



DETERMINISTIC6G

DETERMINISTIC6G – a 6G architecture for deterministic communication

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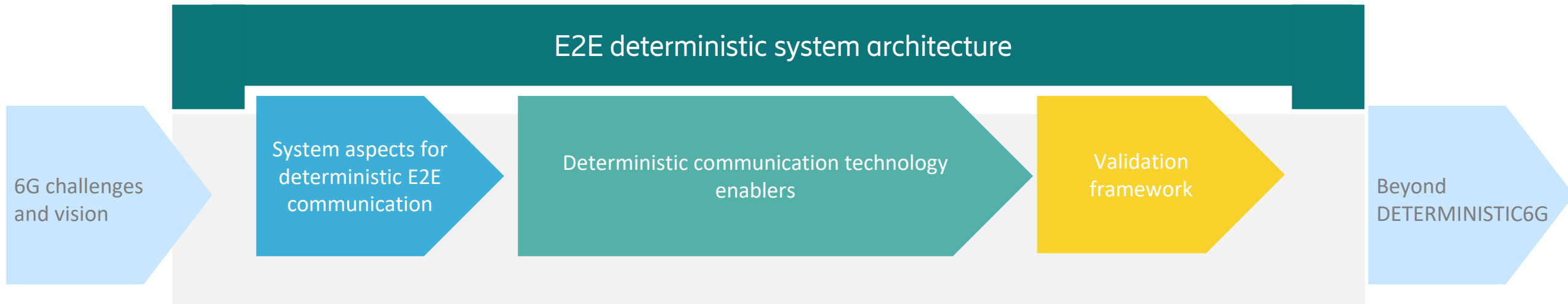
The 6G series workshop by Hexa-X and Hexa-X-II
EUCNC / 6G Summit, June 6 2023, Gothenburg



Deterministic E2E communication with 6G

Project coordination: Ericsson, Technical coordination: KTH

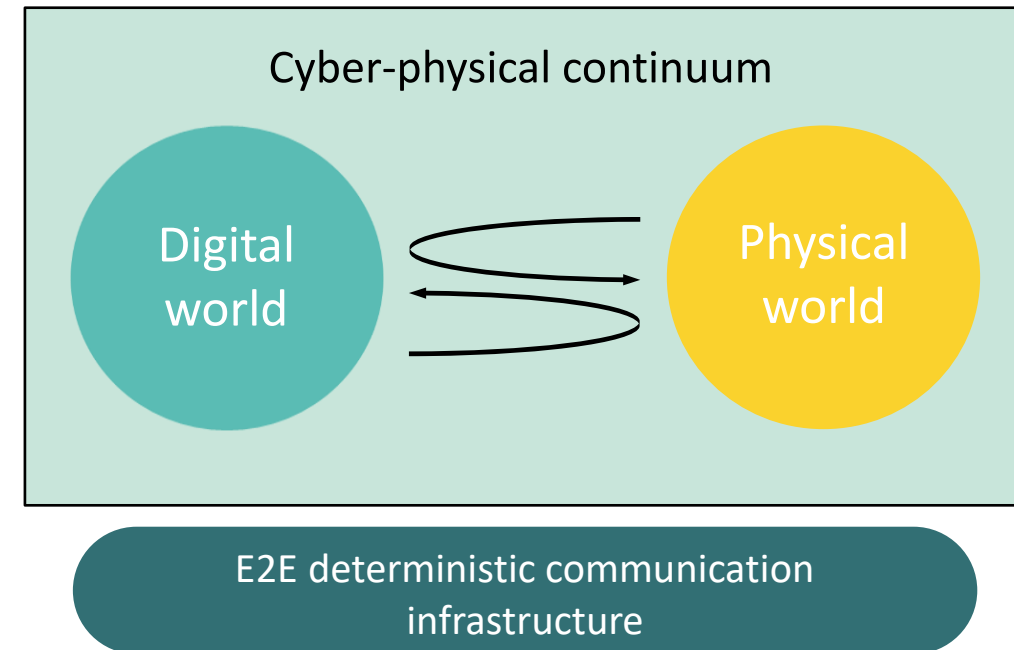
Project start: January 2023, Project duration: 30 months, Contact: coordinator@ deterministic6g.eu, deterministic6g.eu



DETERMINISTIC6G has received funding from the Smart Networks and Services Joint Undertaking (SNS JU) under grant agreement No.101096504. The SNS JU receives support from the European Union's Horizon Europe research and innovation programme

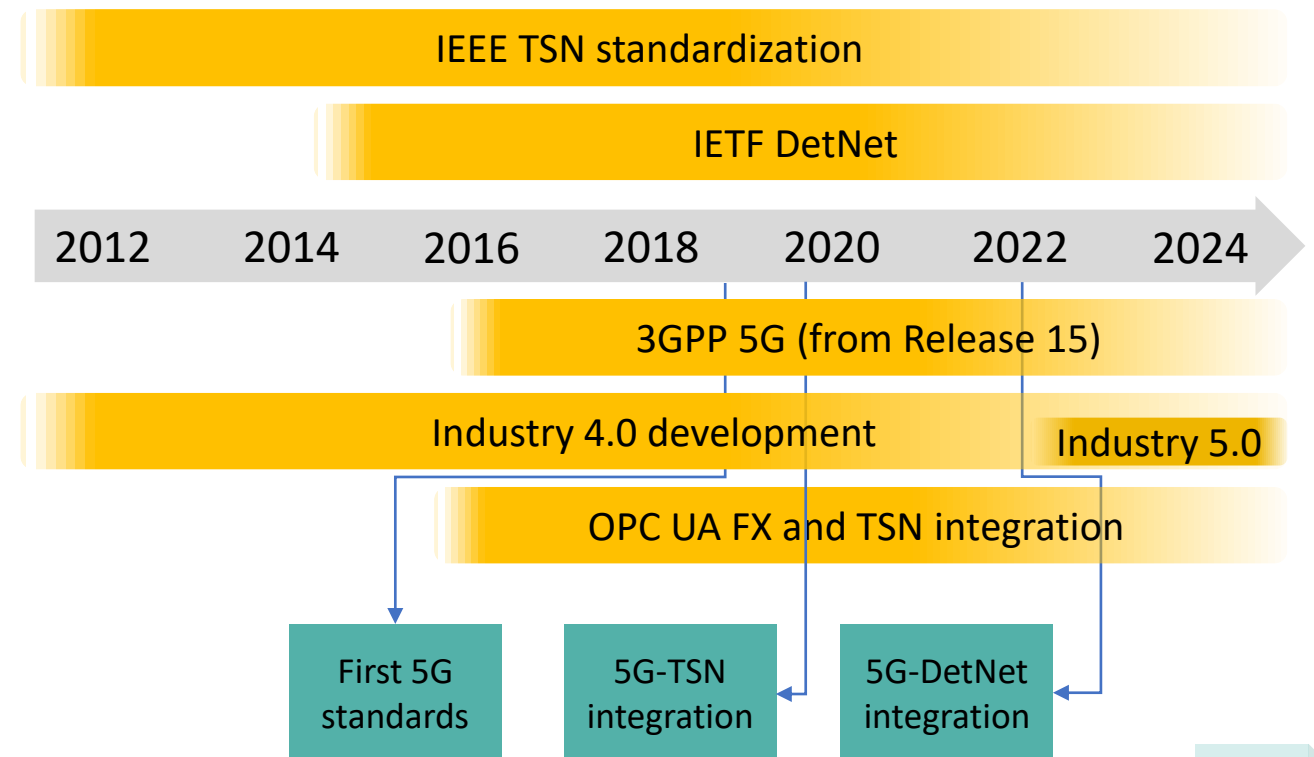
Moving towards a Cyber-Physical Continuum

- ❑ The digitalization is driving the transformation of the society and industries
- ❑ New forms of interactions will lead to a converged cyber-physical continuum spanning different communication technologies
- ❑ End-to-End (E2E) deterministic communication infrastructure is a necessary requirement to support such interactions



Today's Deterministic Communications Arena

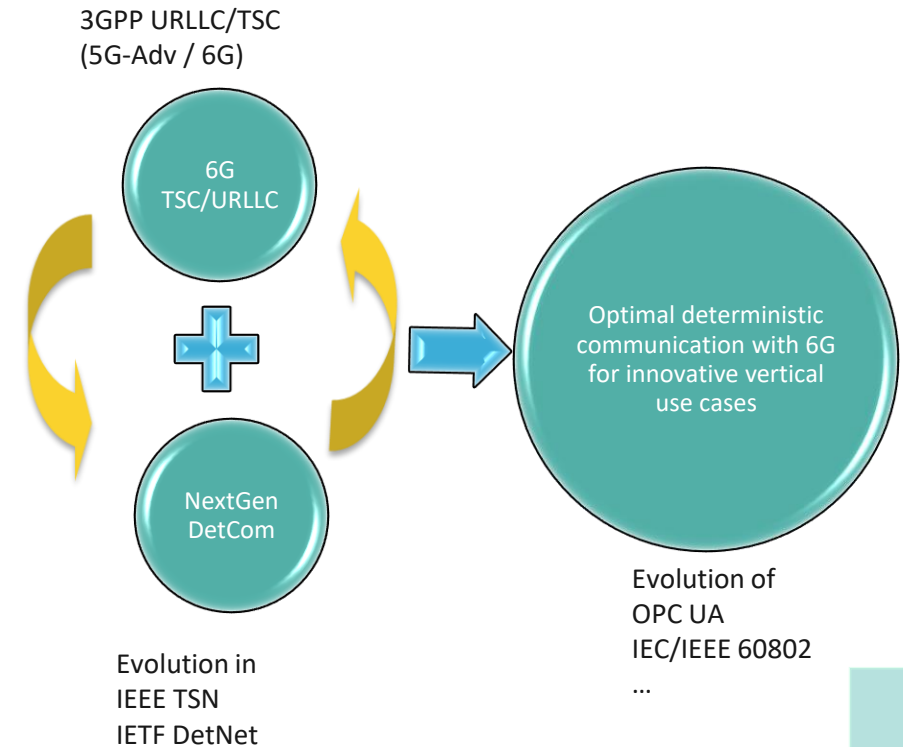
- ❑ Over the last decade, the major pivot of the communications community has been towards low-latency and reliability
 - ❑ Digitalization of automation systems as a main driver
- ❑ Several communication technologies (TSN, DetNet, 5G, OPC UA) are independently evolving towards the support for wired/wireless deterministic communication
 - ❑ So far only limited interworking (e.g., recent 5G-TSN integration architecture)



DETERMINISTIC6G Vision

The DETERMINISTIC6G vision is to set the foundation for future global communication standards enabling 6G deterministic communication for visionary use cases

- ❑ New concepts, features and solutions to
 - ❑ Evolve TSN (&DetNet) to become more wireless-friendly
 - ❑ Improve 5G-Advanced/6G to be better suited for deterministic communication
 - ❑ Align with the main application middleware for deterministic communication: OPC UA (with its features on OPC UA FX (Field eXchange) and the usage of TSN)



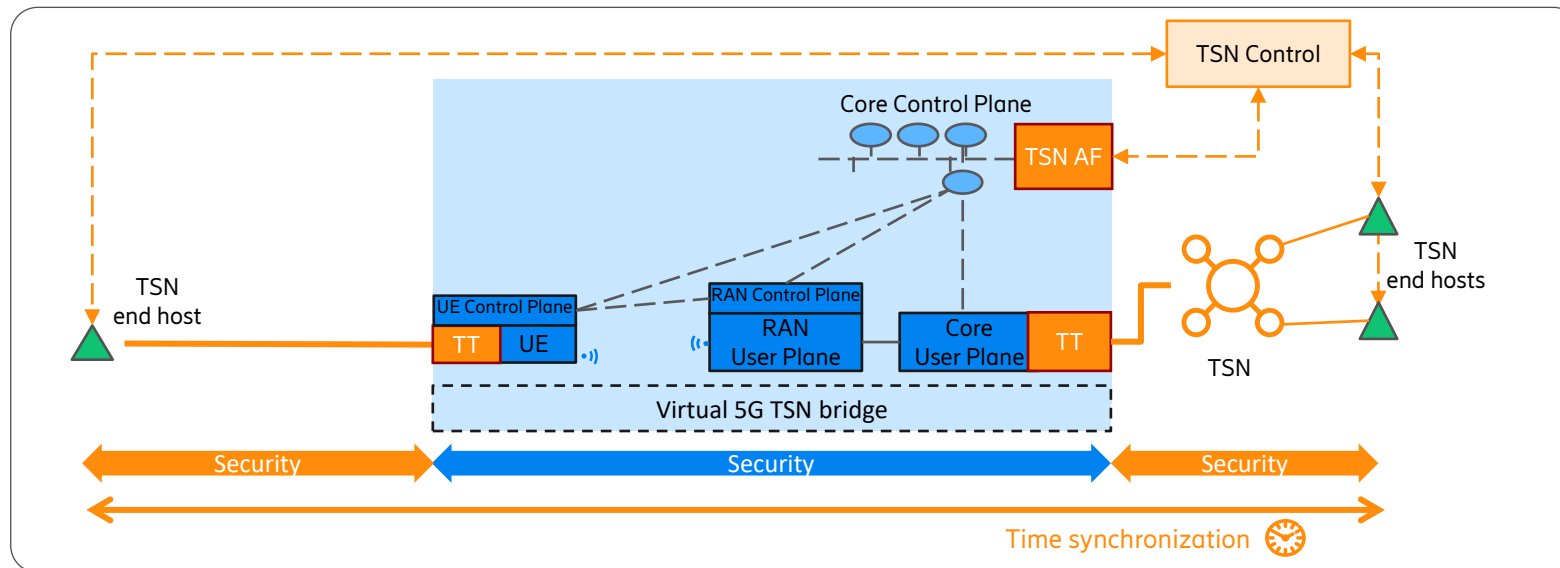
Use Cases and Service Definitions

- ❑ Selected use cases for the evaluation of concepts
 - ❑ Extended reality
 - ❑ Occupational exoskeletons
 - ❑ Wireless industrial automation
- ❑ Definition of specific **KPIs** and **KVIs** for deterministic communication (DetCom) based on selected use cases



E2E 6G deterministic communication architecture

- Enhancements are needed for the existing 5G-TSN integration model for seamless integration



6G convergence enablers for deterministic communication

6G centric enablers for deterministic communication

UE : User Equipment
RAN: Radio Access Network
CNC: Centralized Network Configuration
TT: TSN Translator
AF: Application Function

E2E 6G deterministic communication architecture

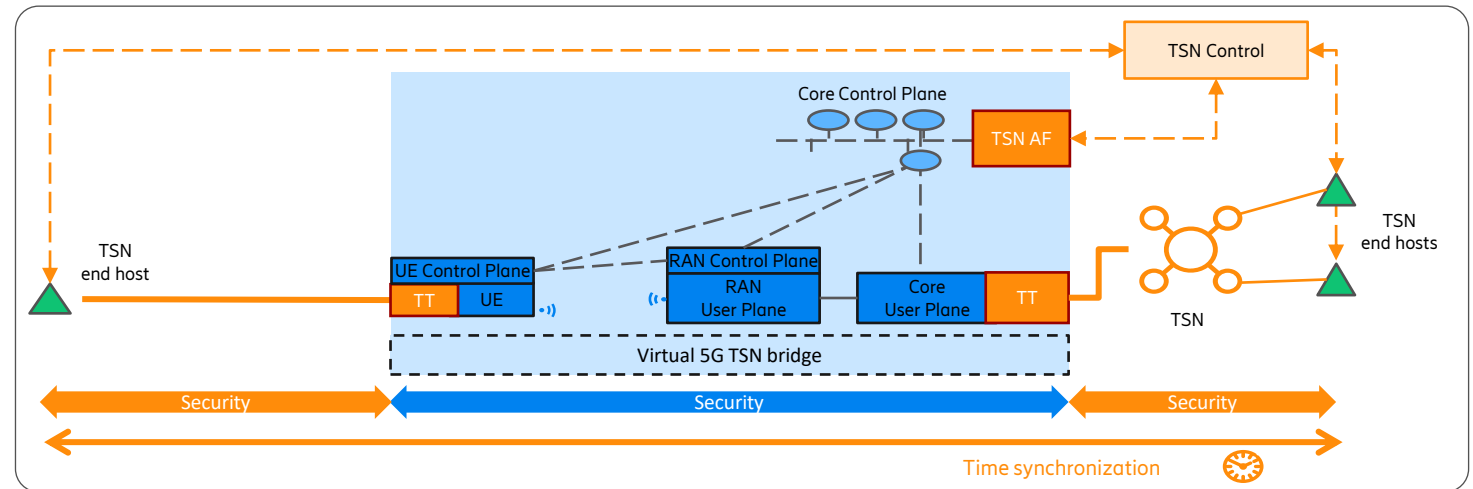
- ❑ DETERMINISTIC6G's enablers for E2E deterministic communication
 - ❑ Data driven approached
 - ❑ Digital twinning
 - ❑ OPC UA enhancement
 - ❑ Wireless friendly evolution of TSN and DetNet
 - ❑ Edge computing for deterministic communication services
 - ❑ E2E security and time synchronization
 - ❑ Deterministic 6G wireless transmission

Data-driven characterization for 6G wireless systems
deterministic 6G wireless transmission

Situational awareness by digital twinning

Enhancing application framework (OPC UA)

Edge cloud solution for deterministic communication services



Seamless interworking (e.g. wireless friendly E2E schedules) of 5G-Adv/6G with TSN/DetNet

E2E security & time synchronization

Summary

DETERMINISTIC6G vision is to set the foundation for future deterministic communication technology standards by developing

- ❑ Deterministic service definition that includes KPI and KVI for innovative 6G use case

- ❑ E2E deterministic system architecture built upon new DETERMINISTIC6G enablers
 - ❑ Data-driven characterization and prediction of 6G latency (tail) characteristics
 - ❑ Edge cloud solution for deterministic communication services
 - ❑ Seamless integration of 6G into wireless-friendly end-to-end deterministic communication
 - ❑ Security and end-to-end time-synchronization

DETERMINISTIC6G Grant Agreement No. 101096504

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