Dedicated LTE Communications for Public Transportations

Laurent Gallo and **Jérôme Härri**, Mobile Communications department, EURECOM

Communications in transportation systems

Public transportations:

- **CBTC** (**C**ommunications-**B**ased **T**rain **C**ontrol) for automatic driving
- **CCTV** surveillance
- **Driver connectivity**

Standard:
TETRA
(**TE**rrestrial **T**runked **RA**dio)

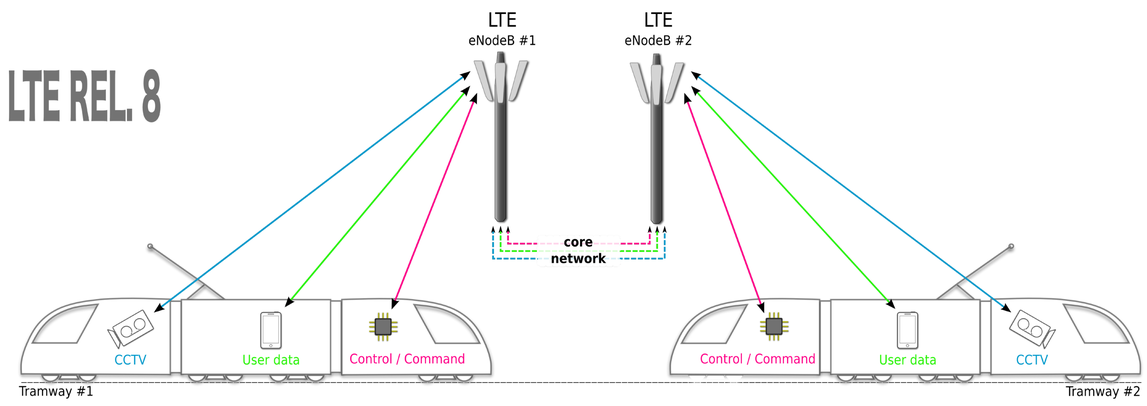
Private transportations:

- **V2V** communications for traffic safety
- **V2I** communications for infotainment and navigation

Standard:
V2X 802.11p
ETSI ITS G5
DSRC (**D**edicated **S**hort **R**ange **C**ommunications)

Objective:
convergence of **DSRC** and **PMR** to ***LTE-A***

LTE for vehicular applications

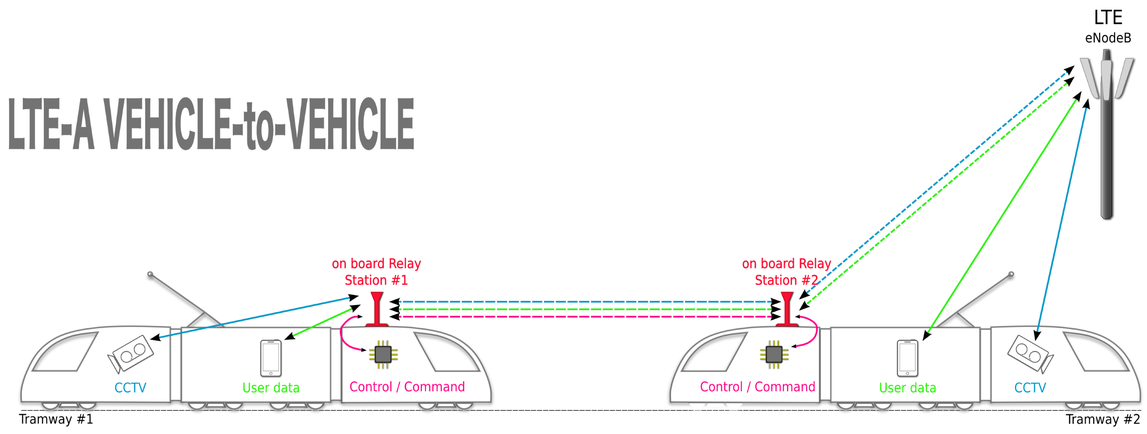


***Commercial ITS** or **M2M** communications*

Limits:

- **Bottleneck**
- Single **point of failure**
- **Delay**
- Large number of **simultaneous handovers**

Vehicle-to-Vehicle LTE-Advanced



Features:

- Vehicles are equipped with **mobile Relay Stations** (**static** relay stations are in **LTE rel. 10**)
- **RS** are connected via **X2 interface** (LTE specifications: X2 interface **connects eNodeBs**)
- **CBTC communications** between vehicles over LTE relay
- **CCTV** and **commercial traffic** can be **relayed** (e.g. in absence of coverage)

Challenges:

- **Wireless** X2 interface (typically **cabled** and **static**)
- **Mobility** of relay stations

Limits:

- **Still relies on the LTE network infrastructure**

Features:

- All communications are direct **device to device**
- Proximity discovery (**awareness**)
- **Infrastructure independent**

D2D communications are in **LTE rel. 12**, however:

- not safety-oriented
- discovery relies on network infrastructure
- discovery delay
- unicast D2D transmissions

Challenges:

- **Dynamic resources allocation**
- **Infrastructure-less** proximity discovery
- **Broadcast** direct transmissions

The presented work is part of the **SYSTUF** (**SYS**tèmes télécoms pour le **T**ransports **U**rbains du **F**utur) project, whose partners are:

EURECOM – CAMPUS SOPHIATECH
450 route des Chappes F-06410 BIOT Sophia Antipolis
www.eurecom.fr

http://systuf.ifsttar.fr