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A SURVEY ON WIRELESS NETWORKS: ARCHITECTURE, APPLICATIONS, USES AND CHALLENGES

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Abstract:

Wireless networks have become increasingly popular in the computing industry since 1970. It is particularly true within the past decade, which has seen wireless networks being adapted to enable mobility. The area of wireless communication has been and is continuing to develop at a rapid pace over the years. Wireless networks allow a more flexible communication model than traditional networks since the user is not limited to a fixed physical location. Unlike cellular wireless networks, ad hoc wireless networks do not have any fixed communication infrastructure.

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1.0 Introduction:

The first professional wireless network was developed under the brand ALOHA net in 1969 at the University of Hawaii and became operational in June 1971. The first commercial wireless network was the Wave LAN product family, developed by NCR in 1986.

- 1991 2G cell phone network
- June 1997 802.11 "WiFi" protocol first release
- 1999 803.11 VoIP integration

There is an important question arise with wireless networks. What is a wireless network, exactly? A wireless local-area network (LAN) uses radio waves to connect devices such as laptops to the Internet and to your business network and its applications. When you connect a laptop to a WiFi hotspot at a cafe, hotel, airport lounge, or other public place, you're connecting to that business's wireless network.

1.1 **Wireless network** is a network set up by using radio signal frequency to communicate among computers and other network devices. Sometimes it's also referred to as **WIFI network** or **WLAN**. This network is getting popular nowadays due to easy to setup feature and no cabling involved. You can connect computers anywhere in your home without the need for wires.

1.2

Here is simple explanation of how it works? Let say you have two computers each equipped with wireless adapter and you have set up wireless router. When the computer sends out the data, the binary data will be encoded to radio frequency and transmitted via wireless router. The receiving computer will then decode the signal back to binary data.

It doesn't matter you are using broadband cable/DSL modem to access internet; both ways will work with wireless network. If you heard about **wireless hotspot** that means that location is equipped with wireless devices for you and others to join the network.

2.0 Wireless Network vs. Wired Network

A wired network connects devices to the Internet or other network using cables. The most common wired networks use cables connected to Ethernet ports on the network router on one end and to a computer or other device on the cable's opposite end.

In the past, some believed wired networks were faster and more secure than wireless networks. But continual enhancements to wireless networking standards and technologies have eroded those speed and security differences.

3.0 Architecture of Wireless networks:

The two main components are wireless router or access point and wireless clients.

If you have not set up any wired network, then just get a wireless routerand attach it to cable or DSL modem. You then set up wireless client by adding wireless card to each computer and form a simple wireless network. You can also cable connect computer directly to router if there are switch ports available.

Wireless router or access points should be installed in a way that maximizes coverage as well as throughput. The coverage provided is generally referred to as the coverage cell. Large areas usually require more than one access point in order to have adequate coverage. You can also add access point to your existing wireless router to improve coverage.

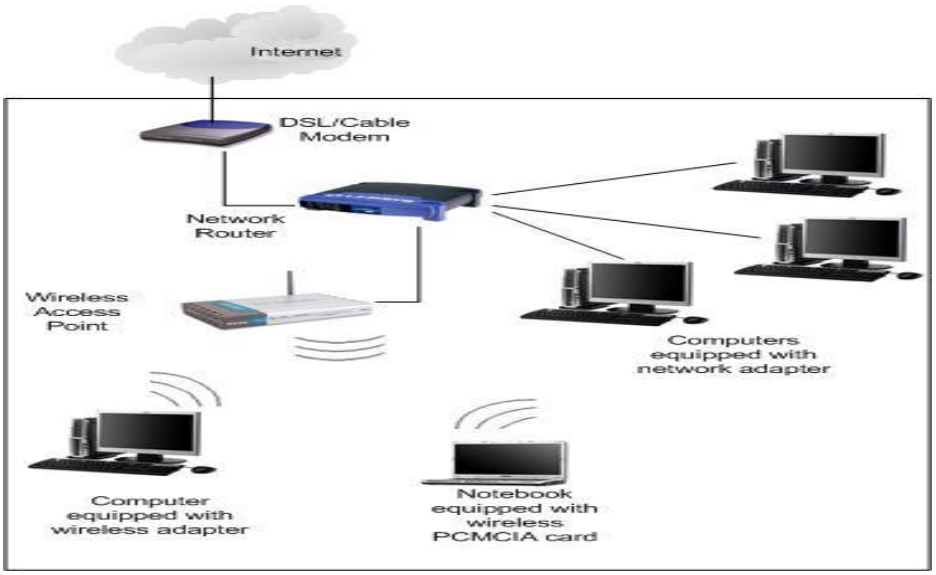

Fig 3.0 Architecture of a wireless networks

4.0 Benefits of Wireless networks

Small businesses can experience many benefits from a wireless network, including:

- ***Convenience.*** Access your network resources from any location within your wireless network's coverage area or from any WiFi hotspot.
- ***Mobility***. You're no longer tied to your desk, as you were with a wired connection. You and your employees can go online in conference room meetings, for example.
- ***Productivity.*** Wireless access to the Internet and to your company's key applications and resources helps your staff get the job done and encourages collaboration.
- ***Easy setup.*** You don't have to string cables, so installation can be quick and cost-effective.
- ***Expandable***. You can easily expand wireless networks with existing equipment, while a wired network might require additional wiring.
- ***Security.*** Advances in wireless networks provide robust security protections.
- ***Cost.*** Because wireless networks eliminate or reduce wiring costs, they can cost less to operate than wired networks.

5.0 Applications of Wireless networks

A wireless network use in many fields as per the requirement of it's by the user. Following are the application areas of wireless networks.

1. Home and Entertainment:

- *Home/office wireless networking*
- *PAN (Personal Area Network)*
- *Multiuser games*
- *Outdoor Internet Access*

2. Educational:

- *Virtual Class Rooms or Conference Rooms*
- *Set up ad-hoc communication during conferences, meeting or lectures*

3. Emergency Services:

- *Search and rescue Operations*
- *Disaster Recovery-Earthquakes, Hurricanes*

4. Tactical Networks:

- *Military Communication*
- *Automated Battlefields*

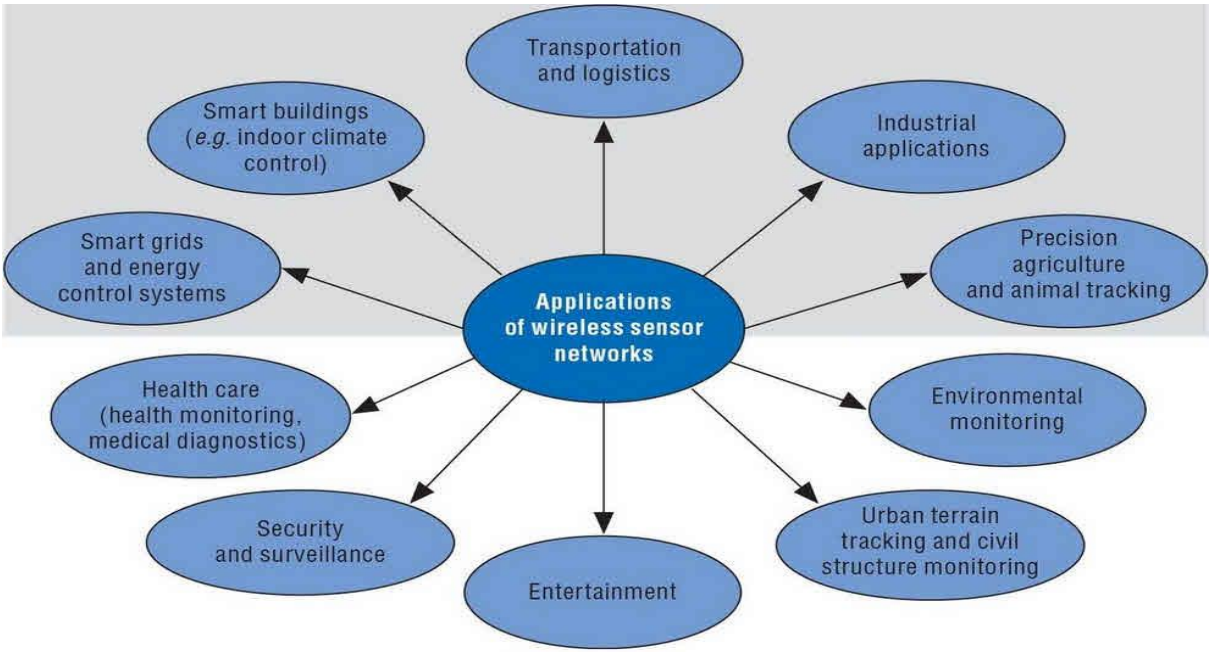

Fig 5.0 Applications of Wireless Networks

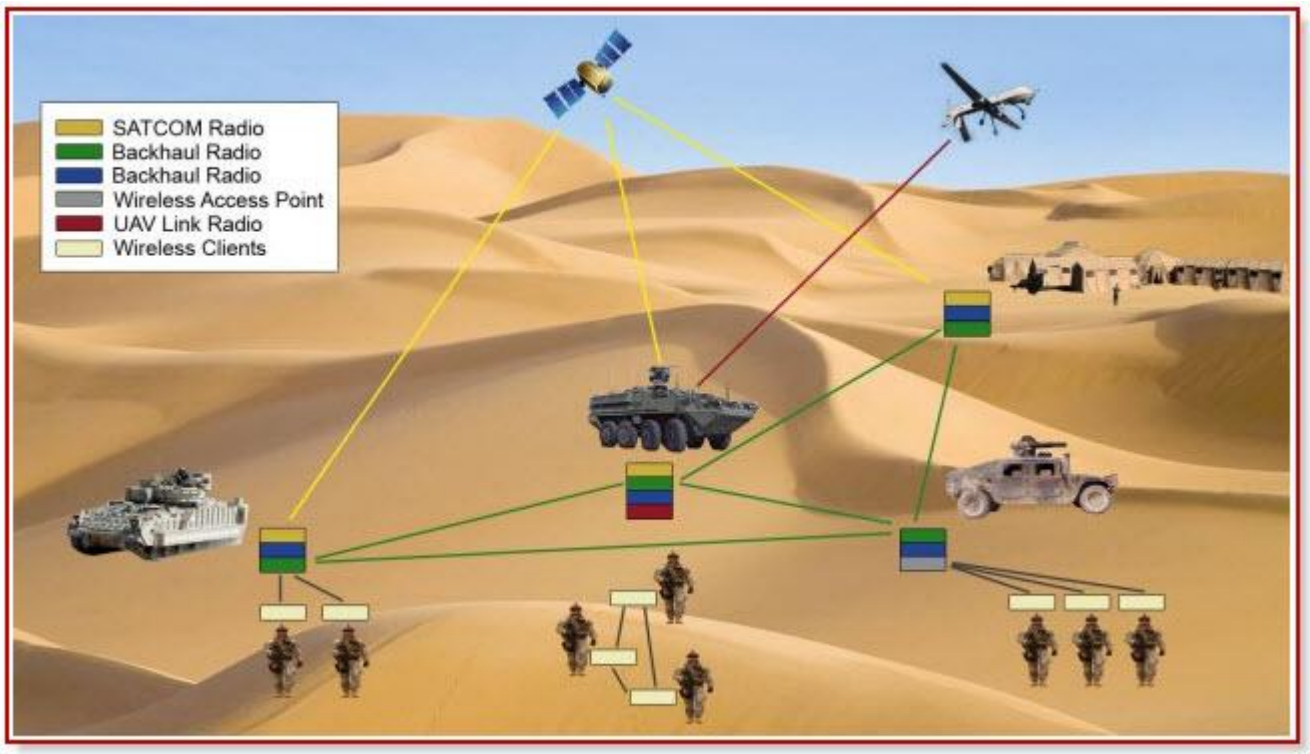

Fig 5.1 Wireless Networks in Military Applications

6.0 Challenges of Wireless Networks

With a lot of benefits there are some challenges of wireless networks as following:

1. ***Infrastructure less:*** Bring new network designing challenges
2. ***Dynamically changing topologies:*** Cause route changes, frequent network partition and packets loss.
3. ***Physical layer Limitations:*** Limited wireless range, Packet loss during transmission, Broadcast nature of the communication
4. ***Limitations of Mobile Nodes:*** Short battery life, limited Capacity
5. ***Network Security***

Conclusions: After the completion of this paper we find overall conclusion of the wireless networks that this network play a very important role in human life in day to day routine. Also we find the better use of this network in education and very important in Military Applications.

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