Managed Lane Scenario

Bob Ferlis

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Outline

- 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

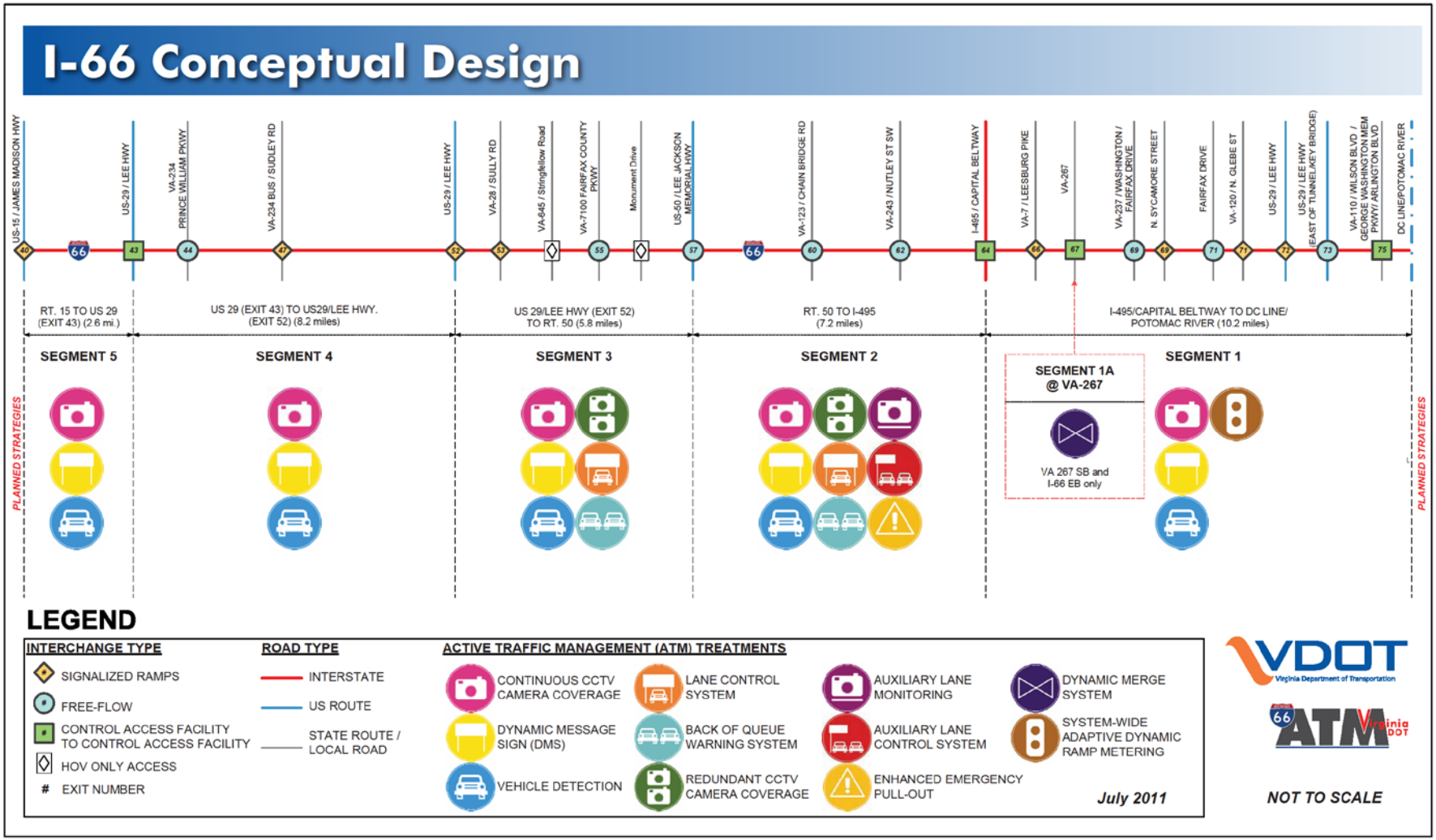
Stakeholders

- 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

Configuration and Use

- 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

- 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