

ICT for ITS: An industry view on safety and global harmonization

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MIC workshop: ICT for Next Generation ITS

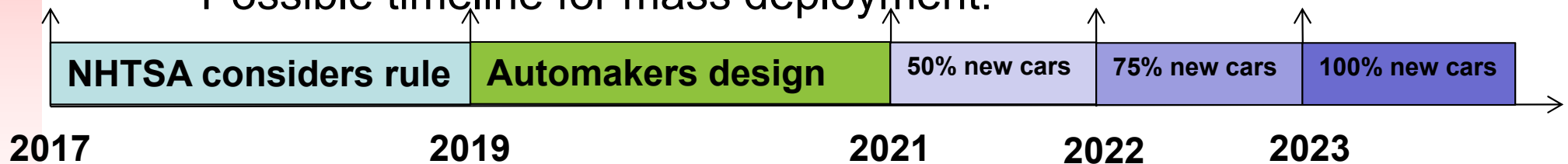
Outline

- **Update on ITS situation in United States**
 - **Deployment**
 - **Standards**
 - **Spectrum sharing with Wi-Fi**
- **Update on ITS situation in Europe**
 - **Deployment**
 - **Standards**
 - **Competition from Cellular V2X protocols**

US Deployment Situation

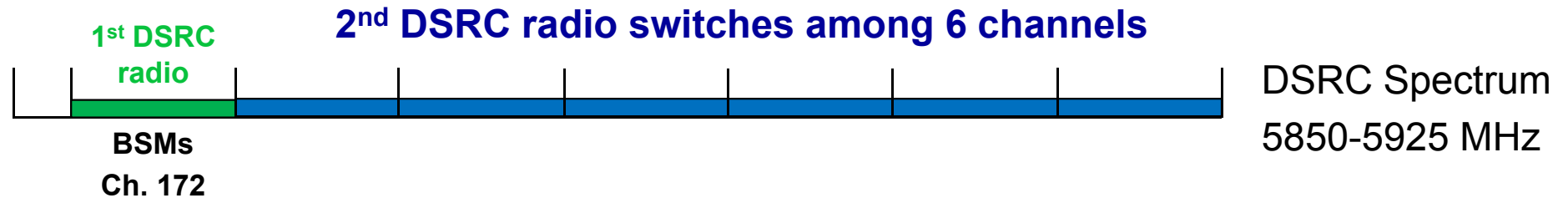


- ITS = Dedicated Short Range Communication
- NHTSA proposal to require DSRC in cars for V2V safety
 - Must send and receive Basic Safety Messages (BSMs)
 - Most automakers support this BSM requirement
 - Opposition may come from Wi-Fi and Cellular stakeholders
 - Possible timeline for mass deployment:



- Voluntary deployments will start soon:
 - National: US DOT Pilot Deployments and Smart City
 - States: “SPaT Challenge” for 1000 intersection devices
 - Commercial: GM announced DSRC in Cadillac on March 9, 2017
- Security implementation continues to be a challenge

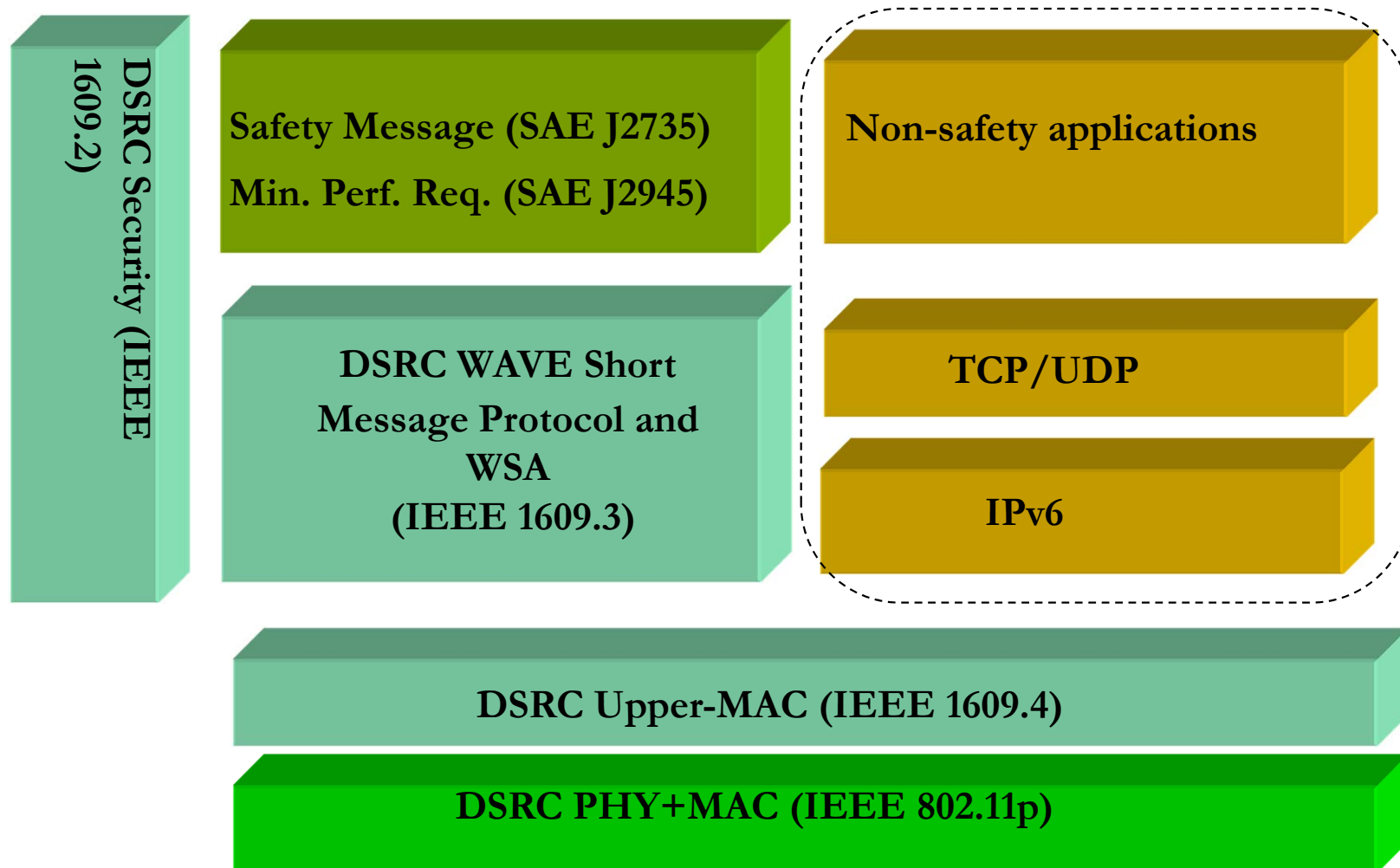
US Deployment continued



- US DSRC has 7 channels
- V2V Mandate (BSM) uses only 1 channel
- Many other DSRC applications will use other channels:
 - V2I safety
 - V2P safety
 - Traffic efficiency
 - Automated Driving
- Automakers may install 2-radio systems.
 - 2nd radio voluntary



US Standards

- SAE and IEEE standards for BSM are complete



US Standards – New

SAE, IEEE adding standards for use on other channels:

- SAE J2945/0 
 - Common aspects of DSRC applications (QoS, band plan usage)
 - Currently in ballot, publish in 2017?
- SAE J2945/2
 - BSM use by other vehicles (e.g. emergency, truck)
 - Currently in ballot, publish 2017?
- SAE J2945/9
 - Personal Safety Message (PSM) for Pedestrian/Bicycle/Worker
 - Completed ballot, “Recommended Practice” for testing
- IEEE 1609.2 
 - DSRC Security
 - Adding new security features
- Many more to be added in future
- Cars can add applications with software update

DSRC Spectrum Sharing Issue

- DSRC/C-ITS operates in licensed 5.9 GHz spectrum in the US
- Unlicensed devices (Wi-Fi, LTE-U) want access to more spectrum
 - Government regulators see economic growth advantages
- Sharing between licensed & unlicensed devices is new emphasis
 - Unlicensed must not cause “**Harmful Interference**” to licensed
 - Sharing with radar systems works, based on “detect & vacate”
 - But, sharing with short range V2V and V2I is quite different

US FCC initiated formal question about 5.9 GHz sharing in 2013

FCC has started testing prototypes.



Major US Stakeholders



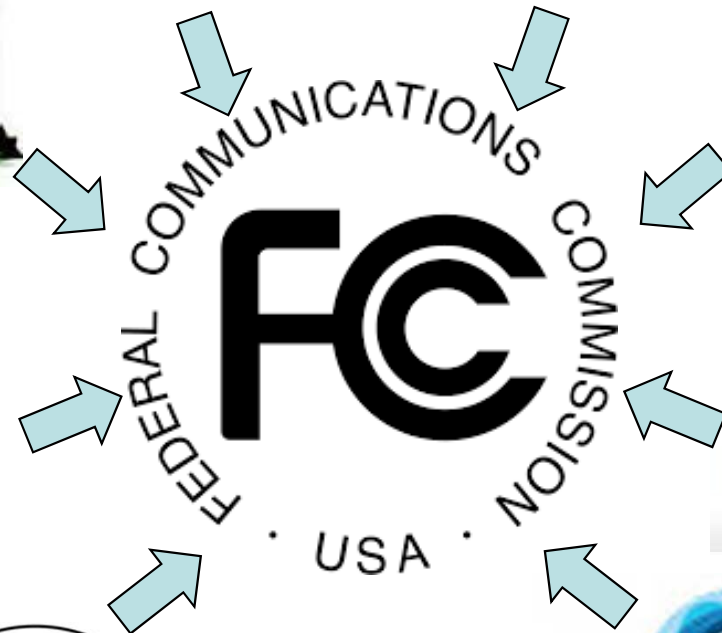
US Congress



US President



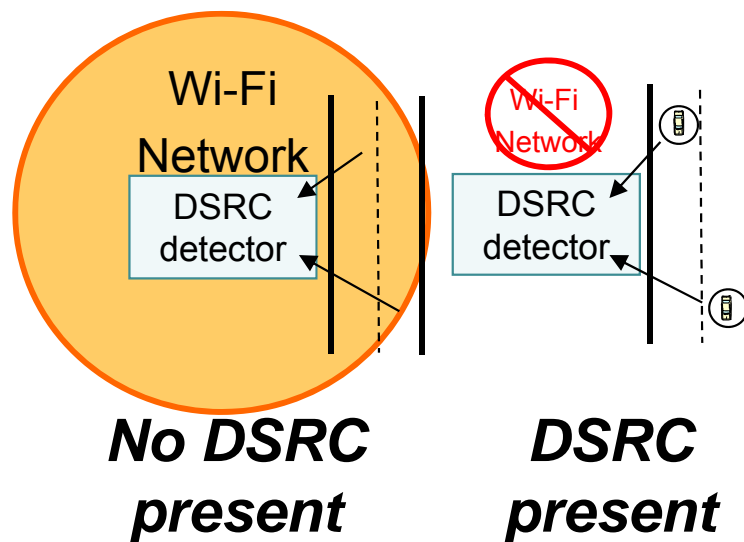
GlobalAutomakers



Two sharing proposals

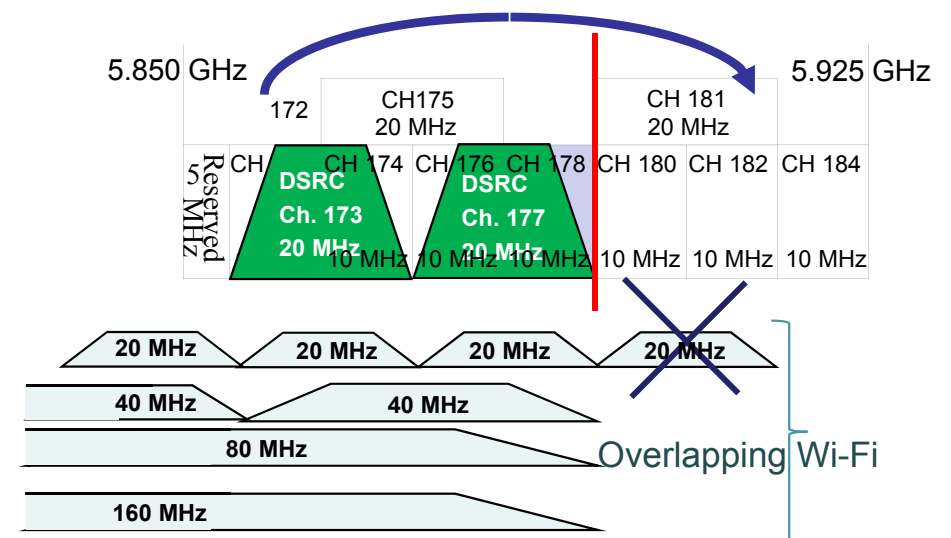
DETECT & VACATE:

- Proposed by Cisco
- Auto industry favors this
- No changes needed to DSRC
- Each Wi-Fi device has a DSRC detector
- When DSRC detected, no WLAN
- When no DSRC present, WLAN ok



RECHANNELIZATION:

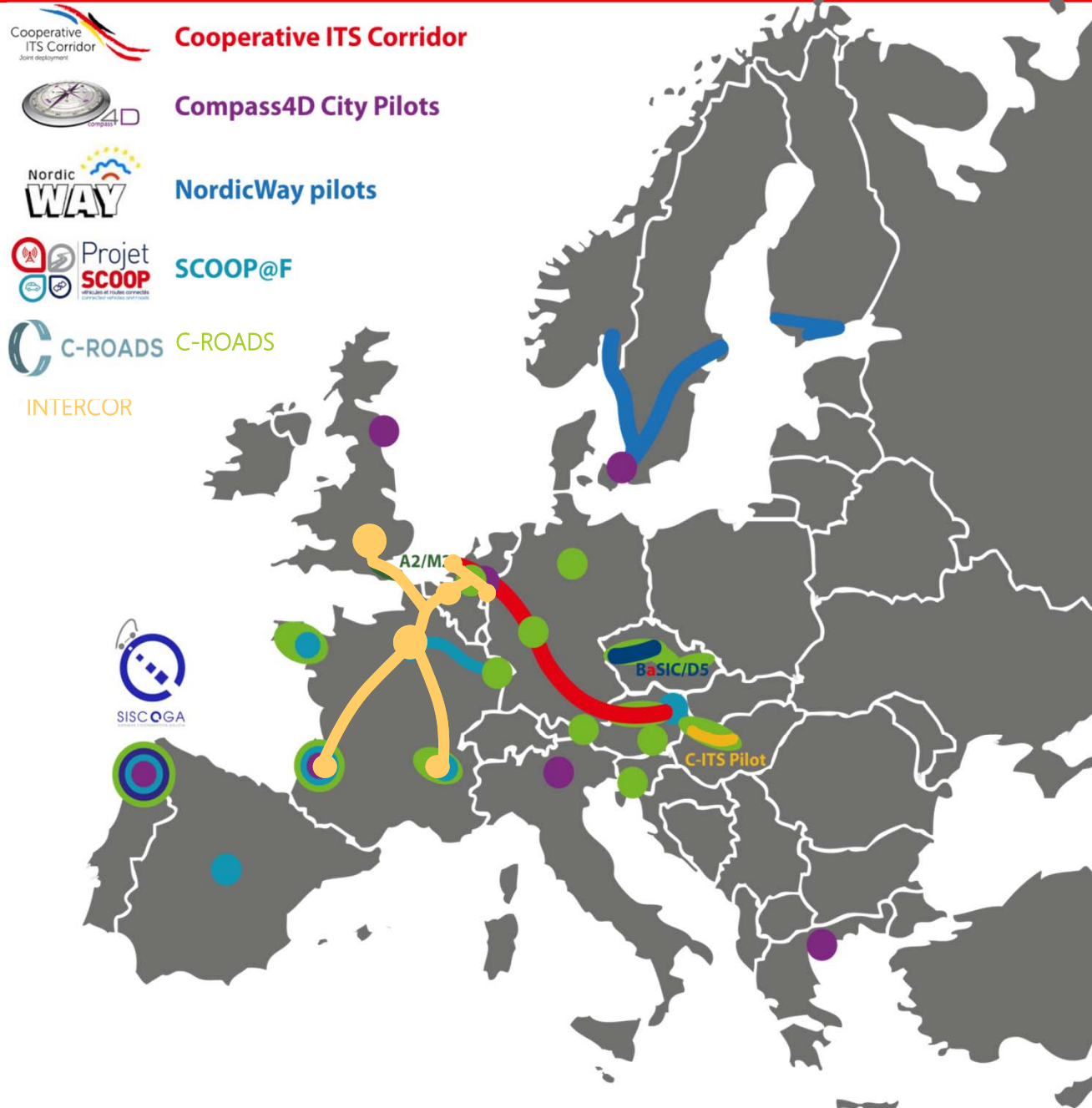
- Proposed by Qualcomm
- Auto industry opposes this
- Requires significant changes to DSRC operation
 - Move safety messages
 - Use 20 MHz channels
 - Many problems for DSRC



US Spectrum Sharing: Current Status

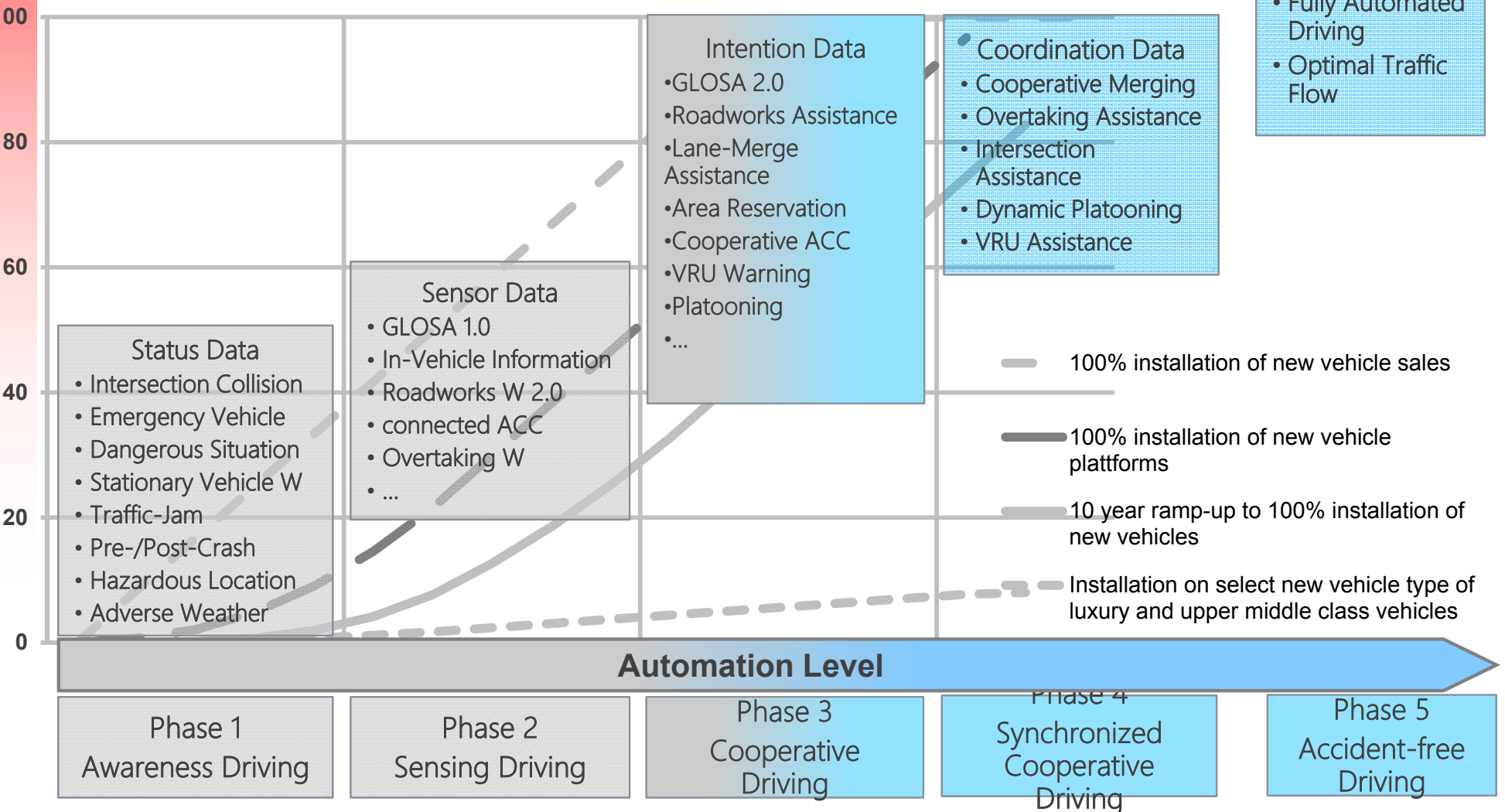
- FCC got comments on proposals July 2016
- FCC started testing prototypes September 2016
- 3-phase test plan:
 1. **Lab testing**
 2. **Outdoor, small number of devices**
 3. **Outdoor, large number of devices**
- Testing will continue for several months
- Will publish initial results after Phase 1
- Problem: Rechannalization prototypes are incomplete:
 - No detection or prioritization of DSRC
 - No 160 MHz IEEE 802.11ac
- FCC final decision date? Unknown

Europe – Cooperative ITS Trials



Europe – Deployment roadmap

Source: Car2Car Communications Consortium



Wide scale deployment planned by 2019 (C2C-CC statement 2015)

EU Standards Update

- Important EU organizations



Standards



Deployment Profiles

EU Standards Update

- Day 1 standards are complete: Release 1
 - CAM, DENM, Geonetworking, ...
- ETSI Working on Day 2 standards:
 - **C-ACC** ETSI TR 103 299
 - **PLATOONING** ETSI TR 103 298
 - **VRU** ETSI TR 103 300
 - **CPS** ETSI TS 103 324
 - **MCO** ETSI TR 103 439
- C2C-CC working on profiles

EU Challenges

- Security – requirements stricter than US
- Certification/Compliance specification
- Spectrum Sharing
 - Similar to US, ETSI TR 103 319 in process
- Competition from emerging Cellular V2X
 - Cellular stakeholders aggressive
 - Want to replace IEEE 802.11p (ITS-G5) with LTE-V2X in 5.9 GHz
 - Most auto makers want ITS-G5.
 - Interested in LTE/5G V2X in other spectrum.
 - Complementary, not replacement
 - mmWave 5G has great potential
 - Competition could slow C-ITS initial deployment

Summary

- **US DOT V2V Mandate is proceeding**
 - **Mass deployment starting ~2021**
- **US Spectrum sharing testing now**
 - **Decision within one year?**
 - **Also discussed in Europe**
- **EU Trials and Deployment moving ahead**
 - **Mass deployment starting ~2019?**
 - **Remaining challenges: security, compliance**
 - **Competition from Cellular-V2X could slow deployment. Automakers prefer ITS-G5**