Interference Detection Concepts

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Interference Detection Concepts

- Geometry defines the coverage and drives the required technology
  - Local area (airport, seaport, bank, brokerage)
  - Transportation route (road, railway, coastline, canal)
  - Large area (town, city, country)
- Enforcement authority also drives decisions
  - Federal, state, local government or private entity
- No one approach is best for all requirements
  - Requirements include deployment cost, operational cost, privacy rights, etc.
- Benefits may not justify the cost
  - Could severe legal penalties suppress incidents?

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Four Basic Types of Detection (1 of 2)

- ## Direction of signal arrival (D/F)
  - Two or more detection sites with narrow-beam antennas measuring angle of arrival
  - Intersection of two or more angles indicates position
  - Coordination needed between sites to verify target
- ## Time difference of signal arrival (hyperbolic)
  - With three or more detection sites with very precise time synchronization it might be possible to measure time difference of arrival of a jamming signal
  - This would define two hyperbolic lines intersecting at the jammer source
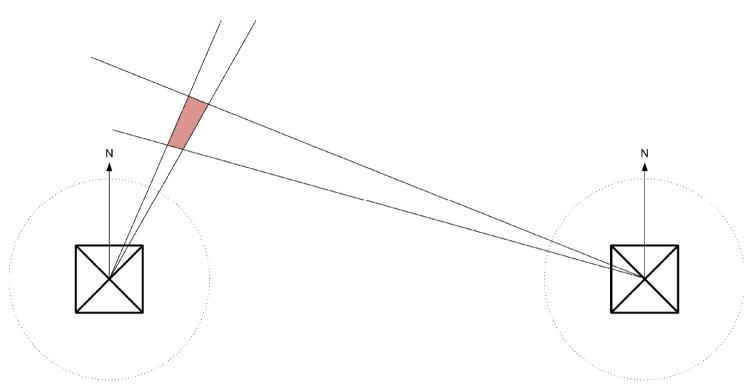- ## Terrain and building clutter and multipath limit both types

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Four Basic Types of Detection

- Linear – detectors along a roadway
- Impact zone (crowd sourcing)
  - A high density of sensors with the ability to detect and report jamming intensity can localize a jammer by evaluating many nearby sensor reports
  - The ideal way to do this is to embed detectors in cell phone chipsets, cause wireless providers to collect the data and report to a "detection center", allowing the detection center to forward the information to a local law enforcement agency
  - A close parallel is the way e911 operates in the U.S.
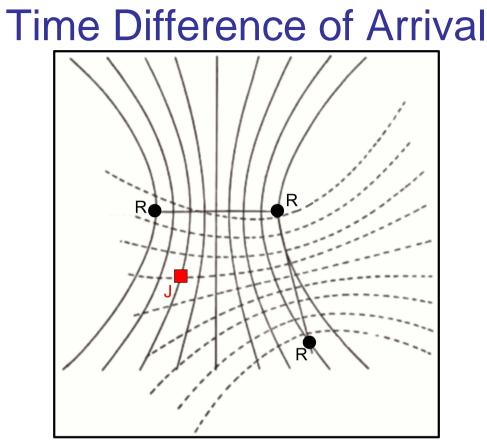 - Crowd sourcing could be implemented with many of the same system elements

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Angle of Arrival

- A jammer can be located by measuring the angle of arrival at two or more known locations
- Accuracy depends on distance, beam width, and multipath

Time Difference of Arrival

- Three or more receivers with nanosecond-level time coordination can determine the location of a jammer by measuring time difference of arrival of the jammer signal

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Jammer Passes a Detector

- To detect jammers on moving vehicles, detectors can be mounted at strategic locations along a roadway

- Police can be dispatched to intercept the offending vehicle

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Crowd Sourcing

Every cell phone can be a GPS jamming detector.
Requires a Public/Private Partnership.

Local Regulations and Detectors

- Local authorities would be the most effective at discouraging jamming
- Protecting GPS for public safety would be the priority
  - Local airports and aircraft
  - Emergency vehicle use
  - GPS Anklets
  - Vehicle tracking
- Heavy fines would discourage GPS jamming
  - Perhaps pay for enforcement

No more GPS Jamming on my Watch!

Will Your Country Detect Jammers?

- Will penalties be sufficient to discourage jamming?
- Will detection methods further suppress jamming?
- What can/will you do?

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Thank You

Questions?