Synergies in Connected Mobility of Tomorrow : C-V2X & Railways Case Study

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Existing and Future Needs for Railways Applications

- **Now**:
  - GSM-R is a major railway technology used for train-to-ground voice and data communications, part of ERTMS (European Rail Traffic Management System)
  - In France, GSM-R covers 16 000 km of lines, representing 80% of traffic flows
  - **GSM-R lifecycle coming to its end, with uncertain vendor support beyond 2030**

- **The Future**:
  - FRMCS (Future Radio Mobile Communication System) is the successor of GSM-R
  - FRMCS could be based on 3GPP LTE/5G system in order to address a large set of applications specified by “UIC FRMCS Project”:

Train-to-Everything Communication Project

- Securing the highest level of safety for people is SNCF's 1st commitment
- SNCF in partnership with Qualcomm are evaluating the potential use of C-V2X technology for railways applications

Train-to-Everything Communications : C-V2X Use Cases In Railways

- C-V2X technology opens a wide range of applications in the rail domain:

Train-to-Infrastructure Communications (e.g. Level crossings)

Train-to-Train Communications (e.g. virtual coupling/platooning)

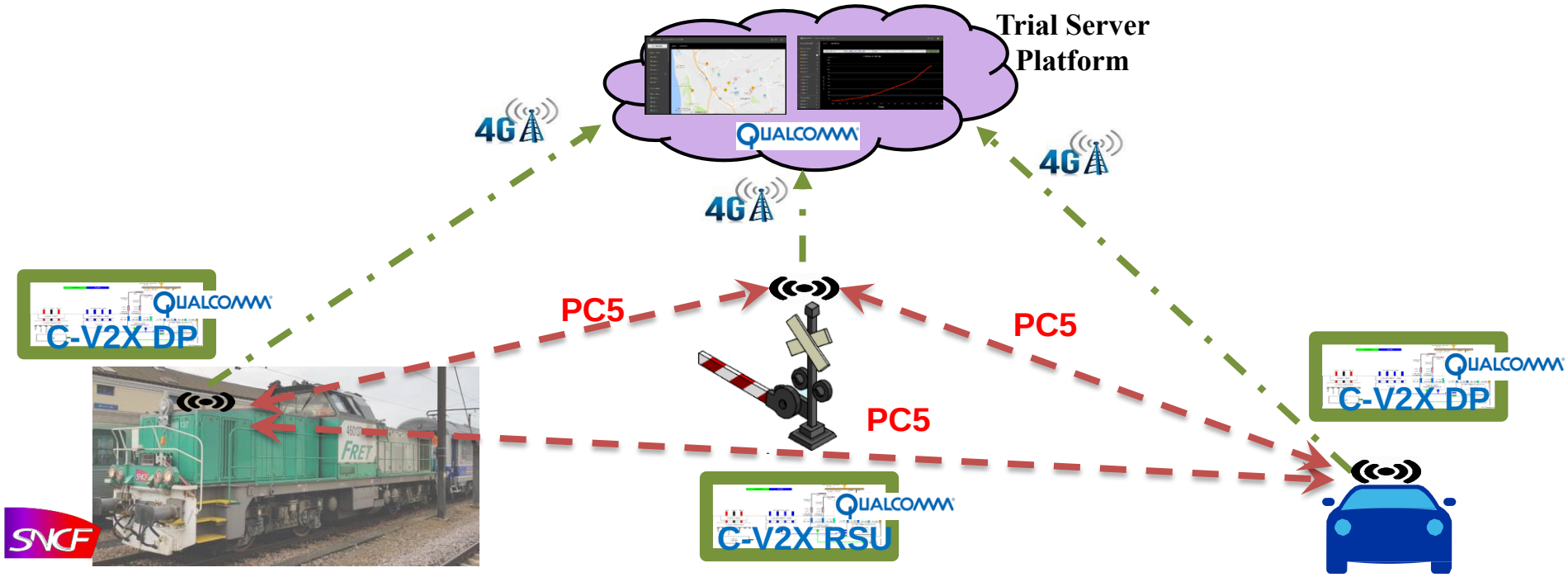
Train-to-Maintenance Operators Communications

Train-to-Ground Communications (e.g. signaling systems)

C-V2X Testing: Train-to-Railway Crossing and Car-to-Railway Crossing

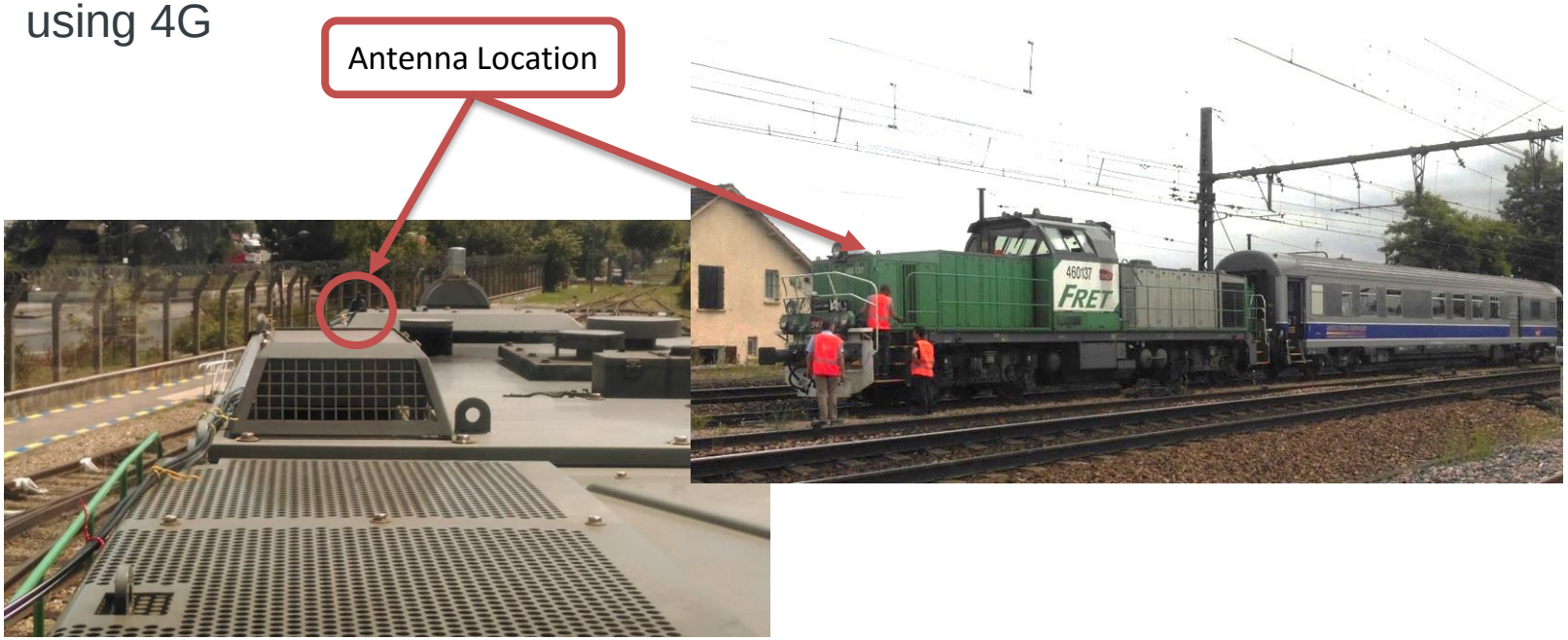
- Tests conducted on SNCF rail route from Vitry to Montereau
- C-V2X communication system set-up on SNCF test train
- RSU setup close to Livry-sur-Seine train station
- C-V2X communication system set-up on a car

High-Level System Architecture



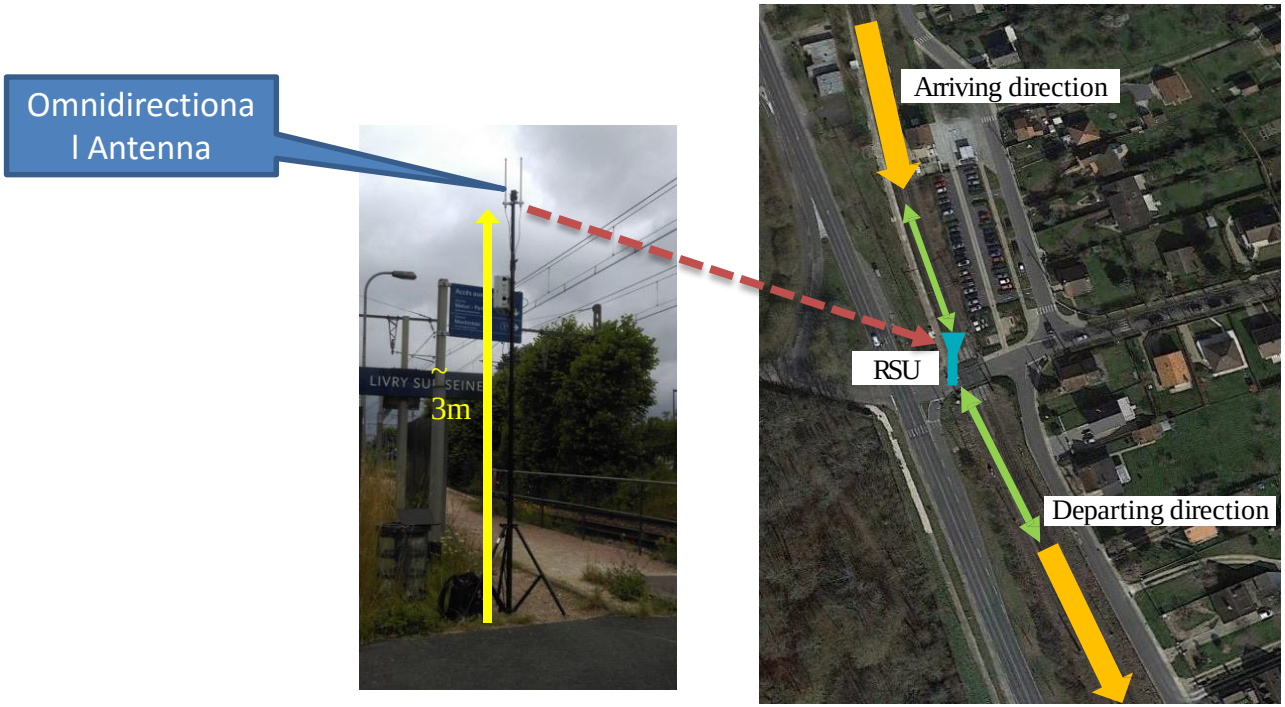
C-V2X Communication System on the Train

- The train is continuously sending and receiving CAM messages using PC5
- All data is recorded by the DP and sent to the “Trial Server Platform” using 4G



RSU System at the Railway Crossing

- The RSU is continuously sending and receiving CAM messages using PC5 from the train and the car



Thank you!