

LTE vs DSRC:

Competing, but should be Complementing

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Conclusion

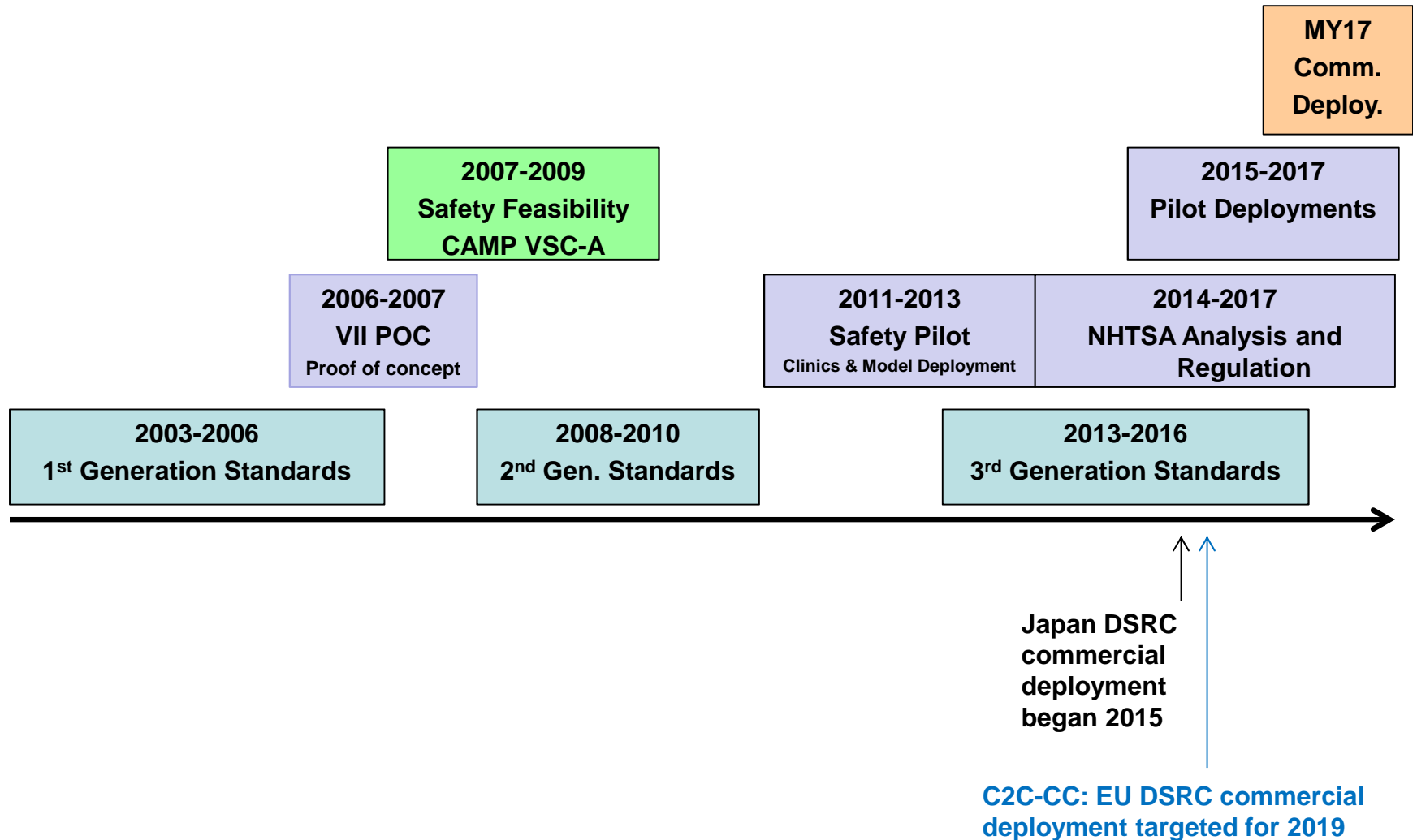
- IEEE 802.11p-based DSRC is in deployment and represents the auto industry's consensus choice for V2X communication for safety and other applications.
- LTE V2X is a concept. It cannot yet be deployed. Positioning it to compete with DSRC will only delay DSRC benefits to society. **This is harmful.**
- LTE/5G V2X can offer complementary benefits for other applications, e.g. range, bandwidth.

US DSRC Timeline



Where does LTE V2X fit?

1st Gen. standards expected 2017 →



LTE V2X TBD ...

- Which spectrum?
- Free or Fee?
- Multi-operator?
- Network operation/management?
- Cell size/V2X range?
- Edge of cell effects?
- Congestion Control/Scalability?
- Security/Privacy?
- Large scale trials?

Field Data on Distance

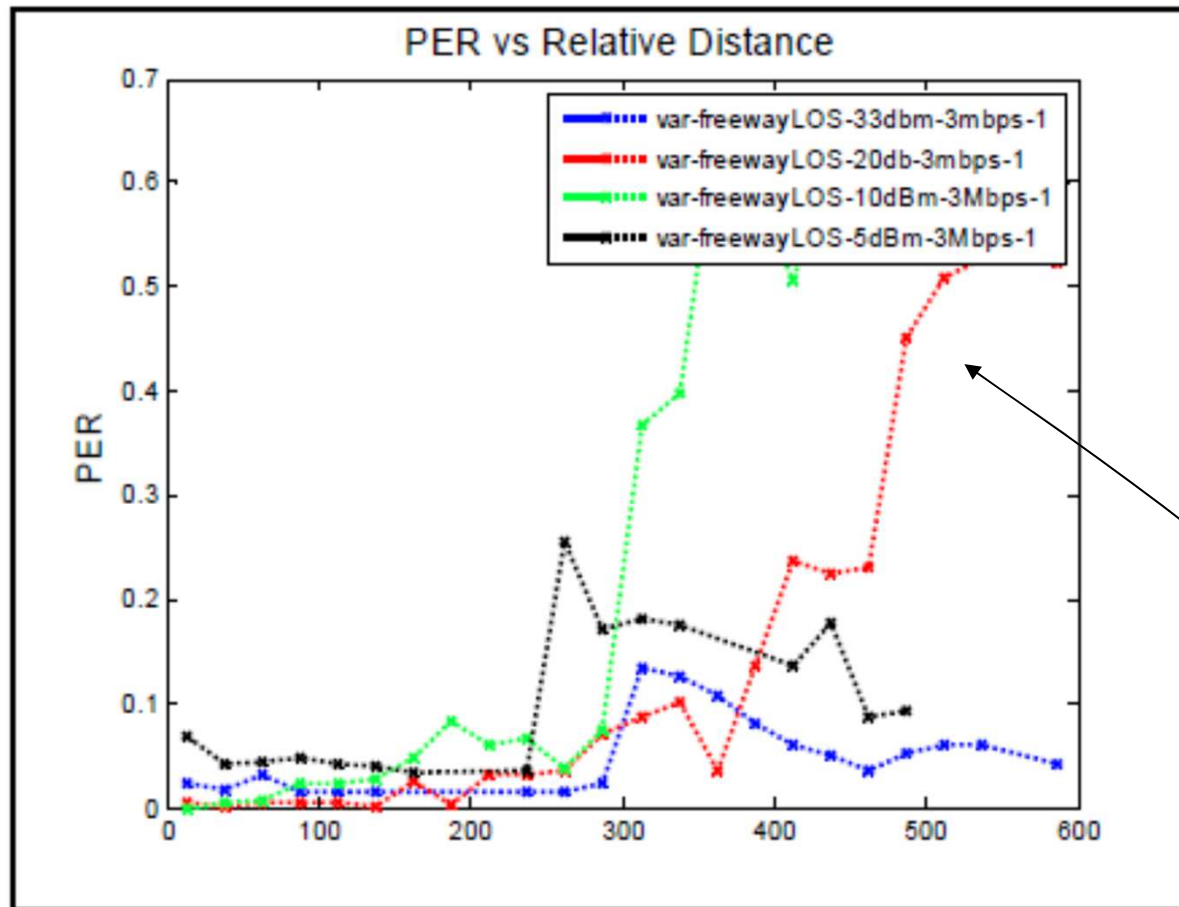


Figure 73: Comparison of PER versus Distance Curves for Various Power Levels in a Freeway-LOS Scenario when Transmitter is Set to 3 Mbps

- Data collected on Highway 101 in CA Bay Area, as part of CAMP VSC-A project.
- 20 dBm easily achieves desired range
- See “VSC-A Final Report: Appendix Volume 2, Communications and Positioning”

Is there harm in positioning LTE V2X as competition for DSRC?

- Yes.
- DSRC is ad hoc networking. Everyone needs to follow the same protocols.
- **DSRC meets our requirements – this is the key**
 - There is always something “newer and better”
 - Multi-technology systems are complex/costly
- V2X is cooperative. Automakers are naturally competitive. Getting started is the hard part.
- Cellular players seeking to disrupt deployment, spreading FUD: Fear, Uncertainty, Doubt
- Won't change outcome. Just cause added delay and cost. Society pays the price.

What about LTE V2X as evolution from 802.11p?



- Evolution will be a challenge for DSRC ... someday, but not today or tomorrow
- Evolution at the MAC/PHY layers is difficult in an ad hoc network because there is no infrastructure to arbitrate generations
 - Must keep legacy devices enfranchised
 - Contrast with cell networks and Wi-Fi networks
- In DSRC it will happen infrequently, decades

Is there any value in LTE/5G V2X?

- Yes.
- DSRC is great for what it does: several hundred meter communication, up to 27 Mbps
- V2X applications sometimes need more range
 - Ex: Icy road 2 miles ahead
- V2X applications sometimes need more bps
 - Ex: Sharing raw sensor data
- Toyota position: Use DSRC for V2V/V2I/V2P safety and non-safety applications where it is already ready for deployment (JP/US/EU at least). Use LTE/5G V2X to complement DSRC.

Conclusion

- IEEE 802.11p-based DSRC is in deployment and represents the auto industry's consensus choice for V2X communication for safety and other applications.
- LTE V2X is a concept. It does not yet exist. Positioning it to compete with DSRC will only delay DSRC benefits to society. **This is harmful.**
- LTE/5G V2X can offer complementary benefits for other applications, e.g. range, bandwidth.

Questions?



Thank You

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