



The Future, Together

THE CONNECTED VEHICLE ERA – POSITIVE IMPACT ON TRAFFIC MANAGEMENT



Detection Considerations for Future Connected Vehicle Intersections



The Next 15 Years...

- ▶ **Advancements in local processing at the intersection and centralized/cloud based computing will spawn and make use of new intersection and roadway data.**
- ▶ **The vehicle awareness of Connected Vehicles opens the door to a myriad of radical improvements in Safety, Mobility and the Environment.**
- ▶ **In safety alone, Connected Vehicles have the potential of addressing approximately 80% of the vehicle crash scenarios involving unimpaired drivers!**



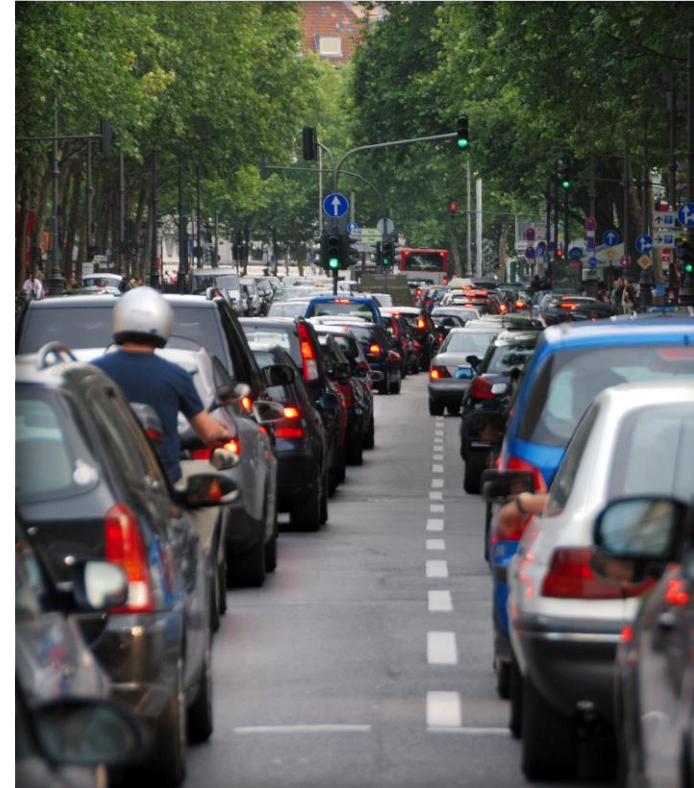


The Econolite Group and Connected Vehicles

- ▶ Participation in CV standards development
- ▶ Joint CV research (academic and commercial)
- ▶ Controller software under development to use V2I/BSM data from connected vehicles
- ▶ Algorithm development to improve safety and throughput while reducing delay and congestion
- ▶ New MOEs and metrics to improve optimization
- ▶ Connected Vehicle-ready hardware
 - Cobalt ATC has sufficient hardware and display
 - Co-processor to run Connected Vehicle Applications

Evolution of point sourced detection vs trajectory based detection

- ▶ Loop Emulation based technology of limited value in CV
 - Presence detection at a given point in space has limited use in the future of Connected Vehicle intersections
- ▶ Vector/Trajectory based data is the future
 - Vehicle tracking within mapped space of the intersection
 - Speed, direction, acceleration and more
- ▶ Vehicle based detection
 - On board vehicle sensors -> On Board Unit (OBU)
 - Precise vehicle position, speed, direction, acceleration
 - Detection inputs via DSRC radio directly to CV intersection, or cellular backhaul
- ▶ Intersection based detection
 - Technologies capable of detecting and providing vehicle trajectory data
 - Video, Radar, other



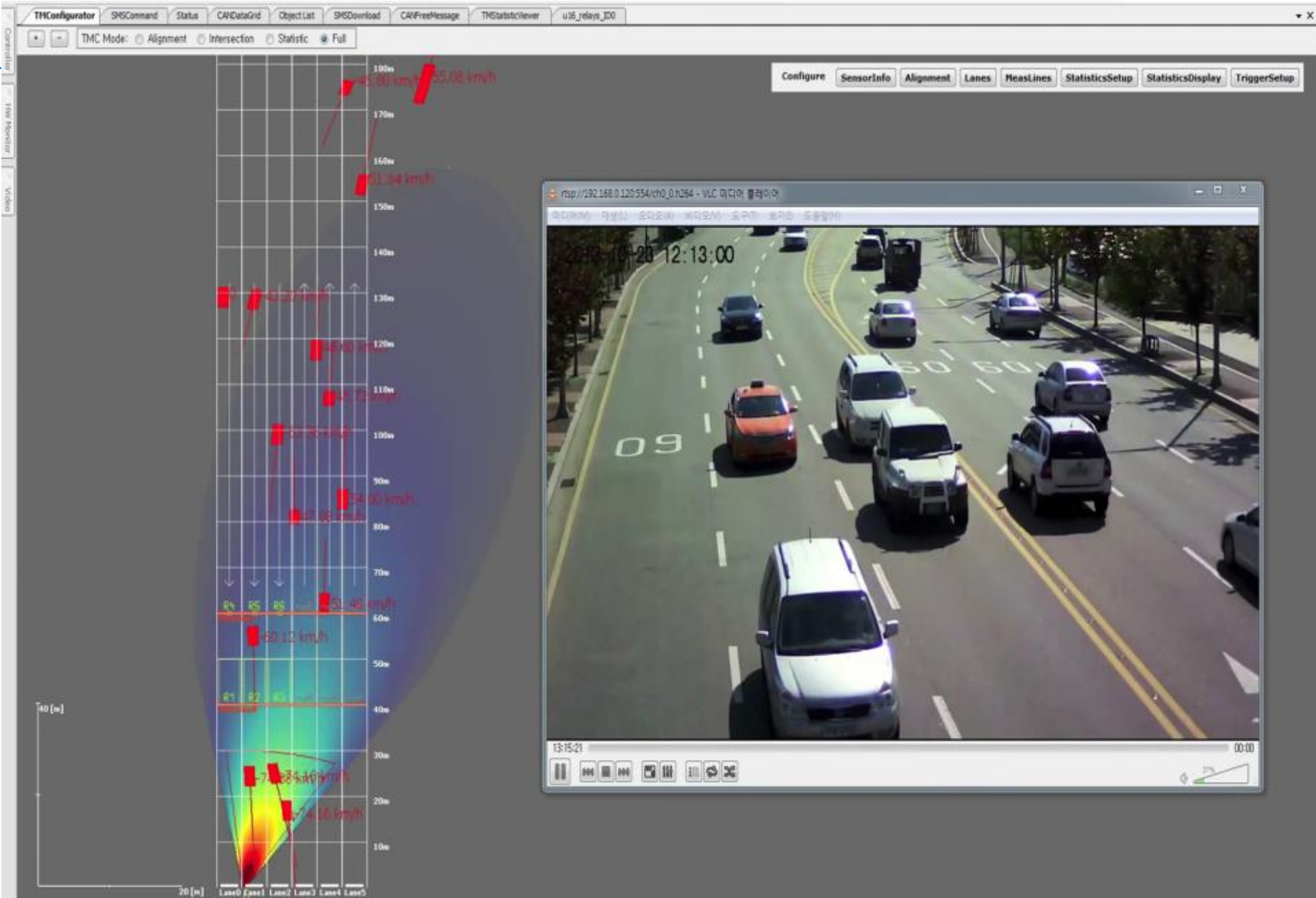
Shifting needs for detection in CV environment:

Moving from loop emulation detection to trajectory based detectors:

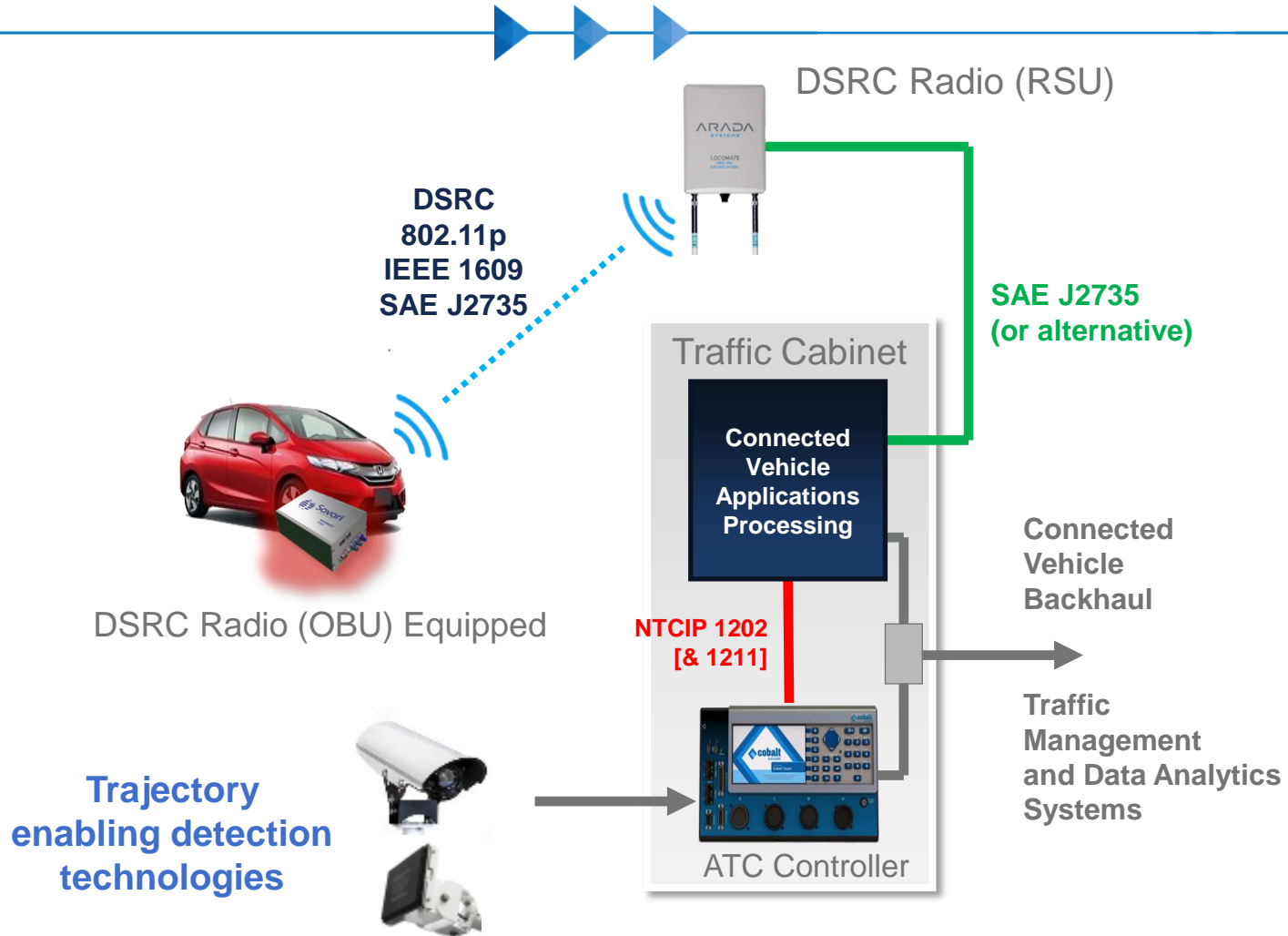
- Will lead agencies to prepare for CV
- Provides better intersection performance measurement
- Paves the way for better control strategies
- Paves the way for simplified detection strategies
- Paves the way for use of exit count & exit trajectory data



Radar based detection with object tracking



The Connected Vehicle Intersection



- ▶ **Controller detection inputs from both CV apps and traditional detection**

Future Proof Intersections for Connected Vehicle Readiness



- ▶ Explore and implement detection technologies that provide or can be developed for vehicle trajectory data
- ▶ Use of NTCIP based ATC controllers –
 - ▶ Compatibility with CV application processing, in-cabinet and back-end
- ▶ Trajectory based data will open up new possibilities for traffic control algorithms, and TMC or Cloud based data analytics systems



5 SOUTH
22 Freeway
ONLY

Thank You

...EXPLORE AND COLLABORATE!