Introduction and Overview of Wireless Sensor Networks

1. What is a Wireless Sensor Network (WSN)?
A. A network of satellites for communication
B. A network of spatially distributed sensors that collect and transmit data
C. A network of mobile phones communicating wirelessly
D. A network used for internet access only
ANSWER: B

2. What is the main purpose of WSNs?
A. To provide internet services
B. To monitor physical or environmental conditions remotely
C. To transmit high-definition video data
D. To create secure internet connections
ANSWER: B

3. Which characteristic is typical of WSNs?
A. Wired connections between all nodes
B. High energy consumption
C. Self-organizing and wireless communication
D. Expensive and large-sized sensors
ANSWER: C

4. What is the major challenge in WSNs?
A. High bandwidth availability
B. Managing power consumption and energy efficiency
C. Unlimited memory in sensors
D. Lack of data security
ANSWER: B

5. WSNs are commonly used in:
A. Data centers
B. Industrial automation, environmental monitoring, and healthcare
C. Local area networks (LANs)
D. Video streaming applications
ANSWER: B

Basic Sensor Network Architectural Elements

6. What is the function of sensor nodes in a WSN?
A. Only processing the data locally
B. Collecting data, processing it, and transmitting to a base station
C. Providing network security only
D. Acting as an internet service provider
ANSWER: B

7. What is the role of a base station in a WSN?
A. To provide power to the sensors
B. To collect data from sensor nodes and transmit to the main server
C. To act as a backup storage device

D. To physically connect all sensors
ANSWER: B

8. What component in WSN is responsible for managing data flow between sensors and the server?
A. Power supply unit
B. Microcontroller
C. Gateway or sink node
D. Memory unit
ANSWER: C

9. Which architectural element ensures that sensor nodes operate within energy constraints?
A. High-capacity storage devices
B. Energy-efficient MAC protocols
C. Large power generators
D. Wireless charging stations
ANSWER: B

10. What is the primary communication method used between nodes in a WSN?
A. Bluetooth
B. Infrared
C. Radio Frequency (RF) communication
D. Fiber optic cables
ANSWER: C

Advantages and Challenges of WSNs

11. Which of the following is an advantage of WSNs?
A. High power consumption
B. Scalability for large deployments
C. High maintenance cost
D. Wired infrastructure requirement
ANSWER: B

12. A key challenge in WSNs is:
A. Unlimited battery life
B. Data redundancy management
C. Wired communication issues
D. Lack of real-time data collection
ANSWER: B

13. Why is energy efficiency critical in WSNs?
A. Sensors have unlimited power supply
B. Sensors are battery-operated with limited energy
C. Sensors do not consume power
D. Sensors rely on direct power lines
ANSWER: B

14. What is an advantage of WSNs in remote environments?
A. Easy deployment without complex infrastructure
B. High cost of maintenance
C. Limited data collection
D. Wired sensor connectivity
ANSWER: A

15. One challenge of WSNs in large-scale deployments is:
A. Efficient data transmission without congestion
B. Unlimited storage availability
C. Infinite sensor lifetime
D. High latency and data loss risk
ANSWER: D

Applications of WSNs

16. WSNs are widely used in which environmental application?6
A. Monitoring office attendance
B. Forest fire detection and environmental monitoring
C. Online video streaming
D. Data analysis in financial markets
ANSWER: B

17. In healthcare, WSNs are commonly used for:
A. Managing hospital finances
B. Remote patient monitoring and wearable health devices
C. Scheduling appointments only
D. Administering medications
ANSWER: B

18. Which application of WSNs is vital in agriculture?
A. Livestock counting manually
B. Precision agriculture for monitoring soil moisture and crop health
C. Packaging of agricultural products
D. Manual irrigation system control
ANSWER: B

19. WSNs contribute to smart cities by:
A. Automating tax collection systems
B. Monitoring traffic, air quality, and waste management
C. Enhancing mobile phone signals
D. Increasing fuel consumption in public transport
ANSWER: B

20. An industrial application of WSNs is:
A. Manufacturing network cables
B. Machine condition monitoring and predictive maintenance
C. Human resource management
D. Reducing internet speeds
ANSWER: B

Sensor Node Technology

21. What is a key component of a sensor node in WSNs?
A. Optical fiber connector
B. Microcontroller for processing data
C. Central server unit
D. Satellite receiver
ANSWER: B

22. Which technology is commonly used for wireless communication in sensor nodes?
A. Ethernet cables
B. Zigbee protocol
C. HDMI interface
D. USB connection
ANSWER: B

23. What is the main function of the power unit in a sensor node?
A. To transmit data
B. To supply energy to all components
C. To store data permanently
D. To increase communication range
ANSWER: B

24. Which memory type is typically used in sensor nodes for temporary data storage?
A. Hard disk drives
B. ROM (Read-Only Memory)
C. RAM (Random Access Memory)
D. CD-ROM
ANSWER: C

25. What technology enables sensor nodes to conserve energy?
A. Continuous high-power transmission
B. Sleep mode and duty cycling
C. Using wired connections
D. Large backup batteries
ANSWER: B

Sensor Taxonomy

26. How are sensors classified based on the type of data they collect?
A. Wired and Wireless sensors
B. Physical, Chemical, and Biological sensors
C. High and Low power sensors
D. Active and Passive sensors
ANSWER: B

27. Passive sensors in WSNs operate by:
A. Generating their own signal for detection
B. Receiving signals from the environment without emitting energy
C. Transmitting signals continuously

D. Requiring external power for detection
ANSWER: B

28. What is an example of a physical sensor in WSNs?
A. Blood pressure sensor
B. Temperature sensor
C. pH level sensor
D. Glucose level sensor
ANSWER: B

29. Which sensor category is based on power consumption?
A. Data and Communication sensors
B. Low-power and High-power sensors
C. Memory-based sensors
D. Optical sensors
ANSWER: B

30. In WSNs, chemical sensors are commonly used for:
A. Detecting motion in a room
B. Measuring humidity levels
C. Monitoring air quality and gas levels
D. Capturing video data
ANSWER: C

WSN Operating Environment

31. Which environment is most suitable for WSN deployment?
A. Underwater cables
B. Harsh and dynamic environments like forests and battlefields
C. Enclosed office spaces only
D. Suburban residential areas only
ANSWER: B

32. A key challenge in WSN operating environments is:
A. Unlimited power supply
B. Environmental interference and node failures
C. Fixed infrastructure support
D. Easy maintenance access
ANSWER: B

Radio Technology

33. Which radio technology is frequently used in WSNs for low power communication?
A. Wi-Fi
B. Zigbee
C. Bluetooth Classic
D. 5G
ANSWER: B

34. What is the primary advantage of using radio frequency (RF) in WSNs?
A. High power consumption
B. Long-range communication with minimal energy usage
C. Dependence on wired infrastructure
D. High cost of operation
ANSWER: B

Network Architecture

35. What is the most common network architecture in WSNs?
A. Mesh topology
B. Ring topology
C. Star topology
D. Bus topology
ANSWER: A

36. In a hierarchical WSN architecture, what is the role of cluster heads?
A. Collect data from sensors and transmit to the base station
B. Provide internet access to all nodes
C. Control power supply to all nodes
D. Store all collected data permanently
ANSWER: A

Optimization Goals and Figures of Merit

37. One key optimization goal in WSN design is:
A. Increasing sensor size
B. Minimizing energy consumption
C. Maximizing signal interference
D. Increasing data storage costs
ANSWER: B

38. What figure of merit measures the efficiency of data transmission in WSNs?
A. Power consumption per node
B. Data throughput and latency
C. Node size and weight
D. Network cable length
ANSWER: B

Design Principles for WSNs

39. What is a fundamental design principle for WSNs?
A. Using high-power devices only
B. Minimizing hardware and energy costs
C. Avoiding any energy management techniques
D. Deploying sensors in a fixed, wired layout
ANSWER: B

40. Scalability in WSN design ensures:
A. Limited number of sensor nodes

B. The network can grow with more nodes efficiently
C. Nodes cannot be replaced once deployed
D. Each node requires wired connections
ANSWER: B

Service Interfaces of WSNs

41. What is the role of service interfaces in WSNs?
A. To provide user-level access to sensor data and network functions
B. To supply power to all nodes
C. To transmit data over wired connections
D. To store all sensor data permanently
ANSWER: A

42. Middleware services in WSNs help in:
A. Improving user interface aesthetics
B. Managing data aggregation and communication efficiently
C. Increasing sensor power consumption
D. Reducing network performance
ANSWER: B

Gateway Concepts

43. A gateway in a WSN is used to:
A. Connect the sensor network to external networks like the internet
B. Power all sensor nodes wirelessly
C. Store all sensor data permanently
D. Act as a physical connector between sensors
ANSWER: A

44. What is a critical function of WSN gateways?
A. Filtering and aggregating data from sensor nodes
B. Limiting the number of nodes in the network
C. Reducing communication range
D. Increasing sensor node size
ANSWER: A

Additional MCQs

45. Which parameter is critical when choosing a radio technology for WSNs?
A. Signal color
B. Power consumption and communication range
C. Cable availability
D. Sensor weight
ANSWER: B

46. What is a common problem in harsh WSN operating environments?
A. Constant power supply
B. Sensor node failures due to environmental conditions
C. Unlimited data storage

D. High-speed wired connections
ANSWER: B

47. In WSN network architecture, the sink node is responsible for:
A. Powering all nodes
B. Collecting and forwarding data to the main server
C. Reducing network performance
D. Encrypting all data
ANSWER: B

48. What is the main purpose of data aggregation in WSNs?
A. Increasing the amount of data stored
B. Reducing the amount of data transmitted
C. Slowing down the network
D. Consuming more power
ANSWER: B

49. Which design principle is critical for long-lasting WSN deployments?
A. Using energy-efficient communication protocols
B. Increasing sensor size
C. Removing all power-saving techniques
D. Reducing the number of nodes
ANSWER: A

50. A key metric for evaluating WSN performance is:
A. Latency and power efficiency
B. Node weight and size
C. Cable length
D. Data storage duration
ANSWER: A

51. In service interfaces, data querying allows users to:
A. Manually configure sensors physically
B. Request specific data from the sensor network
C. Power off all nodes remotely
D. Increase node size
ANSWER: B

52. Gateways are often equipped with:
A. Batteries for all sensor nodes
B. Multiple communication interfaces (e.g., RF, Wi-Fi, Ethernet)
C. Wired connections to all sensors
D. Permanent data storage facilities
ANSWER: B

53. A challenge for WSN gateways is:
A. Managing data traffic efficiently while conserving power
B. Limiting network connectivity
C. Increasing sensor costs

D. Reducing data transmission rates
ANSWER: A

54. What optimization goal is essential for extending WSN lifespan?
A. Minimizing power consumption per node
B. Increasing the number of nodes
C. Increasing data traffic
D. Avoiding data aggregation
ANSWER: A

55. What is a major benefit of WSN service interfaces for developers?
A. Complex access to sensor data
B. Easy access to network functions and sensor data
C. Increasing power consumption
D. Reducing network reliability
ANSWER: B

56. A multi-hop communication method in WSNs helps in:
A. Increasing power usage per node
B. Extending communication range and reducing power usage
C. Reducing data transmission efficiency
D. Limiting the number of active nodes
ANSWER: B

57. Which radio technology supports low-power and low-data-rate communication in WSNs?
A. Wi-Fi
B. Zigbee
C. LTE
D. Bluetooth Classic
ANSWER: B

58. Gateway nodes often act as:
A. Relays between the sensor network and external networks
B. Power sources for all sensors
C. Storage units for all sensor data
D. Wired communication centers
ANSWER: A

59. In WSN design, redundancy helps in:
A. Increasing energy consumption unnecessarily
B. Improving network reliability through backup nodes
C. Reducing node deployment
D. Slowing down data collection
ANSWER: B

60. An essential design principle for WSN scalability is:
A. Support for adding more sensor nodes without performance issues
B. Increasing power consumption with each new node
C. Limiting the number of nodes deployed

D. Using only wired communication methods
ANSWER: A

Wireless Sensor Network Operating Systems

Which of the following is NOT a characteristic of a Wireless Sensor Network Operating System? A. Energy efficiency
B. Real-time processing
C. Multi-user support
D. Distributed nature
ANSWER: C

Which of these operating systems is specifically designed for wireless sensor networks?
A. Windows IoT
B. TinyOS
C. Ubuntu
D. Linux Mint
ANSWER: B

What is the primary challenge of Wireless Sensor Network Operating Systems?
A. High power consumption
B. Real-time scheduling
C. Limited memory and processing power
D. All of the above
ANSWER: D

Which scheduling mechanism is commonly used in Wireless Sensor Network Operating Systems?
A. Round Robin
B. FIFO
C. Event-driven scheduling
D. Multilevel Queue
ANSWER: C

Which component is responsible for task execution in TinyOS?
A. Kernel
B. Scheduler
C. Memory Manager
D. Power Manager
ANSWER: B

Ad-hoc Networks

What is the primary characteristic of an ad-hoc network?
A. Centralized network management
B. Infrastructure-based communication
C. Self-configuring and decentralized communication
D. Wired communication
ANSWER: C

Which of the following protocols is commonly used in ad-hoc networks?
A. TCP
B. UDP
C. AODV
D. HTTP
ANSWER: C

In ad-hoc networks, nodes communicate through:
A. A base station
B. Direct peer-to-peer links
C. Satellite links
D. Optical fibers
ANSWER: B

What is the main challenge in ad-hoc networks?
A. Routing
B. High speed
C. Large bandwidth availability
D. Low latency
ANSWER: A

Ad-hoc Networks in Wireless Sensor Networks

In Wireless Sensor Networks, ad-hoc networks are formed:
A. With a central base station
B. Without pre-existing infrastructure
C. Using fiber-optic cables
D. With fixed routing tables
ANSWER: B

Which of the following best describes an ad-hoc network in a WSN?
A. Pre-configured network topology
B. Nodes communicate through a fixed access point
C. Self-organizing and decentralized network
D. Requires manual configuration for each node
ANSWER: C

What is the role of multi-hop communication in ad-hoc networks?
A. Reduces power consumption by allowing nodes to relay messages
B. Increases the latency in data transmission
C. Requires a base station to function
D. Reduces network scalability
ANSWER: A

Which type of network topology is typically used in ad-hoc WSNs?
A. Star
B. Tree
C. Mesh
D. Ring
ANSWER: C

Characteristics of Ad-hoc Networks in WSNs

One of the key characteristics of ad-hoc networks in WSNs is:
A. Centralized control
B. Infrastructure dependency
C. Dynamic topology
D. Fixed routing paths
ANSWER: C

What is the main reason for the limited lifespan of an ad-hoc WSN?
A. High bandwidth availability
B. Limited power and energy constraints
C. Use of optical fibers
D. Constant wired connectivity
ANSWER: B

Which characteristic makes ad-hoc networks in WSNs highly scalable?
A. Nodes can dynamically join or leave the network
B. Fixed routing tables are used
C. Only a few nodes can be connected at a time
D. Nodes require manual configuration
ANSWER: A

What is a primary advantage of using ad-hoc networks in WSNs?
A. Reduced dependency on centralized infrastructure
B. Increased power consumption
C. Fixed and rigid network topology
D. Increased reliance on wired communication
ANSWER: A

Which feature of ad-hoc networks ensures robustness in WSNs?
A. Use of redundant communication paths
B. Single-point failure
C. Rigid network configuration
D. Fixed and pre-determined routes
ANSWER: A

Challenges of Ad-hoc Networks in WSNs

What is one of the biggest challenges in ad-hoc networks of WSNs?
A. Scalability issues
B. Unlimited battery life
C. Simple network management
D. Fixed infrastructure requirement
ANSWER: A

Which of the following is a major security challenge in WSN ad-hoc networks?
A. Easy authentication of nodes
B. Susceptibility to attacks like eavesdropping and spoofing
C. High energy efficiency

D. Strong centralized security control
ANSWER: B

What challenge is faced by routing protocols in ad-hoc WSNs?
A. Frequent topology changes due to node mobility
B. Fixed routing paths
C. Unlimited bandwidth availability
D. Low latency in all cases
ANSWER: A

Why is energy efficiency a critical challenge in ad-hoc WSNs?
A. Nodes rely on limited battery power for communication
B. The network has an infinite power supply
C. All nodes are directly connected to power sources
D. The use of wired connections increases power consumption
ANSWER: A

Which factor limits the communication range in WSN ad-hoc networks?
A. Low transmission power of sensor nodes
B. Use of satellite communication
C. High-powered antennas
D. Strong centralized control
ANSWER: A

Energy Efficiency Considerations in Ad-hoc Networks

Why is energy efficiency a critical factor in ad-hoc networks?
A. Nodes operate on limited battery power
B. Nodes have unlimited energy supply
C. Wired connections provide continuous power
D. Energy efficiency does not affect network performance
ANSWER: A

Which of the following is a technique used to reduce energy consumption in ad-hoc networks?
A. Increasing transmission power
B. Implementing sleep scheduling mechanisms
C. Keeping all nodes active at all times
D. Using high-energy-consuming routing protocols
ANSWER: B

What is the purpose of duty cycling in ad-hoc networks?
A. To minimize energy consumption by periodically turning off nodes
B. To increase bandwidth usage
C. To enhance data transmission speed
D. To reduce network security risks
ANSWER: A

Which of the following routing protocols is designed to improve energy efficiency in ad-hoc networks?

A. AODV
B. LEACH (Low-Energy Adaptive Clustering Hierarchy)
C. OSPF
D. BGP
ANSWER: B

Which hardware component in a sensor node consumes the most energy?
A. Processor
B. Memory
C. Transceiver (wireless communication module)
D. Battery
ANSWER: C

How does clustering improve energy efficiency in ad-hoc networks?
A. By reducing redundant transmissions and aggregating data
B. By increasing the number of transmissions
C. By keeping all nodes active at all times
D. By using high-power nodes for all tasks
ANSWER: A

What is the main advantage of multi-hop communication in terms of energy efficiency?
A. Reduces energy consumption by using intermediate nodes to relay data
B. Requires direct communication with all nodes
C. Increases transmission power requirements
D. Consumes more energy than single-hop communication
ANSWER: A

Which factor contributes most to energy consumption in ad-hoc networks?
A. High computation load
B. Frequent data transmission and reception
C. Large memory usage
D. Use of multiple network layers
ANSWER: B

What is an effective way to extend the lifetime of a wireless sensor node?
A. Using energy-harvesting techniques (e.g., solar power)
B. Increasing transmission power
C. Reducing sleep time of nodes
D. Keeping all nodes in active mode
ANSWER: A

In energy-efficient MAC protocols, which mechanism helps reduce energy wastage?
A. Collision avoidance and low-duty-cycle operation
B. Increasing transmission power
C. Always keeping the receiver on
D. Using complex encryption algorithms
ANSWER: A

Security and Privacy in Ad-hoc Networks

What is a key security challenge in ad-hoc networks?
A. Lack of centralized control
B. Strong encryption by default
C. Low mobility of nodes
D. Fixed communication infrastructure
ANSWER: A

Which type of attack involves injecting false routing information to mislead network traffic?
A. Wormhole attack
B. Black hole attack
C. Sybil attack
D. Eavesdropping
ANSWER: B

What is the main purpose of encryption in ad-hoc networks?
A. To protect data from unauthorized access
B. To increase transmission speed
C. To reduce power consumption
D. To simplify routing protocols
ANSWER: A

Which of the following is a major privacy concern in ad-hoc networks?
A. Exposure of user location and identity
B. High bandwidth consumption
C. Limited battery power
D. Fixed network topology
ANSWER: A

Which security mechanism is commonly used to ensure data integrity in ad-hoc networks?
A. Hashing algorithms (e.g., SHA-256)
B. Increasing transmission power
C. Sleep scheduling
D. Packet flooding
ANSWER: A

In a **wormhole attack**, an attacker:
A. Creates a tunnel between two distant nodes to manipulate routing
B. Destroys network nodes physically
C. Encrypts all network data
D. Reduces network traffic
ANSWER: A

What is the impact of a **black hole attack** in ad-hoc networks?
A. Malicious node absorbs and drops all network traffic
B. Nodes communicate without interference
C. Network performance improves
D. It extends the network lifetime
ANSWER: A

How can ad-hoc networks prevent Sybil attacks?
A. Using authentication and identity verification mechanisms
B. Allowing multiple identities per node
C. Increasing the number of malicious nodes
D. Allowing anonymous communication
ANSWER: A

What is **key management** in ad-hoc networks?
A. A method of securely distributing cryptographic keys for authentication
B. A way to increase bandwidth
C. A technique to improve energy efficiency
D. A method to increase transmission speed
ANSWER: A

Which security approach helps **detect and mitigate** insider threats in ad-hoc networks?
A. Intrusion Detection Systems (IDS)
B. Increasing network traffic
C. Disabling encryption
D. Reducing the number of nodes
ANSWER: A

UNIT – 2

Fundamentals of MAC Protocols

What is the primary function of a MAC protocol in a network?
A. Routing data packets
B. Controlling access to the shared communication medium
C. Encrypting data packets
D. Managing IP addresses
ANSWER: B

Which of the following is a classification of MAC protocols?
A. Contention-based and contention-free
B. Wired and wireless
C. Symmetric and asymmetric
D. Digital and analog
ANSWER: A

In a contention-based MAC protocol, how do devices access the medium?
A. Through a centralized controller
B. By competing for access to the channel
C. Using a fixed time slot
D. By pre-allocating resources
ANSWER: B

Which of the following is a contention-based MAC protocol?
A. Time Division Multiple Access (TDMA)
B. Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA)

C. Frequency Division Multiple Access (FDMA)
D. Token Ring
ANSWER: B

In contention-free MAC protocols, how is medium access managed?
A. Devices randomly access the medium
B. Devices use a predefined schedule
C. Devices compete for access
D. Devices listen before transmitting
ANSWER: B

What problem does CSMA/CD (Carrier Sense Multiple Access with Collision Detection) aim to solve?
A. Hidden terminal problem
B. Packet duplication
C. Collisions in wired networks
D. Wireless network interference
ANSWER: C

Why is CSMA/CA preferred over CSMA/CD in wireless networks?
A. Wireless signals cannot detect collisions easily
B. CSMA/CD has higher energy efficiency
C. CSMA/CA requires no acknowledgment
D. CSMA/CD performs better in high-traffic networks
ANSWER: A

What is the purpose of the RTS/CTS mechanism in CSMA/CA?
A. To resolve collisions after they occur
B. To prevent hidden terminal issues
C. To increase bandwidth
D. To manage IP addresses
ANSWER: B

Which MAC protocol is based on dividing the available bandwidth into different frequency bands?
A. CSMA/CA
B. TDMA
C. FDMA
D. Slotted ALOHA
ANSWER: C

In Time Division Multiple Access (TDMA), how is access to the channel granted?
A. By pre-allocating frequency bands
B. By allowing random access
C. By assigning fixed time slots
D. By using a token
ANSWER: C

Types of MAC Protocols

Which of the following is an example of a contention-free MAC protocol?
A. ALOHA
B. Slotted ALOHA
C. TDMA
D. CSMA
ANSWER: C

What is a key disadvantage of contention-based MAC protocols?
A. Higher latency due to collisions
B. Fixed allocation of bandwidth
C. Inefficiency in dynamic environments
D. Complexity in implementation
ANSWER: A

Which MAC protocol uses a token-passing mechanism to regulate access?
A. CSMA/CD
B. FDMA
C. Token Ring
D. ALOHA
ANSWER: C

What is the main advantage of using FDMA in wireless communication?
A. Minimizes interference by using different frequencies
B. Reduces the need for synchronization
C. Allows nodes to transmit simultaneously
D. Eliminates the need for contention
ANSWER: A

What does "ALOHA" protocol primarily focus on?
A. Efficient bandwidth allocation
B. Contention-based access
C. Frequency division
D. Time slot synchronization
ANSWER: B

Performance and Challenges in MAC Protocols

Which MAC protocol is most suitable for real-time applications?
A. CSMA/CD
B. FDMA
C. TDMA
D. ALOHA
ANSWER: C

What is the primary disadvantage of Slotted ALOHA compared to Pure ALOHA?
A. Higher collision probability
B. More bandwidth consumption
C. Synchronization requirement
D. Inefficiency in large networks
ANSWER: C

Which issue is commonly faced by MAC protocols in wireless sensor networks?
A. High energy consumption
B. Lack of bandwidth
C. Limited node mobility
D. Low transmission power
ANSWER: A

What is the main goal of power-aware MAC protocols?
A. Increasing transmission speed
B. Reducing energy consumption in sensor nodes
C. Improving bandwidth allocation
D. Increasing network density
ANSWER: B

In wireless MAC protocols, what is the hidden terminal problem?
A. When two nodes transmit simultaneously without sensing each other
B. When a node transmits and fails to receive acknowledgment
C. When data packets get corrupted
D. When network congestion increases
ANSWER: A

Which MAC protocol feature helps prevent the exposed terminal problem?
A. Adaptive power control
B. RTS/CTS mechanism
C. Dynamic time slot allocation
D. Frequency hopping
ANSWER: B

What is the primary advantage of hybrid MAC protocols?
A. They combine the benefits of contention-based and contention-free access
B. They eliminate the need for synchronization
C. They require no control messages
D. They work only in wired networks
ANSWER: A

Which of the following MAC protocols is best suited for dense wireless sensor networks?
A. CSMA/CD
B. TDMA
C. FDMA
D. ALOHA
ANSWER: B

In MAC protocols for IoT applications, which factor is most critical?
A. Low power consumption
B. High transmission speed
C. Wired connectivity
D. High bandwidth usage
ANSWER: A

In dynamic MAC protocols, how is access to the channel adjusted?
A. Based on network congestion
B. By allocating fixed time slots
C. Using static frequency allocation
D. By increasing transmission power
ANSWER: A

Which MAC protocol is commonly used in satellite communications?
A. ALOHA
B. CSMA/CA
C. TDMA
D. FDMA
ANSWER: A

What is the primary reason for using priority-based MAC protocols?
A. To ensure real-time data transmission
B. To reduce bandwidth usage
C. To avoid synchronization issues
D. To minimize packet size
ANSWER: A

Which factor does NOT affect the performance of MAC protocols?
A. Traffic load
B. Node mobility
C. Network topology
D. IP address allocation
ANSWER: D

What is a primary feature of an adaptive MAC protocol?
A. Adjusts parameters based on network conditions
B. Uses only contention-based access
C. Requires manual configuration
D. Allocates fixed time slots
ANSWER: A

What is the primary concern in designing MAC protocols for underwater sensor networks?
A. High propagation delay
B. High data rates
C. Stable connectivity
D. Large node density
ANSWER: A