

47TH ASECAP STUDY & INFORMATION DAYS

Tomorrow's Mobility...Is Here Today!

*Costa Navarino, Messinia, Greece
29-31 May 2019*

www.asecapdays.com

From SCOOP@F to InterCor and C-Roads:
Sanef experience in tests of C-ITS systems

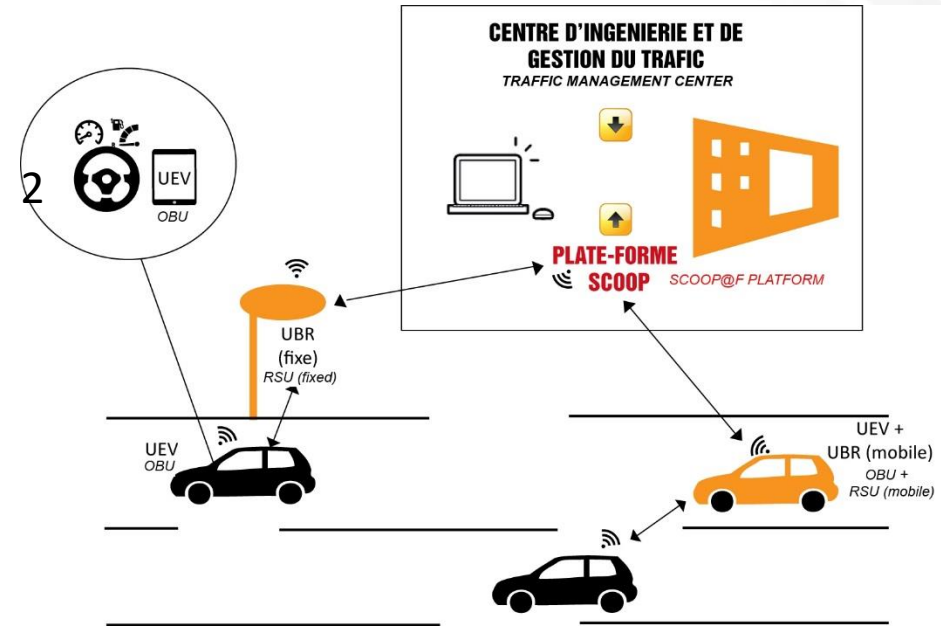


Guy FREMONT - Sanef

Organized by

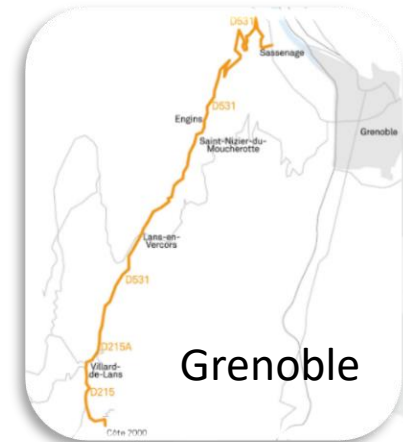
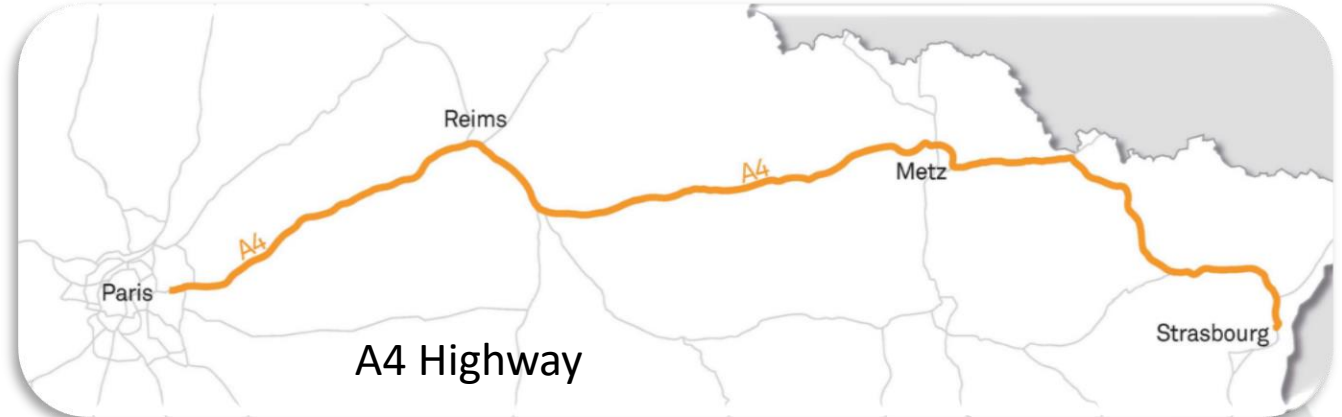
C-ITS Projects

Cooperative Intelligent Transport System



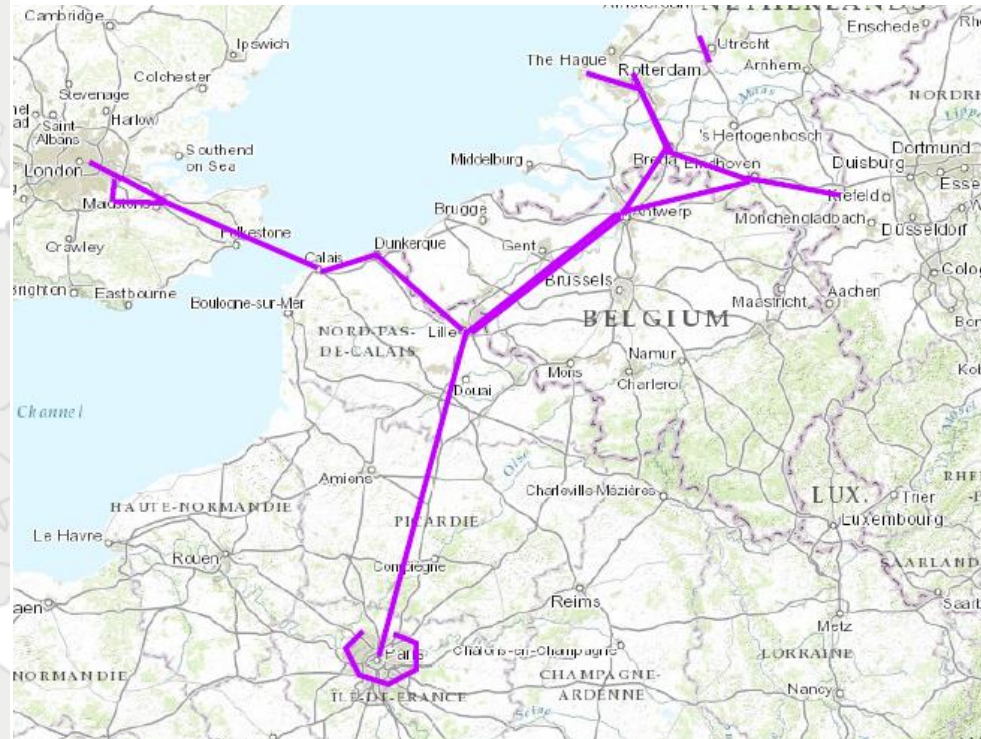
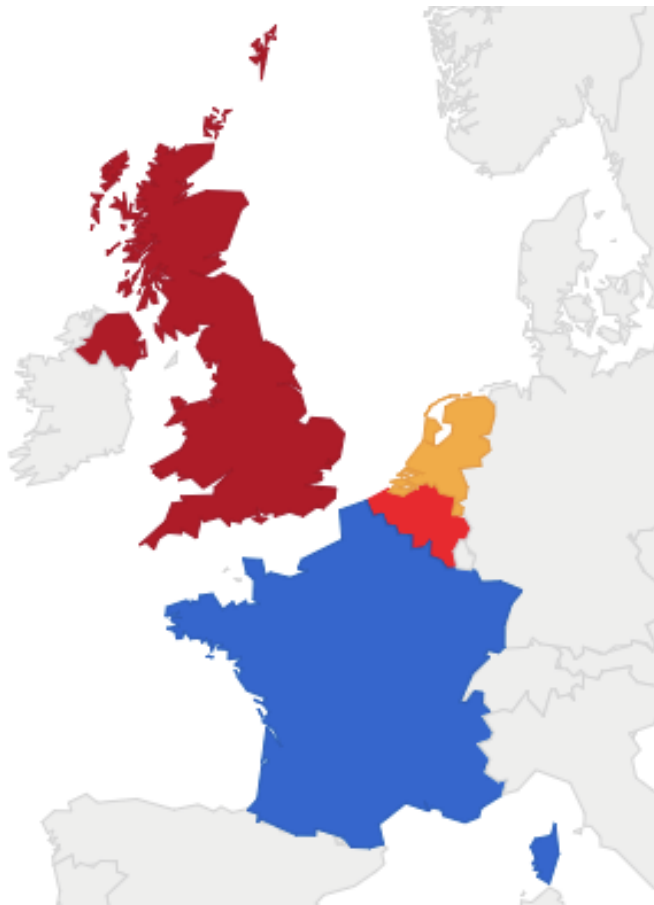
Sanef is participating to 4 C-ITS projects

SCOOP@F project : Pilots sites in France

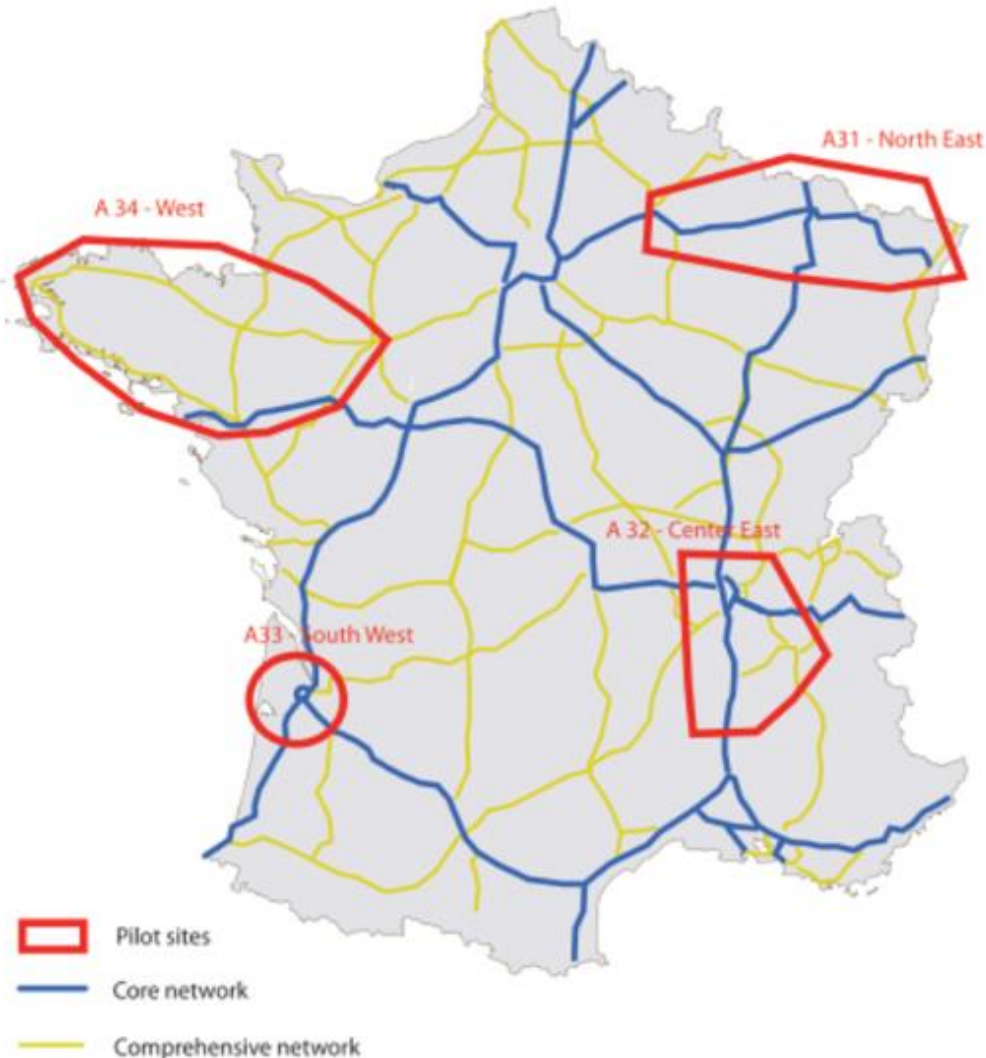


CEF programme, Budget: € 30Mio (50% co-funding) - Duration: 42 months - Start: 1 Sep. 2016

Coordinator: Rijkswaterstaat – Technical and Interoperability Coordinator : ERTICO





Connection to the C-ROADS Platform

16 National projects: Austria, Belgium (Flanders), Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, UK

Extension of the pilot sites

Urban tests sites and new Use Cases

- 33 Road-Side Units



VMS



TM MAST



PYLON



- 20 On-Board Units

- Locations

- 9 on a Traffic Management Mast (12m)
- 23 on a Telecom Pylon (20/30m)
- 1 on a VMS (6m)

- Location Issues

- Strategic Location
- Existing infrastructure
- Facilitate Maintenance
- Users and Road Workers' Safety

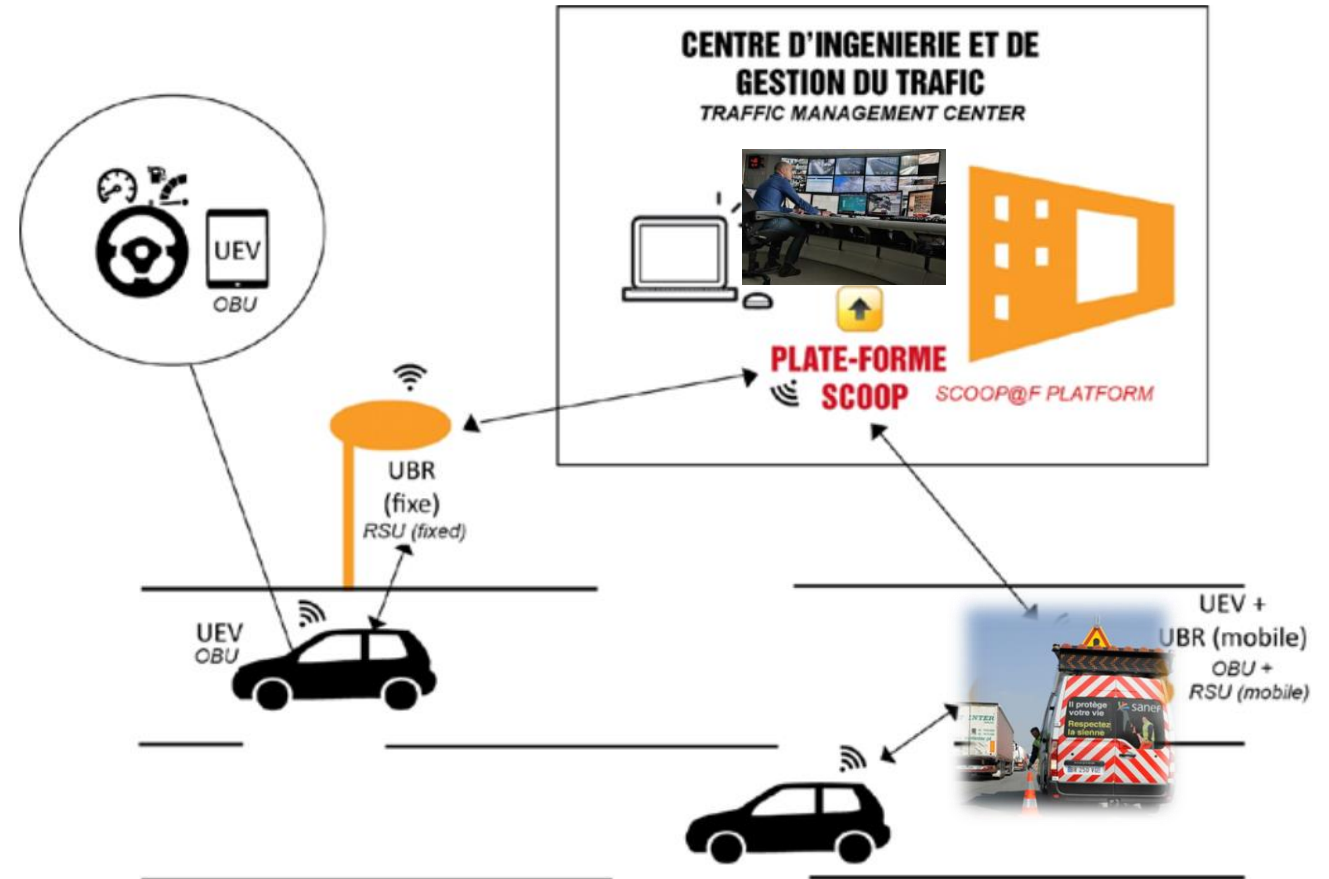
- Communication range

- 3-4 km (RSU at 30 m)
- ~1 km (RSU at 12m)

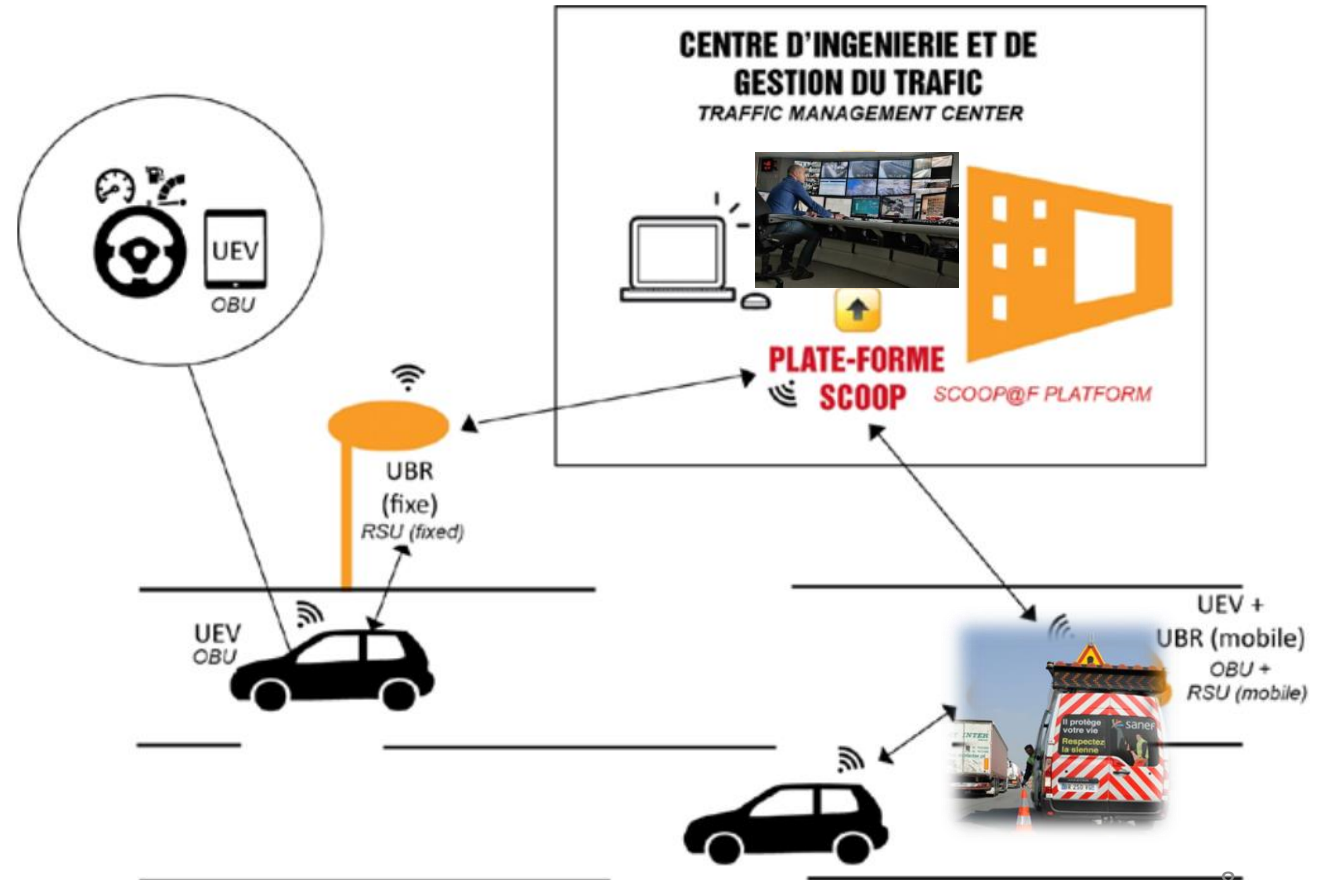
- Equipped vehicles

- 1 Renault Mégane (SCOOP)
- 20 service/operation vehicles (OBU after market)

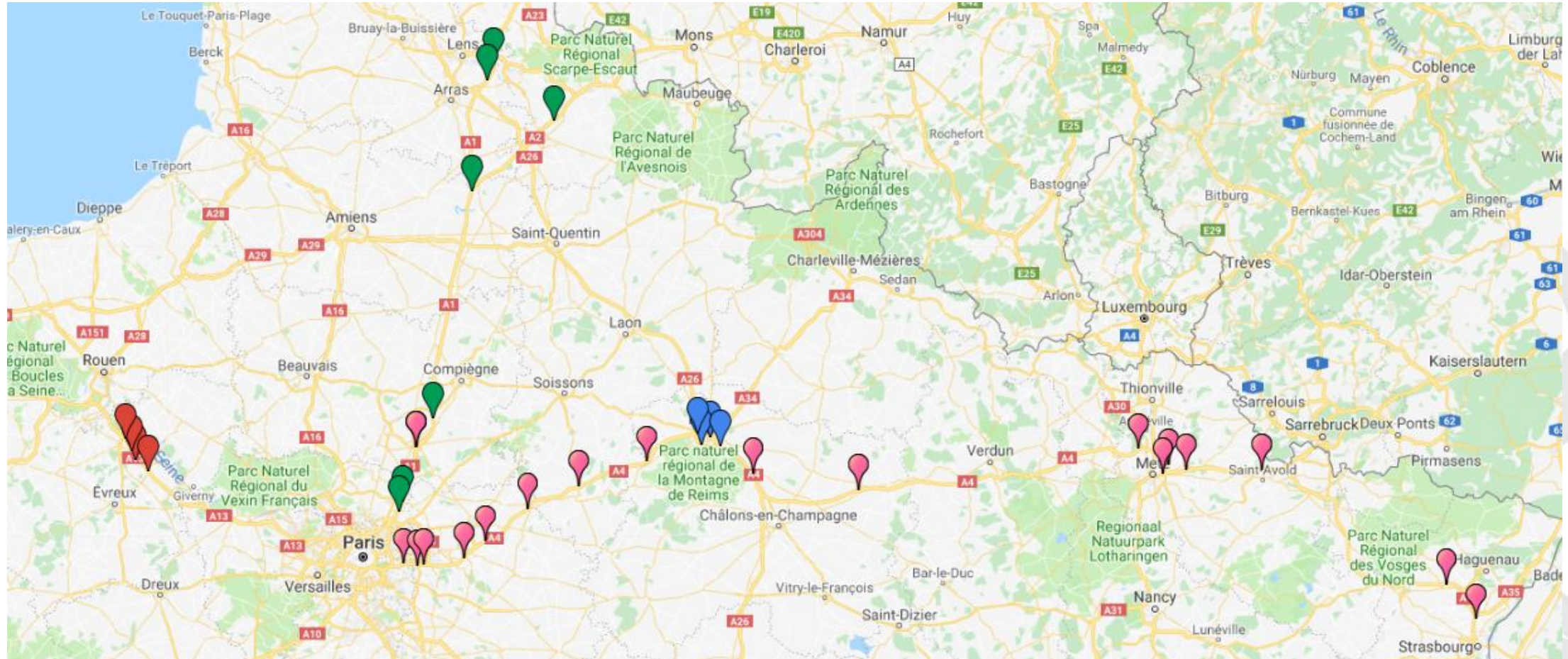
- Access to reliable event data from vehicle
- No intermediate: no additional costs
- Provision of direct information to drivers, at any place (no need for more VMS)
- Possibility to send accurate information on (even unplanned) road works
- Possibility to send information directly from road operators' vehicles intervening
- Direct link between road operators and vehicle



- A common tool for all road operators, developed within SCOOP
- That unifies the interfaces and functions between Traffic Management Centres and Road Side Units
- Controls all RSUs and road operators' OBUs (equipment status and events available on an HMI)
- Delivers Datex II files directly usable by the TMC
- Ensures fast transmission of information
- OpenSource and modular solution : can be linked to different components with other systems



Map of RSU deployments (33) on Sanef network



Hybrid communication concept

- Communication technologies
 - ITS-G5, based on 802,11p
 - Cellular networks (3G, 4G)
- Communication between ITS stations
 - Either Vehicle to Vehicle – V2V
 - Or Infrastructure to Vehicle – I2V or V2I
- Exchanges standardised messages
 - CAM (Cooperative Awareness Messages)
 - DENM (Decentralized Environmental Notification Messages)
 - POI (Point Of Interest)
 - IVI (In-Vehicle Information), etc.
- Security of data exchanges
 - PKI: Public Key Infrastructure



RSU: Road Side Unit



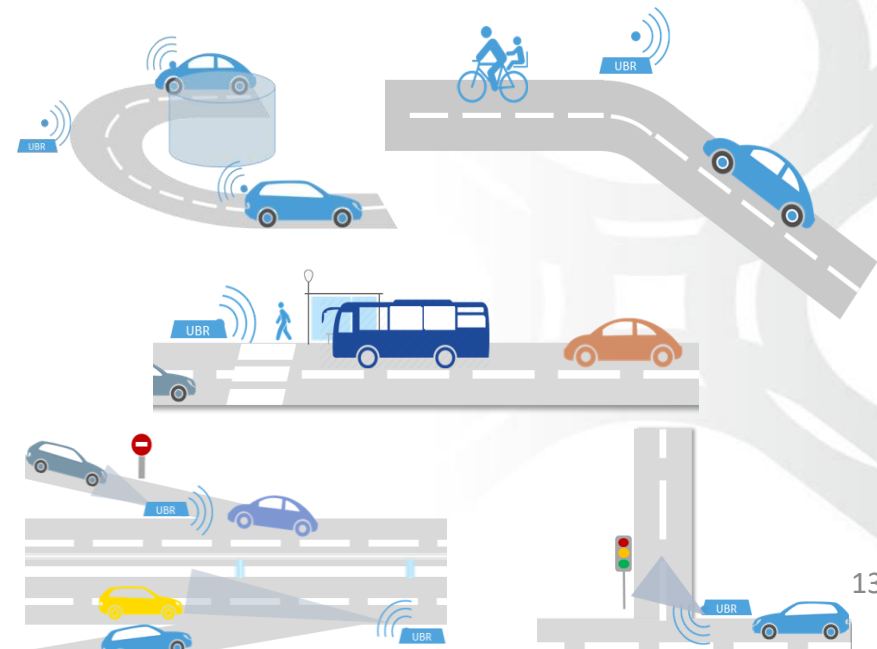
OBU: On-Board Unit

- Day 1 use cases
 - PVD Probe Vehicle Data (upstream):
 - Traffic data: speed, position, direction
 - Events automatically triggered by the vehicle or selected by the driver: accident, stopped vehicle, traffic jam, pedestrian/animal on the road, item/obstacle on the road, bad weather conditions, slippery road, etc.
 - For operation vehicles: salting in progress, patrolling vehicle, snow removal in progress
 - RWW Road Works Warning (downstream):
 - Planned road works, either fixed or mobile
 - HLW: Hazard Location Warning (downstream):
 - Accident, traffic jam, stopped vehicle
 - Pedestrian/animal on the road, obstacle, blocked road
 - Slippery road
 - Emergency breaking
 - Low visibility
 - Wrong way vehicle
 - Extreme weather conditions

- Day 1,5 use cases
 - TP Truck Parking:
 - Location and number of available parking places for trucks
 - Logistics and freight:
 - MCTO Multimodal Cargo Transport Optimisation *
 - Urban road networks:
 - GLOSA Green Light Optimal Speed Advisory *
 - IVI In Vehicle Information:
 - Dynamic speed limits
 - Advisory information (safety)
 - Electronic toll collection via ITS-G5

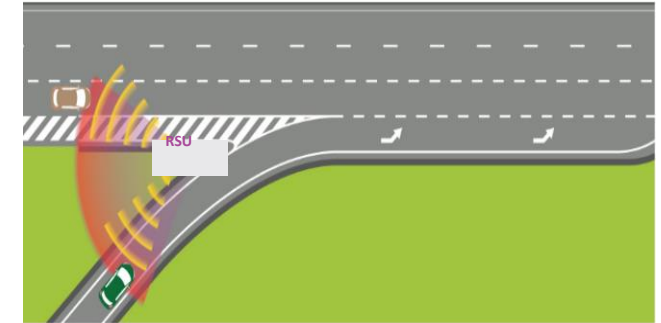
* Not implemented on Sanef network

- PAC V2X (Augmented Perception by V2X Cooperation)
- Extend the perception of vehicles by V2X cooperation, using improved RSU installed on complex sections
- Such as: motorway entry/exit, bus stations, toll plazas, road works zones, etc.

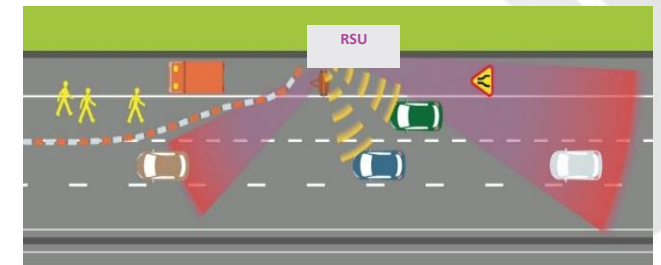


Collision avoidance

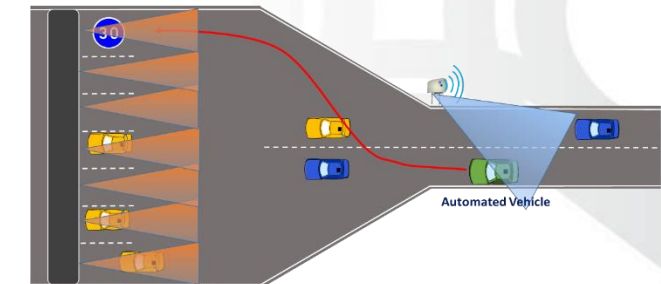
- Merging assistance on motorway entry ramps
- Recommended speed to avoid collisions
- Road works zones announcement
- Motorway tolling assist
- Broadcast by the RSU of useful information to vehicles
 - Announcement messages of detected objects: Collective Perception Messages
 - Itinerary and speed recommendation messages: Manoeuvre Coordination Messages
 - Tolling Announcement Message: tolling gate info, means of payment, speed profile, authorised vehicles



Merging assistance on entry ramps

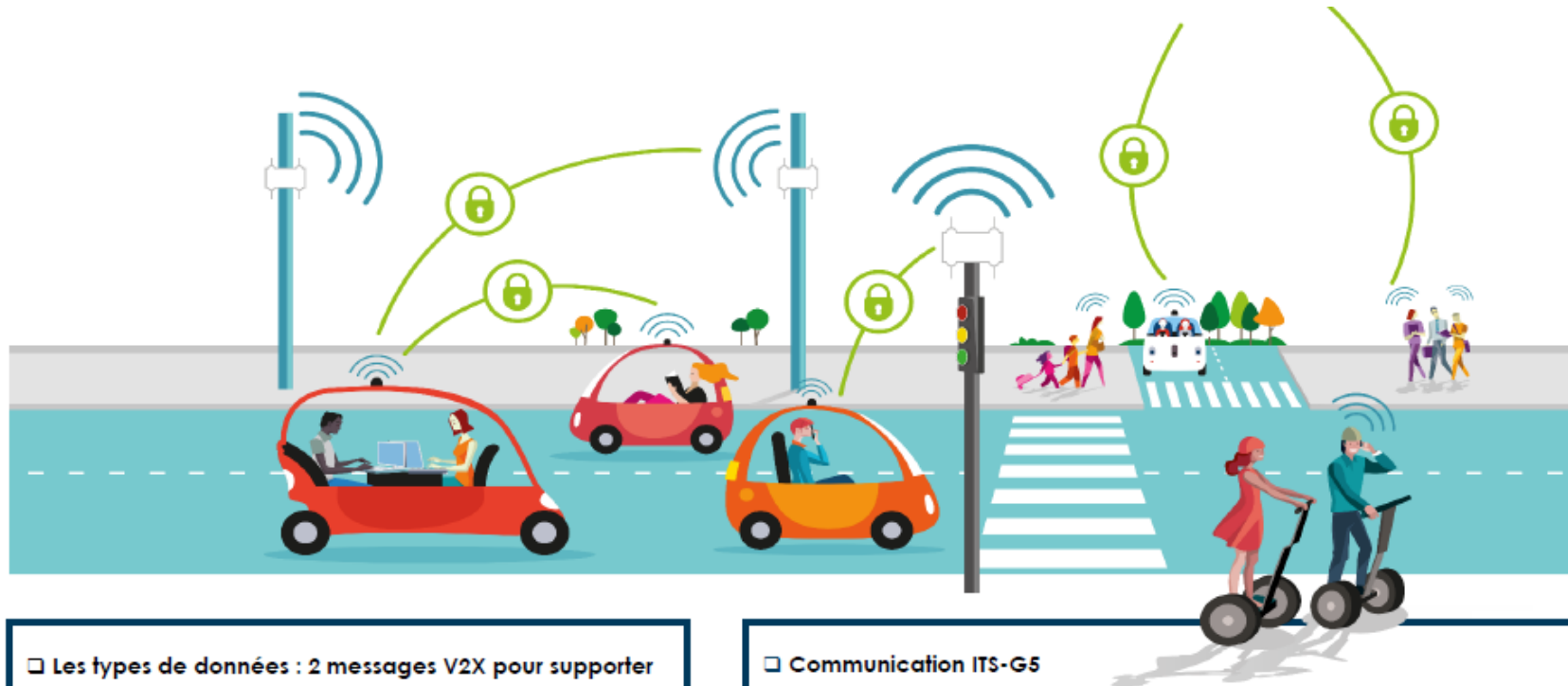


Road works zones announcement



Motorway tolling assist

Data security



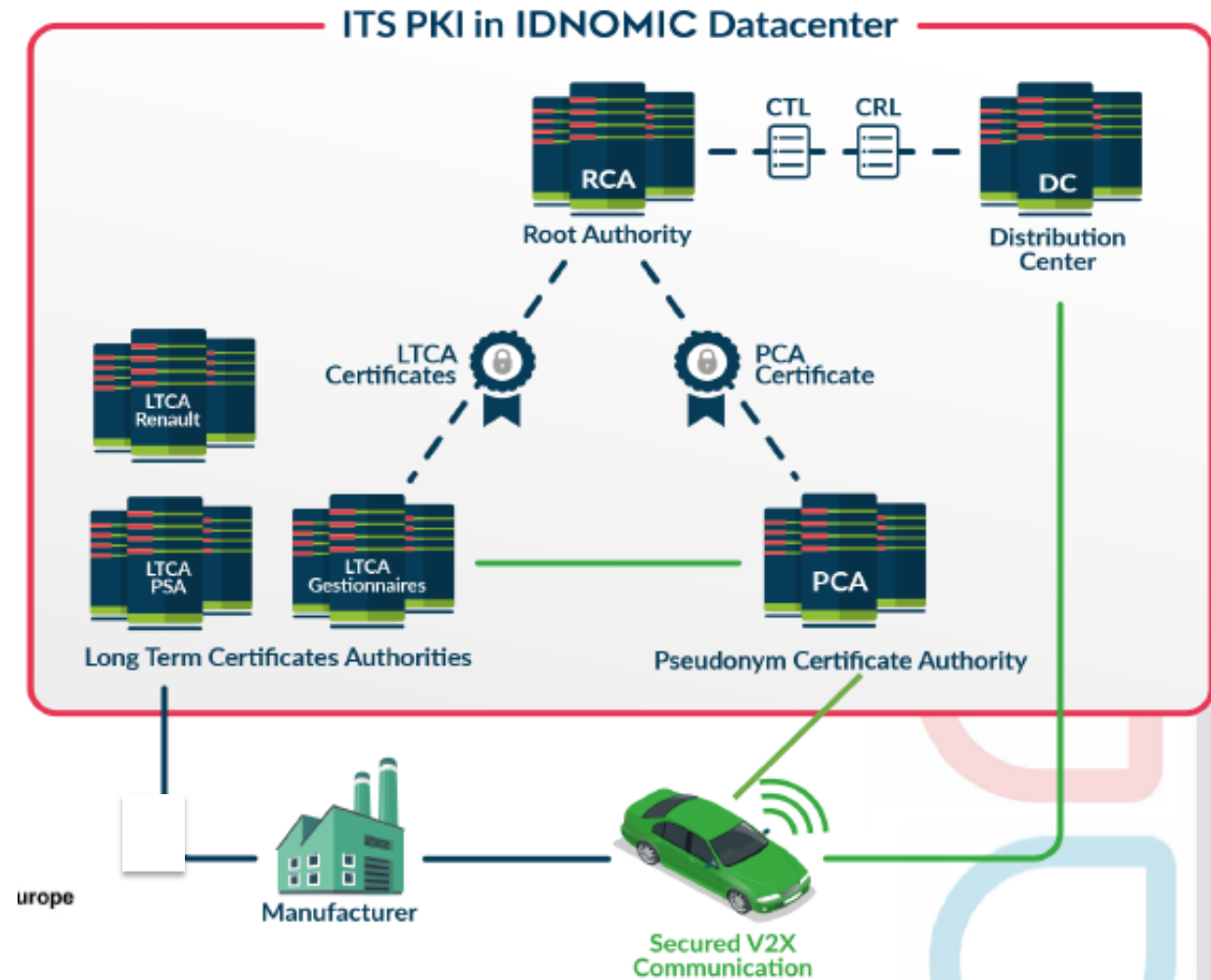
❑ Les types de données : 2 messages V2X pour supporter les cas d'usages SCOP@F:

- ❑ CAM Cooperative Awareness Message
- ❑ DENM Decentralized Environmental Notification Message

❑ Communication ITS-G5

- ❑ Diffusion sans acquittement, données véhicule (vitesse, position, trajectoire), données dynamiques de perception de l'environnement, etc...
- ❑ Les messages CAM, DENM sont signés conformément au standard ETSI 103 097 v1.2.1
- ❑ Messages anonymes sécurisés
- ❑ Pseudonymes délivrés par la PKI via UBRs ou pré-téléchargés

PKI SCOOP architecture



In collaboration with the ISE project (IRT-SystemX)



C-ITS delegated act

"Today is a good day for the safety of European citizens on our roads! I am glad the Members of the European Parliament voted in favour of our proposal. From day one the new EU-wide rules for Cooperative Intelligent Transport Systems will save lives, make traffic more efficient and driving more comfortable. The mass deployment of intelligent transport systems will be cheap, simple and effective. We are also open for any new technology once it is tested and working! This decision will not only significantly contribute to achieving our goals for road safety, but it is also an important stepping stone towards connected and automated mobility."

Violeta Bulc, EU Commissioner for Transport

Thanks for your attention

Any question ?

Contact

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