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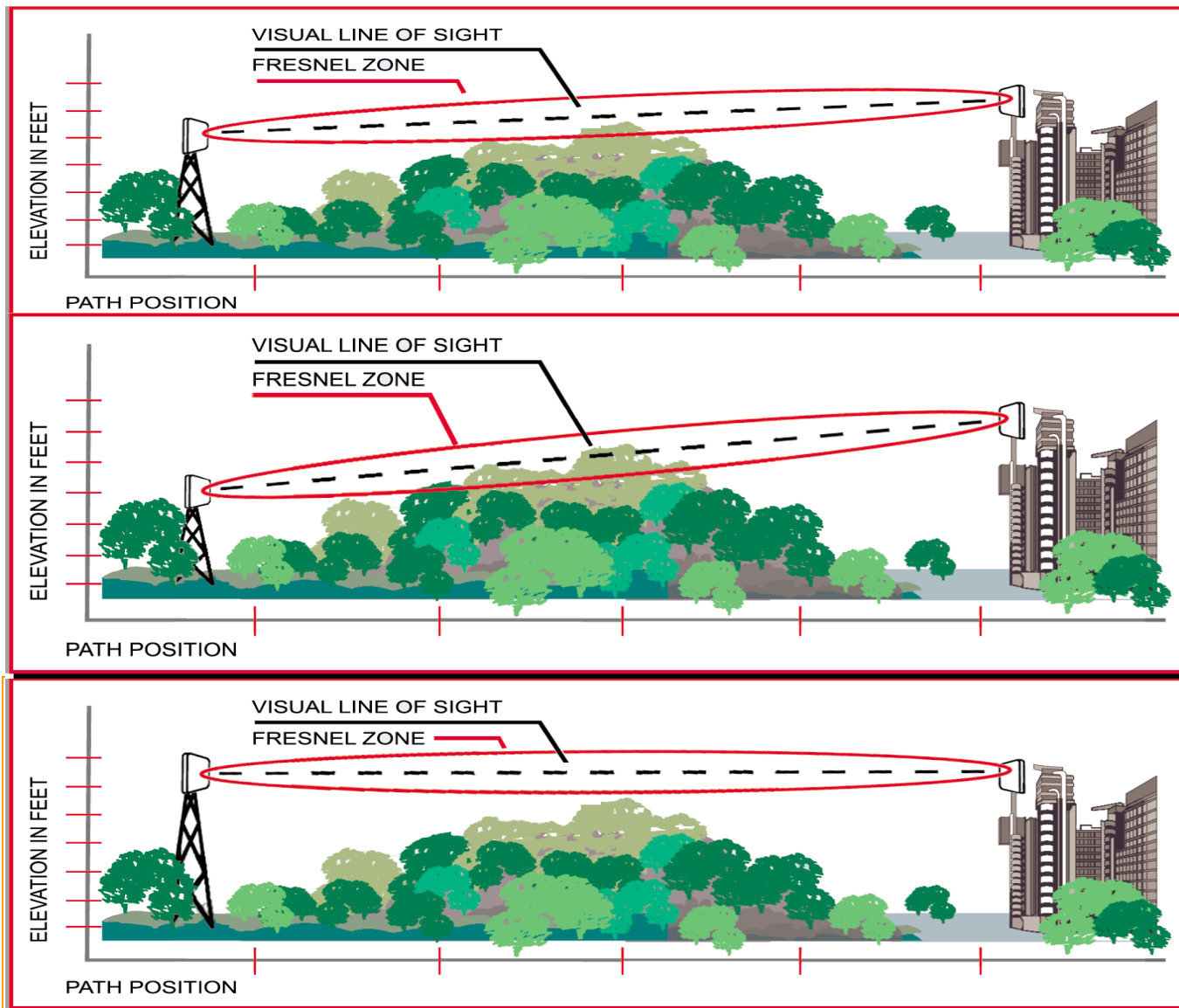


# RF Considerations

# What to Consider ?

- LoS, nLoS, and NLoS Definitions
- Fresnel Zone
- Earth Curvature
- Spectrum Types - Unlicensed, Licensed, Owned
- ISM vs. U-NII
- Duplex – Full, half, FDD, TDD
- Interference

# LoS, nLoS, and NLoS Definitions

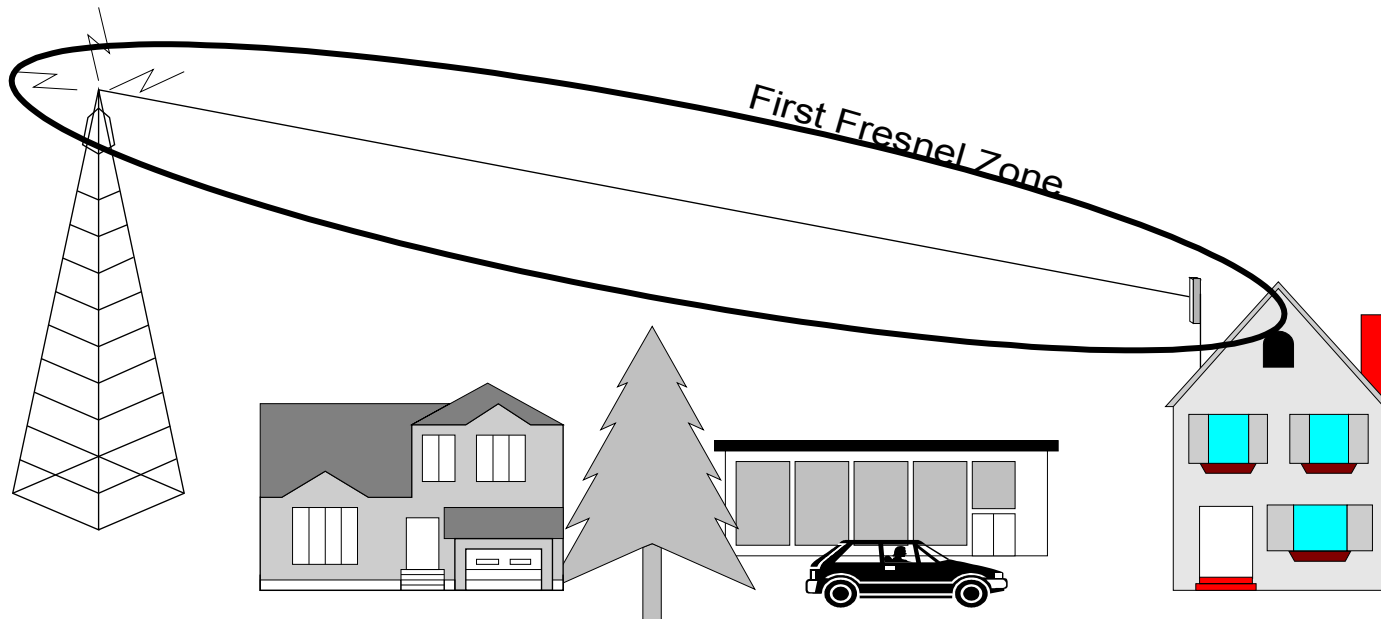


Near Line of  
Site

Non Line of  
Site

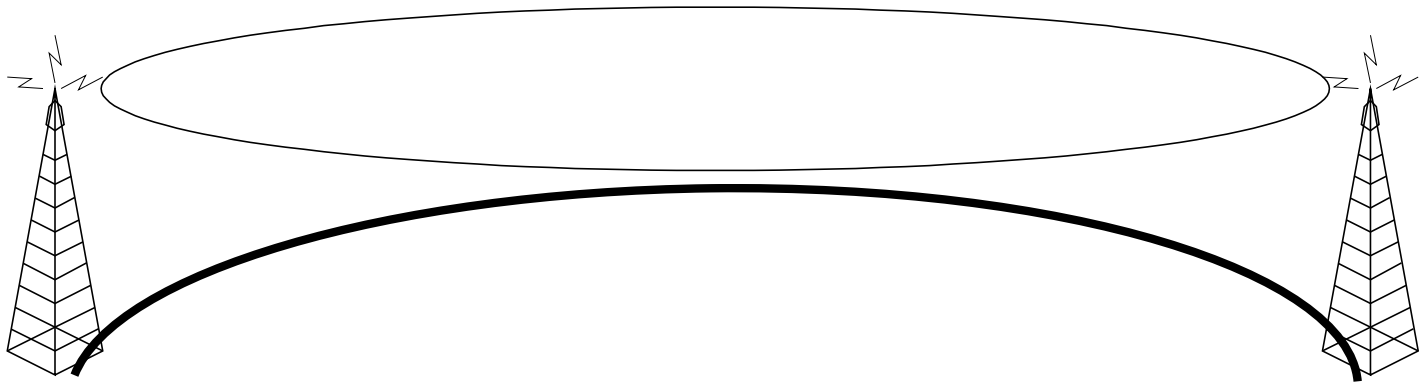
Line of Site

# Definition: Fresnel Zone and Path Clearance



One factor for long distance paths includes earth curvature and the effects of the atmospheric refraction due to the curve of the earth's surface

The earth's bulge between the end points must be considered when determining if LOS and proper path clearance exists, including Fresnel zone



**Not much of a factor under 15 Km**

- License-exempt or Unlicensed
  - Anyone can use
  - No coordination or registration required
  - Opportunity for interference, which the user must work around
- Licensed (or 'Leased')
  - Coordination required
  - Registration required
  - Interference is better controlled, but not completely eliminated
    - Regulatory agency will assist with any interference cases
- Owned
  - Purchased spectrum, usually in a given region, usually by auction
  - Owner needs to self-coordinate intra-system interference potential

- ISM (Industrial, Scientific, Medical) band:
  - “5.7” or “5.8” GHz
  - 5725-5850 MHz
- U-NII (Unlicensed National Information Infrastructure) band:
  - “5.7” or “5.8” GHz
  - 5725-5825 MHz

5725 MHz

5825 MHz

5850 MHz



← U-NII Band →

← ISM Band →

- Full Duplex
  - Communication in both directions at the same time
- Half Duplex
  - Communications in one direction at a time
- Frequency Division Duplex (FDD)
  - Communications in one direction are at a different frequency than in the other direction
- Time Division Duplex (TDD)
  - Communications in one direction are at a different time than in the other direction, transmitting and receiving at the same frequency.



- Based on type of spectrum adopted;

Unlicensed: Opportunity for interference, which the user must work around

Licensed: Interference is better controlled because of the allocation of spectrum by regulatory body.

Owned: Owners need to be concerned about self interference on their systems.