

**WIRELESS COMMUNICATION APPLICATIONS: WI - FI VS. 3G**

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**ABSTRACT**

*In this paper main area of networking compares two technologies for delivering broadband wireless Internet access services: "3G" vs. "Wi-Fi". 3G refers to the collection of 3rd generation cellular technologies that are designed to allow cellular operators to offer integrated and high speed data and voice services over cellular network. Wi-Fi refers to the 802.11b wireless Ethernet standard that was designed to support wireless LANs. Although both the technologies are very different from each other they are both intended to provide broadband wireless internet access to portable devices.*

**Keywords:** *Internet, Broadband, Wireless, 3G, WLAN, Ethernet.*

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## INTRODUCTION

The objective of this article is to evaluate and differentiate two technologies that are: Third Generation mobile ("3G") and Wi-Fi (Wireless Fidelity). 3G and Wi-Fi are both wireless access technologies working in different frequencies and access ranges. Wi-Fi can go up to 250 meters and 3G coverage could go beyond Kilometers. Mostly Wi-Fi is a personal wireless LAN used in small range with low expenses while 3G is generally deployed by Mobile operators in voice and wireless broadband networks. 3G provide a top-down, service-provider approach to deliver wireless internet access; whereas Wi-Fi provides an end-user, decentralized approach to service provisioning. 3G is basically used on mobile phones for the purposes such as watching mobile TV, video calls and video conferencing, etc. The activation of 3G services depends on the service provider. On the other hand, Wi-Fi is also a wireless access standard which is used in laptop, computers and smart phones with Wi-Fi capability. Wi-Fi web connection depends on the hotspots with wireless routers for Internet access inside a particular range.

## OVERVIEW OF 3G

3G mobile phone technology was designed year 2000 to provide mobile phone users access to anything, anywhere and any-time. 3G wireless networks are supposed to have improved voice capacity and are able of supporting more complicated data applications with their rich Quality of Service features. Many 3G technologies are in use now and some of them are EDGE (Enhanced Data rates for GSM Evolution), from CDMA family EV-DO (Evolution-Data Optimized) which uses Code Division Multiple Access or Time Division Multiple Access for multiplexing, HSPA (High Speed Packet Access) which uses 16QAM modulation technique (Quadrature Amplitude Modulation) and results in data rate of 14 Mbit/s downlink and 5.8 Mbit/s uplink speeds.

3G services will add an invaluable mobile dimension to services that are already becoming an important part of modern business life: Internet and Intranet access, video-conferencing, and interactive application sharing. 3G is useful many area like Employees who spend some of their working at home. Accountants that carry out audits at client premises. On-site maintenance engineers who need access to full instruction manuals, mobile emergency services who need a video link with a hospital or doctor for specialised advice. These are a few conditions where 3G will play a important role. We're likely to see 3G services enter our day -to-day lives in all sorts of new ways: for example, in shopping, particularly Internet "mail order" (e-commerce), banking, or playing interactive computer games over the

Network. We'll believe nothing of sitting on a train and using a mobile palmtop with Internet browser to log into our bank accounts. While on-line we'll be able to check our accounts, pay a few bills and click on a screen icon to instantly set up a video-conference to discuss our account with a bank clerk. On vacation, we'll be able to use our mobile palmtops to obtain local tour guides, make a last-minute reservation at a hotel, find and call the nearest taxi firm, and send video postcards. We'll expect location-independent mobile access to a personalised set of services that matches the way we live and work.

## **OVERVIEW OF WI-FI**

Wi-Fi technology was designed year 1991. The technologies for wireless LANs are specified by the IEEE 802.11 standards, which are often identified as "Wi-Fi" (Wireless Fidelity). Wi-Fi is a wireless LAN technology which could be used in short range. It's a most common wireless technology used in home, Hotspots and corporate internal wireless networks. Wi-Fi operates in 2.4GHz or 5GHz which are unallocated frequency band. The current generation of Wi-Fi support up to 11Mbps data rates within 300 feet of the base station. Wi-Fi is a flexible data communication system execute as an extension to a wired LAN within a building or site. Wi-Fi broadcast and receives data in excess of the air by electrical signals, minimizing the need for wired connections. The advent of Wi-Fi opened up a whole new definition of what a network Infrastructure can be. No longer does an infrastructure need to be solid and fixed, difficult to move and expensive to change. Instead it can move with the user and change as fast as the organization does. Wi-Fi was developed to be used for mobile computing devices, such as laptops, in LANs, but is now gradually more used for more applications, Including Internet and VoIP phone Access, basic connectivity of consumer electronics such as televisions and CD players, or digital cameras. A anyone with a Wi-Fi device, such as a computer, telephone, or personal digital assistant can connect to the Internet when in nearness of an access point. The area covered by one or some access points is called a hotspot. Hotspots can range from a single room to many square miles of overlapping Hotspots. Wi-Fi can also be used to make a Wireless mesh network. Wi-Fi also allows connectivity in peer to- peer mode, which allow devices to connect directly with each other. This connectivity mode is useful in consumer electronics and gaming applications.

## **HOW 3G WORKS?**

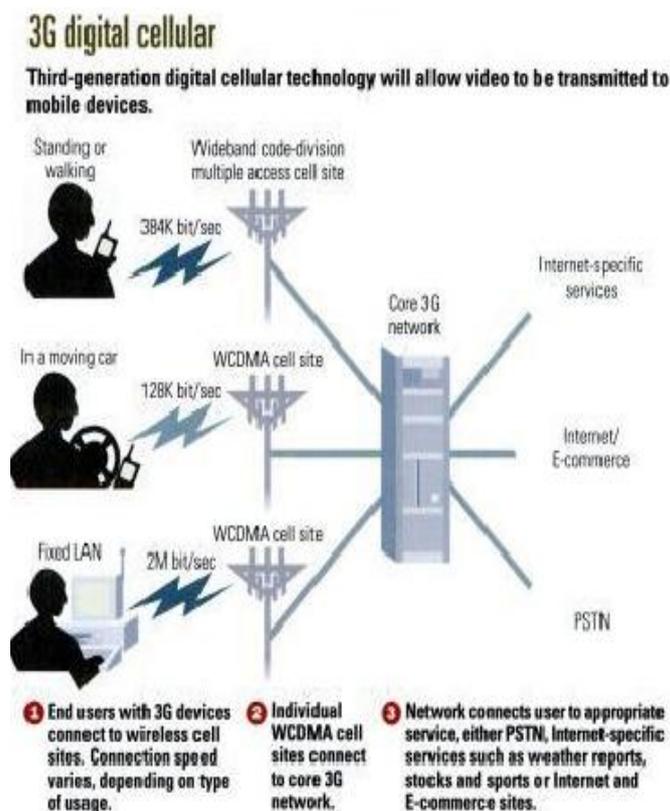
The 3G will provide mobile multimedia, personal services, the convergence of digitalization, mobility, the Internet, and new technologies based on the global standards. The end user will be able to access the mobile Internet at the bandwidth from 64 Kbps to about 2 Mbps. 3G-

enabled devices including phones and laptops work by sending and receiving radio signals to and from base stations. Base stations link individual phones into the rest of the mobile and landline networks.

Base stations are low power radio transmitters and need to be located in the areas they are intended to serve. They provide coverage to a geographical area known as a cell. These cells need to overlap to enable seamless coverage and to ensure a user does not lose connection to the network when on the move.

Radio waves used in mobile telecommunications form part of the electromagnetic spectrum. Radio waves used to deliver 3G services are transmitted at a slightly higher frequency than for 2G and travel a shorter distance. As a result the coverage area or cell size for a 3G base station is smaller than for a 2G site. Furthermore, as user demand increases in a particular cell, the size of that cell shrinks making overlap even more essential.

Due to the advanced technology, the location of cell sites is even more critical with 3G networks to avoid interference between adjacent cells.



**Figure 1 Working of 3G**

## HOW WI-FI WORKS?

A typical Wi-Fi setup contains one or more Access Points and one or more clients. An AP broadcasts its SSID (Service Set Identifier, "Network name") via packets that are called beacons, which are broadcast every 100 ms. The beacons are transmitted at 1 Mbit/s, and are of comparatively short duration and so do not have a major power on performance. Since 1 Mbit/s is the lowest speed of Wi-Fi it guarantee that the client who accept the beacon can communicate at least 1 Mbit/s. supported on the settings, the client may choose whether to connect to an Access Points. Also the firmware running on the client Wi-Fi card is of influence. Say two Access Points of the same SSID are in range of the client, the Firmware may decide based on signal strength to which of the two Access Points it will connect. The Wi-Fi normal leaves connection criteria and roaming totally free to the client. This is strength of Wi-Fi, but also means that one wireless adapter may perform significantly better than the other. Since Wi-Fi broadcast in the air, it has the similar properties as a non-switched ethernet network. Even collisions can then appear as in non-switched ethernet LAN's.



**Figure 2 Working of Wi-Fi**

## HOW 3G AND WI-FI ARE DIFFERENT?

	3G	Wi-Fi
Standard	WCDMA,CDMA2000	IEEE 802.11
High Speed	2 Mbps	54 Mbps
Operations	Cell phone companies	Individuals, WISP
Authorization	Yes	No
Coverage Area	Several km	About 100m
Advantages	Range, Mobility	Speed, Cheep
Disadvantages	Relatively slow , Expensive	Short range

### Functioning

3G is a service that is completely provided by the service provider, while Wi-Fi access can be controlled by a Wi-Fi router placed in a particular range from the access point. For use of Wi-Fi facility, user will have to visit a hotspot which provides a Wi-Fi zone. Today, most malls, cafes, colleges and major streets have Wi-Fi routers for speedy Internet access. For use of 3G, user

needs to get in touch with service provider.

### Range and Signal

3G depends on the mobile service provider; user will receive signal reception as long as user is in the network range. In case of Wi-Fi, user will be able to receive reception as long as you are within the range of the router situated in the hotspot.

### Speed

Wi-Fi is faster as compared to 3G. The maximum speed of the 'N' standard of the newest Wi-Fi technology is reported to be 600 mbps. The data transfer speeds in 3G technology differs according to the kind of device and also whether it is or in motion or motionless. The maximum speed on 3G networks is measured to be about 2.05 mbps.

### Cost

The cost of 3G access depends on the plan you have chosen from user service provider. When it is regarding availing Wi-Fi facilities, user might have to pay the owners of the hotspots. Wi-Fi at some hotspots is free, while others may charge a certain amount. Some hotspots are even code free, and user can directly access the web without the access password.

### **Spectrum policy**

One of the key differences between 3G and Wi-Fi that we have only handled upon evenly therefore far is that 3G and other mobile technologies use licensed spectrum, while Wi-Fi uses unlicensed shared spectrum.

First, the open cost of acquiring a spectrum license represents a large share of the capital costs of deploying 3G services. This cost is not faced by Wi-Fi which uses the shared 2.4GHz unlicensed, shared spectrum.

### **CONCLUSIONS**

This article offers a qualitative evaluation of two wireless technologies that might be viewed all together as alternate and/or corresponding paths for developing to broadband wireless access. These two technologies are 3G, which is the ideal improve path for mobile supplier, and Wi-Fi, one of the many WLAN technologies. The objective of the investigation is to discover two different world views for the upcoming of wireless and to consider on the likely achievement and likely communications between the two technologies in the future. First, both technologies are possible to thrive in the marketplace. This means that the wireless future will embrace various access technologies so equipment producer, service providers, end-users, and policy makers should not expect to see a simple wireless future. Second, we suppose 3G mobile supplier to integrate Wi-Fi equipment into their networks. Thus, we imagine these technologies to be balancing in their most successful group market employment. Third, we also expect Wi-Fi suggest opposition to 3G providers because of the minor access costs related with ascertain Wi-Fi networks. Our study also suggested a number of regions where additional consideration and research would be valuable. These contain the understandable questions of how to put together 3G and Wi-Fi networks or how to add the suitable resource compromise infrastructure to Wi-Fi to allow it to develop into a wide-area service provider platform. These also contain some more remote questions such as which style of technology advance is preferential by the fast pace of wireless technology improvement or which is more likely to favour the growth of differing assets such as broadband content

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