

# Boundless Communication

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**Abstract:** *In the present scenario, some people need to be online all the time but it is not possible to have wired media available at everywhere. In this case Boundless media is the best solution. There are many types of boundless transmission available like radio transmission, microwaves, infrared and laser/light wave transmission. In this paper we will focus on the uses, requirements, benefits and types of unbounded communication.*

**Index Terms:** - Bandwidth, electromagnetic, frequency, signals, wavelengths.

## I. INTRODUCTION

The term boundless communication refers to transmission of data from source to destination without any physical media like wires, cables, or any other electrical conductor. Transmission in this technology is occurred through the air by using electromagnetic waves like radio waves, microwaves, infrared waves etc. This transmission can be anywhere between few meters to thousand kilometers.

### ➤ Benefits of boundless communications:

- With this communication working professionals can access internet anywhere and anytime without wires or cables whenever they want. It enhances their productivity also.
- Wireless communication is beneficial in that situation where urgent changes are required.
- Installation and maintenance cost is less.
- Even that its way of communication is wireless but there is a port available to connect an Ethernet cable in wireless router.
- Another advantage of a wireless network is that it's portable

### ➤ Limitation of wireless communication:

- Transmission from one place to other can be happened with wireless signals in the air that can be accessed or captured by any unauthorized person.
- It is easy to access the data that is transmitted through wireless communication; so it become necessary to make data secure in transmission.

## II. REQUIREMENTS OF BOUNDLESS COMMUNICATION

### ➤ Basic requirements for wireless communications-

- **Source:** It is a device which create signal for transmission; which convert physical phenomena like temperature, optical signals during communications.
- **Modulator:** It modulates the source signal into energetic carrier wave for transmission.
- **Channel:** It carries the modulated wave during transmission
- **Demodulator:** It demodulates the received signal into message signal

### ➤ Hardware Requirements

- **Wireless router:** It is main component of boundless transmission. It provides the private computer network or we can say provide access to network. It is also called access point.
- **Wire based connection:** Almost every wireless router has two Ethernet port. One is to connect the router to broadband modem; other is to connect wired networking to the wireless hub.
- **Wireless NIC:** Desktop computer needs NIC or wireless network interface card to use boundless connection services; there is no need of it in laptops as these are coming in market with inbuilt facility to use wireless services.

### III. TYPES OF BOUNDLESS COMMUNICATION

- ❖ **Radio Communication:** The first boundless communication technology is the open radio communication that has frequencies between 3 KHz to 1GHz. These waves are omnidirectional that means these waves can travel in all the directions from the source. So there is no need of alignment between source and destination. Moreover, at the lower frequencies these waves can easily penetrate hard objects like buildings but at high frequencies these waves are travel in the straight line and bounce off the obstacles. These waves are absorbed by rain also. These waves have an advantage that they can travel long distances so radio waves are good for broadcasting AM radio. However, due to this reason interference between users is an issue on a massive scale. So the actual user of radio transmitter should be tightly licensed by the government. These waves are mainly used for mobile phones, AM and FM radio, cordless phone and wireless LAN etc.



Fig: Radiowave Transmission System

- ❖ **Microwave Communication:** Microwaves are electromagnetic waves that have frequencies between 1GHz to 300 GHz. These waves can travel only in one direction from the source so that these waves are called unidirectional. There should be a line of sight

between sender and receiver. Due to very high frequency these waves are unable to penetrate the hard objects or we can say that these waves bounce off the obstacles. These waves are affected by rain also. As we discussed earlier these waves are unidirectional but sometimes there would be a requirement of two way communication like in telephone conversation where communication from both sides is necessary then a device which is used nowadays called transceiver. One of the advantages of microwave transmission is that it is not expensive like fiber optics and government licensing is not required for short range wireless networking. This type of communication is widely used in television distribution, cellular telephones, long distance telephone communication etc.

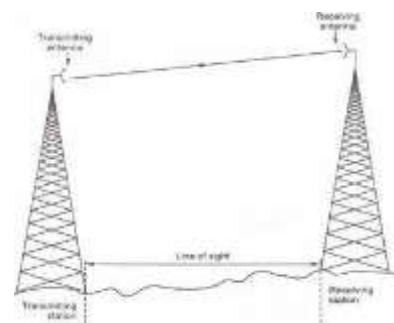


Fig: Microwave Transmission System

- ❖ **Infrared Communication:** These electromagnetic waves have frequencies between 300 GHz to 400 THz. These waves are used for short range communication like remote control of a television. These waves operate in *line-of-sight mode* which means that there must be no obstruction between the transmitter and receiver. These waves have very high frequency so that they unable to penetrate the solid objects, it is also a plus point for e.g. if any person in a room of a house use a remote control it will not create any interference to the system available in the adjacent room. Security in this communication is higher than radio communication. This transmission is inexpensive also and it does not require any government licensing.

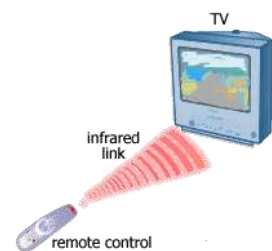


Fig: Infrared Transmission System

- ❖ **Laser Transmission:** Laser communication is also known as light wave communication. In this type of transmission thin laser beams are used for data transmission with in few kilometers It used line of sight propagation therefore it is also called unidirectional. For this kind of setup a photo detector and a laser is used at both side it provides very high bandwidth at very low cost. This is used to connect LAN in two buildings by lasers mounted on their roof tops. The major disadvantage of laser beam is that it cannot penetrate rain or thick fog. It works well in sunny days but on hot sunny days also these waves are affected by hot turbulent air and miss the detector.

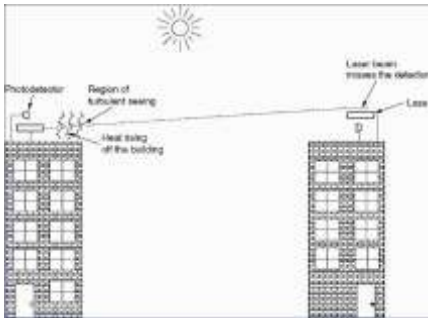


Fig: Laser Transmission System

- ❖ **Satellite communication:** It is also a kind of wireless technology. Users at any place on earth can connect with each other by using this technology. A signal from the earth is sent near the satellite then it amplifies that signal and on the surface area it is received back by antenna. Space segment and ground segment are two components which are used by itself for fixed or mobile transmission respectively.



Fig: Satellite Transmission System

- ❖ **Zigbee:** It has been introduced for the communication of data with simple structure. Zigbee communication can be used when there is a need of low power and low cost wireless sensors. It has very long battery life instead of that it uses low power. Mainly it is used in sensing and monitoring applications.



Fig: Zigbee Transmission System

#### IV. COMPARISON BETWEEN WIRED VS UNWIRED

- If any user need to be online all the time; in that situation unwired media is the best option over wired media as fixed media cannot be available everywhere.
- One of the reasons to choose unwired media is also that it is less expensive. There is no extra cost of cabling in wireless communication with wireless devices.
- Any user who is not concerned with cabling or any type communication setup can also easily use unwired media.
- By enabling security feature other wireless equipment's can also be interconnected easily and automatically.
- Implementation of unwired communication is faster than wired media.

#### V. APPLICATIONS/USES OF WIRELESS COMMUNICATION

- Used by doctors, working in remote areas as they can be touch with medical centers.
- Used in security systems, remote control, Wi-Fi, communication based projects, cellphones, cordless telephones, Bluetooth, satellite etc.
- Oil and gas field communications require reliable and resilient, high capacity wireless networks that operate over large areas under extreme environmental conditions.

#### VI. TECHNICAL CHALLENGES

- **Multipath Propagation**

In boundless communication a signal from sender to receiver by multipath propagation that means via no of different propagation paths. These propagation paths are very large with different amplitude, direction of departure, runtime, different phase shifts of components to each other.

- **Limited Energy**

Any user who is using wireless media at mobile station needs rechargeable batteries. Batteries have to change timely; so it

becomes restriction on devices using unwired technology for data transmission.

- **Spectrum Limitations**

One of the challenges is that Spectrum has to be used very efficient as it is limited and regulated by international agreements

- **Noise-Limited Systems**

To provide transmission quality noise ratio should be minimum at receiver side. So we can say that these systems should be limited or restricted to noise also. If there would be too much noise or little signal it will lead to bad quality of transmission or communication.

- **User Mobility**

In this challenge network has to know the location of user. Different base stations are available to serve user at different mobile station. We can also say that if user at any mobile station move from one cell boundary to other; then any other base station start serving without any disturbing call and also without making user aware of it.

## VII. CONCLUSION

In this paper, we have described the various benefits, applications, requirements and types of boundless technology. As we have discussed in this paper that unwired technology have advantages over wired media in certain conditions like where instant delivery is necessary than accurate delivery of data that means where user need to be online at all the time; we have also focus on different types of boundless communication each type has its own advantages, disadvantages regarding security, transmission, accuracy etc. Users can use any type according to their requirements, condition and situation.

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