

Data Architecture for 6G



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Agenda

- Sensing Data Architecture Overview
- Monetization of 6G Data

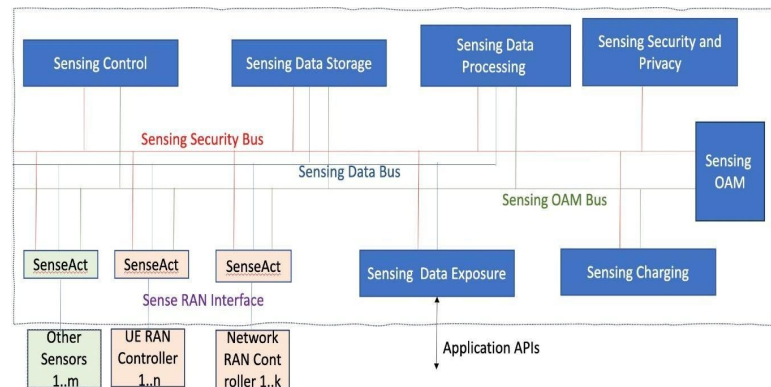
Sensing Data Architecture for 6G

● Problem Statement

- Current 5G standards do not consider data as a first class citizen since they are mainly message-oriented. Going forward, use cases such as URLLC, mMTC, eMBB, as well as immersive communications, semantic communications, etc., will generate huge amounts of data that need to be managed and from which value will have to be generated.
- In particular, given the eventual integration of sensing and communications, management of data from various types of sensors, i.e., sensing data, becomes crucial.
- Indeed, addition of a separate Data Plane in 6G along with User Plane and Management Plane- will help operators monetize the collected data and enhance their revenue

● Proposed Technical Solution

- Sensing Data Architecture for 6G that can integrate data from 3GPP and non-3GPP sensors
- Will permit the in-network processing of data close to the point of generation
- Will usher in the promise of “AI-Native” 6G



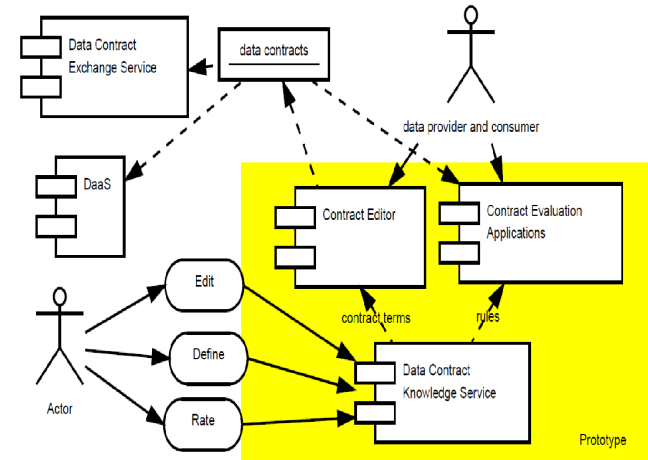
Data Monetization

● Problem Statement

- 6G is expected to be data-oriented. That is, it will involve the transmission, distribution and usage of huge amounts of data generated by sensors of all kinds. Effective value generation from this data would require a data monetization approach that will incentivize all the parties concerned, such as data generators, data distributors, 3rd party service providers and data consumers.
- In particular, data-driven business model innovation is needed to create business value from data, incentivize the growth of 6G, and generated assured monetary value for all stakeholders

● Proposed Technical Solution

- Data Analytics platform that will provide the following: data capture, interpretation, analysis, and visualization from any form and from any type of sources; should move from descriptive analytics through predictive analytics to prescriptive analytics
- Automated modelling of the following: Data as a Service (DaaS); Information as a Service— building on the collected data; Answers as a Service, using GenAI, to provide answers to user queries based on the collected data
- Modelling the 6G network as a Data Marketplace and defining data contracts for it



Thank you !



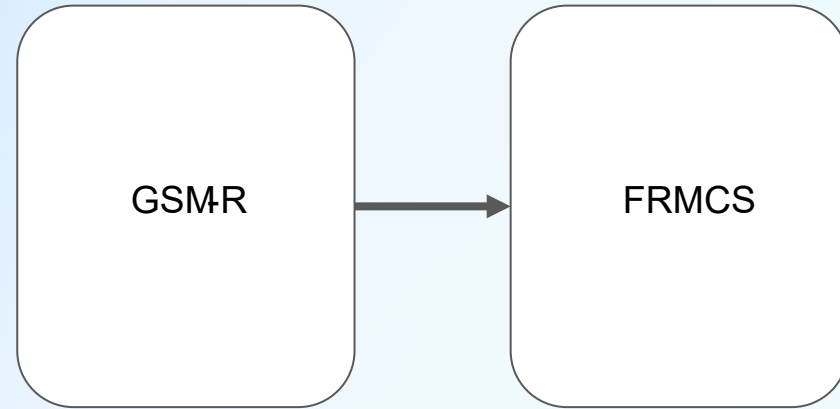
Future Railway Mobile Communications system (FRMCS)



FRMCS

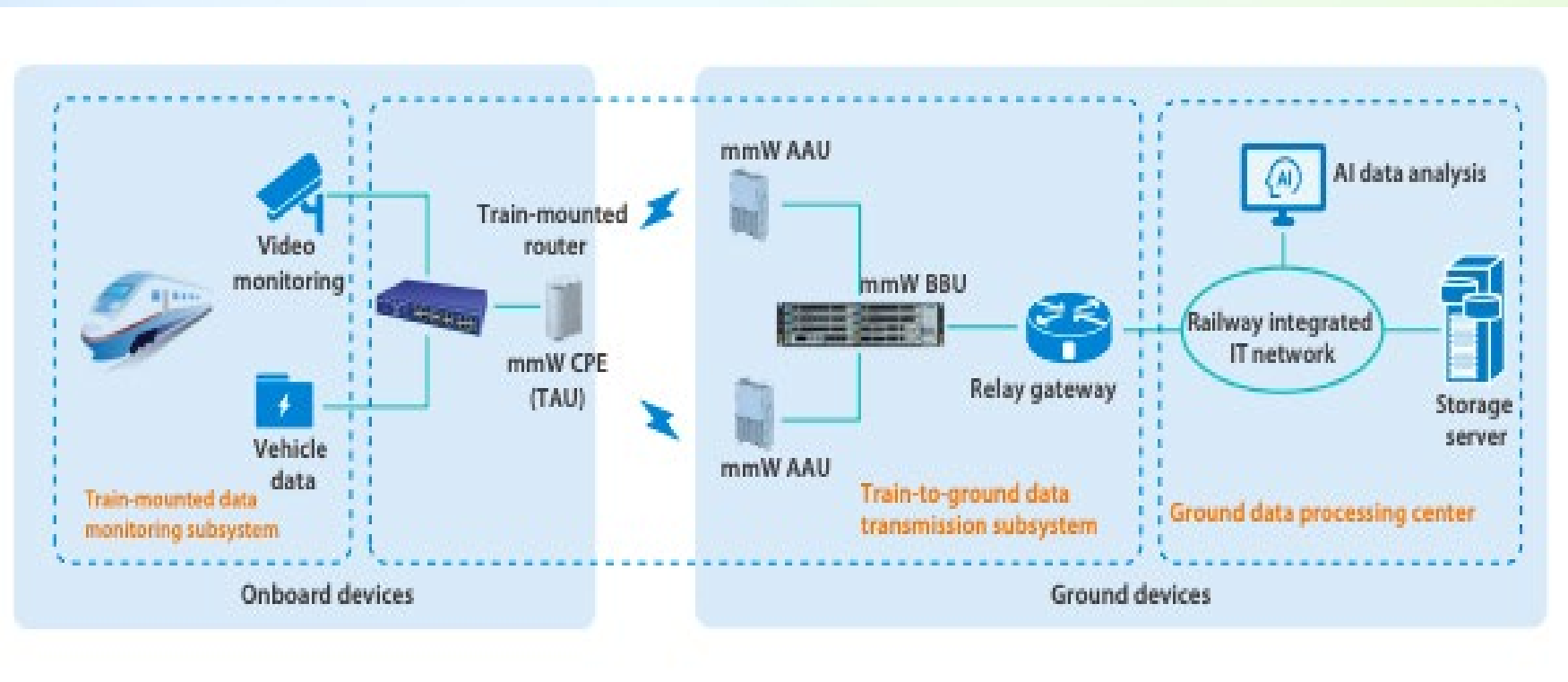
Migration from GSM-R to FRMCS
2028-2035 (Europe)

Projects: 5G RACOM, 5G Rail, R2 Dato,
Morane 2





FRMCS mmwave communications



source:<https://www.zte.com.cn/>

Focus of FRMCS

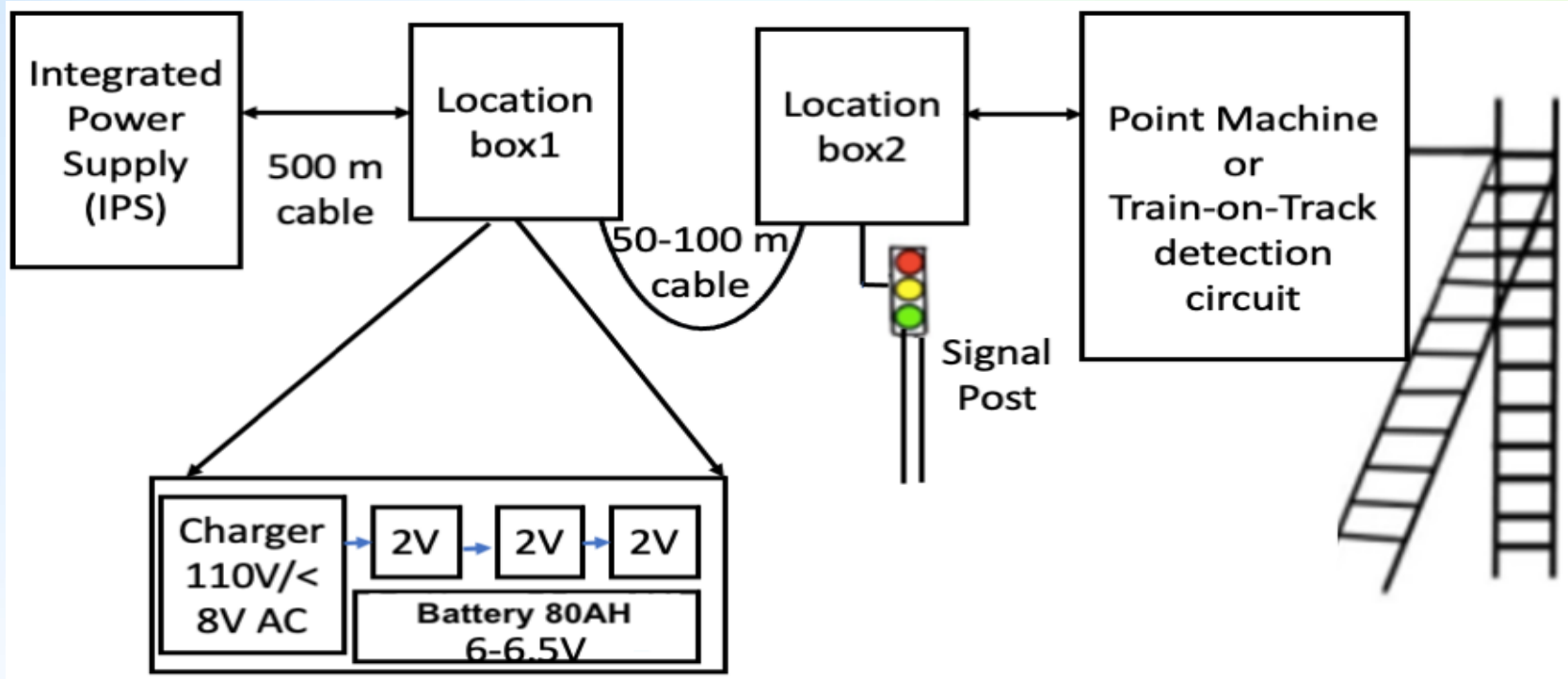
- Enhanced security of the passengers in train using CCTV.
- Millimeter wave communication for high data rate within train.
- Satellite communication for underserved areas.
- Automated Train operation

Signalling– Safety of the train, Efficient operations of railways

Communication- Passenger safety, Mobile broadband connectivity, long term maintenance data transfer.

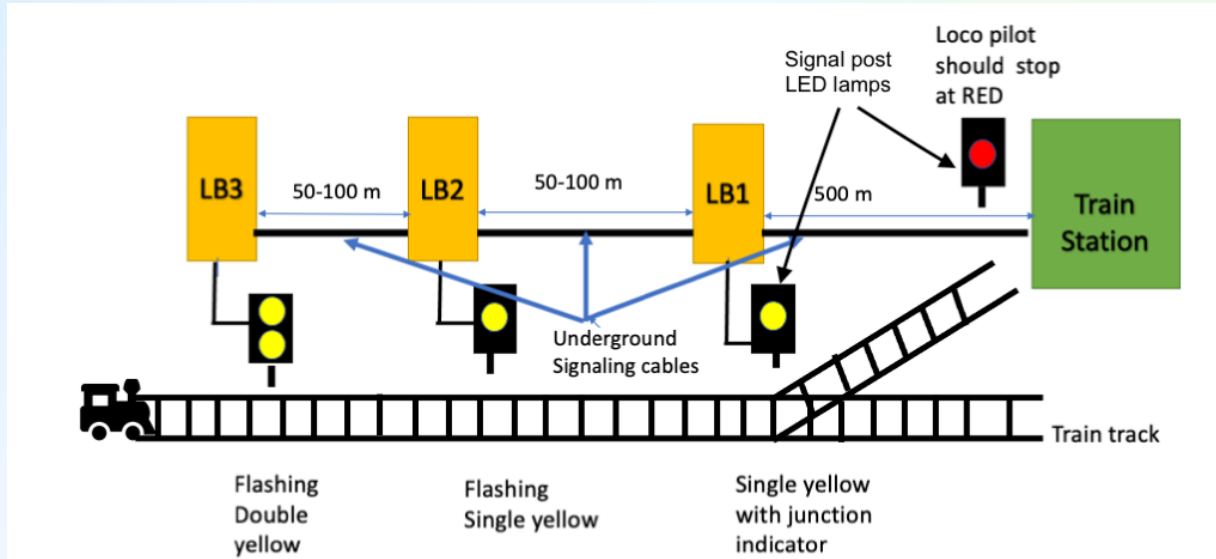


FRMCS for signalling assets monitoring





FRMCS and ML for signalling assets monitoring



R. Vijay, G. Prasad, Y. Huo, S. Sm and P. Tv, "Measurement-based Condition Monitoring of Railway Signaling Cables," *2021 IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (SmartGridComm)*, Aachen, Germany, 2021, pp. 33-38, doi: 10.1109/SmartGridComm51999.2021.9632301

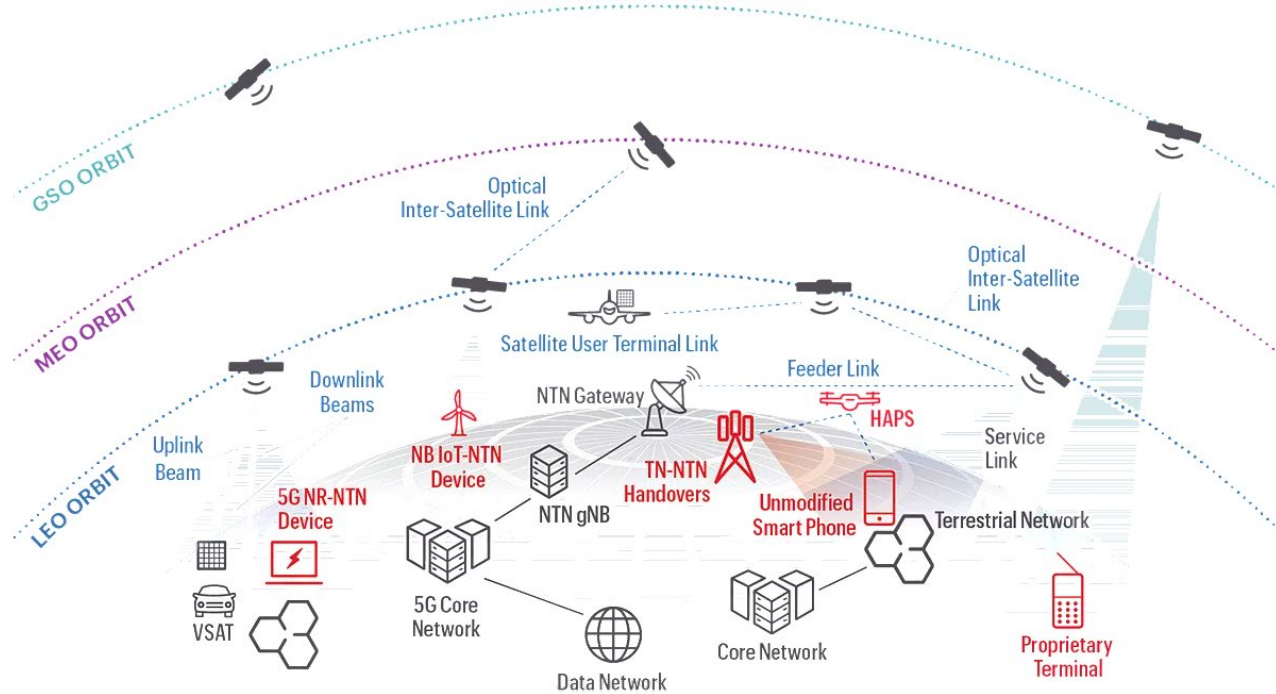
Y. Huo, G. Prasad, L. Lampe, V. C. M. Leung, R. Vijay and T. Prabhakar, "Measurement Aided Training of Machine Learning Techniques for Fault Detection Using PLC Signals," *2021 IEEE International Symposium on Power Line Communications and its Applications (ISPLC)*, Aachen, Germany, 2021, pp. 78-83

Non terrestrial networks



Non Terrestrial Networks (NTN)

- Low Earth Orbit (LEO) Satellites
- Medium Earth Orbit (MEO) Satellites
- Geostationary Earth Orbit (GEO) Satellites
- High Altitude platforms (HAPS)
- Drones
- Disaster management networks
- Resilient networks to mitigate interference



Non Terrestrial Network with multi tier satellites, High altitude platform(HAPS), and drones



FRMCS mmwave communications with NTN

