SEAMLESS COMMUNICATIONS
The Road Ahead for a "Network" of Vehicles

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Ethernet is On Board

What’s Possible?

- Higher speed, larger volumes of data
- Time-Criticality
- Control Applications

An ideal stage-setter for Autonomous and Connected Vehicles
Meanwhile off-Board……..

**Connectivity Involves:**

- A mix of all and sundry – 2G……..5G, DSRC, V2V, V2I……..
- A range of applications
  - eCall
  - Vehicle Platooning
  - Remote Control
- The ability for the vehicle to talk to
  - Other Vehicles
  - Road Infrastructure
  - Cloud
  - A Node on the Comms Infrastructure

No single, seamless connectivity solution that covers all scenarios
A “Network” of Vehicles

Option 1: V2V/Road Infrastructure - VANET

- Very low latency
  - Is this really needed?
  - What about trust and security?

- Infrastructure vs Vehicles Conundrum

- The case of V2V in Vehicle Platooning
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Option 2: V2N

- Is the Comms Infrastructure ready to act as a backbone?
  - Timing & Impact of 5G
  - Network Capacity?
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Option 3: V2I2V

- I = An Intelligent Infrastructure with local knowledge
  - Better timing performance
  - No need for the vehicles to be “in the range”
  - Ease pressure on primary infrastructure
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Three use-cases……

1. In-Vehicle Signage
2. Intersection Collision Risk Warning
3. Emergency Vehicle Warning
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Application 1: In-Vehicle Signage

- V2V - Possible but
  - Range constraints
  - Map & Route Matching

- V2N - Possible but
  - Reliant on Network availability

- V2I2V - Optimal Solution
  - Local coordination
  - Update with “live” map information
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Application 2: Intersection Collision Risk

Warning

- V2V - Possible but
  - Vehicle without comms capability?
  - Bikes and pedestrians?

- V2N - Possible but
  - Network traffic will impact comms latencies

- V2I2V - Optimal Solution
  - Local coordination
  - Added sensor capacity
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Application 3: Emergency Vehicle Warning

● V2V - Possible but
  ○ Range constraints, lost comms due to various reasons

● V2N - Possible but
  ○ On-time information?

● V2I2V - Optimal solution
  ○ Emergency vehicle route can be forwarded via backend and relayed
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• The need for a common framework that
  ○ is agreed across OEMs and Comms Infrastructure providers
  ○ Covers all long/short range applications
  ○ Provides Registration and Inclusion Protocols for the “Network” of vehicles
  ○ Is Engineered to allow distributed safety critical control
  ○ Provides temporal assurance for signals and services
A “Network” of Vehicles....

....Conclusion

Is a “local intelligent comms infrastructure (Fog)” the answer?
THANK YOU

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• What would a consolidated framework for seamless connectivity look like?