



LTE V2X Communication – Scenario and OAI Roadmap

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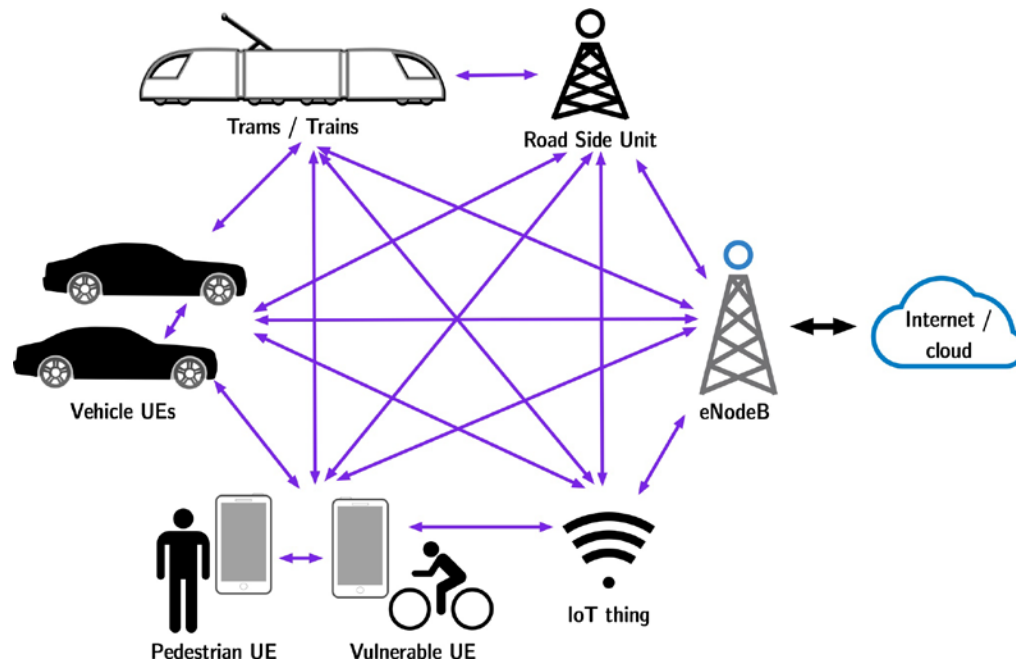


OpenAirInterface

5G software alliance for democratising wireless innovation

<http://www.openairinterface.org/>

Problem Space & Stakeholders



Source: Dr. Gallo,
EURECOM

■ Key Stakeholders

- Automotive industry
- V2X techno providers
- Cellular industry
- Vulnerable road users

■ Key CONOPs for V2X

- Dedicated V2V/V2I/V2P communication, without network support (no SIM)
- Mixed Uu – PC5 communication (V2N)

■ Key Services

- V2X critical safety communication
- Safety of vulnerable road users
- Mission-critical communication
- Collective Perception
- Automated driving/Platooning
- Remote sensing and control

LTE V2X Scenarios

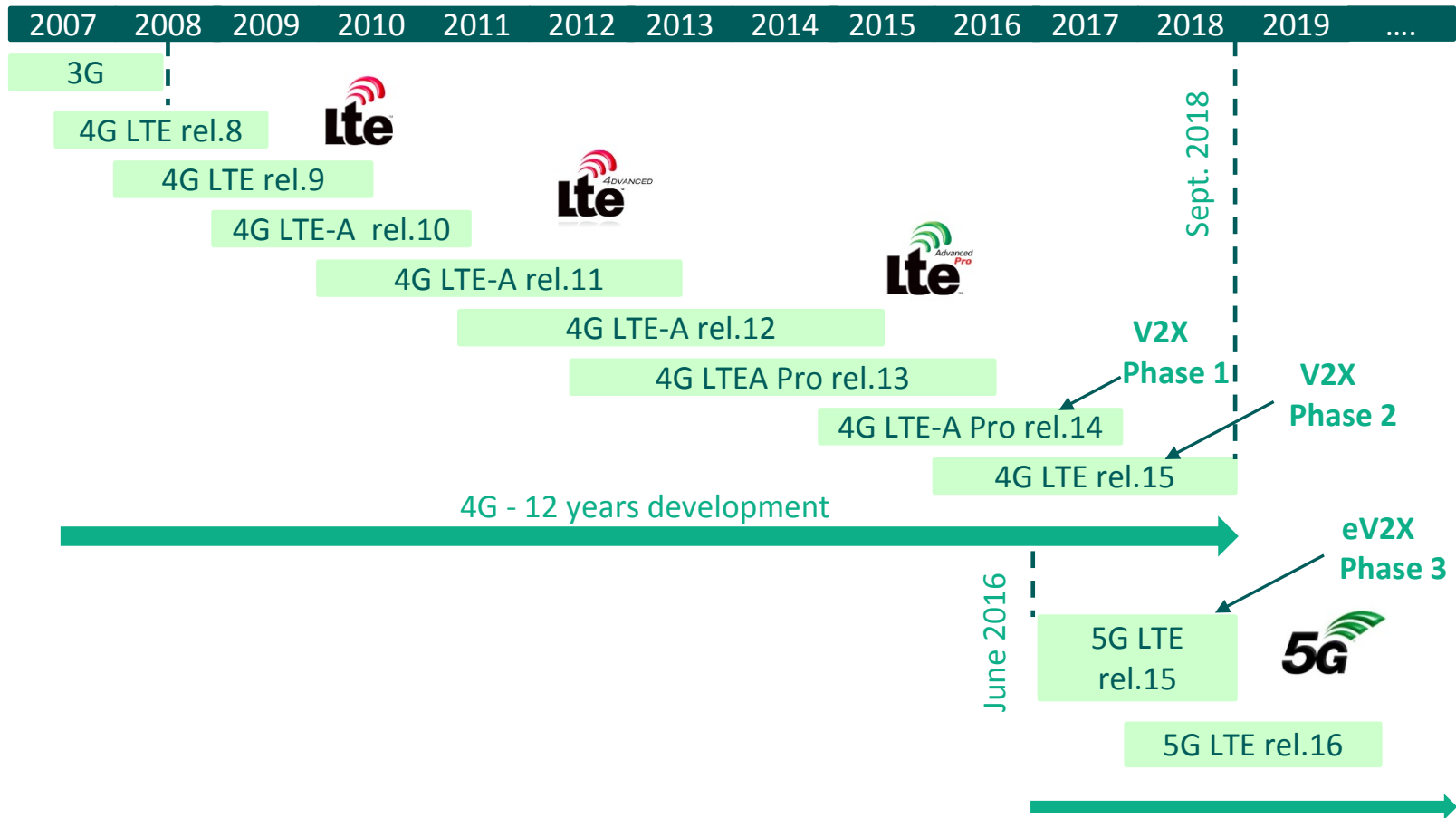
- **Scenario 1: Off-Network V2X-PC5**
 - UEs are off-network but communicate directly via a Sidelink channel

- **Scenario 2: On-Network V2X-PC5**
 - UEs are located closed to their eNodeB but communicate directly via a Sidelink channel

- **Communication Patterns**
 - 'Selective' One-to-Many (group multicast)
 - No Signaling - V2X is connection-less
 - Pure IPv6

- **Spectrum**
 - V2V PC5 – 5.9GHz (current implementations)
 - V2I-V2N Uu – 3.4 GHz (require Research spectrum)

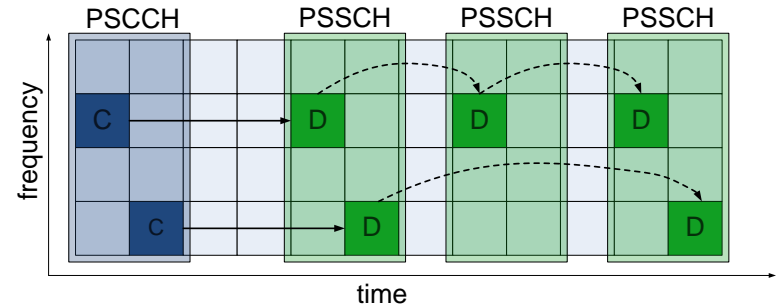
LTE Proximity Services (ProSe)



LTE-V2X – Distributed Scheduler

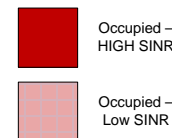
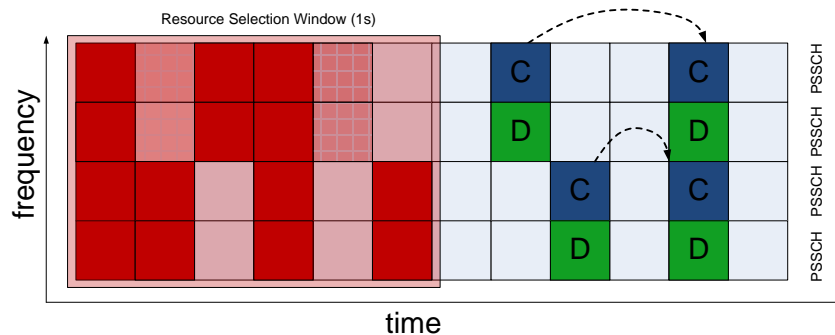
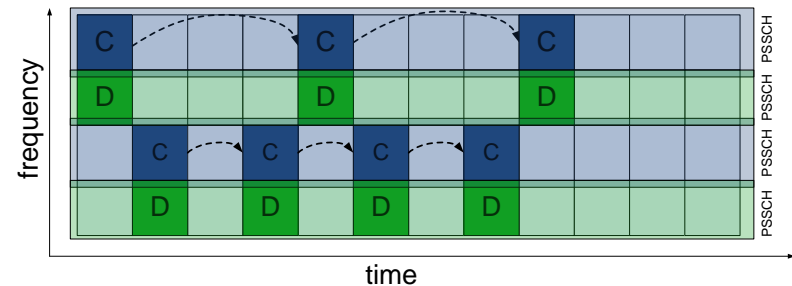
■ LTE V2X mode 3 (eNB)

- multiple SPS configurations can be active
- can be different period/MCS for flexibility
- UE does not have to transmit if no data



■ LTE V2X mode 4 (Ad-Hoc)

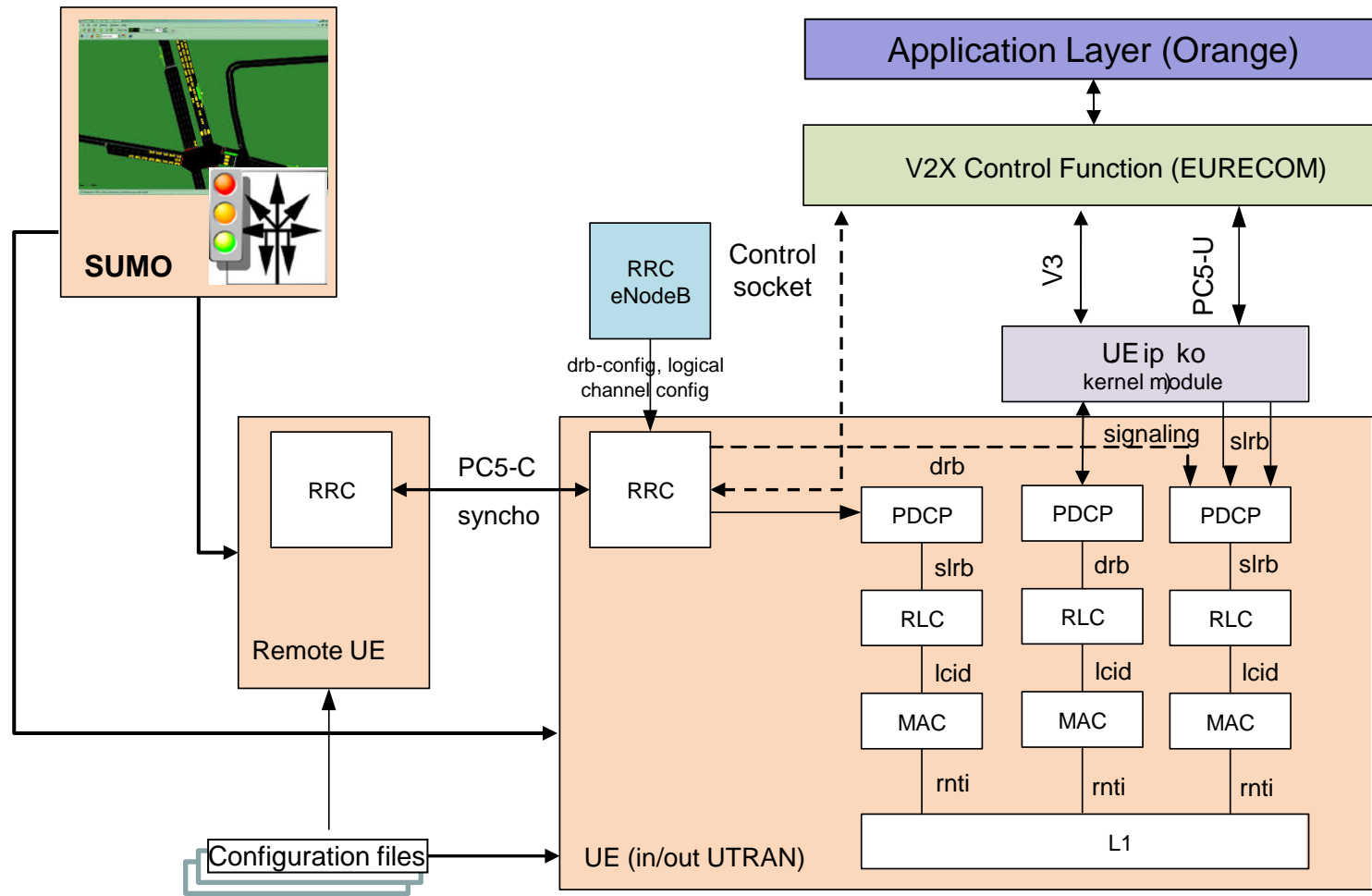
- resource location and MCS selected autonomously
- resources are reserved in advance (“SPS”)
- control-data in the same subframe (Reduced latency)



■ LTE V2X mode 4 Resource Allocation

- 1s monitoring windows
- Selection of the 20% RB with lowest RSSI

OAI Architecture - V2X Interfaces & SUMO for Vehicular mobility



LTE V2X for Public Safety on OAI - RoadMap

■ Phase 1 - Emulation

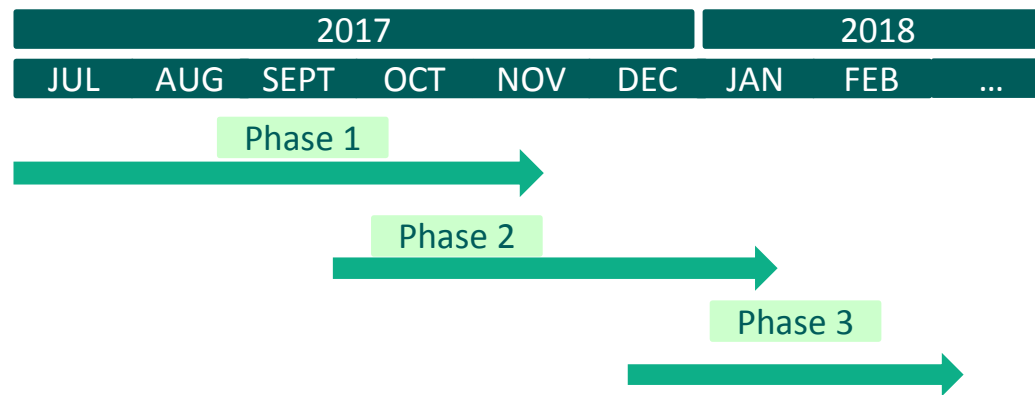
- Redesign of emulation mode – new PHY STUB

■ Phase 2 – V2X Implementation

- Part A – Implementation of the V2X/RRC/PDCP/RLC/MAC
- Part B – Implementation of the PHY
- Part C – Integration of SUMO for vehicular mobility

■ Phase 3: Performance Evaluation

- Mode 3 and Mode 4
- Small scale (1 eNB, 2 UE), large scale (>50 UEs)



■ OAI Code

- <https://gitlab.eurecom.fr/matzakos/LTE-D2D>



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