Design of a 5G Ready and Reliable Architecture for the Smart Factory of the Future

Mathias Strufe, **Michael Gundall**, Hans D. Schotten, Christian Markwart,
Rakash SivaSiva Ganesan

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TACNET 4.0 Project

- Sponsor: Federal Ministry of Education and Research

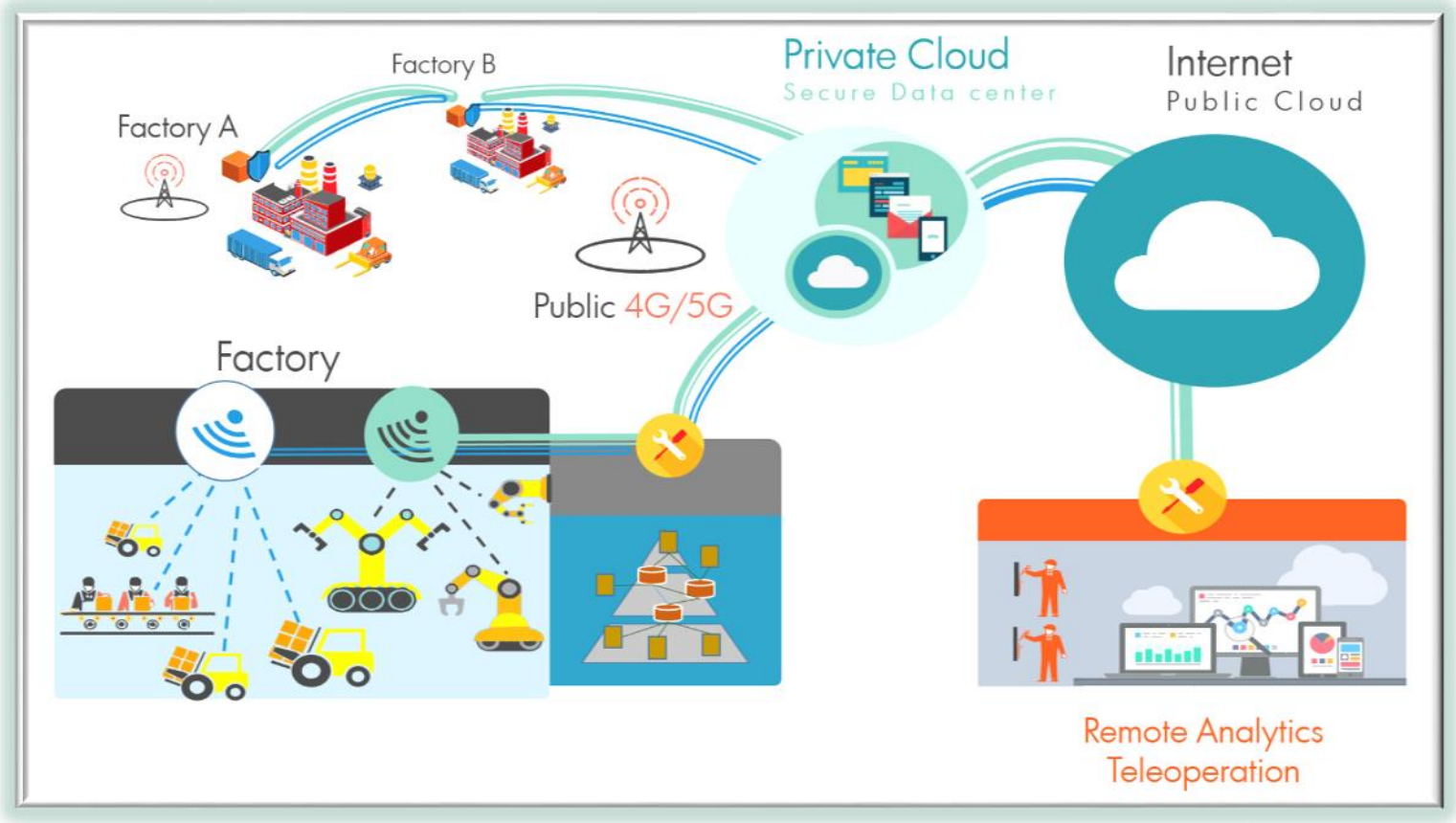
TACNET 4.0 Tactile Internet

- Content:
  - Highly reliable and real-time 5G networking for industry 4.0
  - The tactile Internet for production, robotics and digitalization of the industry

- Partners: ABB, ASCORA, BOSCH, COMMSOLID, DFKI, GÖTTING, inIT, MECSware, NOKIA, NXP, TARIS, Technische Universität Dresden, Universität Bremen*

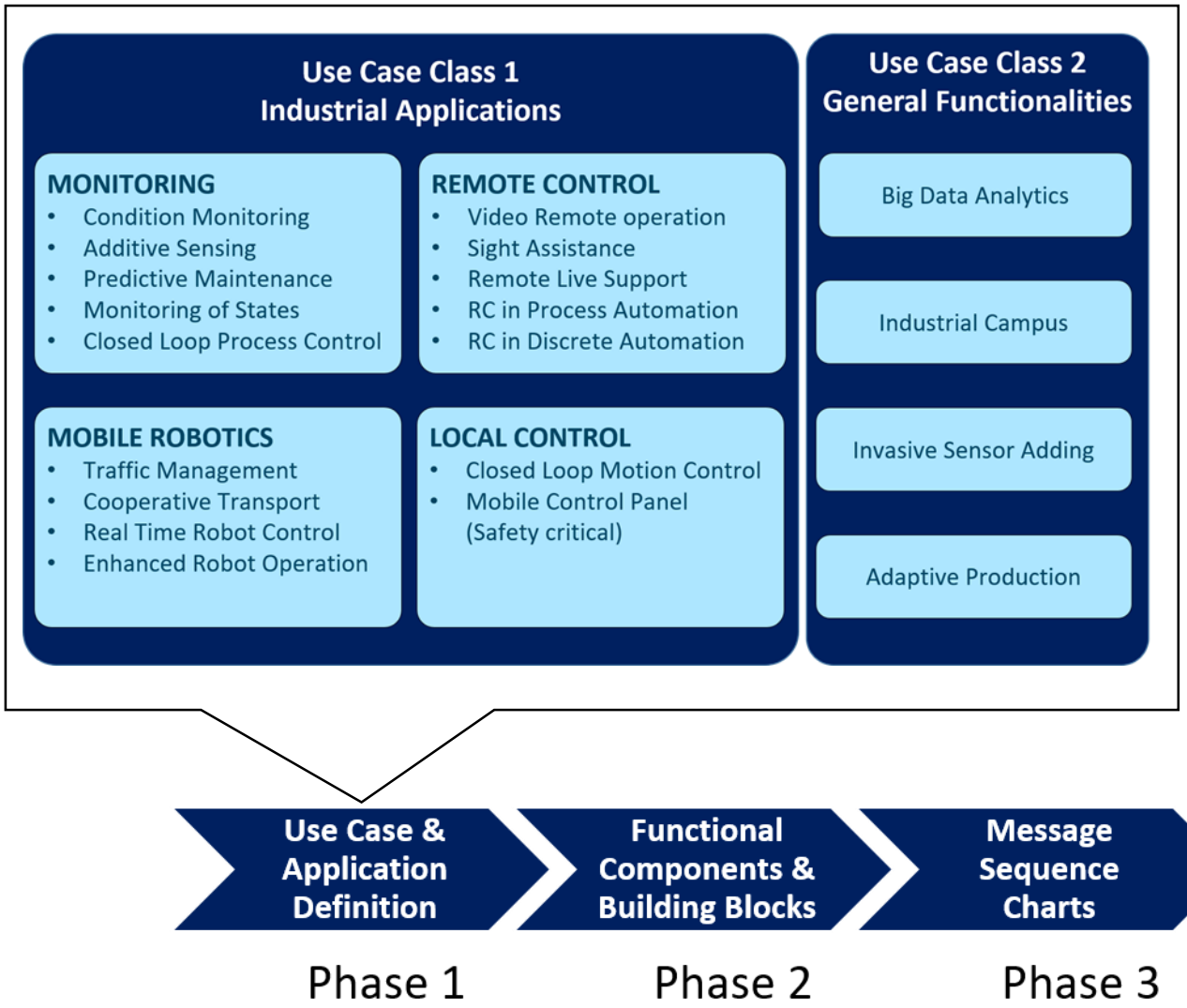
- Further information: www.tacnet40.com

Motivation


Factory A
Factory B
Private Cloud
Secure Data center
Internet
Public Cloud
Public 4G/5G
Factory
Remote Analytics
Teleoperation

Design Process

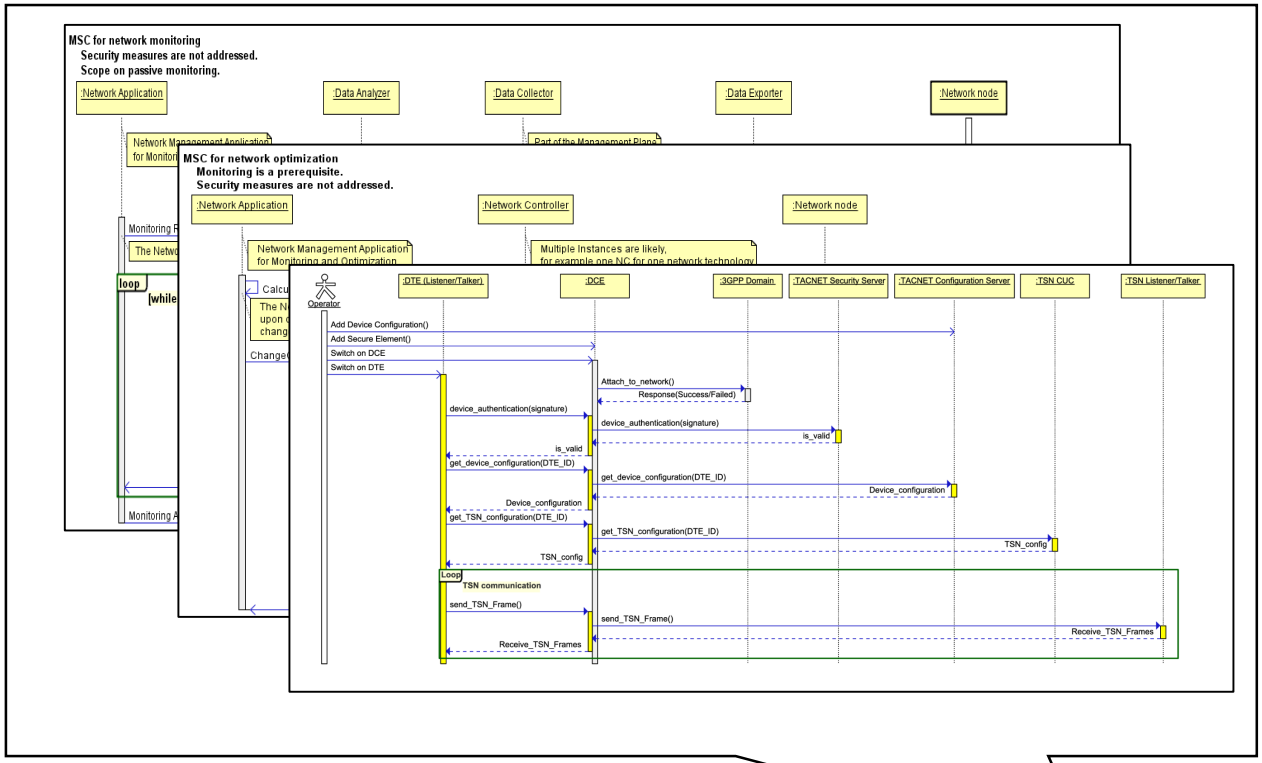
Design Process



Design Process

No	Name
1	Talker / UE function
2	Listener / UE function
3	Registration Application function
4	Remote Control Application function
5	Pre-Processing Application function
6	Monitoring and Optimization function
7	Time Synchronization function
8	Big Data Application
9	Network Resource Management function
10	Authentication and Authorization function
11	Maintenance and Optimization Function
12	Traffic Management Application function
13	Localization Application function
14	Sight Assistance Application function
15	Local Control Application function
16	Control Logic Update Function
17	Remote Live Support Application function

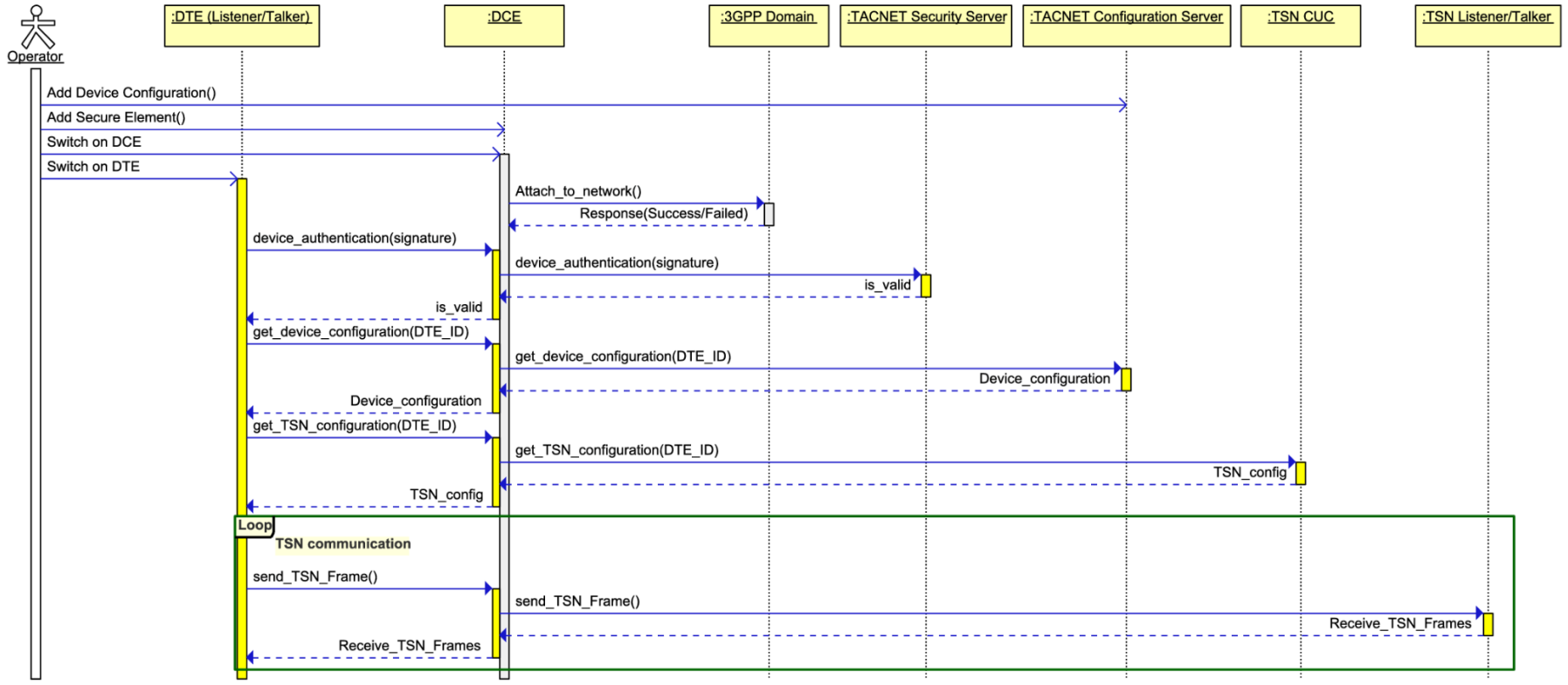
Design Process



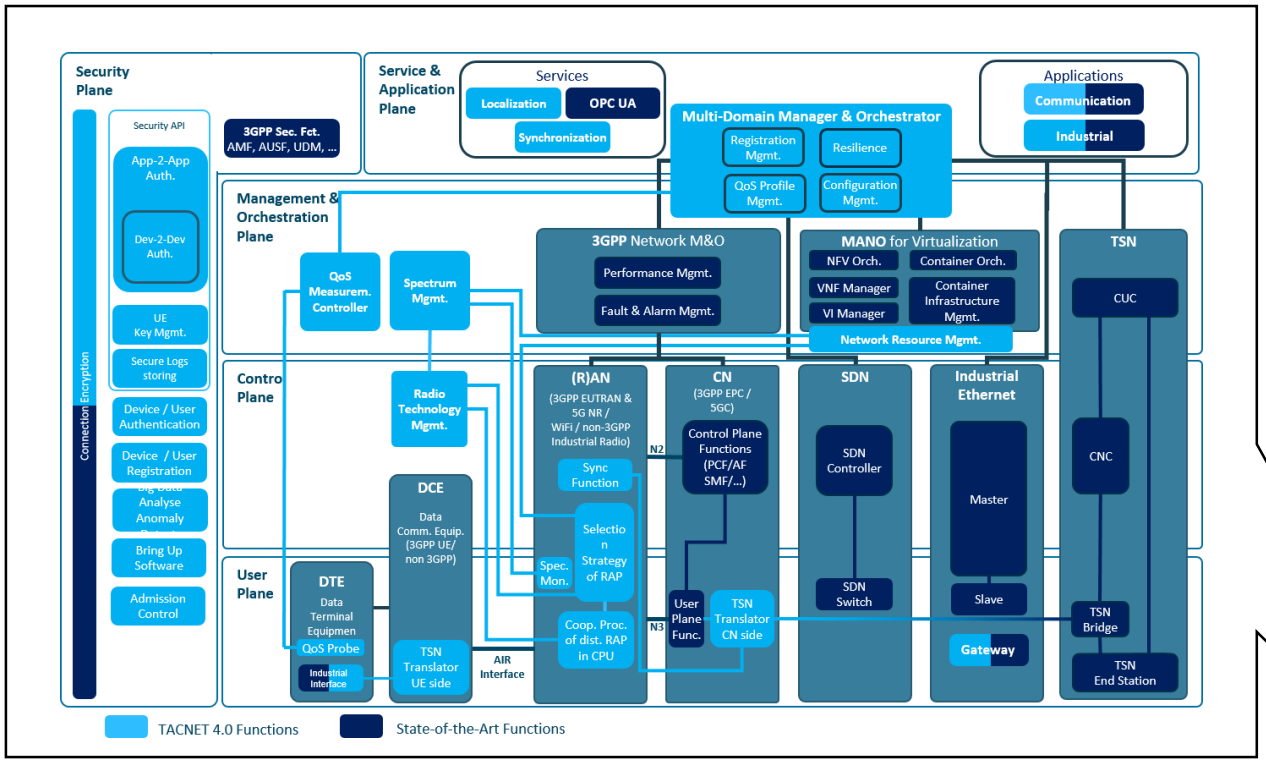
Use Case & Application Definition → **Functional Components & Building Blocks** → **Message Sequence Charts** → **Complete Functional Architecture**

Phase 1 | Phase 2 | Phase 3 | Phase 4

Initial Registration Process



Design Process



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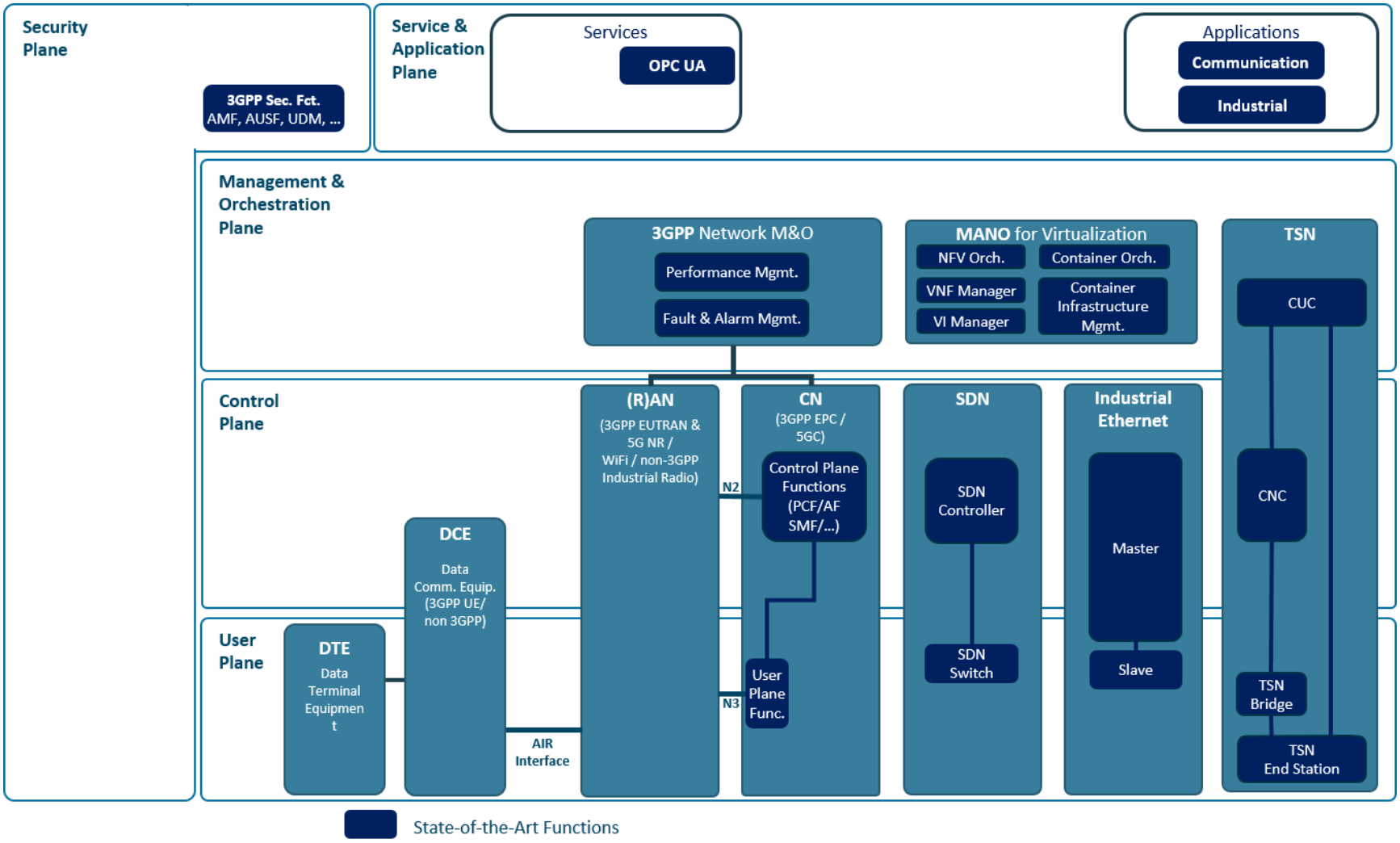
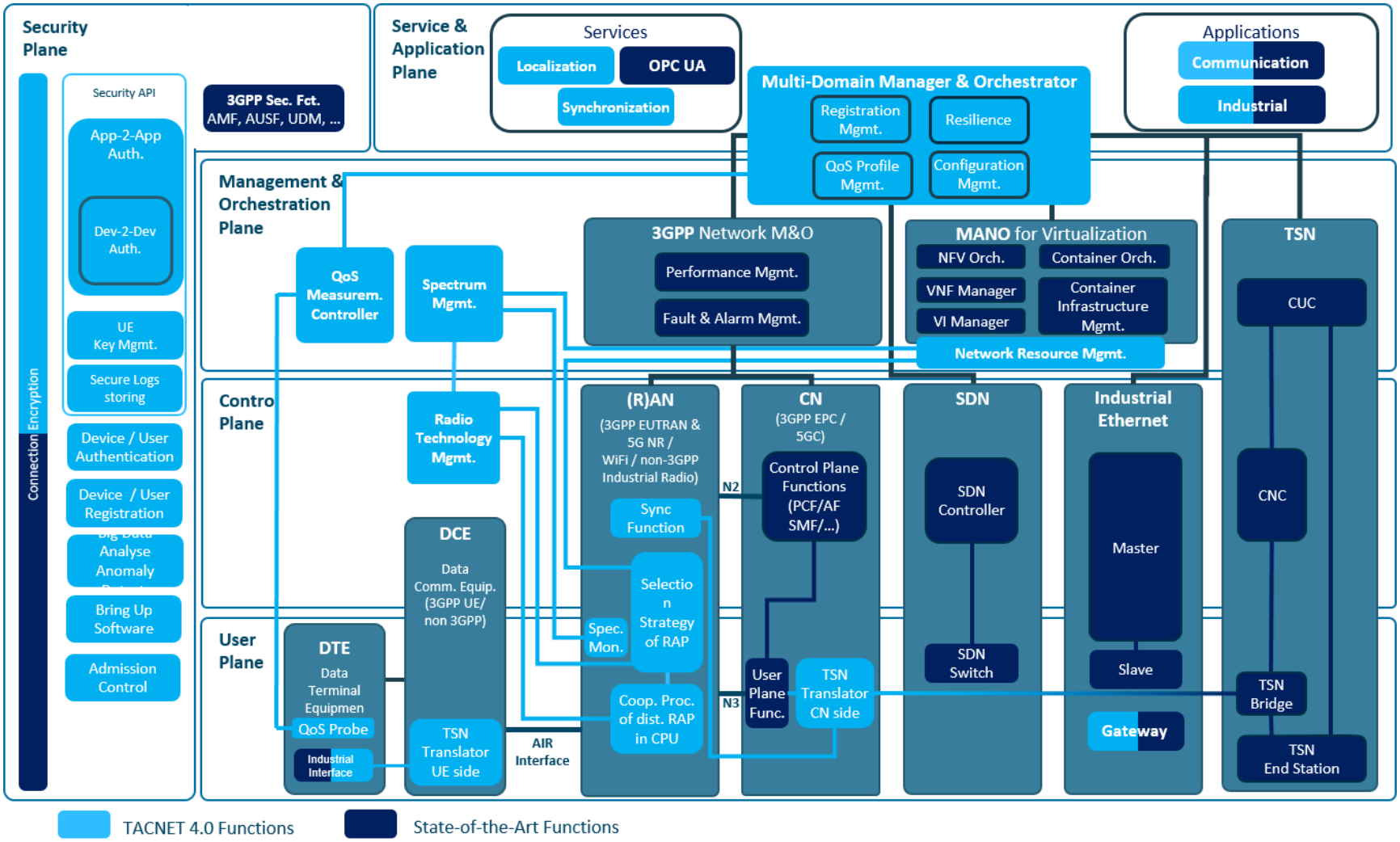
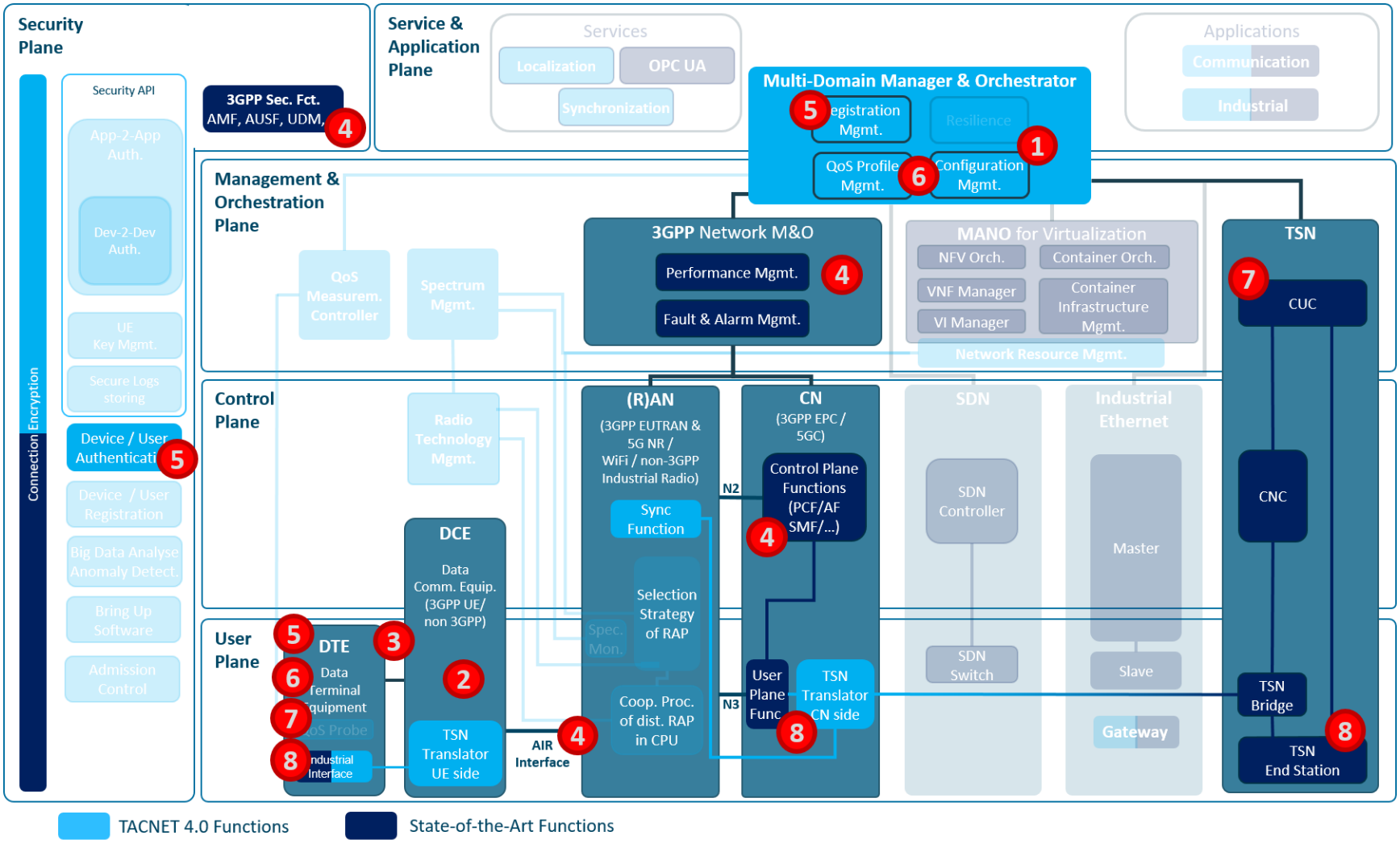
Final Architecture



Final Architecture



Final Architecture



SWOT Analysis

Strengths	Weaknesses
- Design of holistic architecture - Considering cutting edge technologies (5G, TSN, SDN) - Strong consortium consisting of a good mix of industrial and academic partners	- Technology risk, new technologies at an early development stage can affect deadlines - Architecture may get too complex for small size enterprises
Opportunities	**Threats**
- First holistic architecture for industrial environments considering 5G - Strengthening German small and medium size enterprises (SMEs)	- Various competitive architectures

Thank you!

Michael.Gundall@dfki.de