

# WI-FI Technology and Its Exhilarating Applications

LAVANYA.S, M.DHAHIRA THESNEEM, M.SINTHU RAJA, C.GOMATHI, **MISTRAL SOLUTIONS**

**W**i-Fi technology uses radio waves to provide wireless high-speed Internet and network connections. You can get connected almost anywhere- at home, work, libraries, schools, airports, hotels and even in some restaurants. As the wireless network works as a two-way traffic, the data received from the Internet will also pass through the router to be coded into a radio signal that will be received by the computer's wireless adapter. Emitting frequencies for Wi-Fi are usually between 2.4GHz to 5GHz based on the amount of data on the network. A few of its applications have been briefed below.

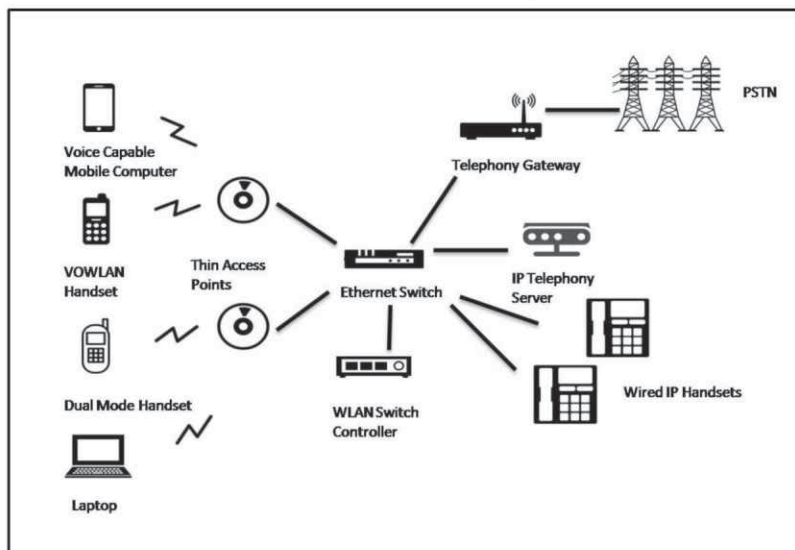
## VoWLAN

Voice over Wi-Fi is one of the most exciting areas of growth in the Wi-Fi industry. VoWLAN is the latest, most cost effective, and clearest way of carrying voice data wirelessly. It allows users to transmit and receive voice calls over their Wi-Fi networks with significant benefits. The basic idea of voice over WLAN is to support mobile voice communications over the same wireless LAN infrastructure that is implemented to support mobile data access. Unlike a cellular service, where the carrier designs

the network, with Voice over WLAN, the enterprise can control its own site coverage and provide continuous access to critical personnel regardless of where they are located throughout the premises. VoWLAN is an efficient means of addressing recognized business needs. Each emerging technology has its own challenges. While today's wired network provides plenty of bandwidth for both voice and data to coexist, WLANs provide less bandwidth, and quality of service issues must be revisited. Security measures such as authentication and encryption must be implemented and can add to the problem by increasing the size of the voice packet.

Additionally, users on the move will traverse wireless access points where handoffs must be quick and smooth. Wi-Fi Voice-Enterprise products operate within demanding enterprise environments, typically coexisting with heavy data traffic. Users need the flexibility to use a wide range of client devices and move freely within the enterprise network, and advanced voice applications must be integrated within the end-to-end enterprise network.

Using VoWLAN one can have access to telephone service, data and email access, even when away from the desk.



VoWLAN solution is most frequently used in the retail, manufacturing and health care sectors. As greater enhancements are being fine tuned in VoWLAN, there will be gradual increase in interoperability and seamless mobile connectivity.

## WI-FI – Positioning System

WPS (Wi-Fi Positioning System) is used to track the exact location of a device within a building without the requirement of GPS. The major feature which GPS technology fails to provide is the

support of robust indoor coverage. Using WPS, we can accurately locate a device inside a building. The basic function of the WPS is to gather particular information about the mobile station and to process that information to form a location estimate. WPS does not require a connection to be established with the Wi-Fi network. There are three topologies used for positioning - Network based, Terminal based, Terminal Assisted.

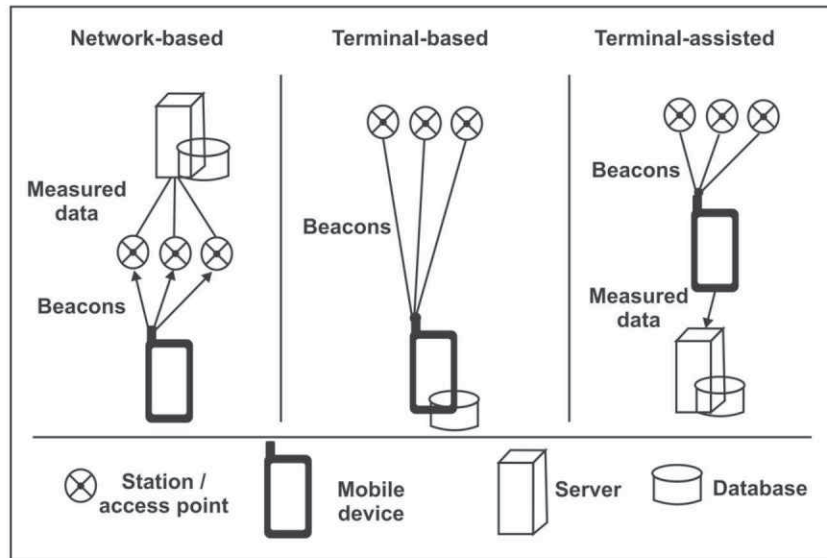
Although there are several methods available to measure the distance, the finger print method, otherwise called the pattern matching technique, has more accuracy than any other technique. The word 'fingerprint' here denotes the location-sensitive parameters of measured radio signals. Just as how a human finger print is used to identify a person, the finger print of a specific place, i.e., the entire area where the positioning is supposed to work must be loaded into a database and then can be used to locate the position.

This technology has wide applications such as for indoor navigation at shopping malls or for finding a lost child in an indoor area and for hospitals. It is a good choice in calculating accurate position as it is a wide spread well structured network. Positioning technology always tries to depend on existing network rather than installing a new network. Hence Wi-Fi is used to calculate location in environments where GPS cannot perform well.

## Harvesting power from Wi-Fi

Power plays a major role as well as a hurdle in most of the modern applications. As a solution, many new power-generation techniques have evolved and harvesting power from WiFi signals is one among them. This technique generates electricity from background radiation and could be used to beam power to remote locations or charge phones wirelessly.

The power-harvesting technology, with efficiency similar to that of modern solar panels, can capture and utilized otherwise "lost" energy by converting the microwave signal to direct current voltage capable of charging a cell phone battery or other small electronic device. The key to the power



harvester lies in its application of Meta materials i.e., the engineered structures that can capture various forms of wave energy and tune them for useful applications. A series of five fiberglass and copper energy conductors are wired together on a circuit board to convert microwaves into 7.3V of electrical energy. The efficiency of the conversion is 36.8% which is similar to that achieved using solar panels, which convert light energy to electricity.

It is a simple and inexpensive approach. A Meta material coating could be applied to the ceiling of a room to redirect and recover a Wi-Fi signal. The Power-harvesting metamaterial could be built into a cell phone allowing the phone to charge wirelessly while not in use. People who may not have access to conventional power outlet can harvest energy from a nearby Cell phone tower.

The basic building blocks are self-contained and additive in nature. To increase power production, one can increase the number of Meta material blocks. This approach can be further tuned to harvest power from sound signals, vibration and even from satellites passing overhead.

### Authors profile:

**Lavanya.S,** Project Lead, Mistral Solutions

**M.Dhahira Thesneem, M.Sinthu Raja and C.Gomathi** are Design Engineers working on wireless technologies at Mistral Solutions