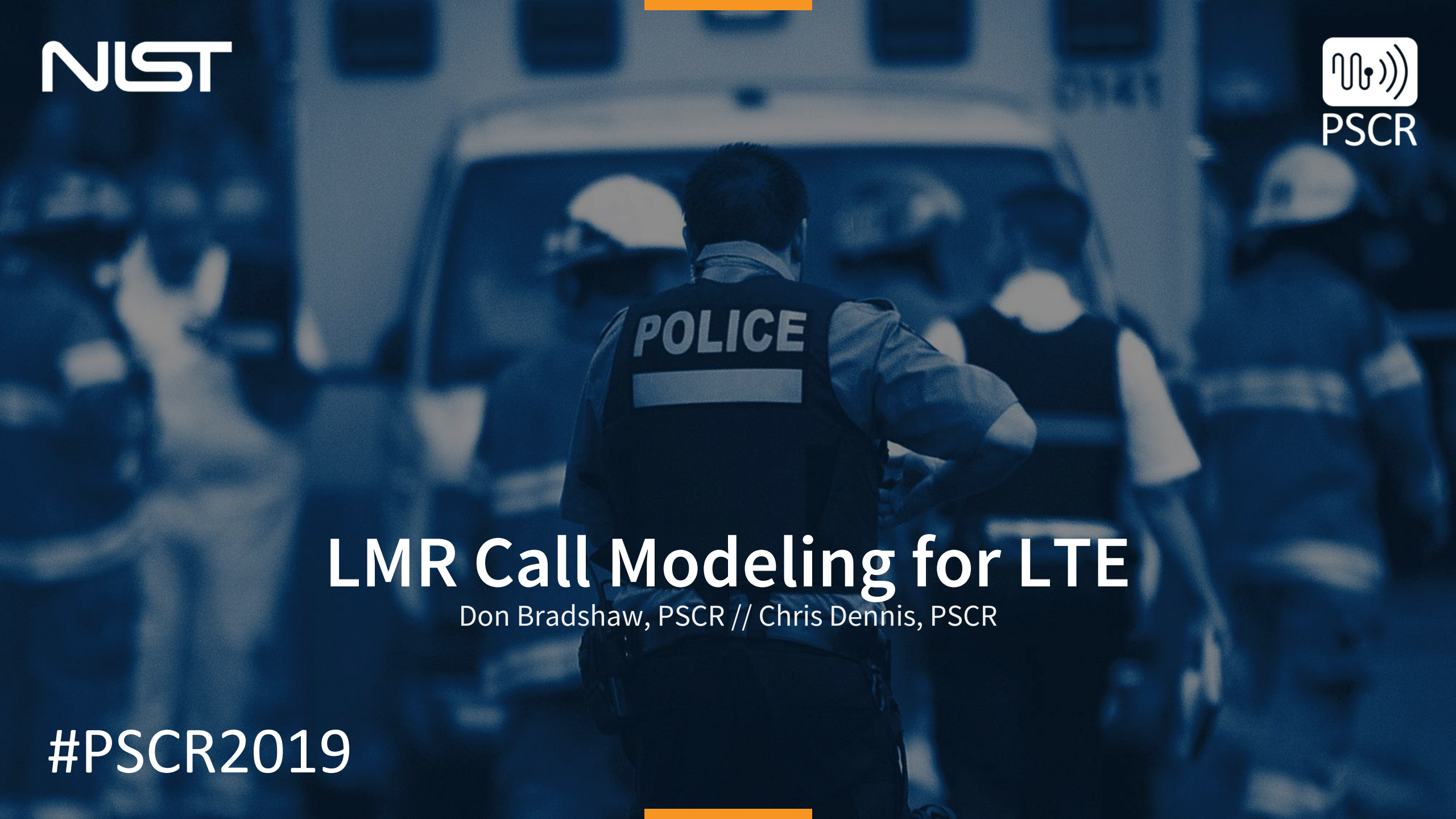


LMR Call Modeling for LTE

Don Bradshaw, PSCR // Chris Dennis, PSCR

#PSCR2019

DISCLAIMER

Certain commercial entities, equipment, or materials may be identified in this document in order to describe an experimental procedure or concept adequately.

Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the entities, materials, or equipment are necessarily the best available for the purpose.

*Please note, unless mentioned in reference to a NIST Publication, all information and data presented is preliminary/in-progress and subject to change

Executive Summary

- Need for Mission Critical Voice Call Model
- Necessary Data
- Data Collection
- Data Modeling
- Current PSCR Project
- Success

Need for Mission Critical Voice Model

- Implementing MCV on Broadband
  - How Are LMRs Used Now?
    - Infrastructure-based and direct mode
  - Different than Commercial Voice Calls
- Lack of Publicly Available MCV Data/Models
- Standards, Equipment, and Network Development
  - Get it right the first time
- Comparison of LMR to Broadband

Necessary Data

- LMR Radio User Location
- Call Time/Duration
- Calling User ID
- Called User/Group ID

Data Collection

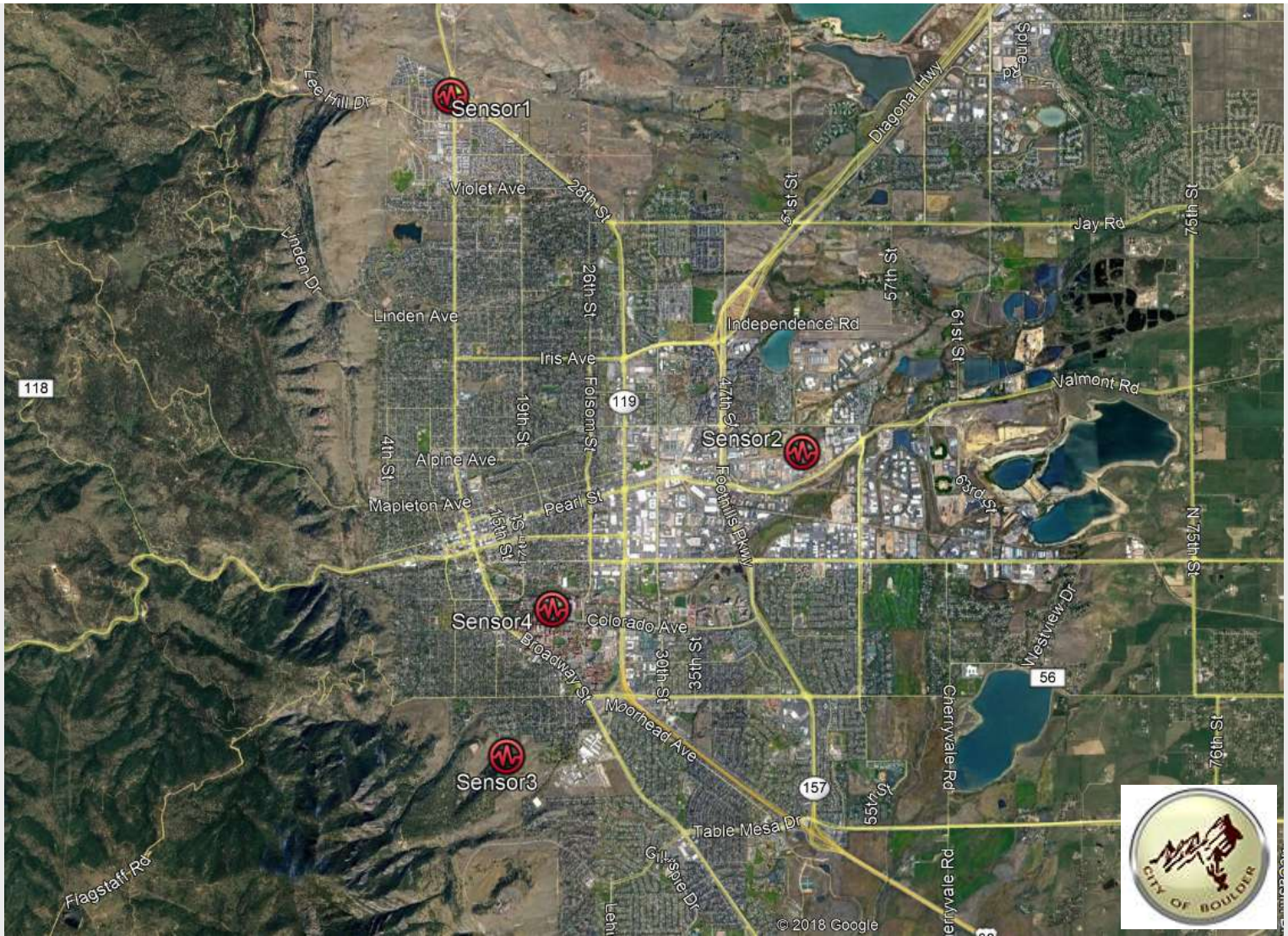
- LMR Equipment Geolocation
  - Commercial Solution with Custom RF Equipment
  - Measure User Location When Transmitting
  - Multiple Sensors Placed Around Measurement Area (3 Minimum)
  - User Location Estimated from Signal Time Difference of Arrival (TDOA)
- LMR Decoding
  - If Available
    - P25, Analog Digitally Coded Squelch (DCS), Motorola Data Communications
  - Software Defined Radio (SDR) Equipment
  - Decode User and Group IDs

Data Modeling

- Use Collected Data to Create Generic Model(s)
- Anonymizes Collected Data
- Uses
  - LMR/Broadband Comparison (PSCR)
  - Simulation of Direct Mode Capabilities (PSCR)
  - Standards Contributions (PSCR/Others)
  - Product and Network Development (Others)

Current PSCR Project

Pilot Test Data Collection in Boulder

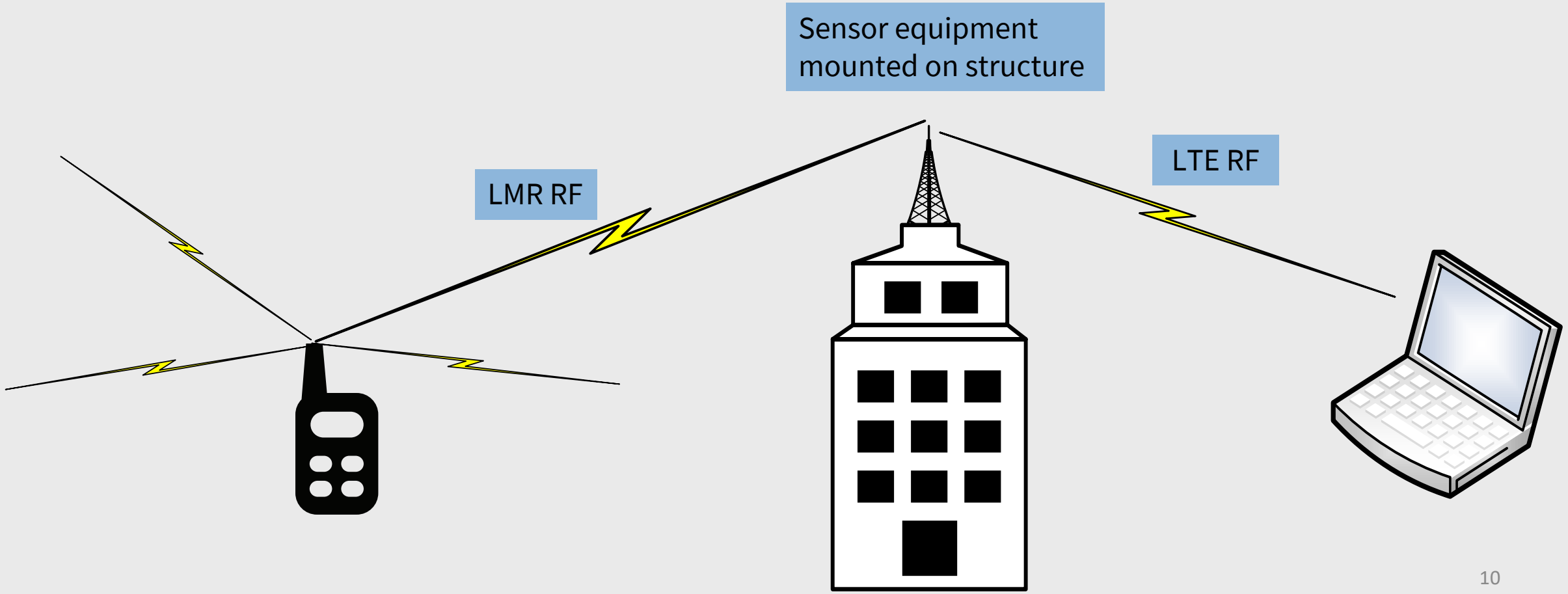


Sensor Site Components

- RF Sensor
- Bandpass Filter
- Low-Noise Amplifier
- Antennas
- Linear Power Supply
- Wireless Backhaul

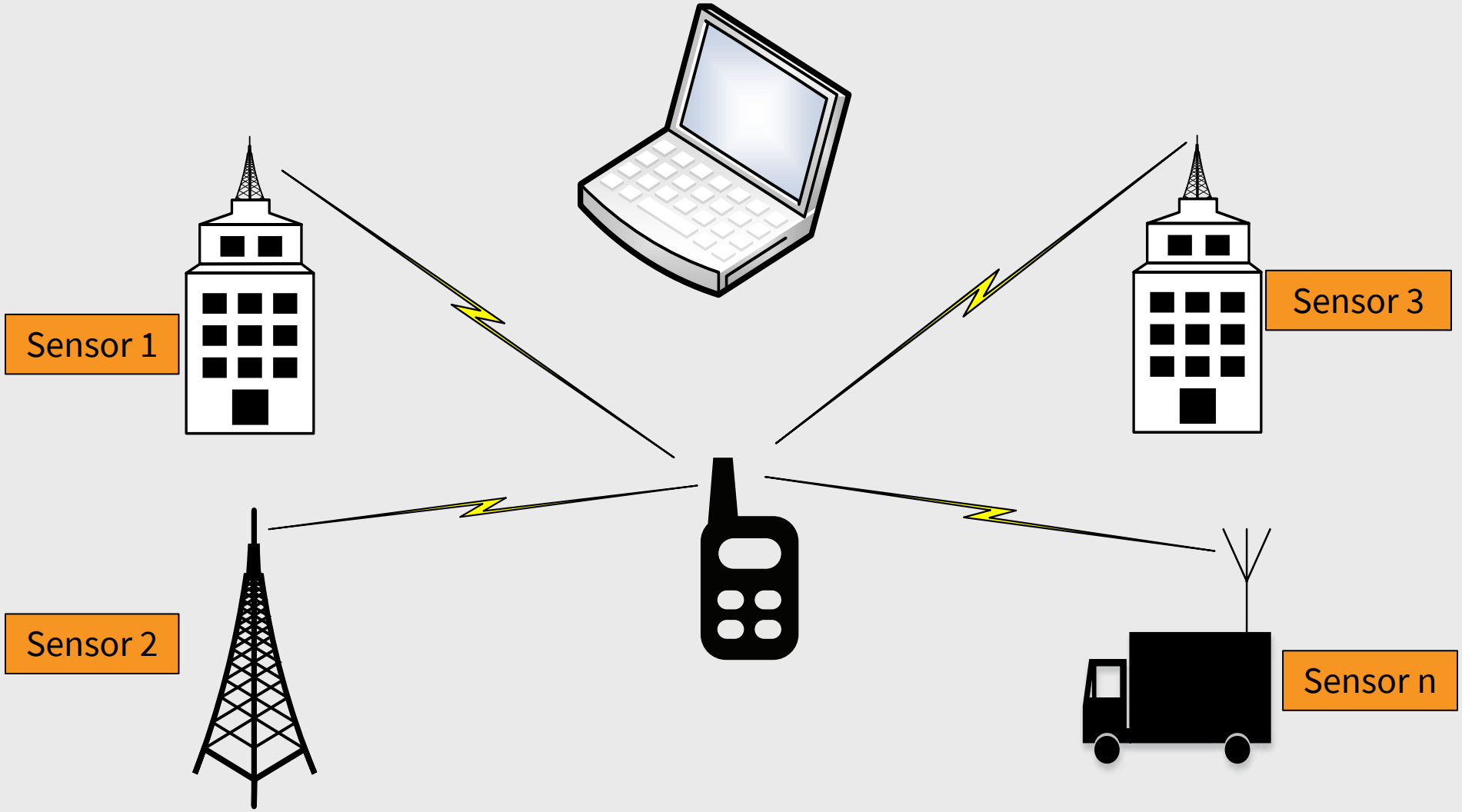
Sensor System

Single Sensor

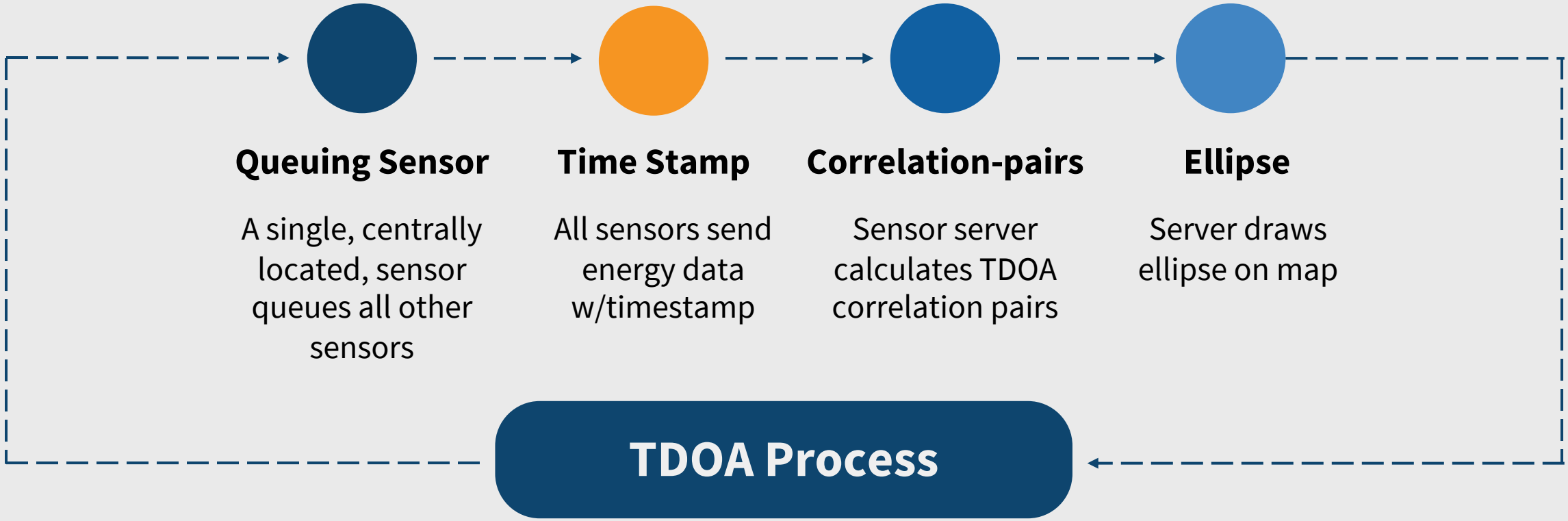


Sensor System

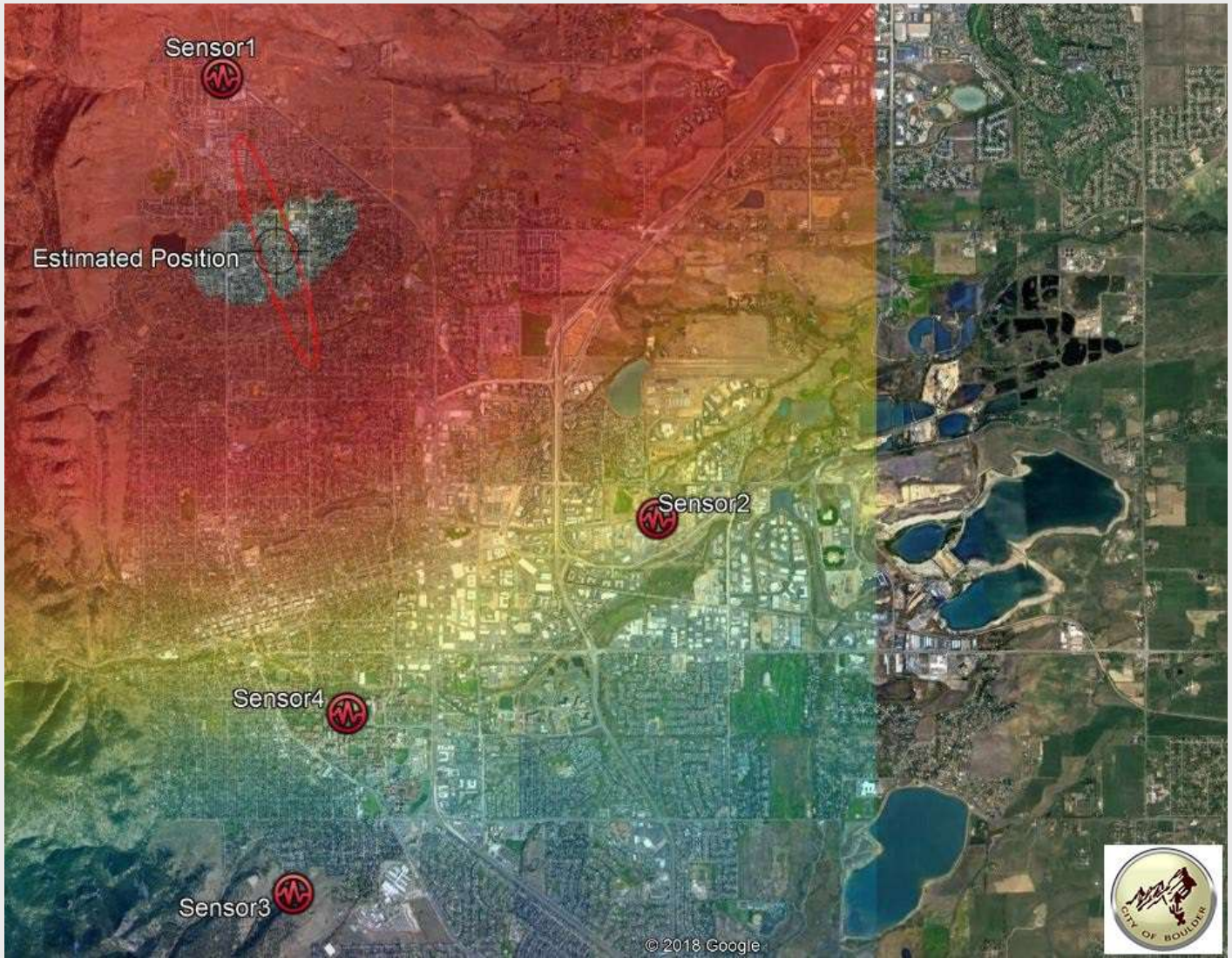
Multi-Sensor Setup



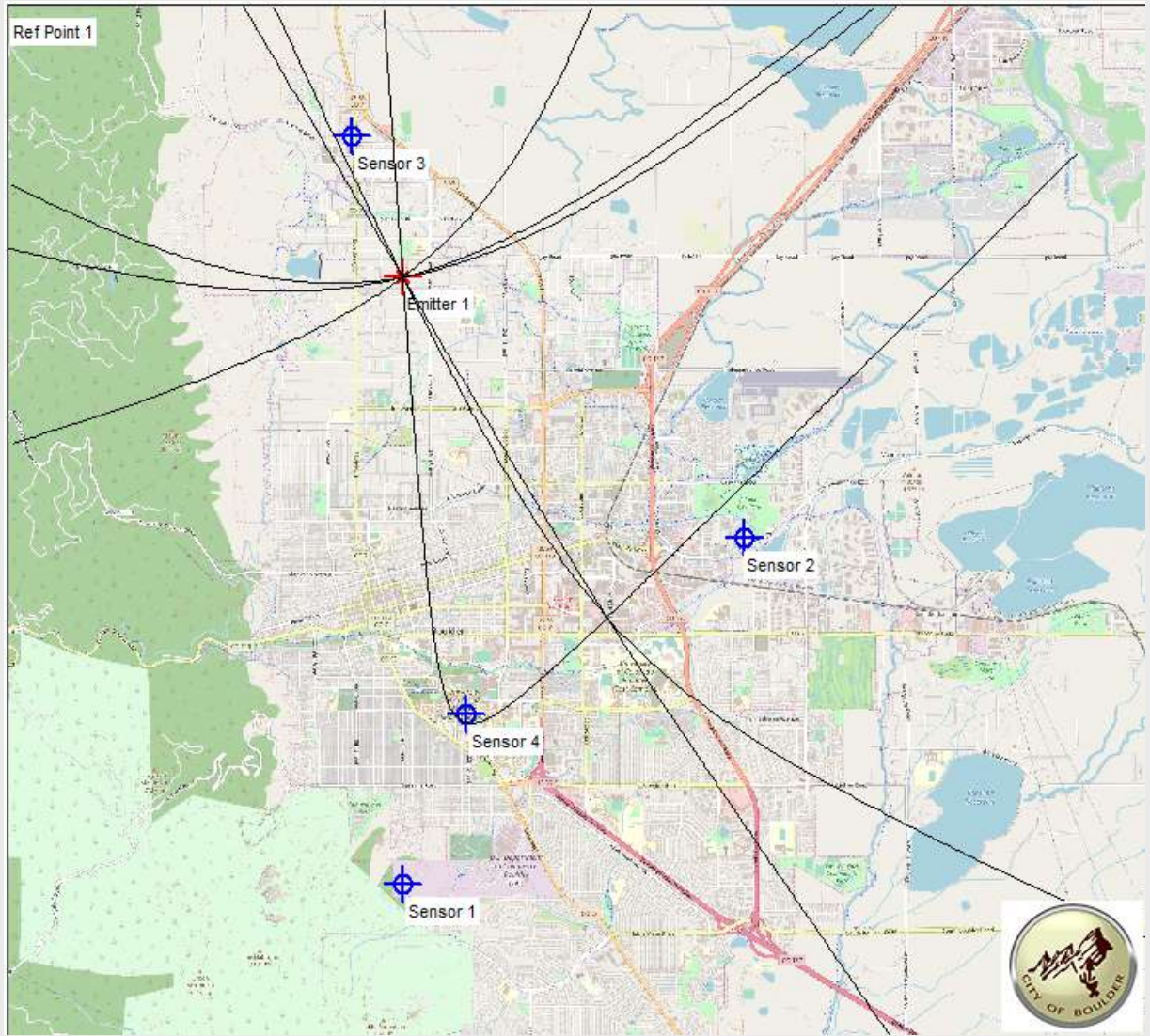
Time Difference of Arrival (TDOA)



Geolocation Ellipse



TDOA Correlation Pairs



Success

- Geolocation and Usage Data Sets for Multiple Localities
  - Infrastructure-Based and Direct Mode
- Data Model(s)
  - Describe Public Safety User's Use of MCV
  - Different Models for Different Environments/Scenarios
- Applications
  - Standards
  - Broadband Equipment Development and Network Deployment
    - Get it right the first time
  - Comparison of LMR to Broadband

THANK YOU

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Come back for the

Next Session

1:35 PM