Managed Lane Scenario

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• What are our objectives?
• What applications considered?
• How can stakeholders be engaged?
• A possible early deployment scenario
• Technical challenges
• Opportunities
Objectives

- Use emerging automation technologies:
  - Reduce recurring congestion on urban freeways
  - Improve reliability, reduce travel times, and improve safety
  - Reduce fuel consumption and emissions
  - Maintain and increase car-sharing options
Applications

- Advisory and longitudinal control:
  - Speed Harmonization
  - Cooperative Adaptive Cruise Control
  - Cooperative merging

- Significant US DOT research investments

- Collaboration with automotive OEM’s and states
Stakeholders

- Roadway owners and operators, technology providers, vehicle owners
- All stakeholders must have incentives to participate and clear expectations
- Use of roadways must be limited to vehicles that improve utilization
- Need agreement or “compact” with users to set expectations, encourage investments, and measure performance
A Possible Scenario

- Existing HOV/HOT lane in a congested (peak period, at least) urban corridor

- Very simple topology, with long distances, controllable entry points, and limited (maybe no) exits until the end

- Limit use to vehicles equipped for:
  - CACC and speed harmonization
  - High occupancy tolls (HOT)
  - Registered car pools
One Example: I-66?
Configuration and Use

- Only four direct ramp connections in each direction enables control points
- Simple network topology enables measurement and prediction of flow and ramp control
- Existing base of HOV and special use (hybrid) vehicles can be retained
- But all vehicles must use DSRC
- Soft barriers can limit access to lane
TMC uses speed harm algorithms to determine reasonable speeds by section, and communicates to speed harm vehicles for advice/automated use.

TMC conditions flow by speed and ramp control to maintain consistent flow, higher speeds (higher speed limit?).

Cooperative merging control on all ramps, only CACC vehicles allowed at ramps, and merging action controlled by CACC and TMC.
Eligibility rules only for peak periods

Registered car pools and special use vehicles with vehicle awareness devices (DSRC) (and FLEX transponders?)

HOT users with DSRC and transponders

Other vehicles with CACC and speed harmonization capabilities
Technical Challenges

- Develop applications for vehicles?
- Predict possible gaps at merge points based upon traffic entering stem and conditioned by TMC?
- Predict waiting time for CACC vehicles entering at ramps (time at ramp is XX minutes)?
- Limit carpool/SU based on random selections, tightening over time, to encourage CACC conversion?
Opportunities

• Use growing investments in managed lanes to introduce early automation technologies

• Encourage investments by roadway providers and consumers

• Significantly improve roadway capacity and performance