# Program Information

## Lesson:

### *Cabling for Wireless*

## Training:

## Premises Cabling

## Time frame:

### 45-60 minutes

# Instruction Section

## Learning Objectives:

# Differentiate between UTP (Unshielded Twisted Pair) and fiber optic cables, including their characteristics, advantages, limitations, and suitable applications in wireless network setups.

# Make informed decisions regarding cabling choices, placement of access points, coverage considerations, bandwidth requirements, security measures, and budget constraints in real-world scenarios.

## Assessment Tools/Methods:

# Assess participants' engagement and active participation during discussions, group activities, and hands-on tasks. Take note of their contributions, questions asked, and level of involvement in the learning process.

# Encourage discussions where participants can share their insights, ask clarifying questions, and relate the lesson to real-world applications.

## Learner Prior Knowledge:

## Prior to class, participants will need to read:

## Reference Guide: Wireless in Premises Cabling Systems (<https://www.thefoa.org/tech/ref/premises/wireless.html>)

## Prior to class, the participants will need to watch:

## [Premises Cabling Lecture 10: Wireless](http://www.youtube.com/watch?v=-PaqO1sHdN0&list=PL3F0669372E06AE8B&index=10&feature=plpp_video)

## Instructional Activities:

# Begin by reviewing the use of UTP and fiber cabling in wireless networks, as discussed in the self-guided learning.

# Activity 1: Designing a Wireless Network with UTP and Fiber Optic Cables:

# Ask participants to share the main considerations to remember when designing a wireless network (coverage, capacity, interference, connectivity, power requirements, and future use issues).

# Divide the participants into five small groups and assign each a scenario from the Wireless Network Design Scenarios handout (Note: example answers are given on Instructor Key).

# Ask the groups to design a wireless network for their given scenario, specifying the considerations listed on the handout using their knowledge from self-guided learning or prior experience.

# Allow the groups time to brainstorm and encourage group discussion throughout the design process.

# Ask each group to present their wireless network design to the class, focusing on their choice and implementation of cabling.

# Encourage questions and feedback from the other groups.

# Activity 2: Design Extension:

# Provide materials such as diagrams, markers, and optional sample cables (UTP and fiber optic).

# Ask each group to create a visual representation of their wireless network design, highlighting the cabling components.

# Allow the groups time to walk around and view the displays.

# After viewing, allow time for questions or feedback regarding the displays.

# Summarize the key points covered in the lesson regarding UTP and fiber optic cabling for wireless networks.

# Discuss the advantages and limitations of each type of cable in different scenarios.

## Resources:

# Wireless Network Design Scenarios handout

# Wireless Network Design Scenarios Instructor Key Examples

# Optional: Sample cables (UTP and fiber)

# Whiteboards and markers

# Paper, markers, pens, etc. for design activities

# Reflection Section

Reflect on the differences between UTP and fiber optic cables in terms of their impact on wireless network design and performance. Evaluate the decisions made during the wireless network design activity, considering cabling choices, access point placement, coverage considerations, security measures, and budget constraints.

*This lesson is supplemental to the Fiber Optics lesson within FOA's Fiber U curriculum and not part of the FOA required curriculum to obtain the Certified Premises Cabling Technician certification. If interested in becoming an approved school and/or obtaining a certification, please contact FOA at* [*thefoa.org/contact-foa.html*](https://www.thefoa.org/contact-foa.html)*.*

*Note: AI, specifically ChatGPT 3.5, was used to generate timeline for this contextualized lesson plan.*

**Wireless Network Design Scenarios**

1. **Smart Home Upgrade**
   * **Coverage**: Ensuring seamless Wi-Fi coverage in all rooms, including dead zones.
   * **Capacity**: Supporting multiple smart devices simultaneously (smart TVs, thermostats, security cameras, etc.).
   * **Interference**: Minimizing interference from neighboring networks and electronic appliances.
   * **Connectivity**: Establishing reliable connectivity for smart home automation and remote access.
   * **Power Requirements**: Consideration of power outlets for additional access points or Wi-Fi extenders.
   * **Future Use Issues**: Anticipating future additions of smart devices and scalability of the network.
2. **Corporate Office Expansion**
   * **Coverage**: Extending Wi-Fi coverage to newly acquired office floors or buildings.
   * **Capacity**: Accommodating a growing number of employees and devices (laptops, smartphones, IoT devices).
   * **Interference**: Mitigating interference in densely populated areas with multiple networks.
   * **Connectivity**: Seamless connectivity for video conferencing, file sharing, and cloud services.
   * **Power Requirements**: Power over Ethernet (PoE) considerations for access points and network equipment.
   * **Future Use Issues**: Scalability for future office expansions and technology upgrades.
3. **Outdoor Event Venue**
   * **Coverage**: Providing outdoor Wi-Fi coverage for large event areas.
   * Capacity: Supporting a high number of concurrent users (attendees, vendors, staff).
   * **Interference**: Addressing potential interference from outdoor elements and nearby electronic devices.
   * **Connectivity**: Reliable connectivity for live streaming, ticketing systems, and social media interactions.
   * **Power** **Requirements**: Outdoor power sources or battery backups for access points and network infrastructure.
   * **Future** **Use** **Issues**: Temporary setup considerations for periodic events and adaptability to varying event sizes.
4. **Hospital Network Optimization**
   * **Coverage**: Ensuring Wi-Fi coverage in all hospital areas, including patient rooms, hallways, and administrative areas.
   * **Capacity:** Supporting numerous medical devices, patient monitoring systems, and staff devices.
   * **Interference**: Minimizing interference from medical equipment and electromagnetic interference (EMI).
   * **Connectivity**: Secure and reliable connectivity for electronic health records (EHR), telemedicine, and medical imaging systems.
   * **Power** **Requirements**: Backup power solutions for critical network components during power outages.
   * **Future** **Use** **Issues**: Integration with emerging healthcare technologies and compliance with regulatory standards.
5. **Educational** **Campus Overhaul**
   * **Coverage**: Extending Wi-Fi coverage to classrooms, lecture halls, libraries, and outdoor study areas.
   * **Capacity**: Supporting a large number of students, faculty, and staff devices (laptops, tablets, smartphones).
   * **Interference**: Managing interference from electronic equipment, neighboring networks, and high-density areas.
   * **Connectivity**: Seamless connectivity for online learning platforms, collaborative tools, and research databases.
   * **Power Requirements**: Energy-efficient solutions and power management for sustainable campus operations.
   * **Future Use Issues**: Flexibility for technology advancements in education, scalability for campus growth, and long-term network sustainability.

**Wireless Network Design Scenarios Instructor Key Examples**

1. **Smart Home Upgrade**
   * **Coverage:** Use of a mesh Wi-Fi system to eliminate dead zones and provide consistent coverage throughout the home.
   * **Capacity:** Upgrade to a high-capacity router or mesh system capable of handling multiple smart devices simultaneously.
   * **Interference:** Select Wi-Fi channels with less interference and consider using dual-band or tri-band routers for better performance.
   * **Connectivity:** Ensure strong connectivity for smart home automation by positioning access points strategically and using Ethernet connections for critical devices.
   * **Power Requirements:** Use of Power over Ethernet (PoE) for access points and consider smart power strips for efficient device management.
   * **Future Use Issues:** Plan for scalability by choosing a Wi-Fi system that can easily expand to accommodate future smart devices.
2. **Corporate Office Expansion**
   * **Coverage:** Deploy additional access points or Wi-Fi extenders to cover new office areas effectively.
   * **Capacity:** Invest in enterprise-grade networking equipment capable of handling increased user and device loads.
   * **Interference:** Perform a site survey to identify and mitigate sources of interference, and use enterprise-level Wi-Fi management tools for optimization.
   * **Connectivity:** Ensure robust connectivity for business-critical applications by implementing Quality of Service (QoS) policies and VLAN segmentation.
   * **Power Requirements:** Consider PoE switches for ease of deployment and management of access points and network devices.
   * **Future Use Issues:** Design the network with scalability in mind, allowing for easy expansion and integration of new technologies as the office grows.
3. **Outdoor Event Venue**
   * **Coverage:** Use high-power outdoor access points with directional antennas to cover large outdoor areas effectively.
   * **Capacity:** Deploy multiple access points with load balancing capabilities to support a high number of concurrent users.
   * **Interference:** Optimize Wi-Fi channels and antenna placements to minimize interference from nearby networks and environmental factors.
   * **Connectivity:** Ensure reliable connectivity by using weatherproof equipment and establishing redundant internet connections.
   * **Power Requirements:** Utilize outdoor-rated PoE switches and power sources to provide power to outdoor access points.
   * **Future Use Issues:** Design the network for temporary setups, with provisions for easy dismantling and reconfiguration for future events of varying sizes.
4. **Hospital Network Optimization**
   * **Coverage:** Deploy multiple access points with seamless roaming capabilities to ensure complete coverage across all hospital areas.
   * **Capacity:** Invest in high-capacity network infrastructure to support numerous medical devices and staff connectivity.
   * **Interference:** Implement strict RF interference management policies and use shielded cables to reduce interference from medical equipment.
   * **Connectivity:** Prioritize network reliability and security for critical applications such as EHR systems and telemedicine.
   * **Power Requirements:** Use backup power solutions like uninterruptible power supplies (UPS) for critical network components.
   * **Future Use Issues:** Design the network to be scalable and adaptable to accommodate future medical technologies and compliance requirements.
5. **Educational Campus Overhaul**
   * **Coverage:** Implement a combination of indoor and outdoor access points to provide comprehensive coverage across the campus.
   * **Capacity:** Use high-density access points and load balancing techniques to support a large number of concurrent users.
   * **Interference:** Conduct regular RF spectrum analysis and optimize Wi-Fi channels to minimize interference in high-density areas.
   * **Connectivity:** Prioritize network security and reliability for educational applications such as online learning platforms and research databases.
   * **Power Requirements:** Install energy-efficient equipment and implement power management strategies to reduce campus-wide power consumption.
   * **Future Use Issues:** Design the network infrastructure to be scalable and future-proof, allowing for seamless integration of emerging educational technologies and expansion as the campus grows.