

Wireless Internet Access: 3G v/s WiFi

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Abstract

This article compares and contrasts two technologies for delivering broadband wireless Internet access services: "3G" vs. "Wi-Fi". **3G**, short for third generation, is the third generation of mobile telecommunications technology. This is based on a set of standards used for mobile devices and mobile telecommunication use services and networks that comply with the **International Mobile Telecommunications-2000 (IMT-2000)** specifications by the International Telecommunication Union. **3G** finds application in wireless voice telephony, mobile Internet access, fixed wireless Internet access, video calls and mobile TV. Wi-Fi, also spelled Wi-Fi or Wi-Fi, is a technology that allows an electronic device to exchange data or connect to the internet wirelessly using microwaves in the 2.4 GHz and 5 GHz bands. Many devices can use Wi-Fi, e.g., personal computers, video-game consoles, smartphones, some digital cameras, tablet computers and digital audio players. These can connect to a network resource such as the Internet via a wireless network access point. Such an access point (or hotspot) has a range of about 20 meters (66 feet) indoors and a greater range outdoors.

Key Words: 3G, Wi-Fi, Hotspot, Microwaves

1.0 Introduction

The two most important phenomena impacting telecommunications over the past decades have been the explosive parallel growth of both the Internet and mobile telephone services. The main motto of this article is to show how the two internet technologies i.e. Third Generation mobile ("3G") and Wi-Fi (Wireless Fidelity) have been complement with each other. Since both technologies are wireless access technologies that enable user to access internet from system or from any mobile devices at anyplace at any time. Both the technologies work on the different frequencies and access ranges. The Internet brought the benefits of data communications to the masses with email, the Web, and e-Commerce; while mobile service has enabled "follow-me-anywhere/always on" telephony. The Internet helped accelerate the trend from voice- to data-centric networking. Wi-Fi can communicate within a short range of distance say approximately 250 metres but 3G has long range of communication, beyond kilometres. Basically, Wi-Fi is used in a personal wireless LAN used in a small range at low cost like in a private organization or in an institute. 3G is generally deployed by Mobile operators in voice and wireless broadband networks. 3G provide a top-down approach that allow user to deliver wireless internet access whereas Wi-Fi provides an end-user, decentralized approach to service provisioning. Wireless is a transmission or information transport method that enables mobile computing. We believe that the wireless future will include a mix of heterogeneous wireless access technologies. From 3G activation point of view, 3G services depends on service provider like what types of services did the server provide to the user. 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. 3G is basically introduced for mobile devices to access internet for the purpose of watching online videos, video

calls, video conferencing etc. The speed of Wi-Fi is much higher than the speed of 3G. Since Wi-Fi is used in small range of internet access this makes Wi-Fi much faster than 3G. In focusing on 3G and Wi-Fi, we are ignoring many other technologies that are likely to be important in the wireless Internet such as satellite services, LMDS, MMDS, or other fixed wireless alternatives. We also ignore technologies such as Bluetooth or Home RF, which have at times been touted as potential rivals to Wi-Fi, at least in home networking environments. Since both the internet technologies were same means both were used for accessing internet but they are used for different devices.

Analysis and Discussion

In this section, we provide a brief overview of the two technologies that provide the reader to understand about the two explosive technologies.

2.1 Wi-Fi

Wi-Fi is a method of accessing internet or network with wireless cables using radio waves. Accessing of Wi-Fi network is done in smartphones, laptops, etc. For creating a wireless network, wireless router is needed. Wi-Fi uses IEEE 802.11 standard for sending and receiving messages between the mobile devices and computers. A Wi-Fi device will work anywhere in the world. Around the time 2013, there are two wireless network of frequency bands. There are more than two bands but most probably two bands are used in wireless network. One of the bands is at around 2.4 Ghz, and the other is at 5 Ghz. Still both the bands have some advantages and some drawbacks. 2.4 Ghz bands are widely used across the wireless network but the devices are cheaper. They are available to users very easily. The main problem is that there may be three or four devices can be used at the same time without communication interference between the devices. Another

problem is that devices like microwave ovens, baby phones, DECT telephones and other wireless devices mostly use the 2.4 Ghz band. While using 5 Ghz band there may be more than 20 devices. 5Ghz is not used everywhere like outdoors. Because less devices use the 5 Ghz band, devices that do are often more expensive.

2.1.1 Hotspot in Wi-Fi

A **hotspot** is a site that offers Internet access over a wireless local area network (WLAN) through the use of a router connected to a link to an Internet service provider. Hotspots typically use Wi-Fi technology. Users can publically use wireless internet with their suitable devices. A single wireless router combining these functions may suffice.

Security is a serious concern in connection with Hotspots. There are three possible attack vectors. First, there is the wireless connection between the client and the access point. This needs to be encrypted, so that the connection cannot be eavesdropped or attacked by a man-in-the-middle-attack. Second, there is the Hotspot itself. The WLAN encryption ends at the interface, then travels its network stack unencrypted and then travels over the wired connection up to the BRAS of the ISP. Third, there is the connection from the Access Point to the BRAS of the ISP. Hotspots are often found at restaurants, train stations, airports, libraries, hotels, hospitals, coffee shops, bookstores, fuel stations, department stores, supermarkets, RV parks and campgrounds, public pay phones, and other public places. Hotspot 2.0 is based on the IEEE 802.11u standard, which is a new set of protocols to enable cellular-like roaming. If the device supports 802.11u and is subscribed to a Hotspot 2.0 service it will automatically connect and roam.

2.2 3G

Third generation abbreviated as 3G is the third generation of mobile communication technology. **3G** finds application in wireless voice telephony, mobile Internet access, fixed wireless Internet access, video calls and mobile TV.

The transfer rate of 3g technology is atleast 250kbits/sec. Later 3G releases, often denoted 3.5G and 3.75G, also provide mobile broadband access of several Mbit/s to smartphones and mobile modems in laptop computers. A new generation of cellular standards has appeared approximately every tenth year since 1G systems were introduced in 1981/1982. Each generation is characterized by new frequency bands, higher data rates and non-backwards compatible transmission technology. The first release of the 3GPP Long Term Evolution (LTE) standard does not completely fulfil the ITU 4G requirements called IMT-Advanced. First release LTE is not backwards compatible with 3G, but is a pre-4G or 3.9G technology, however sometimes branded 4G by the service providers. Its evolution LTE Advanced is a 4G technology. WiMAX is another technology verging on or marketed as 4G.

The following standards are typically branded 3G:

- the UMTS system, first offered in 2001, standardized by 3GPP, used primarily in Europe, Japan, China (however with a different radio interface) and other regions predominated by GSM 2G system infrastructure. The cell phones are typically UMTS and GSM hybrids. Several radio interfaces are offered, sharing the same infrastructure:
 - The original and most widespread radio interface is called W-CDMA.
 - The TD-SCDMA radio interface was commercialized

- in 2009 and is only offered in China.
- The latest UMTS release, HSPA+, can provide peak data rates up to 56 Mbit/s in the downlink in theory (28 Mbit/s in existing services) and 22 Mbit/s in the uplink.
- the CDMA2000 system, first offered in 2002, standardized by 3GPP2, used especially in North America and South Korea, sharing infrastructure with the IS-95 2G standard. The cell phones are typically CDMA2000 and IS-95 hybrids. The latest release EVDO Rev B offers peak rates of 14.7 Mbit/s downstream.

3G is a technology for mobile service providers. Mobile services are provided by service providers that own and operate their own wireless networks and sell mobile services to end-users, usually on a monthly subscription basis. The cell towers are connected to each other by a backhaul network that also provides interconnection to the wireline public switched telecommunications network (PSTN) and other services. The mobile system operator owns the end-to-end network from the base stations to the backhaul network to the point of interconnection to the PSTN (and, perhaps, parts thereof). The chief focus of wireless mobile services has been voice telephony. However, in recent years there has been growing interest in data services as well. While data services are available over AMPS systems, these are limited to quite low data rates (<10Kbps). Higher speed data and other advanced telephone services are more readily supported over the digital mobile 2G systems. The 2G systems also support larger numbers of subscribers and so helped alleviate capacity problems faced by older AMPS systems in more congested environments.

3G technology is much more secure than 2G technology thereby offers higher security than

2G. By allowing the UE (User Equipment) to authenticate the network it is attaching to, the user can be sure the network is the intended one and not an impersonator. 3G networks use the KASUMI block cipher instead of the older A5/1 stream cipher. However, a number of serious weaknesses in the KASUMI cipher have been identified.

Conclusions and Recommendations

3G and Wi-Fi are communication technologies that provide wireless internet access and services to users. 3G and wireless are commonly used by devices such as laptop computers, smartphones and PDAs, and other entertainment gadgets.

The major difference between Wi-Fi and 3G is the way they connect to the internet. Wi-Fi connects to the internet through a wireless network and has a short range. You may have a private wireless network set up at home, its range depends on your vicinity to your computer router. Wi-Fi is also commonly available in public places such as cafes, airports and shopping centres.

3G is a type of cellular network and connects to the internet wherever there is mobile phone service. This means its range is a lot wider than a wireless network. Accessing the internet through your mobile phone provider usually comes at a greater cost than Wi-Fi, especially if you are travelling overseas and using International Roaming.

When using a portable device that is capable of using both Wi-Fi and 3G, such as an iPhone, unless you have turned Wi-Fi off your device should always connect to the internet using Wi-Fi unless it is not available. If it is not available or you are out of range, your device will then connect using 3G.

The problem with Wi-Fi is that the service is decentralized and chaotic. Wherever you're traveling, you first have to find out where Wi-Fi is offered and then hope it's either free or falls into your subscription plan whereas the

big enticement of 3G is its locally pervasive availability. If it's offered in your metro area, you don't need to look for a coffee bar or pirate someone's home connection.

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