A FEDERAL, STATE AND MUNICIPAL PARTNERSHIP

Alaska Land Mobile Radio Communications System

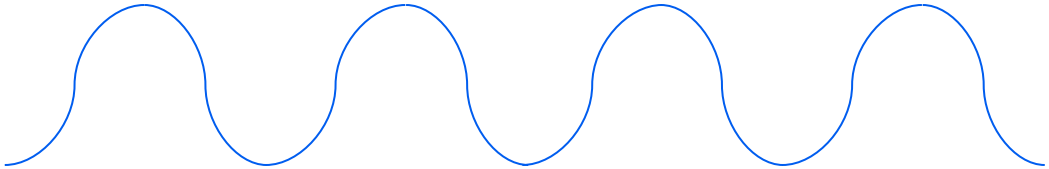
Radio Concepts

Overview

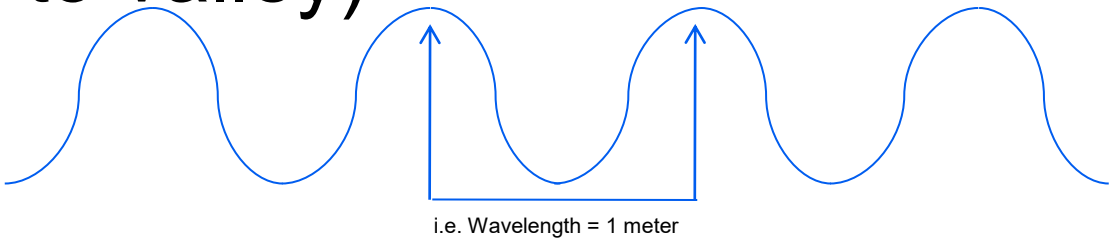
- Radio Concept Review
- Types of Radios Systems
  - Conventional System
  - Trunked System
  - ALMR Zones

Radio Concept Review

- **Radio waves** are a repeating stream of peaks and valley

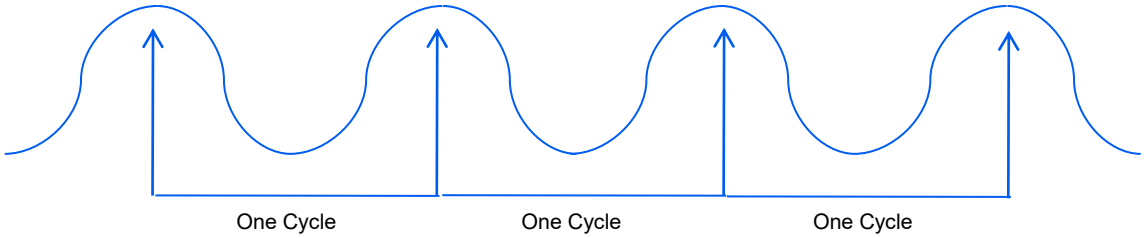


- **Wavelength** is the measurement of distance from one point to another equal point in the wave (either peak to peak, or valley to valley)

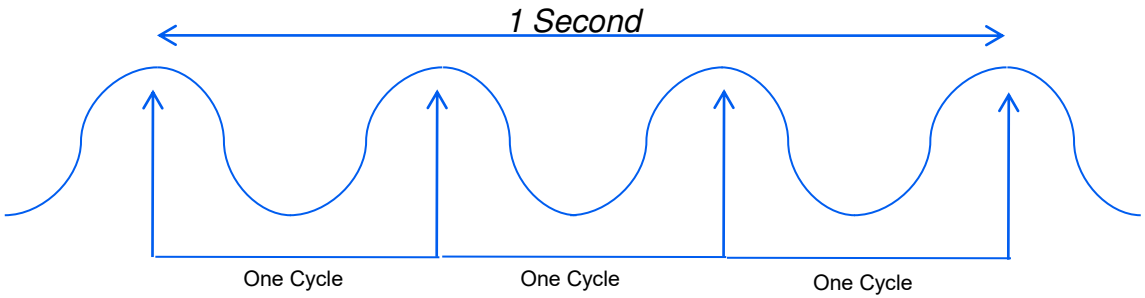


Radio Concept Review

- **Cycle** is the entire pattern of the wave before it repeats itself



- **Frequency** is the number of cycles that occur each second



Radio Concept Review (cont)

Frequencies are measured in *Hertz* (Hz) – one Hertz is one cycle per second.

- ***Kilohertz*** (KHz)

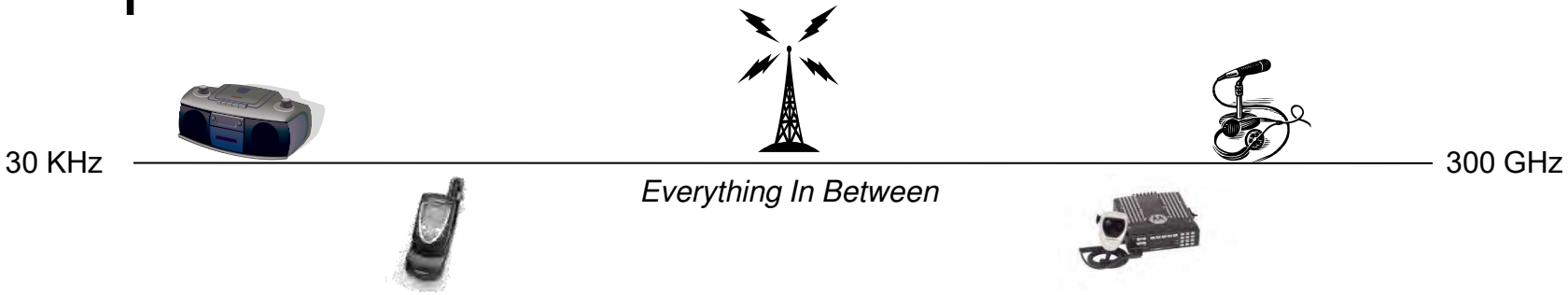
  One thousand cycles per second
- ***Megahertz*** (MHz)

  One million cycles per second
- ***Gigahertz*** (GHz)

  One billion cycles per second

Radio Concept Review (cont)

Spectrum – the complete range of frequencies that can be used.



Bands – grouping of frequencies within the spectrum.

Radio Concept Review (cont)

Common Bands Used in Public Safety:

- **Low Band: 25 – 42 MHz** *(VHF Low)* ***(Some DOT radios still operating in this range - most of Western Alaska and part of Southeast)***
- **VHF: 150 – 170 MHz** *(VHF High)* ***(Current Public Safety range)***
- **UHF: 450 – 470 MHz** ***(Currently Anchorage Police Department operates in this band; they will transition to 700 MHz)***
- **800 MHz: 800 – 900 MHz** ***(Currently fire and airport operate in this band; they will transition to 700 MHz)***

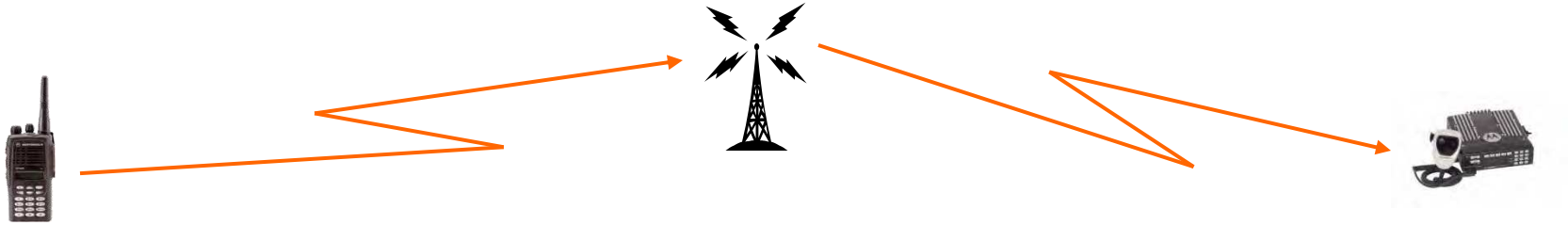
Radio Concept Review (cont)

Transmitter – radio device that generates and emits a radio wave.

Receiver – radio device that receives a radio wave.

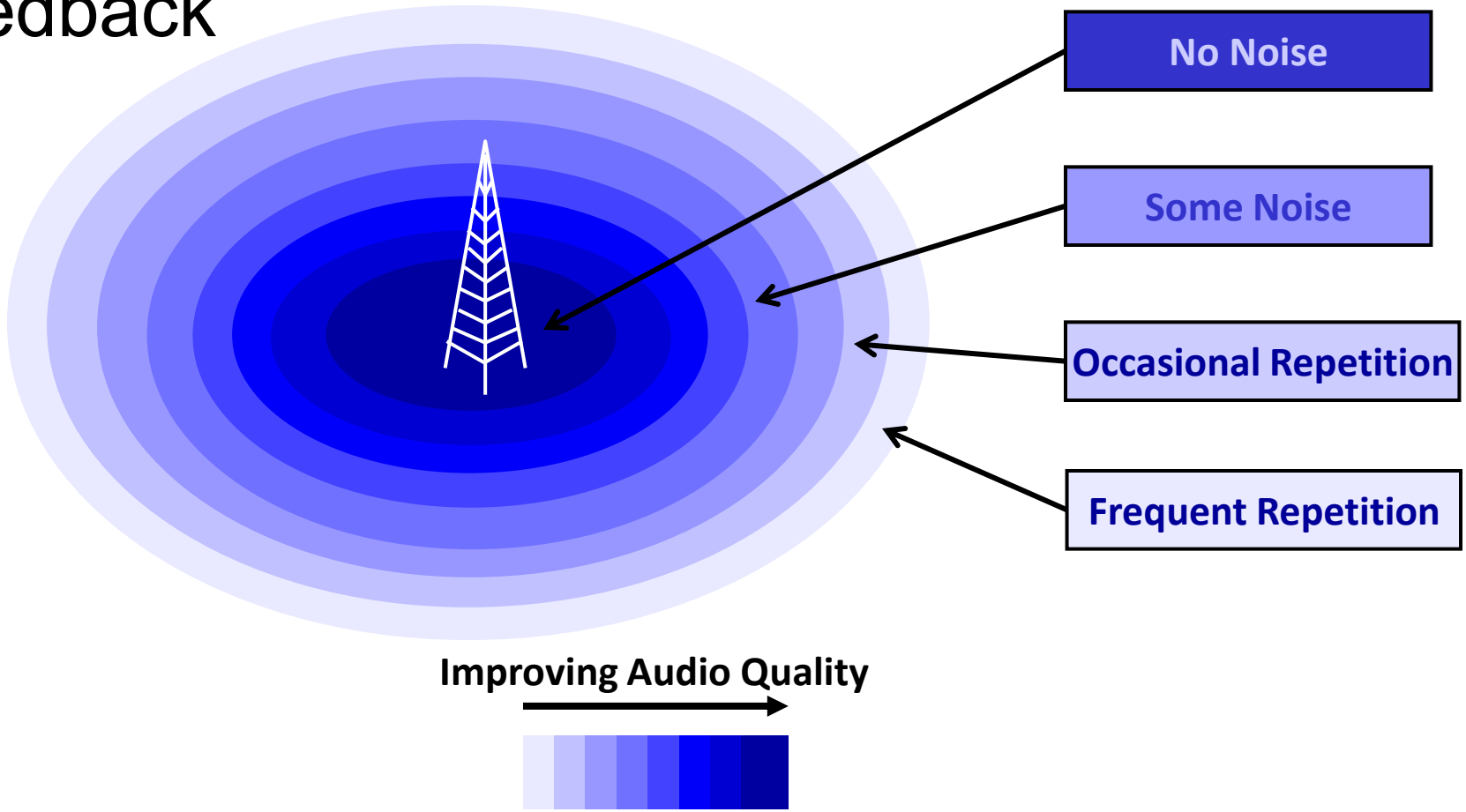
NOTE: All devices on ALMR are *TRANSCEIVERS*; a combination of transmitters and receivers.

Repeater – device that receives a radio wave and re-transmits that wave



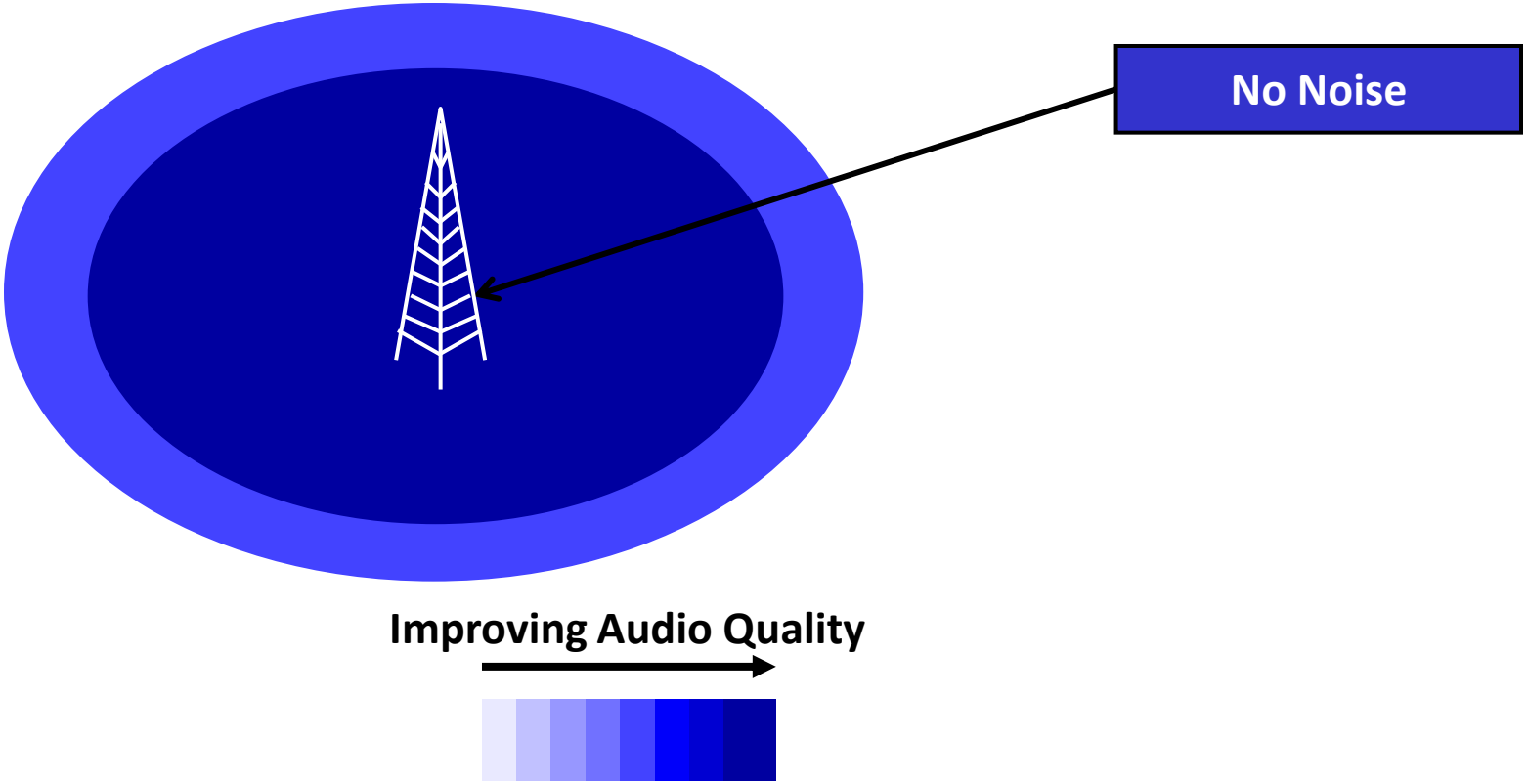
Radio Concept Review (cont)

Analog – can produce static, fading, and feedback

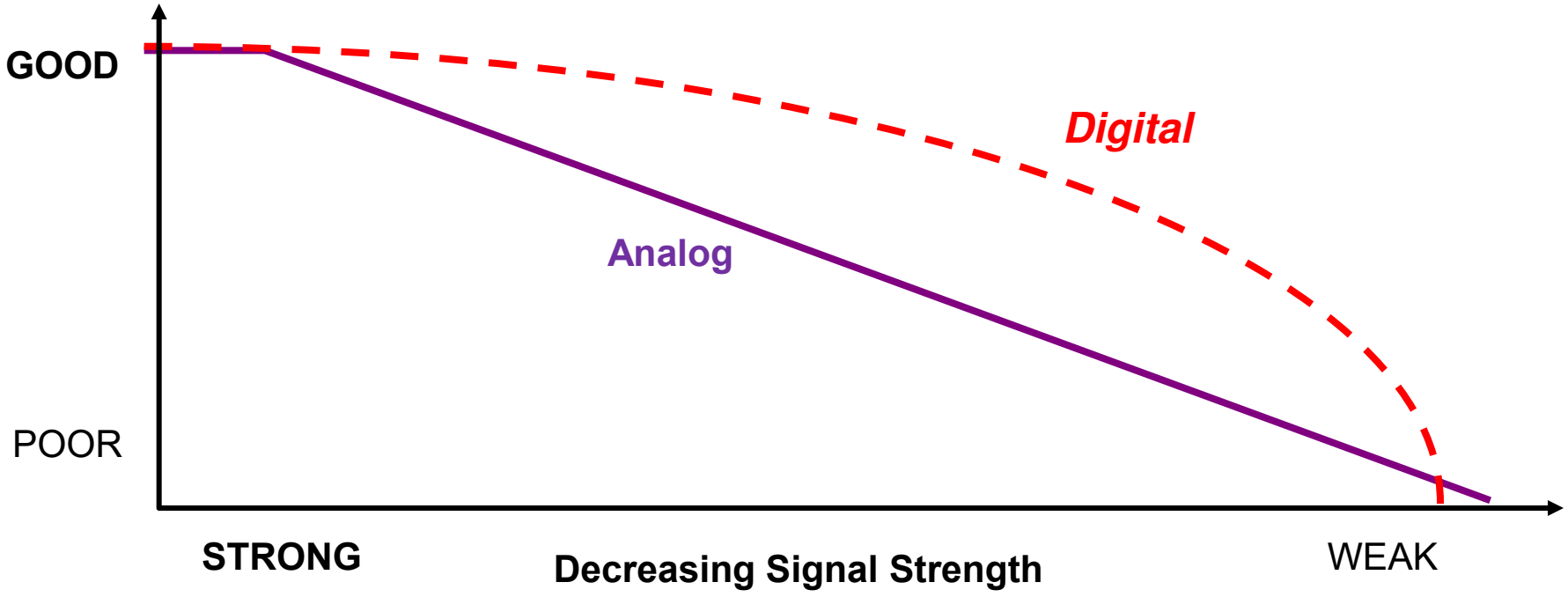


Radio Concept Review (cont)

Digital – may sound ‘metallic’ or fake, does not reproduce certain sounds properly, receives all or none



Radio Concept Review (cont)



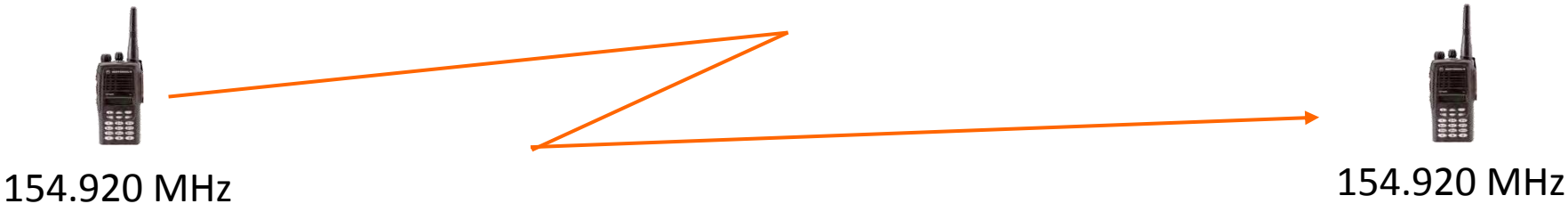
Conventional Systems

Conventional – uses preset/designated frequencies

- Simplex
- Repeater
- Talk around

Conventional Systems (cont)

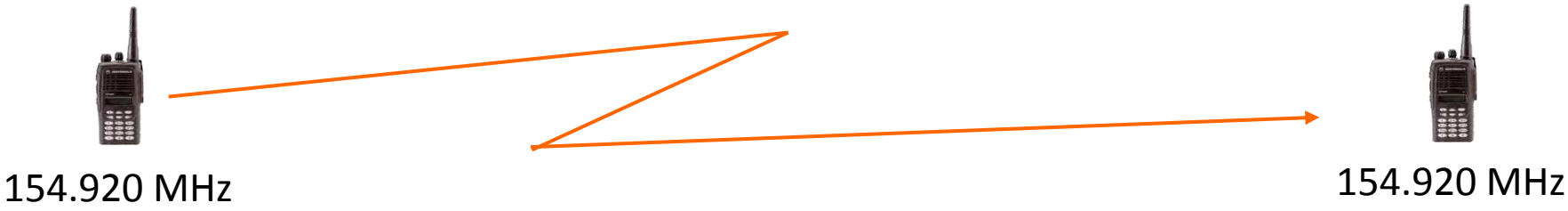
Simplex– Conventional radios selected to both receive and transmit on a single frequency that never changes



Conventional Systems (cont)

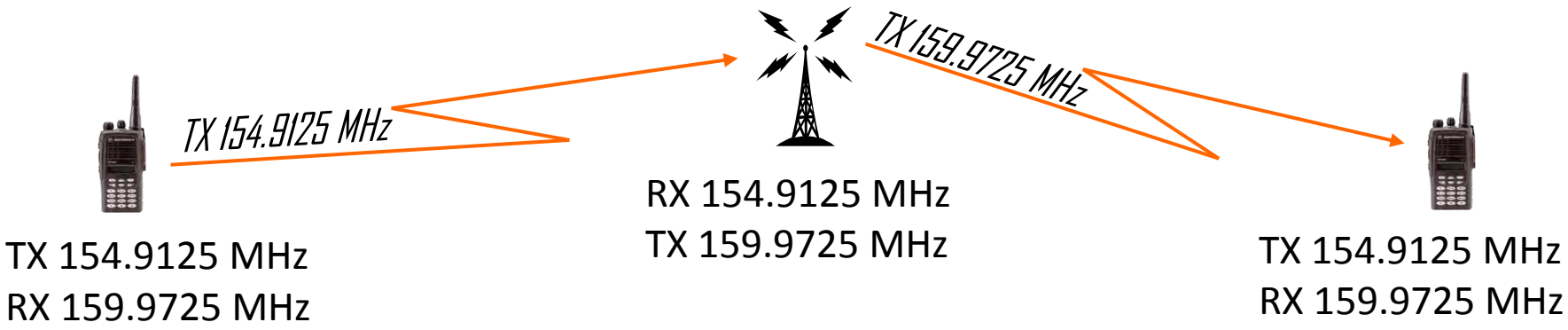
Simplex Applications:

- Point-to-Point
  - Portables
  - Mobiles
  - Base Stations with or without remotes (consoles)



Conventional Systems (cont)

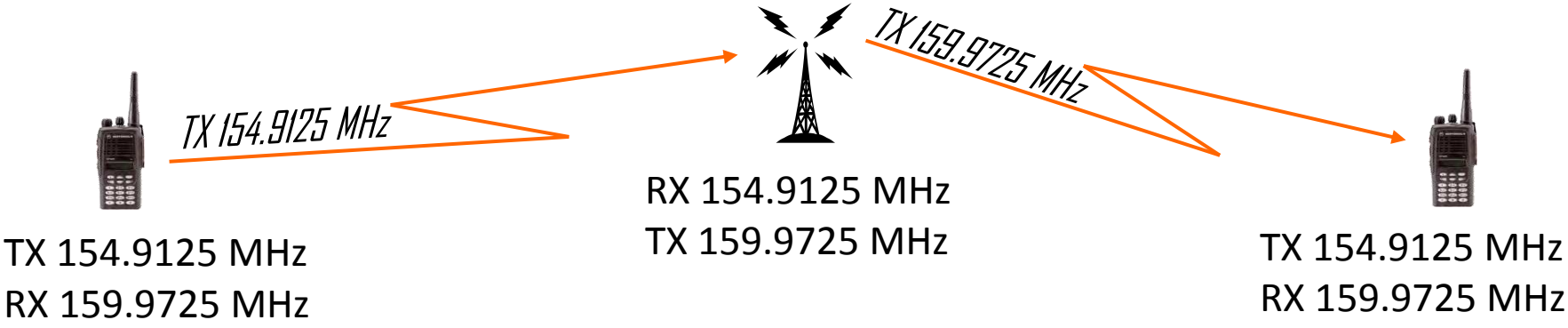
Repeater – Half-duplex radios selected to receive on one frequency and re-transmit on another frequency. The frequencies are a licensed pair and do not change.



Conventional Systems (cont)

Repeater:

- Mountain tops, towers, and tall buildings
- Higher power = longer distances and better coverage
- May be linked together to extend coverage

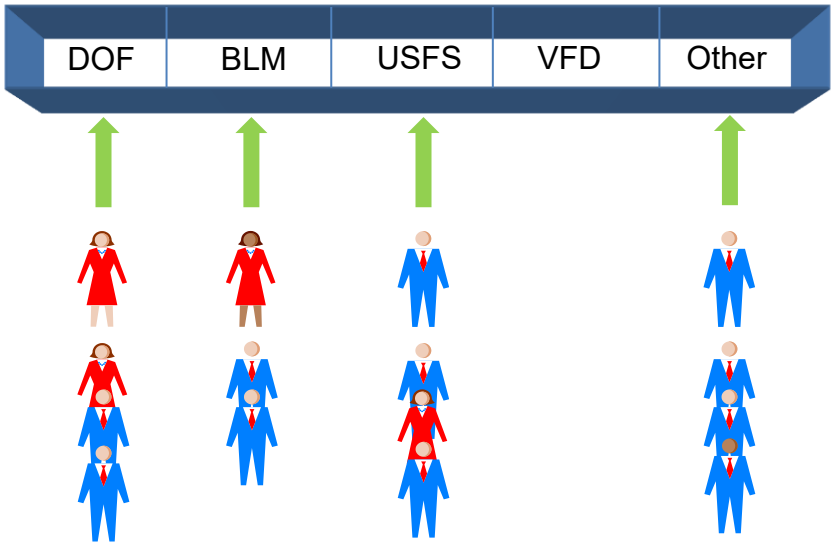


Types of Radio Systems

Direct or Talkaround - transmitting on the repeater frequency to bypass the high power radio in the middle.

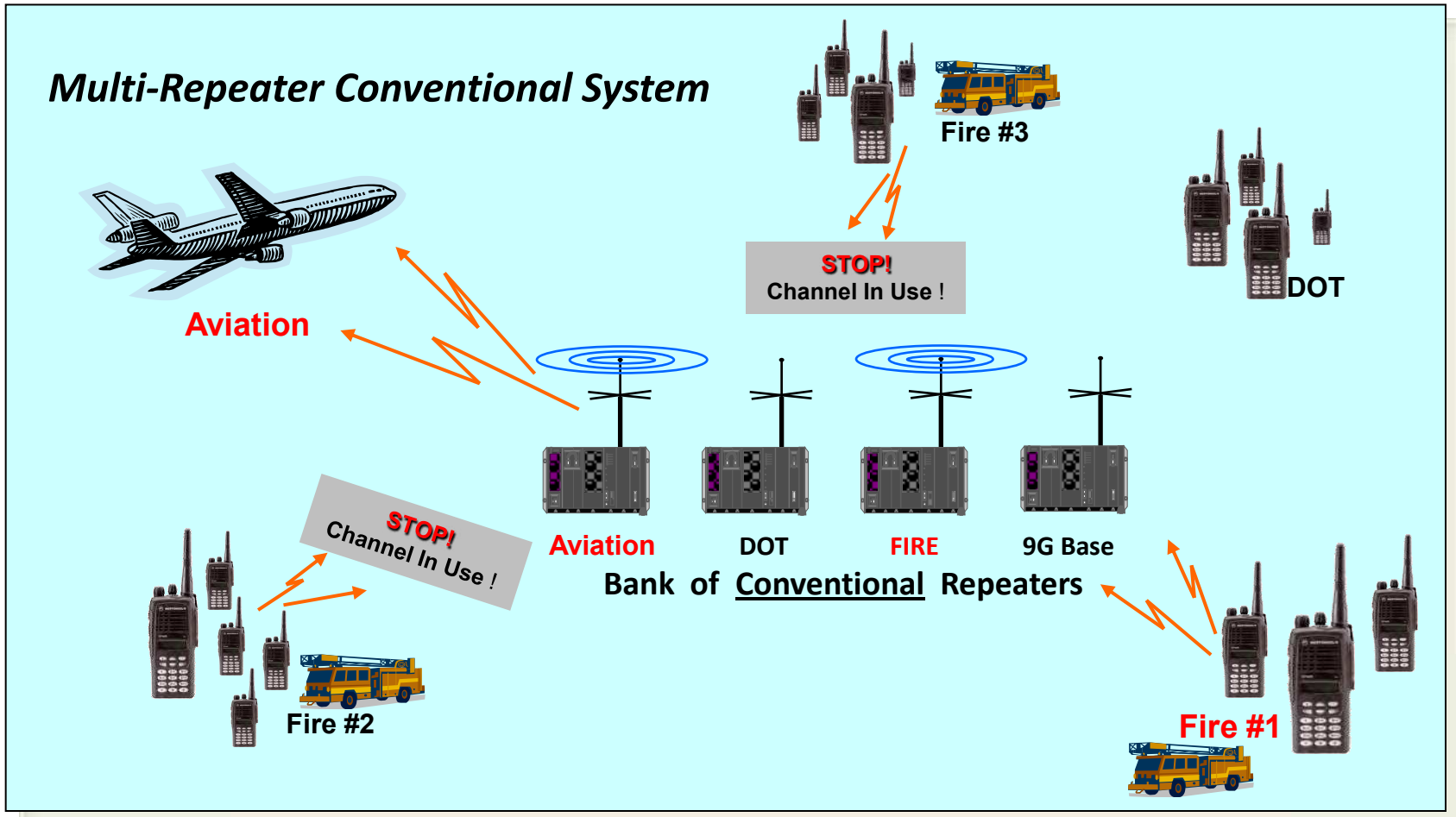
- Can be programmed as a button; typically added as a new channel

Conventional Systems (cont)



- Similar to a grocery store line
  - Users can only talk when their channel is clear to traffic

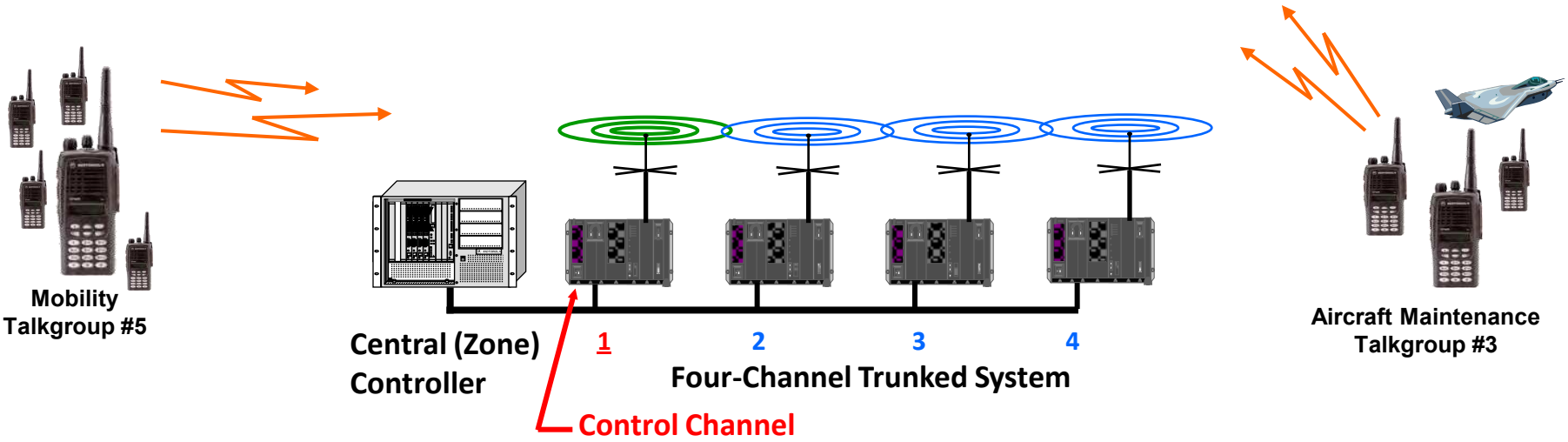
Conventional Systems (cont)



Trunked Systems

Trunked – uses a computer to assign frequencies, as needed.

- Each radio is recognized by the computer/Site Controller

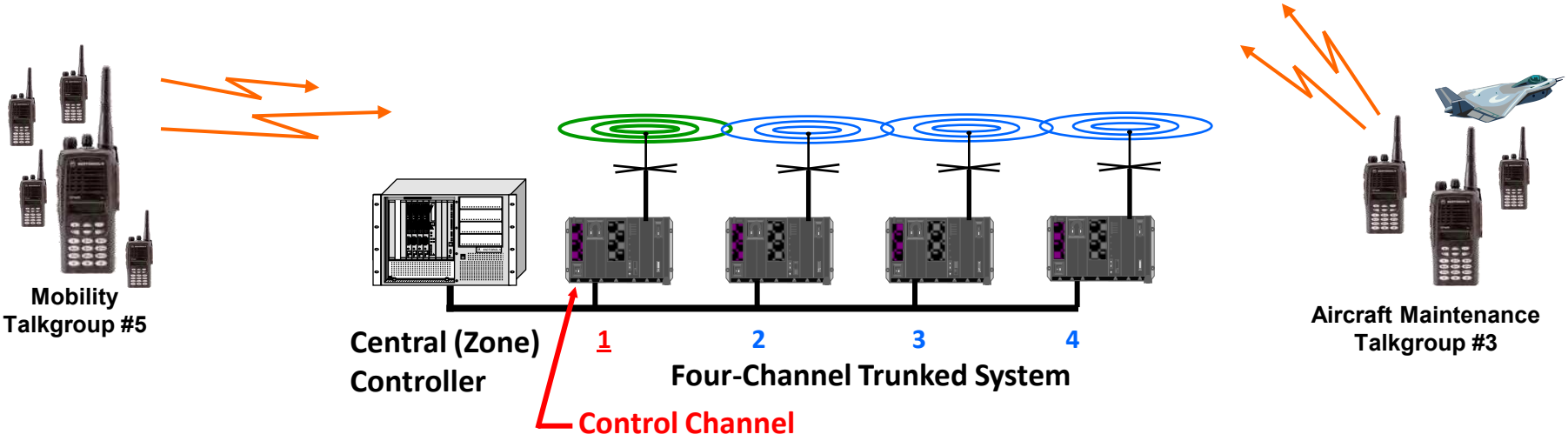


Trunked Systems (cont)

- In a trunked radio system, channels are referred to by a ***Talkgroup ID*** as opposed to a frequency
- The IDs are represented by a name in the radio called an alias

Trunked Systems (cont)

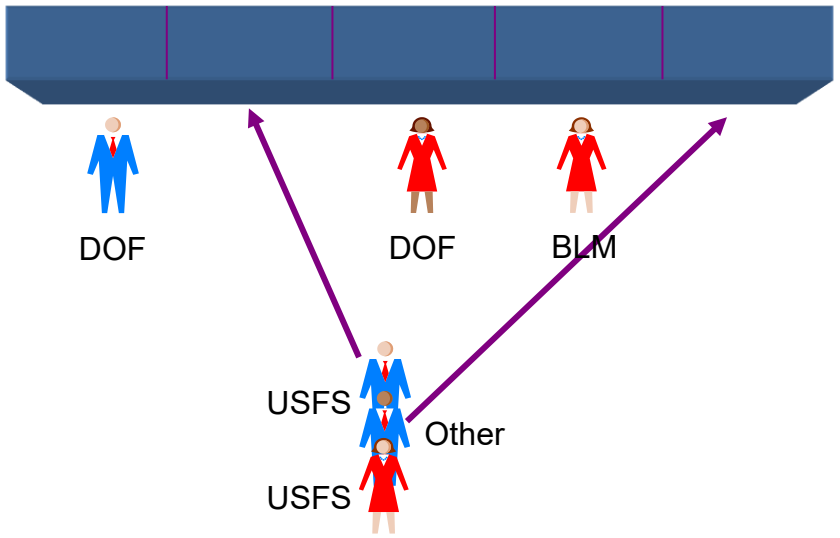
- Each radio gets its Site Controller information from the Control Channel
- Control Channel does not send audio traffic, it sends passive information (radio ID, talkgroup ID, and channel assignments)



Trunked Systems (cont)

- When the user presses Push-to-talk (PTT), the Site Controller determines which radios on that talkgroup need to hear the broadcast
- The Controller assigns a frequency set at each repeater needed to accomplish transmission, then releases the frequency after the transmission is complete

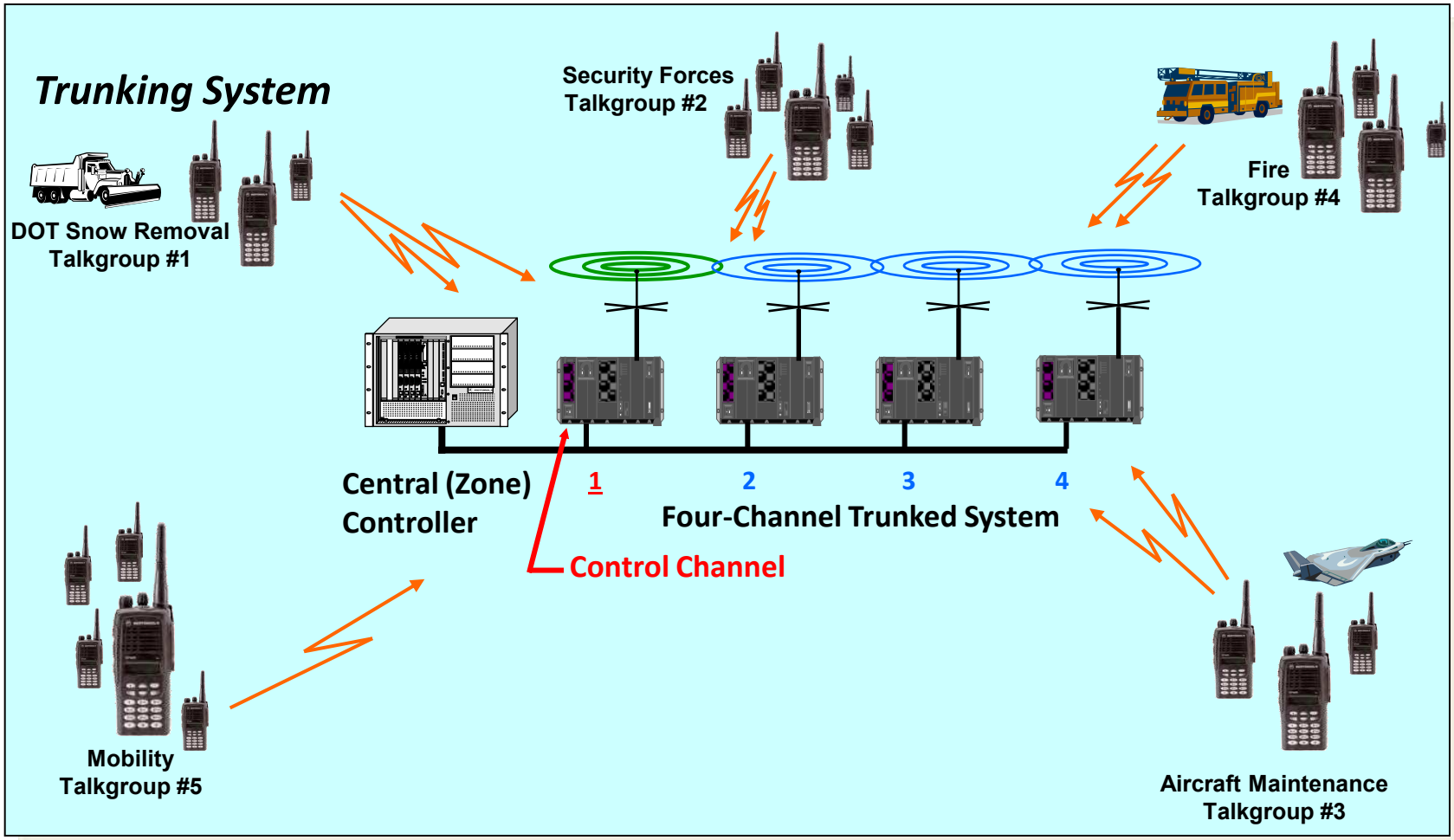
Trunked Systems (cont)



- Similar to a bank teller line
  - Users are directed to the first available channel

NOTE: *Trunking allows many talkgroups to utilize a limited number of repeaters.*

Trunked Systems (cont)



Questions

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