



VACATION TASKS

SET-1

Types of Communication Protocols

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Basic wireless communication protocols

Wi-Fi

Wi-Fi is a technology based on the IEEE 802.11 suite of standards that uses radio frequencies (RF) to extend wired Ethernet-based local area networks (LAN) to Wi-Fi-enabled devices, allowing the devices to receive and send information from the internet.

Working

Wi-Fi uses Internet Protocol (IP) to communicate between endpoint devices and the LAN. A Wi-Fi connection is established using a wireless router that is connected to the network and allows devices to access the internet.

One disadvantage of Wi-Fi is that it may be prone to interference depending on the RF environment it's operating in. Everything from other Wi-Fi signals to radio waves emitted by microwave ovens to cement walls can interfere with your data transmission. That's where Wi-Fi's two frequencies, 2.4GHz and 5GHz, come in. Wi-Fi can broadcast on both frequencies, helping its signal cut through all the noise and deliver a fast, strong signal from your wireless router to your device.

Applications

LAN video, e-mail, and web applications requiring higher data rate network connections (1Mbps-1Gbps).

Li-Fi

Li-Fi is a form of visual light communication that uses light waves from LED bulbs for high-speed wireless communication. It is used to exchange data quickly and securely at a much lower power level compared to Wi-Fi.

Working

When a constant current source is applied to an LED bulb, it emits a constant stream of photons observed as visible light. When this current is varied slowly, the bulb dims up and down. Since the bulbs are semiconductors, the current and optical output can be modulated at extremely high speeds that can be detected by a photodetector device and converted back to electrical current.

Li-Fi has fewer interference issues than RF technology, making it ideal for dense environments where Wi-Fi may fall short. Li-Fi can't penetrate solid materials, which makes it more secure, but also means a Li-Fi network in a building would need multiple transmitter bulbs, so a mobile user could experience seamless wireless coverage as they move between the illumination area of each LED bulb.

Applications

Li-Fi is still a long way from widespread commercialization, but it has potential applications for the Internet of Things in many industries, including aerospace, education, consumer electronics, healthcare, retail, security and transportation, among others.

Bluetooth

A standard for the short-range wireless interconnection of mobile phones, computers, and other electronic devices.

Working

Bluetooth sends and receives radio waves in a band of 79 different frequencies (channels) centered on 2.45 GHz, set apart from radio, television and cellphones, and reserved for use by industrial, scientific and medical gadgets. Bluetooth's short-range transmitters have very low power consumption and are more secure than wireless networks that operate over longer ranges, such as Wi-Fi.

Applications

Bluetooth is a global 2.4 GHz personal area network for short-range wireless communication. Device-to-device file transfers, mobile credentials, wireless speakers and wireless headsets are often enabled with Bluetooth.

ZigBee

ZigBee is a 2.4 GHz mesh local area network (LAN) protocol. It was developed as an IEEE 802.15.4-based specification for a suite of high-level communication protocols used to create personal area networks with small, low-power digital radios.

Working

ZigBee devices transmit data over long distances by passing it through a mesh network of intermediate devices to reach more distant ones. ZigBee networks have a defined rate of 250 kbps and are secured by 128-bit symmetric encryption keys.

Applications

ZigBee is typically used in low-data-rate applications that require high scalability, long battery life, and secure networking. It is simpler and less expensive than Bluetooth or Wi-Fi and is commonly used for home, building and industrial automation applications, such as controlled lighting and thermostats, home energy monitors, smart metering, medical device data collection, traffic management systems and other low-power, low-bandwidth needs.

TECHNOLOGY	APPLICATION	SUCCESS METRICS	DATA RATE	RANGE
Wi-Fi	LAN, Internet	Speed, Flexibility	.1-7 Gbps	100m
Li-Fi	LAN, Internet	Security, Speed, Cost	1-3.5 Gbps	10m
Bluetooth	PAN, Mobile Credentials	Cost, Convenience	48 Mbps	<300m
ZigBee	Sensor Networks	Reliability, Power, Scalability, Cost	.250 Mbps	70-300m