

5G Providing the Secure Platform for Digitalization of Enterprises and Society



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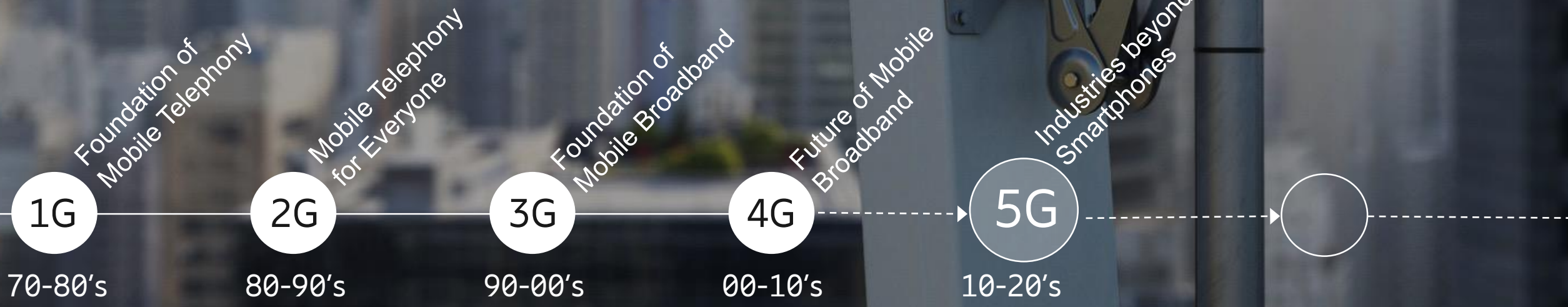
4th Industrial Revolution

powered by 5G



- Enriched Broadband Communications
- Critical Machine Type Communications
- Massive Machine Type Communications

10-100X End-user Data Rates	
5X Lower Latency	1000X Mobile Data Volumes
10-100X Connected Devices	10X Battery Life



WHAT IS 5G?



10-100x ↑
END-USER DATA RATES

1000x 🗄️
MOBILE DATA VOLUMES

5x ⏳
LOWER LATENCY

100x 🌡️ 📶
MORE DEVICES

Cost 📉
DEVICE COST REDUCTION

10+ 🔋
YEARS BATTERY LIFE

+20dB 📶
BETTER COVERAGE

Virtual network slices ...

- Health
- Robotic communication
- Media
- MBB Basic



... based on a common set of physical resources
Access – Connectivity – Computing – Storage

A common network platform supporting multiple industries and use cases

Use case evolution



Current

On the road to 5G

5G experience

Remote Experts		Screens everywhere	New tools	Augmented reality surgery
Transport		On demand information	Real-time information	Self-Drive Ambulance
Logistics		Asset management	Flow management and remote supervision	Integrated Seamless, everywhere
Building automation		Smart locks Surveillance cameras Connected sensors	Automated facility management	Machine intelligence
Healthcare		Connected doctors and patients	Monitoring and medication e-care	Integrated, Seamless everywhere

Technologies	Multi-standard network Cat-M1/NB-IoT Cloud optimized network	Gigabit LTE (TDD, FDD, LAA) Massive MIMO Dynamic service orchestration	5G NR Local deployment Real time machine learning/AI

5G for Enterprises and Society



- Inherent security capabilities
- Network slices, meaning on the same physical infrastructure (nationwide network) isolated logical partitions for e.g. safety, defense, ambulances, remote healthcare, traffic safety, utility control, etc can be provided.
- Similarly for enterprises supporting processes e.g. in supply, production, delivery and life cycle operations
- Build on ability to drive outstanding security and scale for the evolving use cases (as for 2G-4G)
- Reuse existing ecosystem and expand towards providing capabilities for Enterprises and Society

Enhanced mobile broadband



Non-SIM devices



Smart phones



Homes, enterprises and venues (mobile/wireless/fixed)



4K/8K, UHD, broadcasting, virtual reality, augmented reality

Massive machine-type communication



Smart building



Logistics, tracking and fleet management



Smart meters



Smart agriculture



Capillary networks

Critical machine-type communication



Traffic safety and control

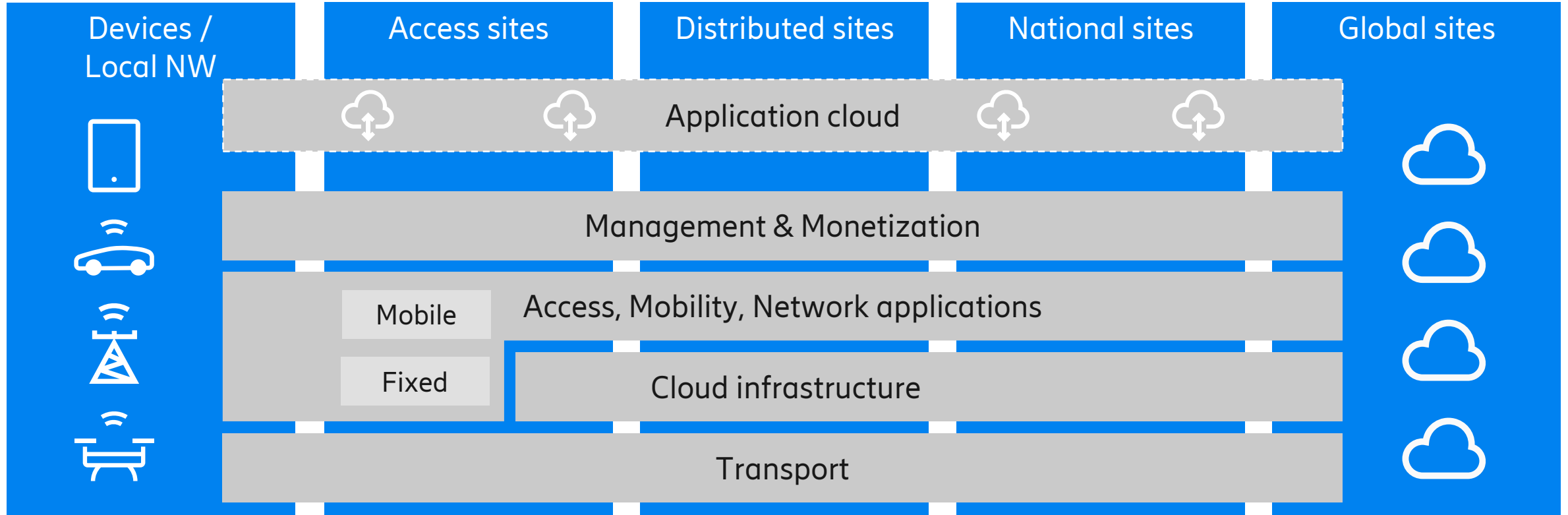


Remote manufacturing, training and surgery



Industrial applications and control

Our 5G architecture



Network slicing to enable 5G use cases



Society and Enterprises going digital – Facing new Challenges – Tackled by 5G



Ever evolving security threats



Critical infrastructure concerns



Increasing regulatory requirements (e.g. GDPR)



DevSecOps accelerating cycles



Billions of new devices



Distributed Cloud - specific challenges

5G's built-in security provides new properties for enabling mission critical use cases



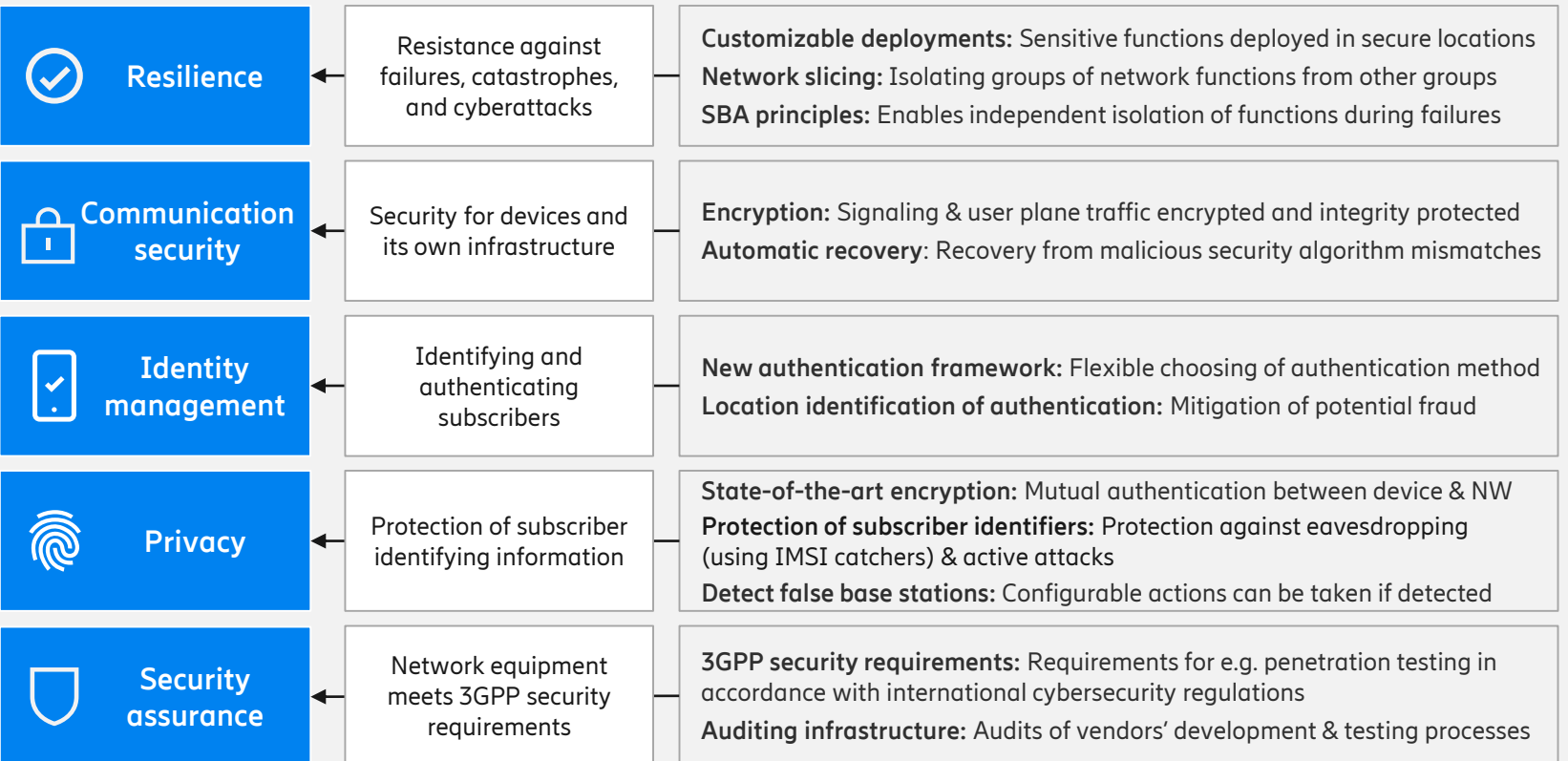
Next gen connectivity to enable new use cases

Security properties for critical infrastructure

Innovation & ecosystems

5G's built in security is designed to protect mission critical infrastructure for new use cases

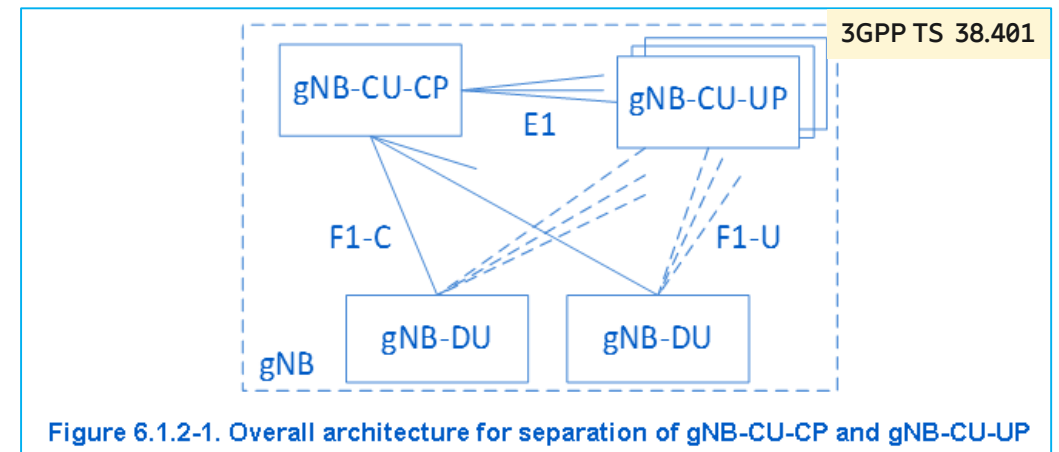
5G builds on proven 4G security for MBB, and introduces new properties to secure new use cases



Resilience



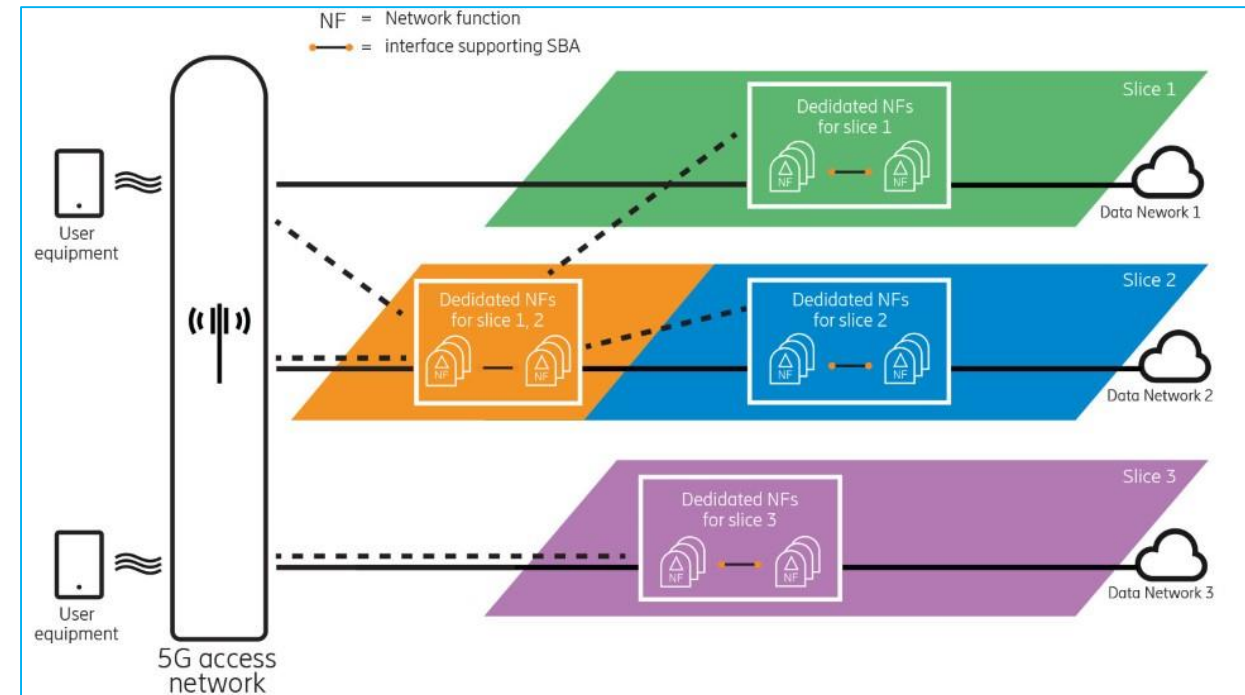
- The 5G NR (New Radio) access supports **NEW** service category called URLLC (ultra-reliable low latency communications) which is ideal for industrial control, critical infrastructure and public safety applications.
- Even greater resilience against failures and attacks can be obtained by **NEW** deployment option where a single base station can be deployed as two split units, called a central unit and a distributed unit.
- The resilience of the 5G system also stems from **NEW** multi connectivity features and strong mobility support that it shares with previous generation 3GPP networks, which ensures continuous secure connectivity for devices when current radio conditions become unsuitable or moving from one location to another.



Resilience contd..



- The 5G core network architecture itself is designed around **NEW** resilience concepts, e.g., compute-storage separation. The 5G system supports "stateless" network functions, where the "compute" resource is decoupled from the "storage" resource.
- The **NEW** feature called network slicing enables isolating groups of network functions from other functions. An operator may isolate low-priority IoT devices on a separate slice to ensure that these will not interfere with other users (say of public safety organization) should a problem occur with large quantities of IoT devices.
- Further, the **NEW** architecture principles of SBA (service based architecture) make use of software and cloud-based technologies that enables creating network functions that can easily be scaled depending on traffic load, and can be independently replaced, restarted, or isolated when failing or under attack.



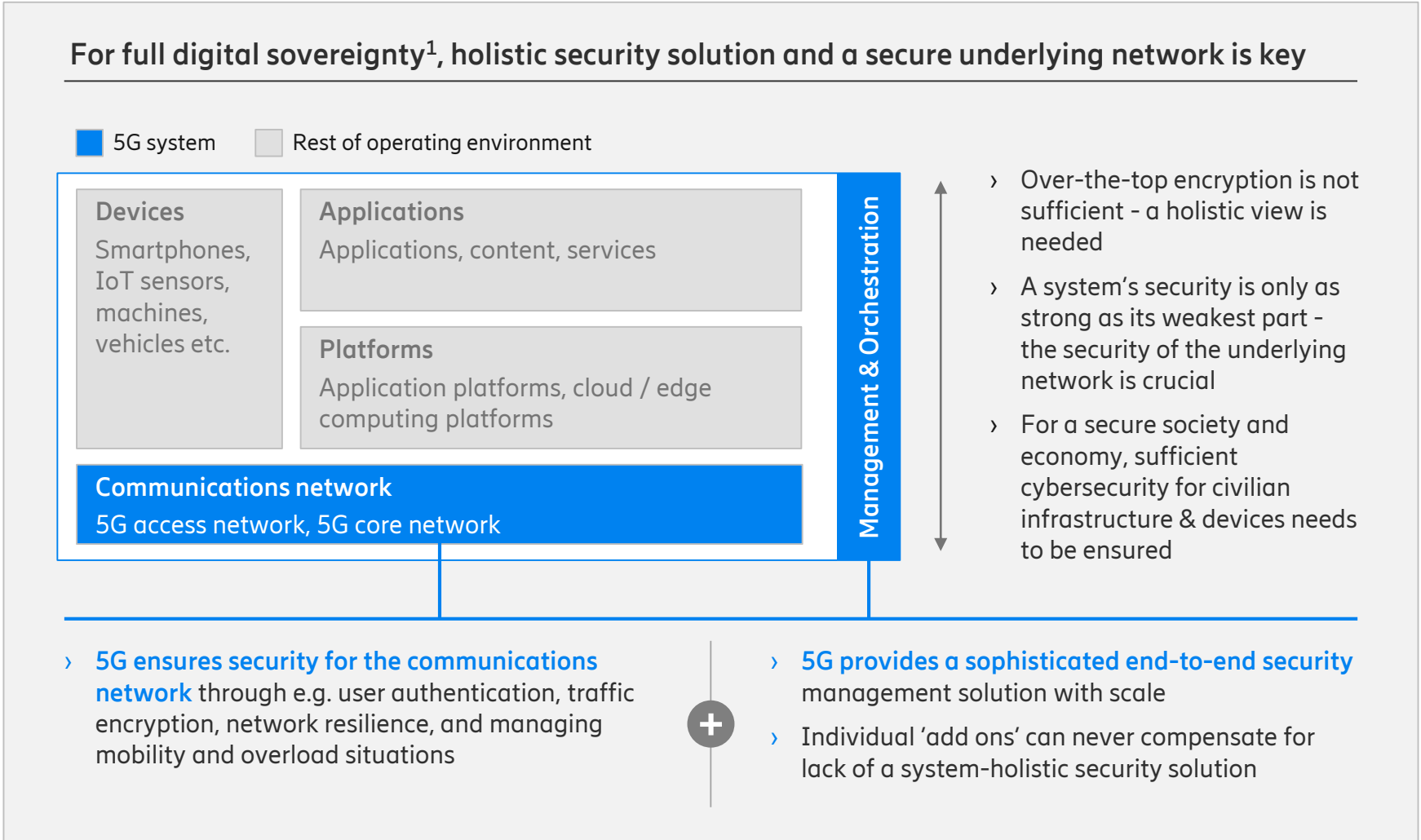
5G's built-in security provides new properties for enabling mission critical use cases



Next gen connectivity to enable new use cases

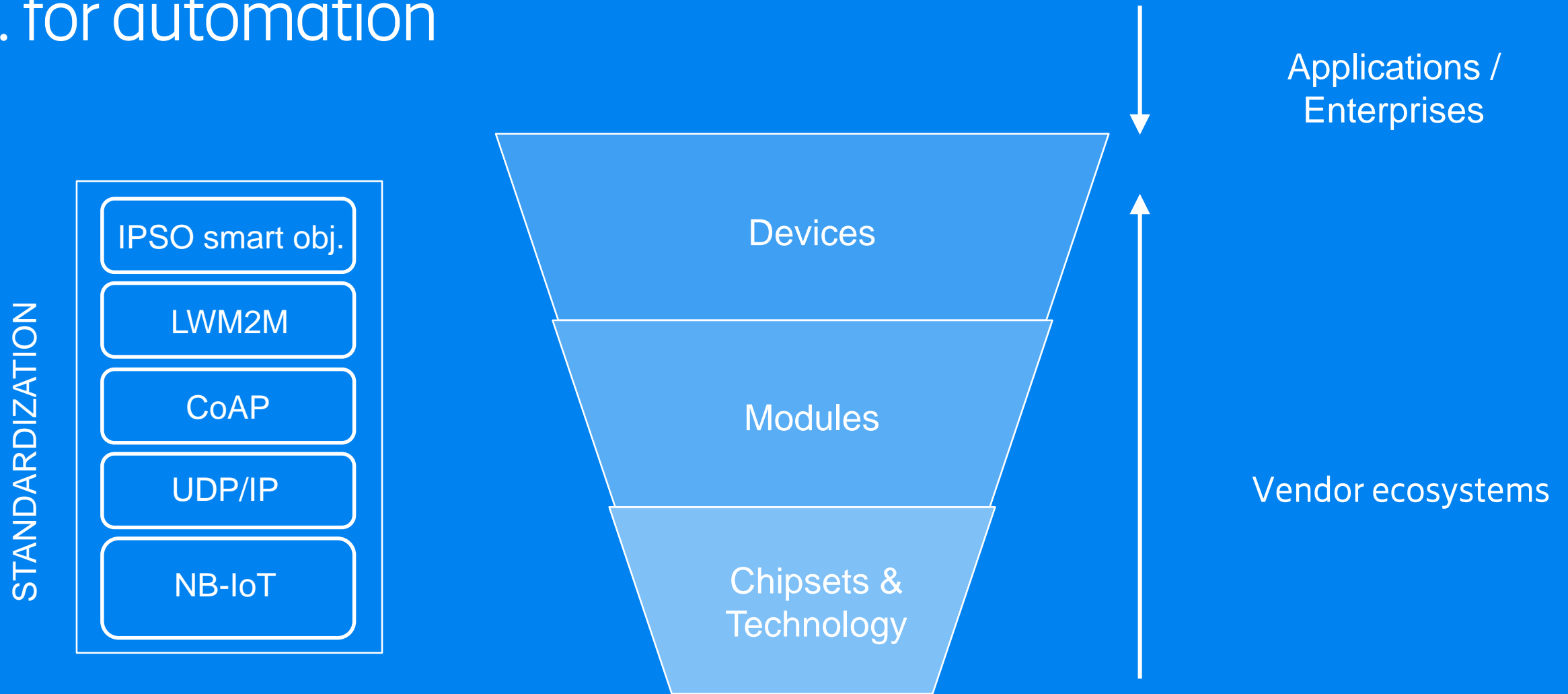
Security properties for critical infrastructure

Innovation & ecosystems



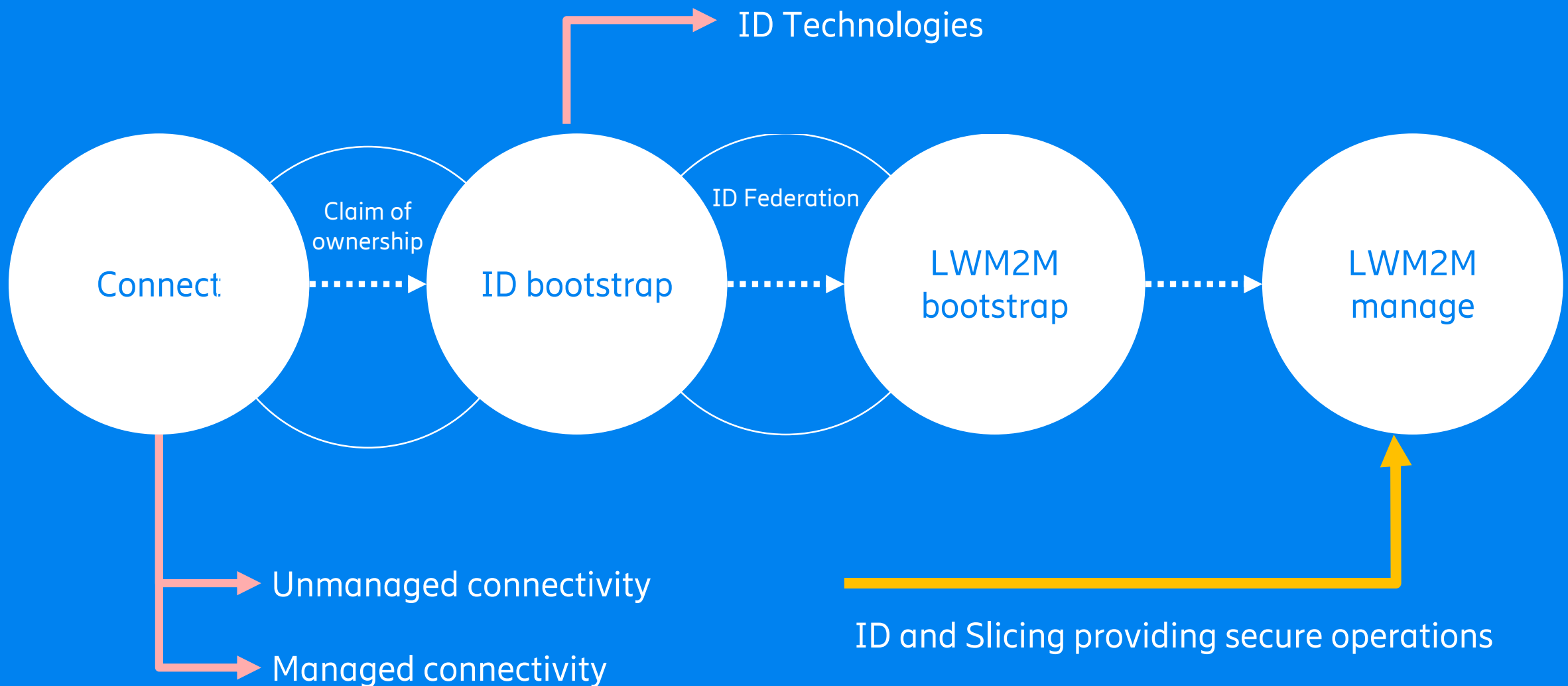
1) Digital sovereignty = enabling users to freely and independently decide which data can be gathered, distributed, used and saved about them

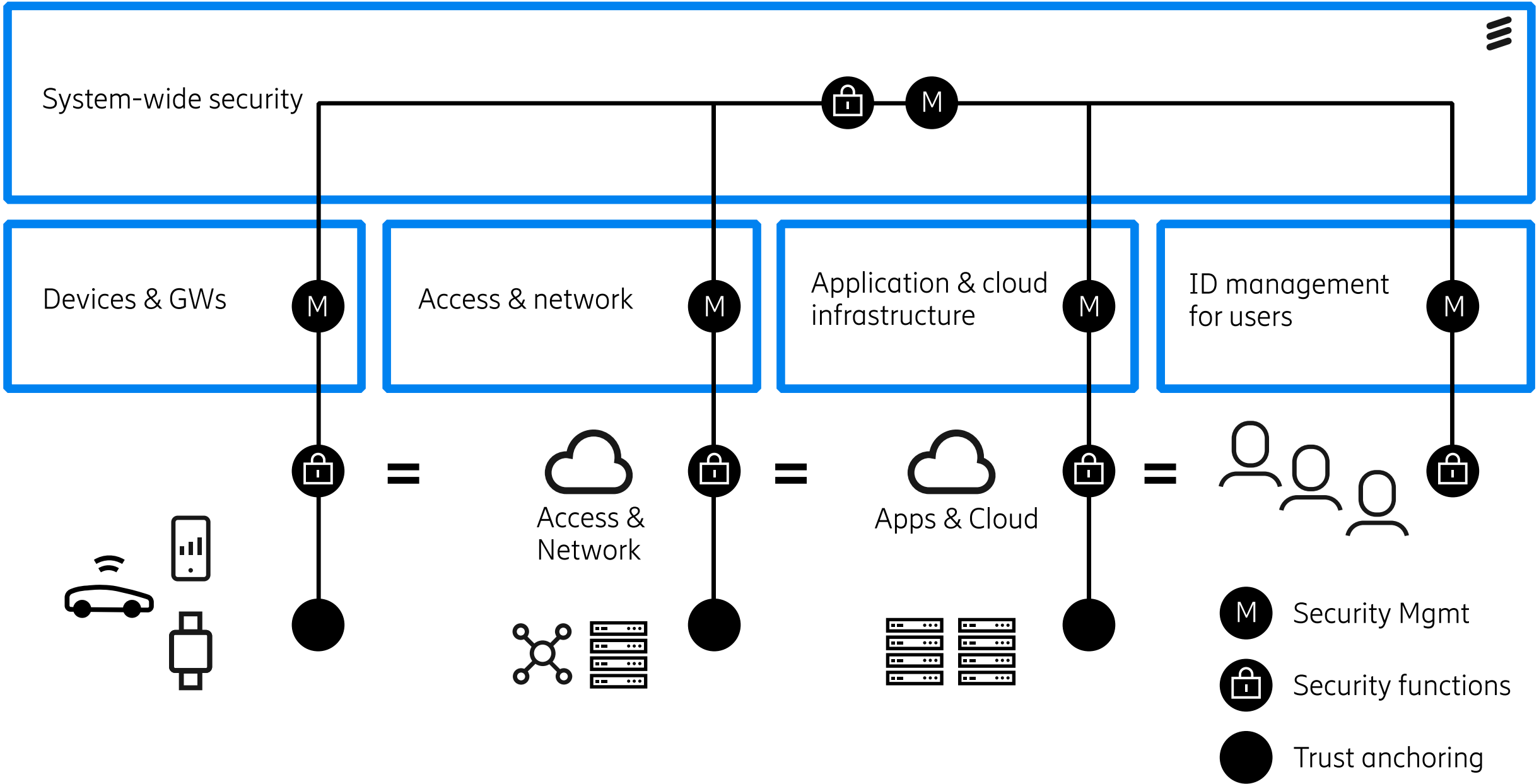
To get scale you need standards ... for automation



Standardization – The engine for scale

ID provisioning flow





Four aspects of security of live telecommunication networks



Operations

- Secure operational procedures, e.g. segregation of duties, use of least privilege and logging
- **Management of security functions, vulnerability mgmt. and detection of attacks**
- Response and recovery after breach

Deployment process

- Solid network design with security and resilience in mind
- Operator specific configuration of security parameters, hardening

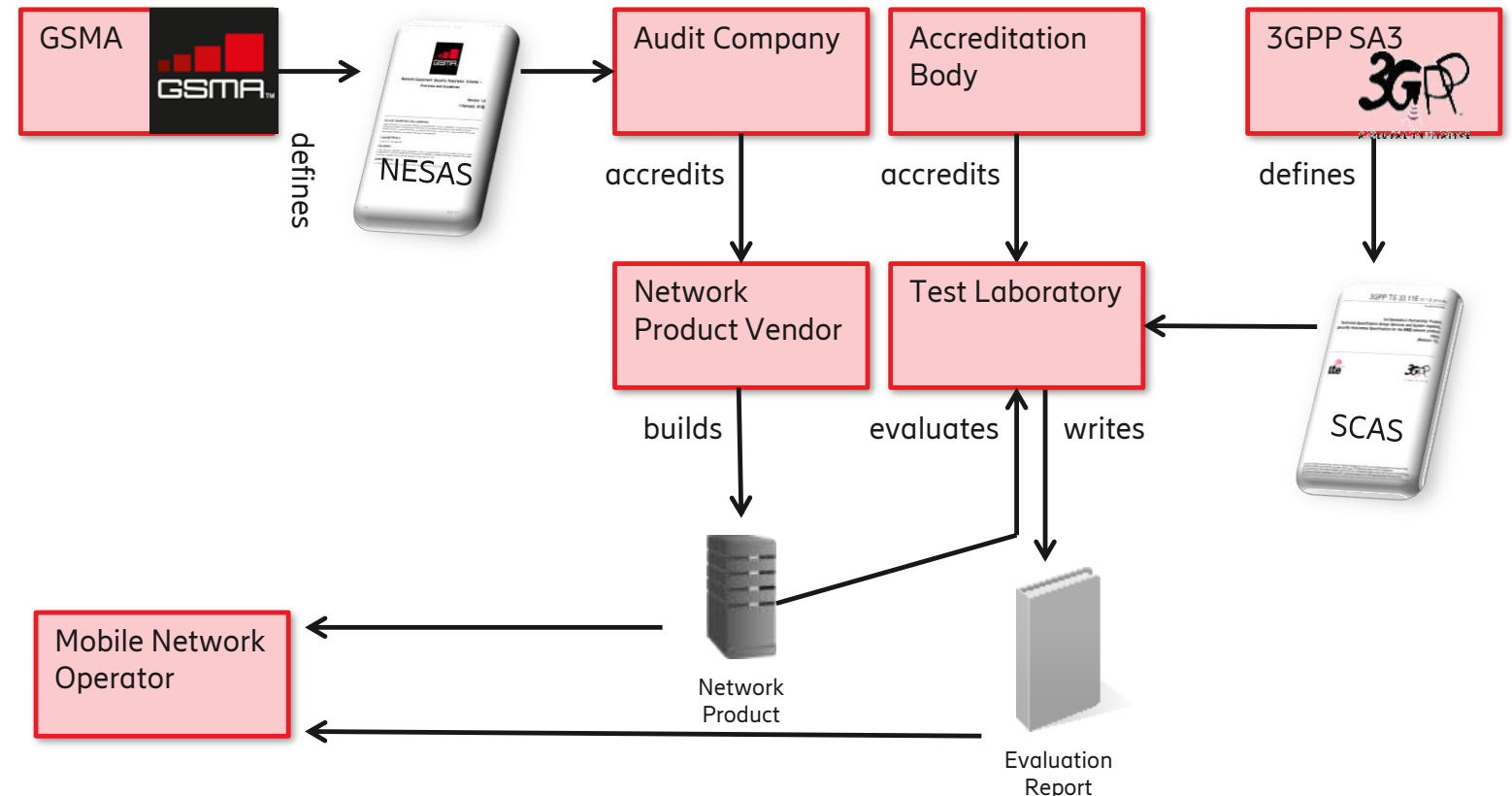
Vendor product development process

- Secure hardware and software components
- Secure development processes
- Version control and secure software update

Telecommunications standardization process

- Secure protocols, algorithms, storage

Security Assurance Standards



- › **3GPP SA3** defines SCAS = SeCurity Assurance Specifications containing security requirements and test cases
- › **GSMA NESAS** defines security assurance requirements on vendors development process, and the scheme for accreditation of vendors' dev process, test labs.
- › **Vendors** are responsible for adapting their development process, building the product according to SCAS and providing Evaluated product + report

Summary



- 5G with its intrinsic capabilities have a unique potential for the secure digitalization platform:
 - Intrinsic network security
 - Security in device interfaces, adding usual application level security resting on technology (e.g. Trusted computing, slicing etc) and business logic gives security by design and scale end-to-end
 - Security functionality set from the beginning to match the use cases in scale (billions) and time (decades)

