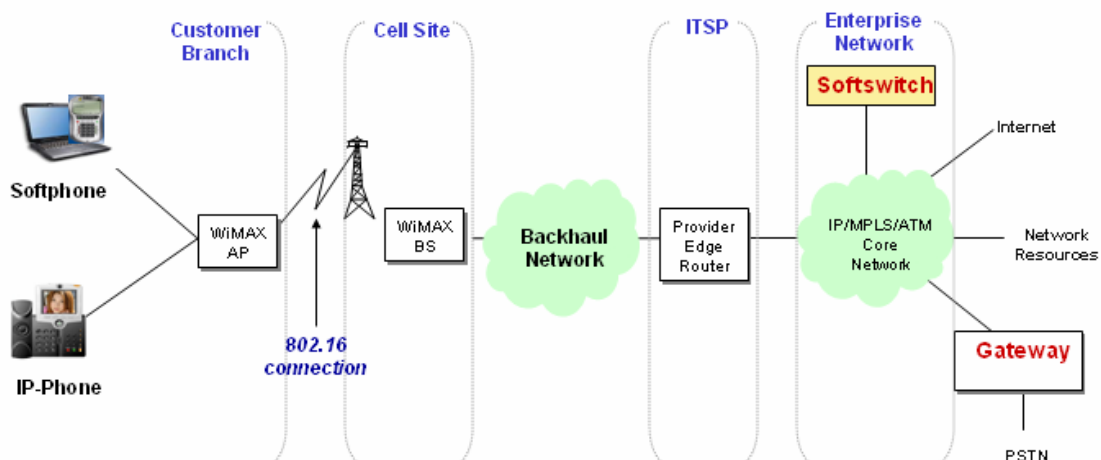
Protocol	Frequency	Throughput	Data Rate (Max)	Range (Indoor)	Range (Outdoor)
Legacy	2.4 GHz	0.9 Mbps	2 Mbps	~20 M*	~100 M
802.11a	5.0 GHz	23 Mbps	54 Mbps	~35 M	~120 M
802.11b	2.4 GHz	4.3 Mbps	11 Mbps	~38 M	~140 M
802.11g	2.4 GHz	19 Mbps	54 Mbps	~38 M	~140 M

M\* = Meters

Wi-Fi hot spots are increasingly ubiquitous, providing Enterprise users accessibility to the IP Network wherever they go. Using the Wi-Fi infrastructure, a wireless IP phone entity can become an integrated entity of the IP PBX.

Currently in the market, there is a spectrum of dual-mode (bi-mode) phones from various vendors that enable access to the IP network using unified wireless handset. Therefore a user can be an IP-PBX extension and remotely gain all the benefits and services regardless of their location.

**WiMAX** ( **W**orldwide **I**nteroperability for **M**icrowave **A**ccess) is a telecommunications technology that offers high-speed data, mobile video and voice services including unified messaging and mobility over long distances in a variety of ways, from point-to-point links to full mobile cellular type access, as illustrated in figure 2.1.

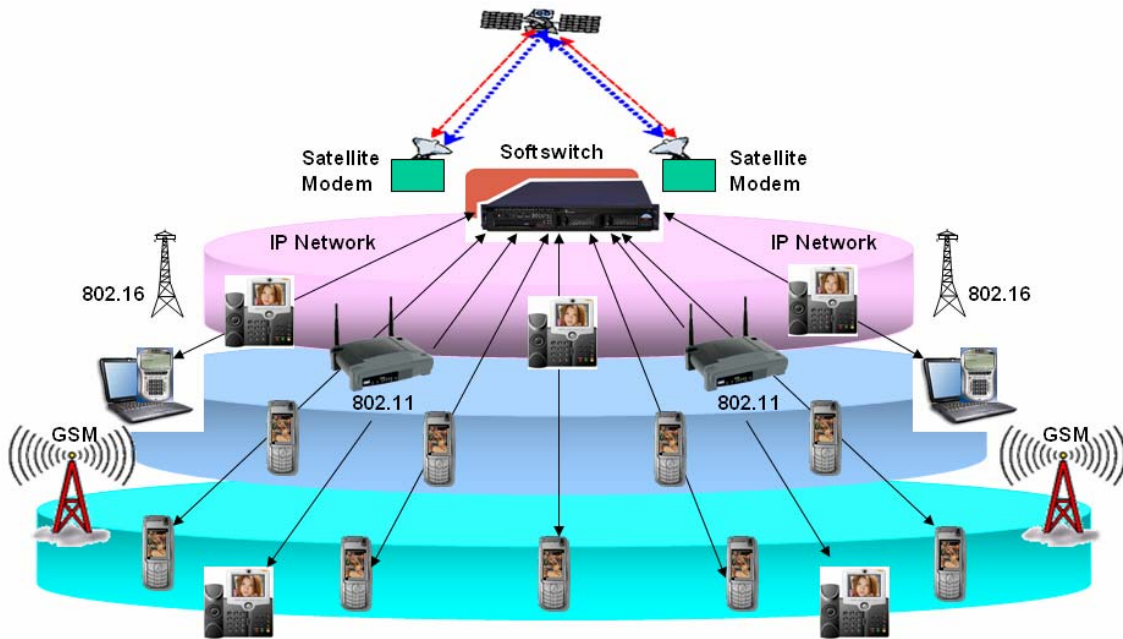


**Figure 2.1: Integrated Enterprise branch through WiMax**

Customers that have multiple branches, some of which are located in rural areas, can use a centralized IP-PBX providing Class 5 services to remote branches. Furthermore, the multi-layered solution can provide services to the remote mobile user (802.16e). These capabilities comprise an important advantage for IP-PBX vendors supplying customers that in turn serve remote and rural subscribers.

Standard	Data Rate	Range
802.16d	Up to 75 Mbps (20 Mhz channel)	4–10 miles
802.16e	Up to 30 Mbps (10 Mhz channel)	1-3 miles

By utilizing the above mentioned technologies in a unified IP-PBX, Multi-Layered Mobility architecture brings to any enterprise the apex of currently available mobility combined with location-less IP-PBX as illustrated in figure 2.2.



**Figure 2.2: Multi-Layered Mobility Architecture**

These technologies, as illustrated in figure 2.2, are the fundamentals of the multi-layered mobility concept.

### 3 The business model and the benefits

In order to understand the market trends, first we have to analyze what are the incentives and the business models that will drive enterprises towards the NGN (Next Generation Network) migration process.

In order to overcome the market-saturation stage, IP-PBX vendors must provide Enterprise with advanced new services such as Dynamic User Availability (DUA) solutions based on the Multi-Layered Mobility model, vendors will present enterprises with technological advantages that they will want to fully exploit. The new capabilities, services and economic efficiencies provided by multi-layering will make migration to distributed IP-PBX controlled by a Softswitch a must-have for Medium/Large Enterprises.

Enterprise benefits of adapting the Softswitch based solution include:

1. Reduction of Capex (Capital Expenditure) and Opex (Operational Expenditure)
2. Infrastructure convergence leading to higher efficiency and unified services
3. Distributed contact-centers to provide 7x24 location-less services
4. Unified Help-Desk and Customer-Services reduce number of required agents and increase efficiency

## 4 Possible solutions utilizing multiple layers

Comprehensive mobility can be achieved through several solutions:

- a. Call Through  
User should have the ability to call a dedicated number. After complying with security and authentication, the user receives a dial tone and the user's phone becomes an integrated extension of the IP PBX and therefore he can use all the services of the hosting Softswitch.
- b. Call Back  
User should be able to call a dedicated number from any location. The system identifies the user, disconnects the call, and calls the user back at a predefined callback number. Upon answering the call, the user receives a dial tone and the user's phone becomes an integrated extension of the IP-PBX. From this point the user can use all the services of the hosting Softswitch.

The communication costs of enterprise personnel overseas is greatly reduced due to arbitrage between incoming and outgoing calls.

- c. User-Centric  
Enterprises today demand a centric system approach that allows high availability of easily-reached employees. This need is satisfied when employees can receive calls on a full range of Off-net devices at their disposal (cell phone, or fixed based POT – (Plan Ordinary Terminal) and on a selected On-net phones (IP phone, softphone or POT).  
When the employee logs in from one of his On-net registered extensions, the extension is automatically added to his list of endpoints on the Softswitch. Incoming calls ring on all of the user's associated endpoints until the call is answered from one of the endpoints.

## 5 Summary

The proliferation of the IP-PBX and the availability of multiple layers of mobile communication provides the impetus and motivation for enterprises to enter the NGN (Next Generation Network) migration process. By providing new services, such as Dynamic User Availability (DUA) solutions based on Multi-Layered Mobility, vendors in the IP-PBX field provide compelling incentives to their enterprise customers to continue to improve their IP-PBX telephony infrastructure. The new capabilities not only provide continuous enterprise access to enterprise employees and continuous employee access to the enterprise and colleagues, but also can provide enterprise customers with continuous access to distributed, location-less, full-service contact centers. The multi-layered Mobility approach helps Enterprises lower operating expenditures while empowering their organizations to provide unified services at higher efficiency and lowered costs.