جامعة المستقبل
AL MUSTAQBAL UNIVERSITY

كلية العلوم
قسم الانظمة الطبية الذكية

المحاضرة الرابعة

Wireless Metropolitan Area Networks

المادة: Wireless Sensor Networks
المرحلة : الثالثة
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Wireless MANs: Connecting Cities Wirelessly

Wireless Metropolitan Area Networks (MANs) offer cities a way to connect wirelessly. These networks can provide cost-effective, high-speed internet access. They also enable various smart city applications and improve connectivity for residents and businesses.

What are Wireless MANs?

WiMAX

Worldwide Interoperability for Microwave Access (WiMAX) delivers broadband wirelessly. It provides high-speed internet access over larger areas.

Mesh Networks

Mesh networks use multiple nodes to create a network. Data hops from one node to another. This creates a self-healing and resilient network.

Benefits: Cost Savings & Rapid Deployment

1

Reduced Infrastructure Costs

Wireless MANs eliminate the need for extensive cabling. This reduces initial infrastructure expenses significantly.

2

Faster Deployment

Wireless networks can be set up more quickly. It reduces the time it takes to connect users.

3

Lower Maintenance

Fewer physical cables mean less maintenance. This results in long-term cost savings.

Benefits: Increased Mobility and Flexibility

Enhanced Mobility

Users can connect to the network from various locations. This improves mobility and productivity.

Flexible Network Design

Wireless MANs can be easily adapted. Networks can be tailored to specific needs and environments.

Scalability

The network can easily expand. It accommodates more users and devices as needed.

Disadvantages: Security Vulnerabilities

1

Eavesdropping

Wireless signals can be intercepted. This poses a risk of eavesdropping and data breaches.

2

Unauthorized Access

Without proper security measures, unauthorized users can access the network. This can compromise sensitive information.

3

Interference

Wireless networks are susceptible to interference. This can affect signal quality and reliability.

Disadvantages: Limited Range and Bandwidth

Range Limitations

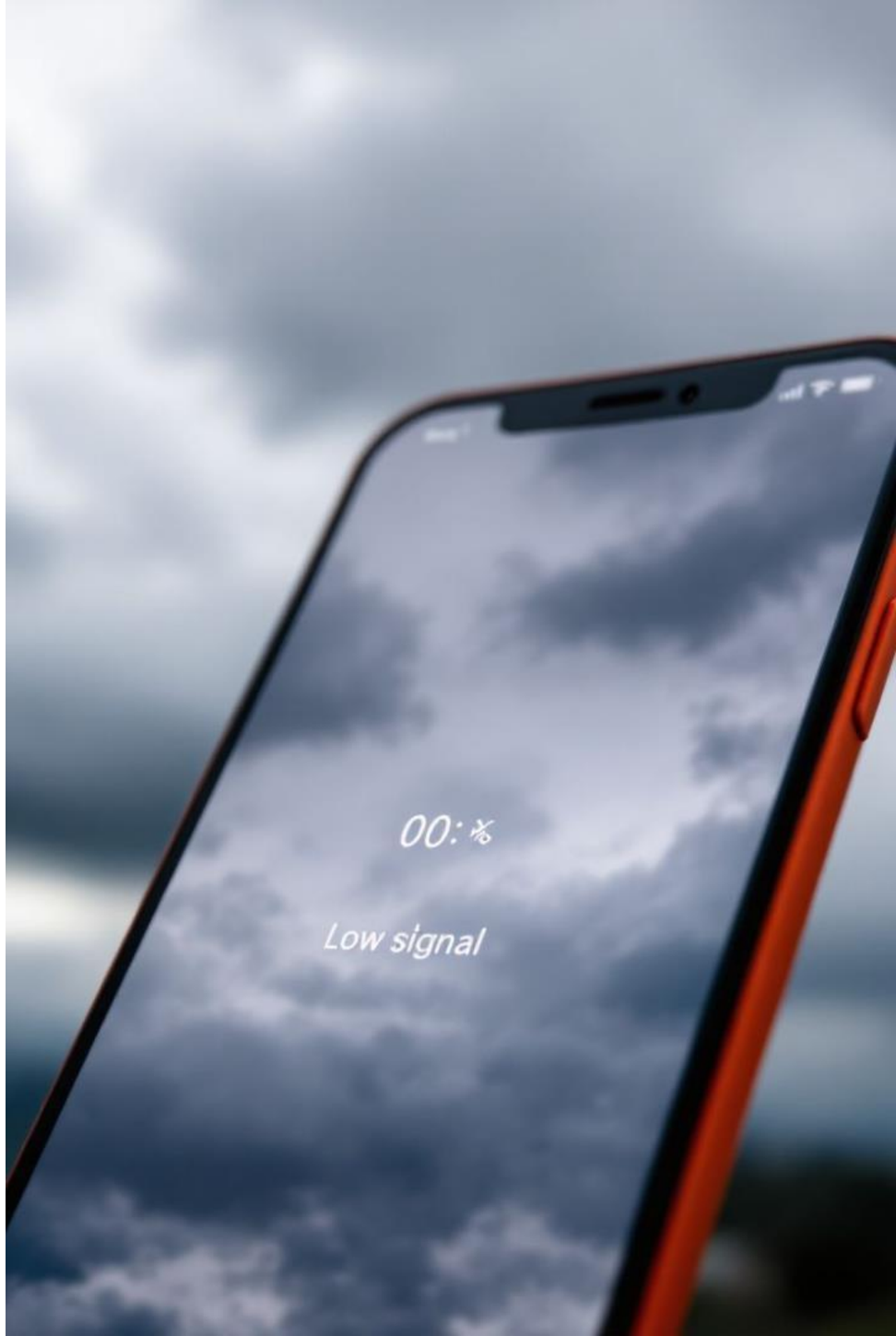
Wireless signals have a limited range. This may require multiple access points for coverage.

Bandwidth Constraints

Wireless bandwidth can be lower than wired connections. This affects the speed and performance of data transmission.

Environmental Factors

Weather conditions can impact signal strength. This can lead to disruptions in connectivity.



Real-World Examples of Wireless MANs

1

Smart Cities

Barcelona uses a wireless mesh network for various smart city applications. These include traffic management and public safety.

2

Rural Broadband

WiMAX is used in rural areas. It provides internet access where wired infrastructure is limited.

3

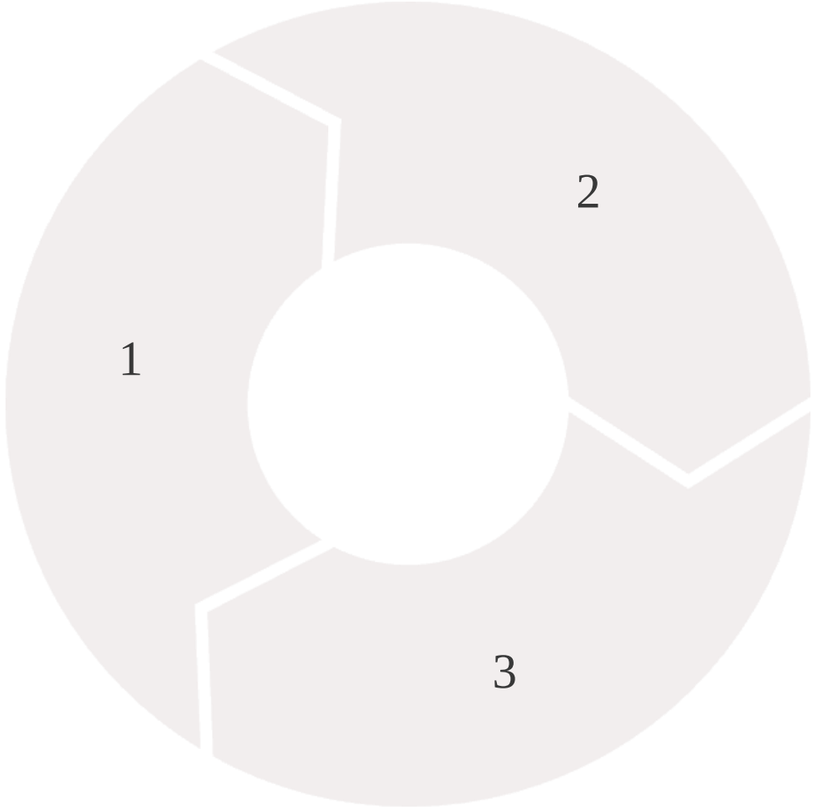
Campus Networks

Universities implement wireless MANs. This connects buildings and provides internet access to students and faculty.

The Future of Wireless MANs: 5G and Beyond

5G Integration

5G technology will enhance wireless MANs with faster speeds and lower latency.



IoT Expansion

Wireless MANs will support the growing number of IoT devices in smart cities.

Enhanced Security

Advanced security protocols will address the vulnerabilities of wireless networks.