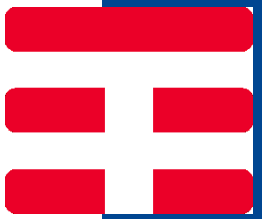


GRUPPO TIM

AEIT Automotive 2019

Torino, July 3, 2019

Smart Mobility: new roles for Telcos in the emergence of electric and autonomous vehicles

Gianluca Zaffiro, Giuseppe Marone
TIM - TELECOM ITALIA S.p.A.

TIM

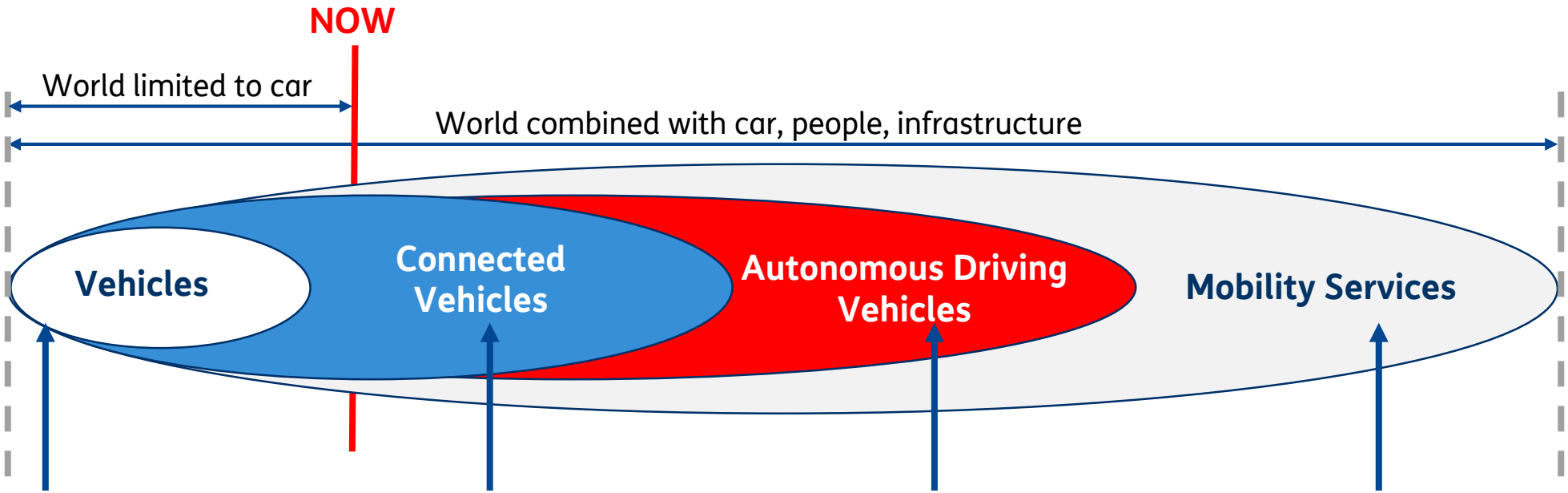
5G EVE

Agenda

- Setting a common ground: where all cars are going to?
- Electric mobility: Telcos benchmark & opportunities
- Connected & autonomous cars: future Telco solutions for cybersecurity
- Take aways and possible next steps

Setting a common ground: where all cars are going to?

There is an (r)evolution from the «car» to the «car as a mobility service»



The evolution of the vehicle as a hardware

- Electric car
- Hybrid car
- Fuel cell car

Connected car using cloud services

- Infotainment
- Telematics
- Preventive maintenance
- Geofencing, etc.

Advanced driving assistant system

- Cruise control
- Collision prevention
- Automatic parking
- Hands-off driving

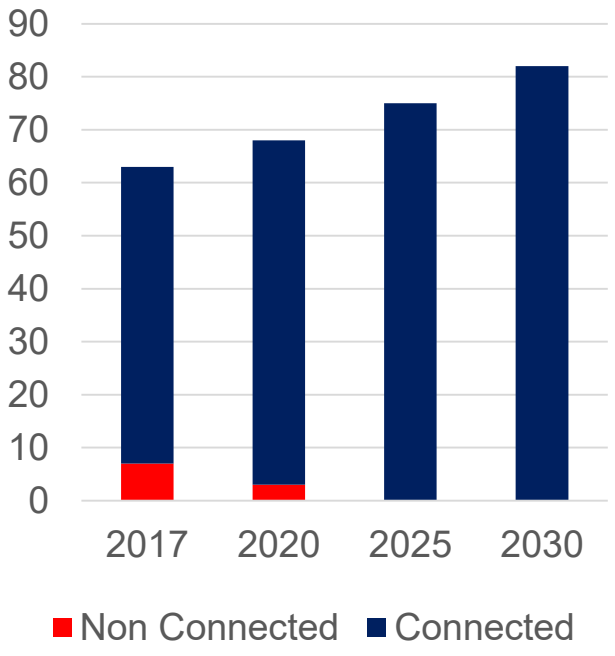
Fusion of social infrastructure and the car

- Robot taxi
- Car sharing services
- On-demand multi-mobile services

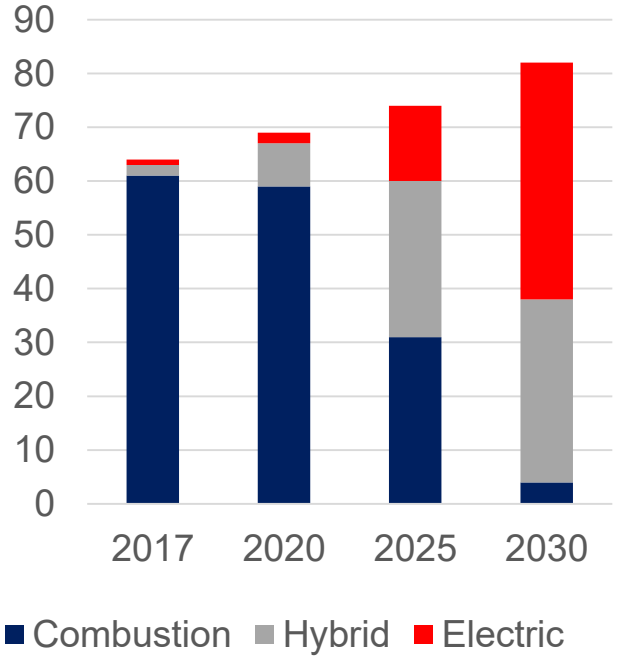
Source: adapted from NISSAN new strategy, 11-2016

The cars of the future are connected (tomorrow), electric (sooner) and autonomous (later)

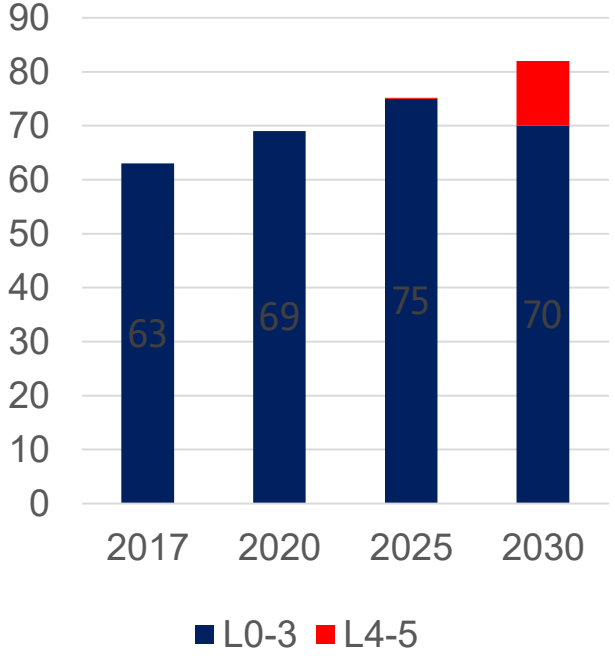
Connected Cars
(new unit sales in millions)



Electric Cars
(new unit sales in millions)



Autonomous Cars
(new unit sales in millions)



Source: adapted from Strategy&, PwC, "The 2017 Strategy& Digital Auto Report," 2017

Electric mobility: Telcos benchmark & opportunities

AT&T offers an IoT solution to ease Schneider Electric e-charging station servic

- **AT&T** and **Schneider Electric** have developed a proof of concept solution allowing facility managers and drivers to access data from Electric Vehicle Charging (EVC) systems. This enables intelligent load distribution and effective energy access management

Key features:

The proof of concept uses **AT&T Internet of Things (IoT) solutions** to wirelessly connect **Schneider Electric's EVlink charging stations** to an open, flexible cloud platform that can integrate with any back-end system.

Solution components are:

- **AT&T Flow Designer** and **AT&T M2X:** EVC controller data aggregation, presentation, alerting, and and functioning control
- **AT&T Global SIM** and **AT&T Control Center**: global EVC controller data transmission to back-end systems and mobile apps, centralized connected device deployment and management
- **Mobile Apps**: EVC station authentication, localization, and charging support

Market: EVC service providers, energy utilities, public administration / municipalities

Source: About AT&T

NTT DATA is offering the Open Charging Station Controller (OCC) for EVs

- The OCC is a charging point management system that enables the charging infrastructure of different manufacturers to be used with a uniform and intuitive user interface

Key features:

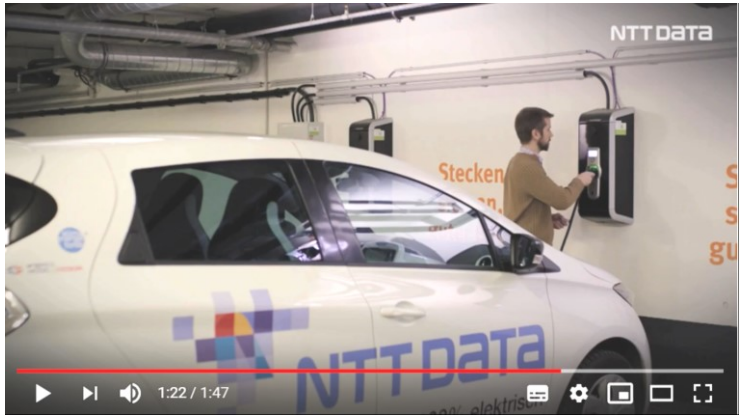
OCC is an **open and vendor-independent management system** that serves as an administration platform for e-charging points and e-mobility services

- Its user interface offers **user authentication options** such as **SMS**, **QR codes and RFID cards**
- It handles **reservations, evaluations** and **load management**

EVC station operators can easily offer third-party providers the possibility to charge electric vehicles in a platform called "**intercharge**"

The "intercharge" platform is certified by **Hubject GmbH**, a joint venture established by 6 car manufacturers and major electric power companies in Germany

Market: EVC service providers, energy utilities, public administration / municipalities



Certified eRoaming System
HUBJECT

Source: NTT DATA

Deutsche Telekom developing a nationwide network of EVC stations in Germany

- DT on November 2017 announced a plan to use 12,000 of its about 380,000 cabinets around Germany to develop an EVC network, to be completed by 2020. On November 2018 the first charging station was opened in Darmstadt. At present in Germany there are already 10,800 public charge points.

Key features:

The suitable boxes are already fitted with a power supply and back-up and would need only a small modification to allow electric cars access. The plan will create:

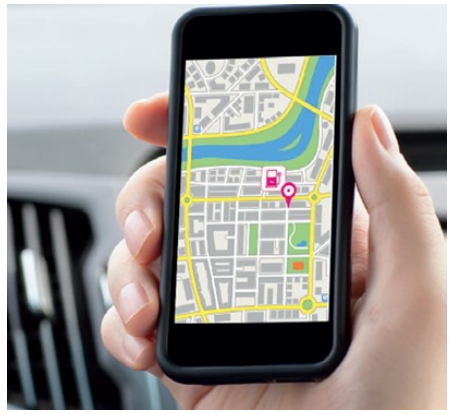
- **500** distribution cabinets with **100 kW fast-charging stations,** located in DT central offices;
- **11,500** level 2 charge points capable of a charge rate **up to 22 kW**

DT exploits existing internal assets:

- **PASM** (Power & Air Solutions) Gmbh, an electric power and distribution company
- **Comfort Charge** Gmbh, a new company responsible for the acquisition of real estate to build, operate and market the charging stations

Separately DT is also offering a solution that provides access to an international network of charging locations, avoiding the "range anxiety"

Market: EV fleets and private owners



Source: Telecompaper , Electrek , electrive , B2B Europe Telekom

KT installed EVC stations, including for the Mercedes brand EQ, and is testing V2G

- **KT has installed 3,656 chargers for electric cars**, in a rush with four other competitors licensed by the Korean government to provide charging stations. KT is also codeveloping EVC stations with Mercedes-Benz Korea for its electric sub-brand EQ
- KT is demonstrating a **vehicle-to-grid (V2G) business model** to supply power in case of emergencies

Key features:

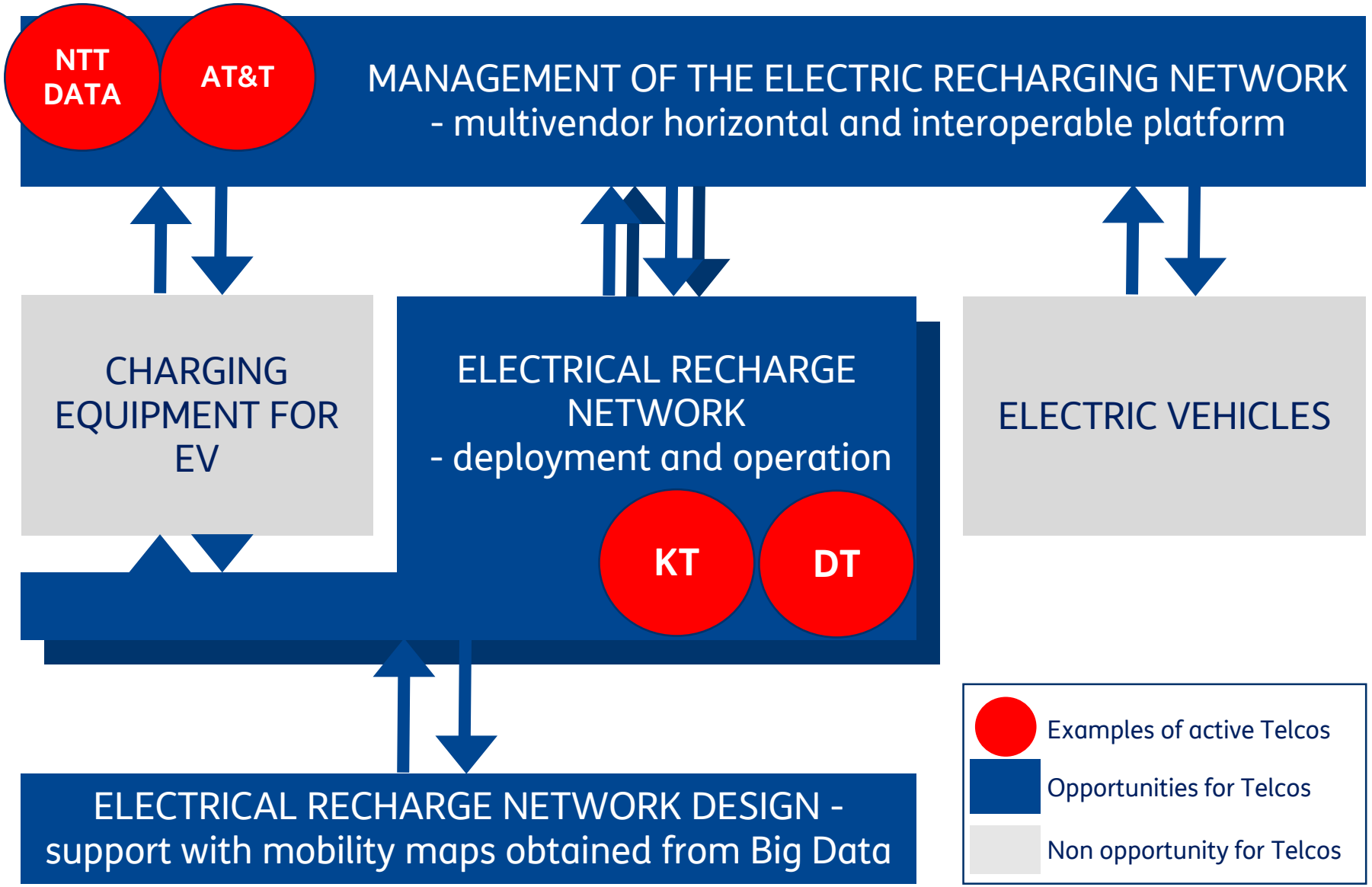
The government has established 8,457 EVC points in parking lots for apartments and public facilities nationwide: KT's contribution accounts for 43 percent of the total.

The V2G test bed, set in a KT building in Bundang, is **called electric vehicle-demand response (EV-DR), and enable EVs to be utilized as supplementary power supplies** in case of emergency such as blackout.

Market: EV fleet/private owners, energy utilities, public administration /municipalities

Source: KoreanTimes
PulseNews

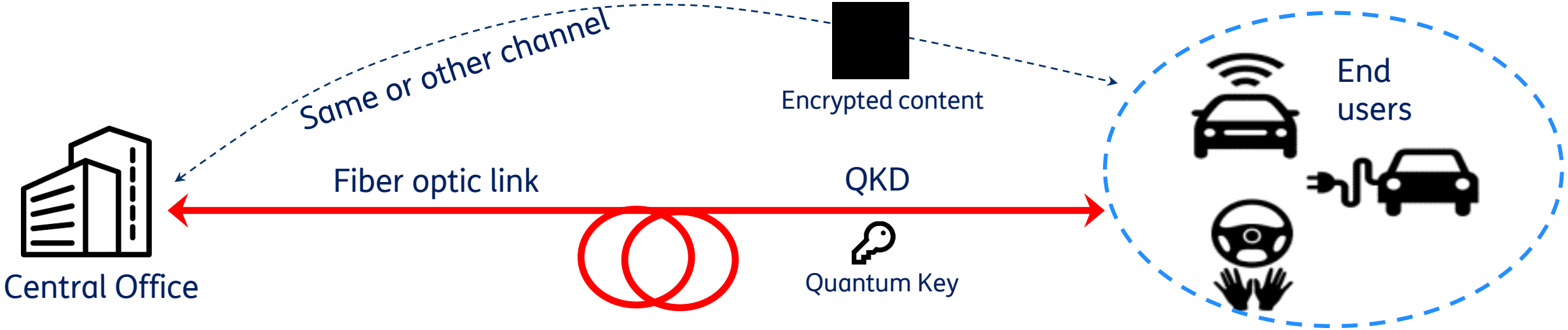
Telco opportunities in the scenario of spread of electric vehicles



Connected & autonomous cars: future Telco solutions for cybersecurity

Fiber optics can deliver quantum keys to update car SW in a future proof secure way

- Connected & autonomous cars might be subjected to cyber attacks, particularly when connected to stations for software update etc.. Terroristic groups might take control of autonomous drive cars – malicious users might install malware to steal confidential and personal data
- **The use of robust cryptographic techniques is of primary importance** to ensure secure communication between cars and central offices/gateways in charge of software update. The global **quantum cryptography market** is expected to reach **USD 506 million by 2023**



- Many Telcos, eg.: **BT**, **DT**, **Telefonica**, **NTT**, **SKT**, are considering the use of **Quantum Key Distribution (QKD)** to distribute in an inherently secure way cryptographic keys to encode confidential data
- **SK Telecom** announced to launch soon its **Quantum Security Gateway** solution to prevent hacking in self-driving cars. **SK Telecom** recently bought **half the stake (65M$)** of Swiss-based quantum solution provider **ID Quantique.**

Source: marketsandmarkets.com
BT on computerweekly.com; DT on IDQuantique.com; Telefonica; NTT on uqcc.org; SKT on IDquantique.com
SKT on ZDNet
SKT on IDquantique.com

Take aways and possible next steps

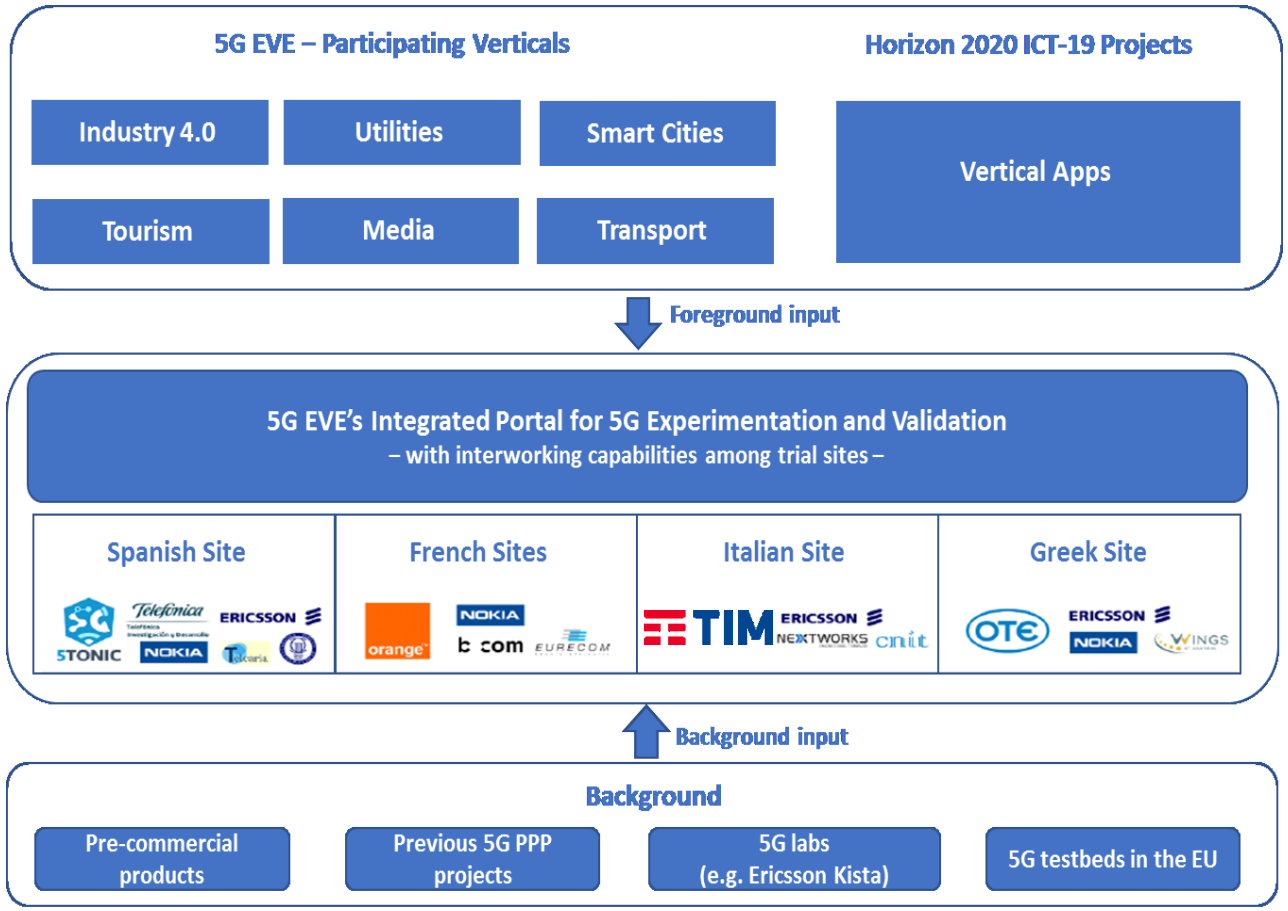
Take aways and possible next steps

- The evolving car scenario is transforming vehicles in high end computing devices that need to be electrically recharged and securely updated.
- In this presentation we presented some use cases of Telcos already working on these challenges.
- From the Telcos benchmarking results, the possible next steps are:
  1. Analysing the opportunity to offer an **«interworking» platform for EVC**, in order to increase the user experience on electric charging, creating a solution to manage recharging, and offering a platform for EVC providers for universal / cross-provider authentication, billing, localization, scheduling, navigation
  2. Verify what is the Italian feasibility to leverage on cabinet / central office to **deliver EVC services**, i.e.: by checking power installed at these facilities, the implications of creating partnerships to resell power
  3. Address the opportunity to offer **anonymized heat maps** based on people/car mobility to support EVC network design and planning
  4. Exploring **quantum key distribution** in the cybersecurity car scenario by setting a trial, and identifying all contexts where this technique can be beneficial

EU H2020 - 5G EVE project (2017-2021)

5G EVE partners

5G EVE Overall Objectives

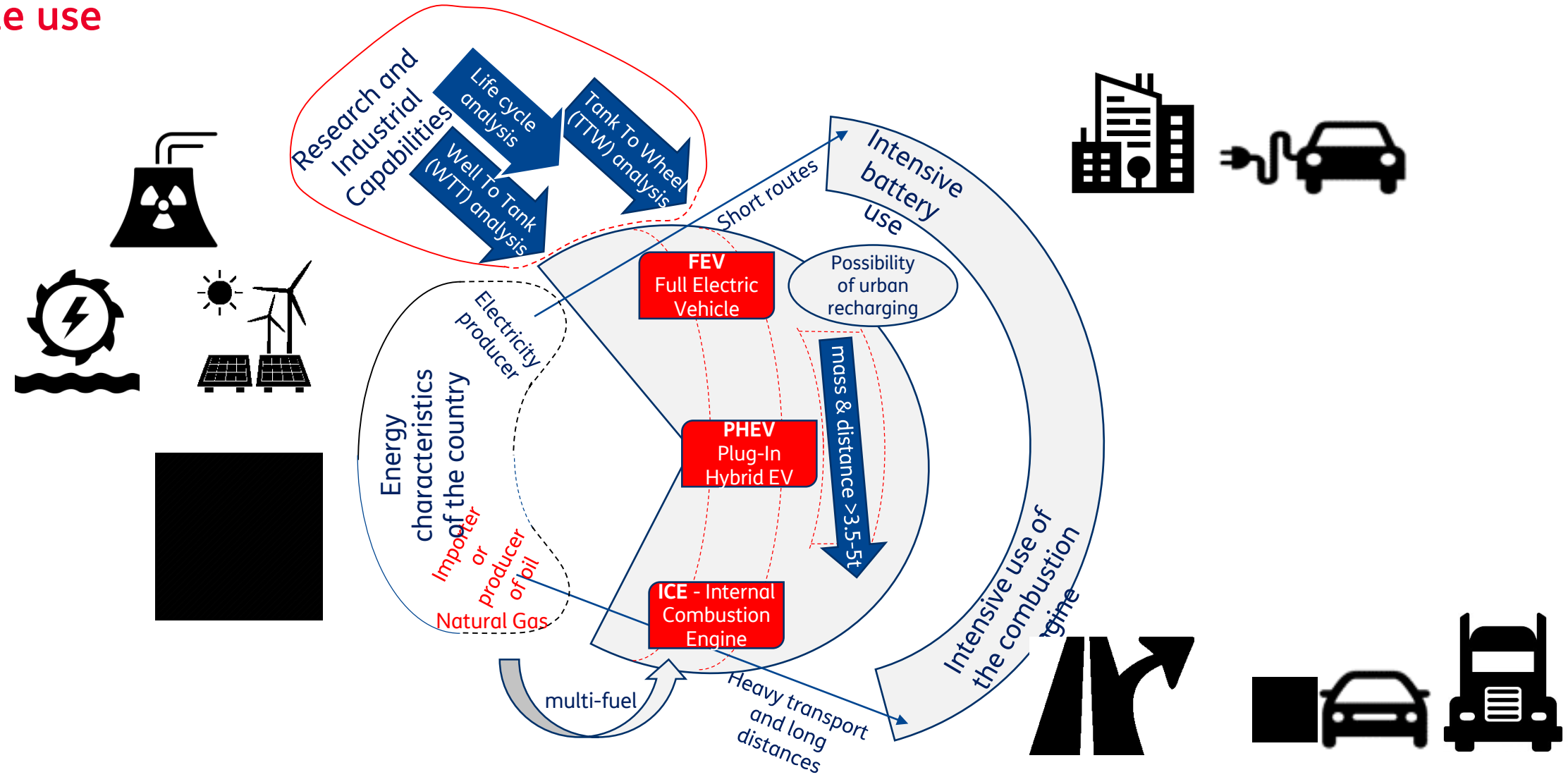


This work was partly funded by the European Commission under the European Union's Horizon 2020 program – grant agreement number 815074 (5G EVE project). The paper solely reflects the views of the authors. The Commission is not responsible for the contents of this paper or any use made thereof.

Thank you

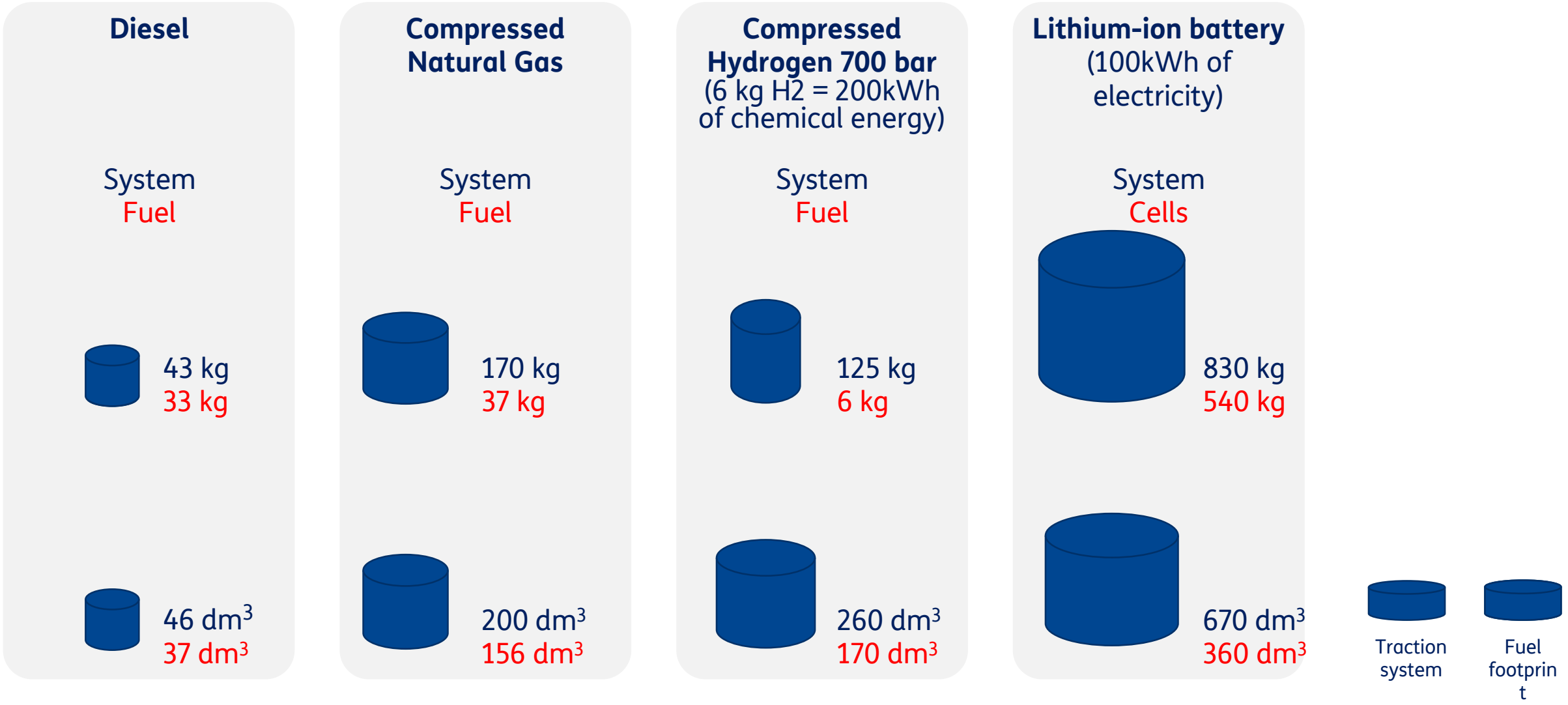
Back up

Trade-off between different motorized transport solutions: a future that will see electric vehicles, hybrid, and internal combustion still for a long time depending on the vehicle use



Source: B. Dalla Chiara and M. Pellicelli, "Sustainable road transport from the energy and modern society points of view: Perspectives for the automotive industry and production," Journal of Cleaner Production 133, 1283-1301 2016

Comparison of combustion and battery mobility weight and volume of energy storage systems required for 500 km of travel.

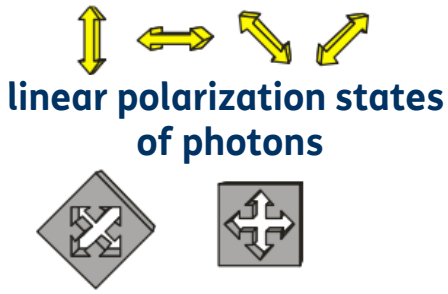


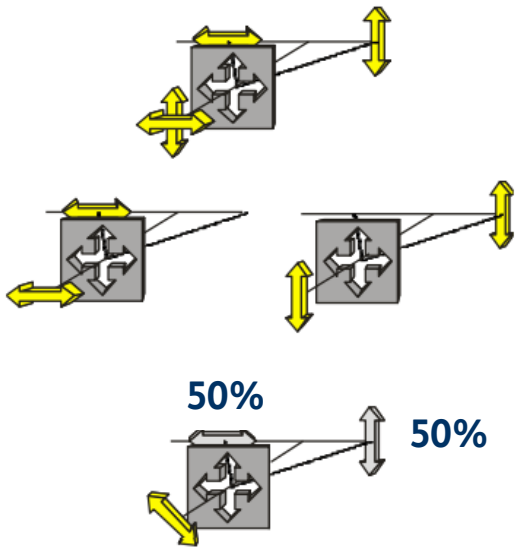
Source: U. Eberle, "Hydrogen & Batteries for Automotive Applications. Two Competing or Two Complementary Technologies?" International Energy Agency HIA Expert Meeting, Heidelberg, May 7, 2012, courtesy of M. Baricco, University of Turin

Quantum Key Distribution (QKD): what is it?

- QKD is a technology for **exchanging cryptographic keys** between remote users in a secure way
- Based on a fundamental quantum mechanics principle (Heisenberg uncertainty principle): at microscopic level it is impossible to observe a variable without perturbing itself
- Therefore, by checking the state of a quantum variable it is possible to ascertain if someone tried to observe it

1. The information (**encoding key**) is encoded in some microscopic variable: for fiber optics communications the key is usually **encoded in the state of polarization of photons**
2. Special protocols are used (e.g. BB84) to exchange keys on the basis of an acceptable error probability (QBER, Quantum Bit Error Rate)
3. If an eavesdropper in the middle of the chain tries to capture the keys, its presence is revealed by an increase of the QBER and the keys are retransmitted
4. Once the keys are exchanged on the quantum channels, the **cypher text can be sent over a standard channel** and decoded at end points

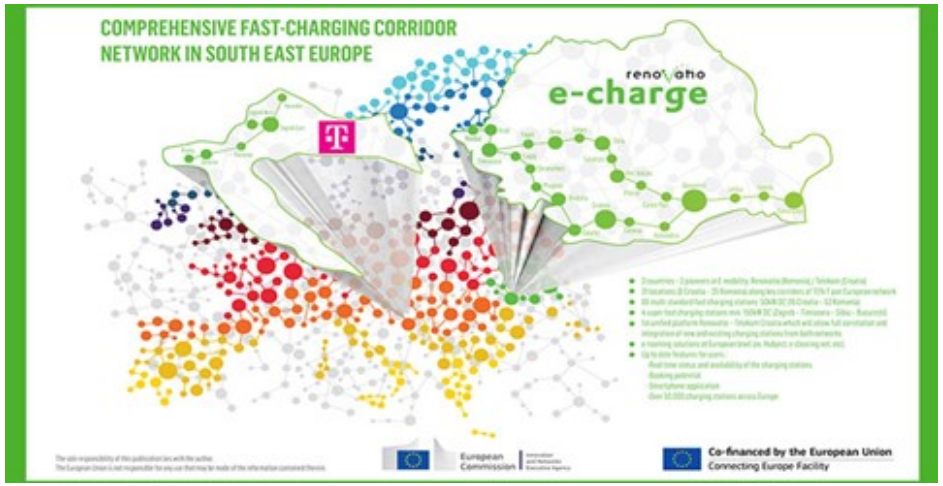




Hrvatski Telekom joins SEE e-chargers network

By Dec 2018 Hrvatski Telekom (Croazia) has installed 8 fast electric vehicle (EV) charging stations, the first at the ROX gas station - the charging time is only 20 minutes and the use is fully digital. Hrvatski Telekom is a DT's subsidiary (51% stake hold)

- The project aims to create e-chargers network and help development of green e-mobility corridors in Central and South East Europe (SEE).
- The project joined by Hrvatski Telekom and retail Kaufland Croatia, is part of the EUR 4.3 million project (2016-EU-TMC-0344) **Comprehensive fast-charging corridor network in South East Europe**, co-financed by the European Union.



- The plan under the project is to open a total of **73 fast electric chargers, including four ultra-fast ones,** at 31 locations in Croatia and Romania. The project is designed to last until the end of 2020.
- In Croatia, it's planned to install 16 fast and 1 ultra-fast e-charging station on 6 locations at least, mostly around shopping centers, gas stations and other spots with easy access to the motorways.
- The largest regional network of e-chargers **Puni.hr** currently has 105 chargers across Croatia, in 70 towns and provides 150 charging spots.

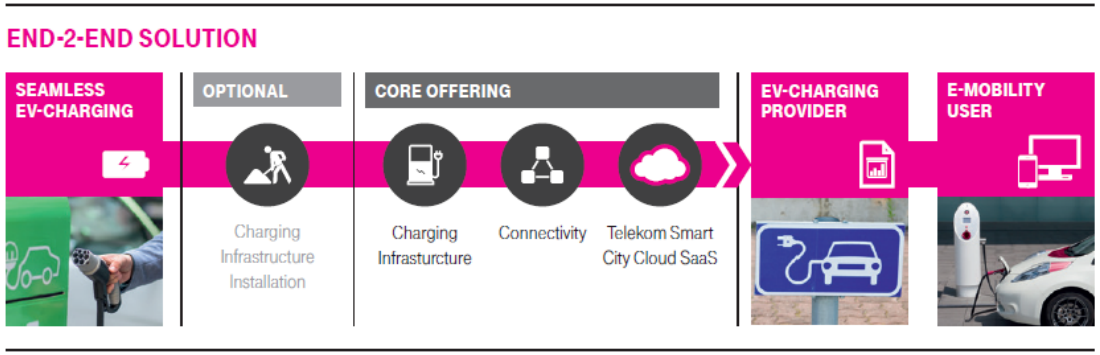
Source: Balkan HT

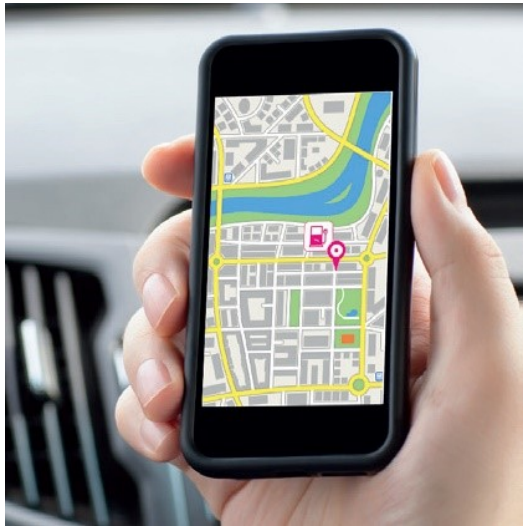
Deutsche Telekom - Smart Electric vehicle charging

Service description: it combines charging infrastructure with easy to use software that helps electric vehicle (EV) drivers find, book and pay for electric vehicle charging

Key features:

- Cloud based ICT management platform that delivers information on the availability of infrastructure to EV drivers in real-time
- Add benefits for EV charging service providers: a single solution from infrastructure to software to start their business, attract potential customers and ensure proper invoicing
- Increase benefits for parking lot owners: offer new charging services and benefit from positioning their location on interactive maps
- Improve the experience for EV drivers: easy to use authentication and initiation of the charging session simplifies charging
- Automated transaction tracking and billing increases transparency on the energy cost
- Eliminate “range anxiety”: a single solution that provides access to an international network of charging locations (more than 10,000)





Partnership: DT has established strategic partnerships to bring charging service information to the EV Driver

Market: EV charging service providers, energy utilities, public administration and municipalities

Source: B2B Europe Telekom