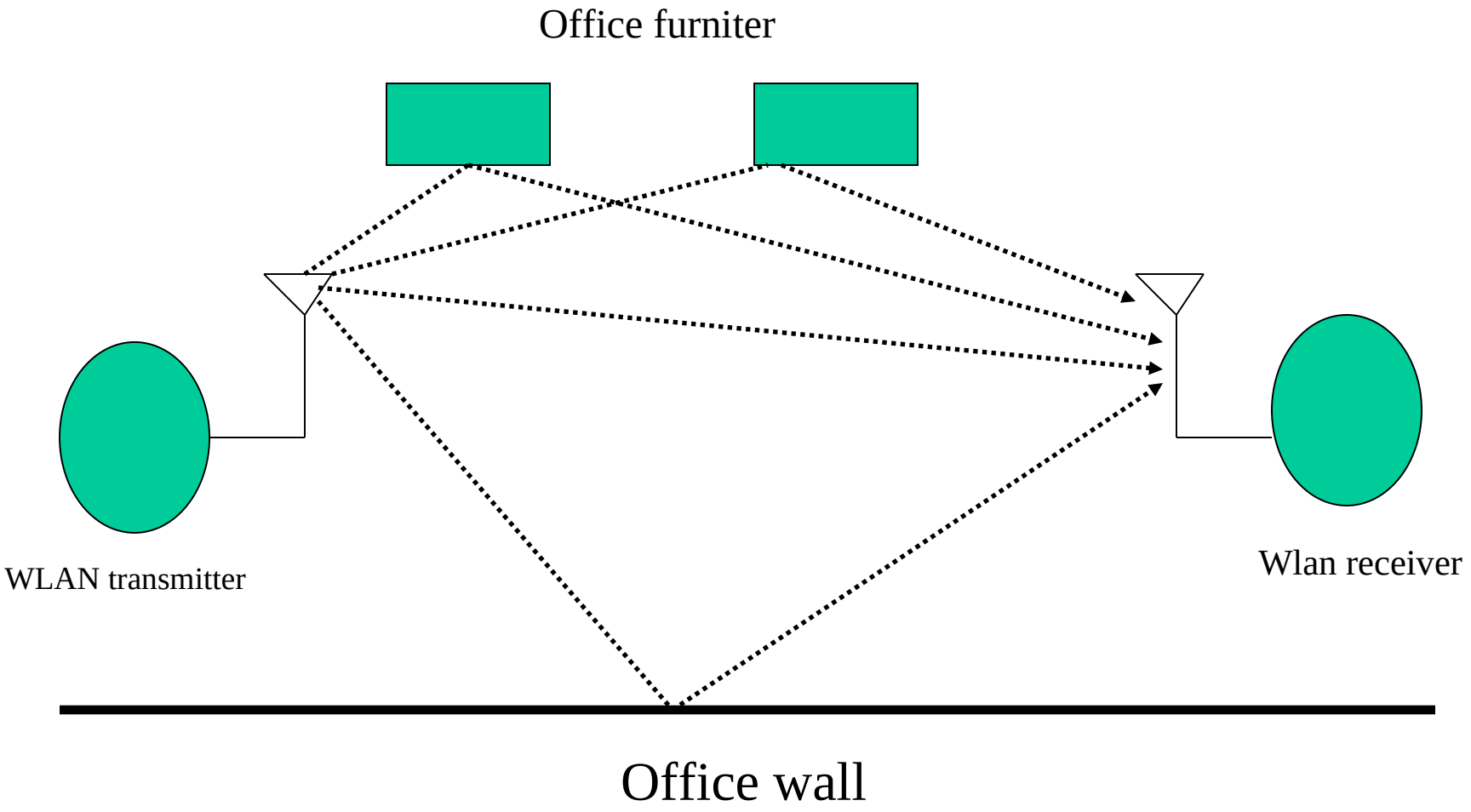
Wireless LAN implications

- Project managers and design engineer should be aware, the following potential problems from the implementation and use of wireless networking:
- Multipath propagation
- Path loss
- Radio signal interference
- Battery longevity
- System interoperability
- Network security
- Connection problems
- Installation issues
- Health risk

Multipath propagation

- As fig 1.3 illustrates, transmitted signals can combine with reflected ones to corrupt the signal detected by the receiver.
- This is known as multipath propagation. Delay spread is the amount of delay experienced by the reflected signals compared to the primary signal. As delay spread increases, the signal at the receiver becomes more distorted and possibly undetectable even when the transmitter and receiver are within close range.

Fig 1.3: multipath propagation decreases the quality of the signal at the receiver



- Multipath propagation can be a significant problem, especially with indoor applications.
- Often furniture, walls, and machinery are obstacles that can redirect parts of the transmitted signal.
- WLAN manufacturers compensate for the effects of multipath propagation by using special processing techniques.
- As e.g., equalization and antenna diversity are methods for reducing the number of problems arising from multipath propagation.

Path loss

- Path loss between the transmitter and receiver is a key consideration when designing a wireless LAN soln.
- Expected levels of path loss, based on the range between the transmitter and receiver, provide valuable info when determining requirements for transmit power levels, receiver sensitivity, and signal-to-noise ratio (SNR).
- Actual path loss depends on the transmit frequency, and it grows exponentially as the distance increases between the transmitter and receiver.
- With typical indoor applications, the path loss increases approx 20dB every receiver.

Radio Signal Interference

- The process of transmitting and receiving radio and laser signals through the air makes wireless systems vulnerable to atmospheric noise and transmission from other systems.
- In addition, wireless networks can interfere with other nearby wireless networks and radio wave equipment.
- Radio-based LAN can experience inward interference from the harmonics of transmission systems or other products using similar radio frequencies in the LAN.
- E.g. microwave ovens operate in the S band (2.4GHz) that many WLAN use to transmit and receive. These signals result in delays to the user by either blocking transmission from stations on the LAN or causing bit errors to occur in data being sent. These types of interference can limit the areas in which you can deploy a wireless network.

Techniques for reducing interference

- When dealing with interference, we should coordinate the operation of radio-based wireless network products with our company's frequency mgt organization, if one exists.
- Govt org and most hospitals generally have ppl who manage the use of transmitting devices. This coordination will avoid potential interference problems.
- For. E.g. the military does not follow the same frequency allocations is issued by the FCC. (FCC deals with commercial sector and the military has its own frequency mgt process.)