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5G Security Overview

overview based on global experience

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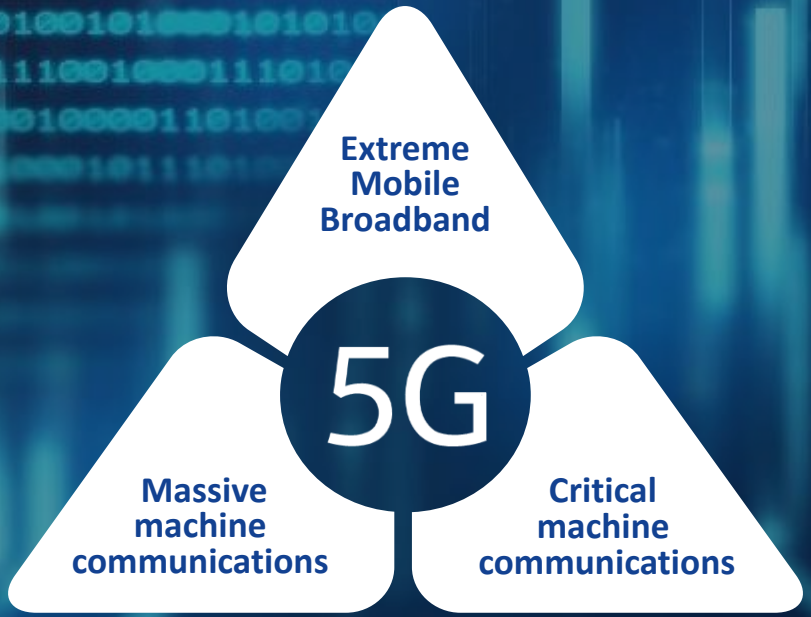
What is 5G?
5G is the next generation mobile broadband

enhanced Mobile Broadband



massive Machine Type Communications

Ultra Reliable Low Latency Communications

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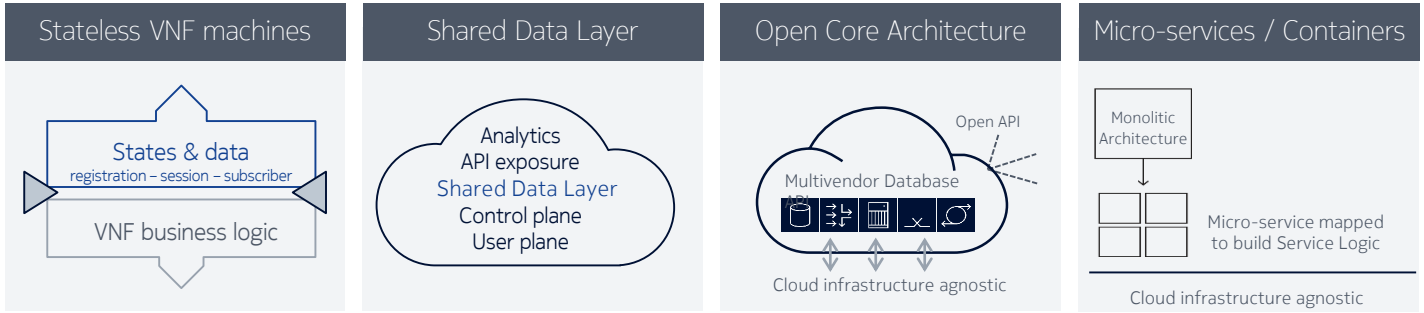
How?

Nokia 5G Cloud-Native Core strategic direction



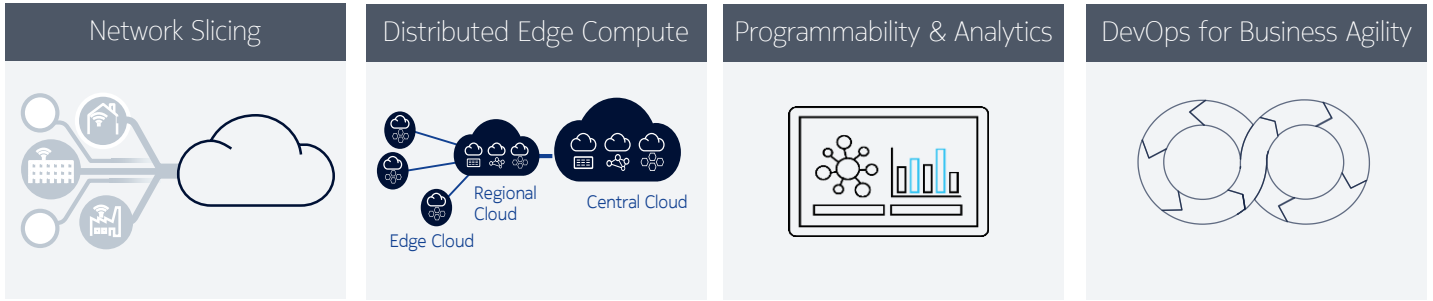
Cloud Technology Drivers

for Nokia Products and Solution

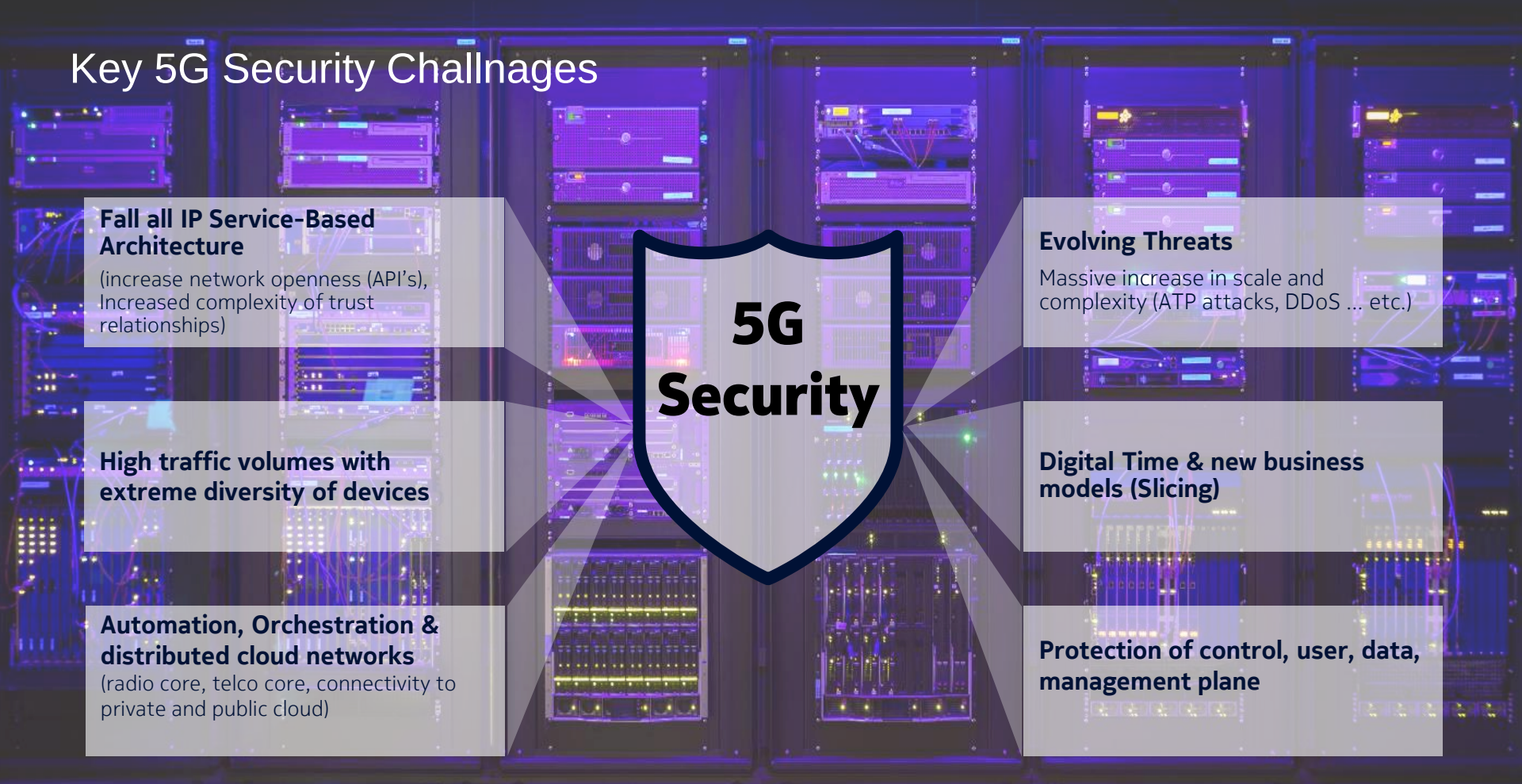
Business Transformation Drivers

for Operators to monetize cloud investment

Automated Operation & Cloud Agility



Key 5G Security Challnages



Fall all IP Service-Based Architecture
(increase network openness (API's), Increased complexity of trust relationships)

High traffic volumes with extreme diversity of devices

Automation, Orchestration & distributed cloud networks
(radio core, telco core, connectivity to private and public cloud)

Evolving Threats
Massive increase in scale and complexity (ATP attacks, DDoS … etc.)

Digital Time & new business models (Slicing)

Protection of control, user, data, management plane

Cyber attack strategy advancement demands a different approach

Cyber criminals are now using automation and artificial intelligence to attack companies and networks more efficiently. They're also exploiting an attack surface that's growing as companies embrace cloud, Internet of Things (IoT) and 5G technologies.

End-to-end security for digital networks and operations	**Analytics** that correlates data from networks, devices and cloud to spot anomalies	**Automate** security for business processes, regulations and policies

...to protect assets and interests:

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SOAR

Security **O**rchestration **A**nalytics and **R**esponse

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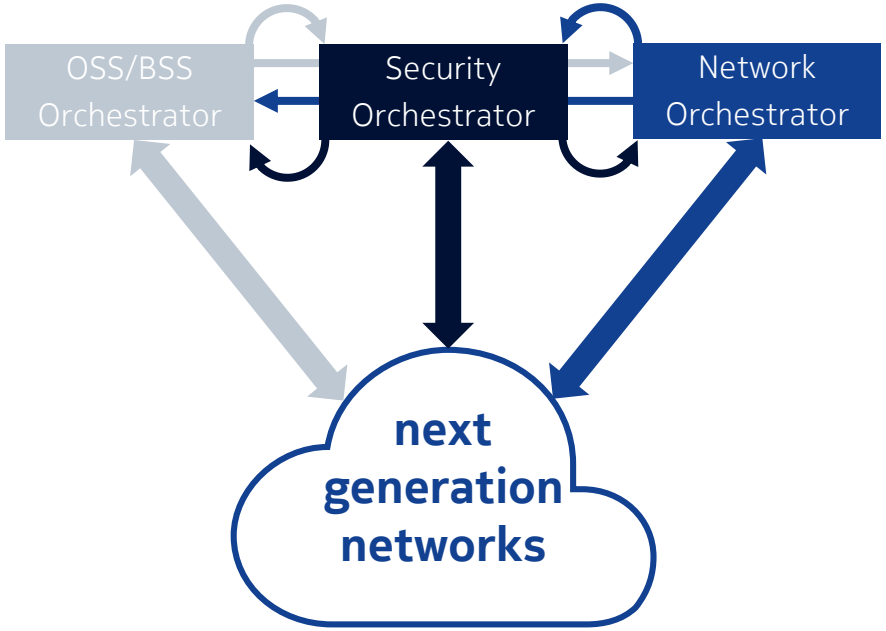
Security Orchestration (SOAR)



ETSI Group Specification (GS) NVF Security 001-0013

- There are 3 orchestrators in the network
- They are parallel to each other each one with a unique task
- All of them together achieve the automation and orchestration task ensuring security lifecycle management

These 3 orchestrator interact with each other and with the network to achieve the objectives

Still, standards only define high level ideas, guidelines and methodologies they do not explain how to achieve objectives.

We will have to define the techniques, processes and tools to fulfill our objectives.

Securing next generation Telco

SOAR - Security Orchestration, Analytics and Response

Automation of all security controls, security mentoring, correlation of events,
Automated Incident detection and automated security response

Securing cloud infrastructure

- Automated policy management
- While List policy enforcement
- Telco Security Zoning
- Roaming Security
- DNS Security
- Radio Access Security
- VNF/Container security

Zero Trust (assurance and verification)

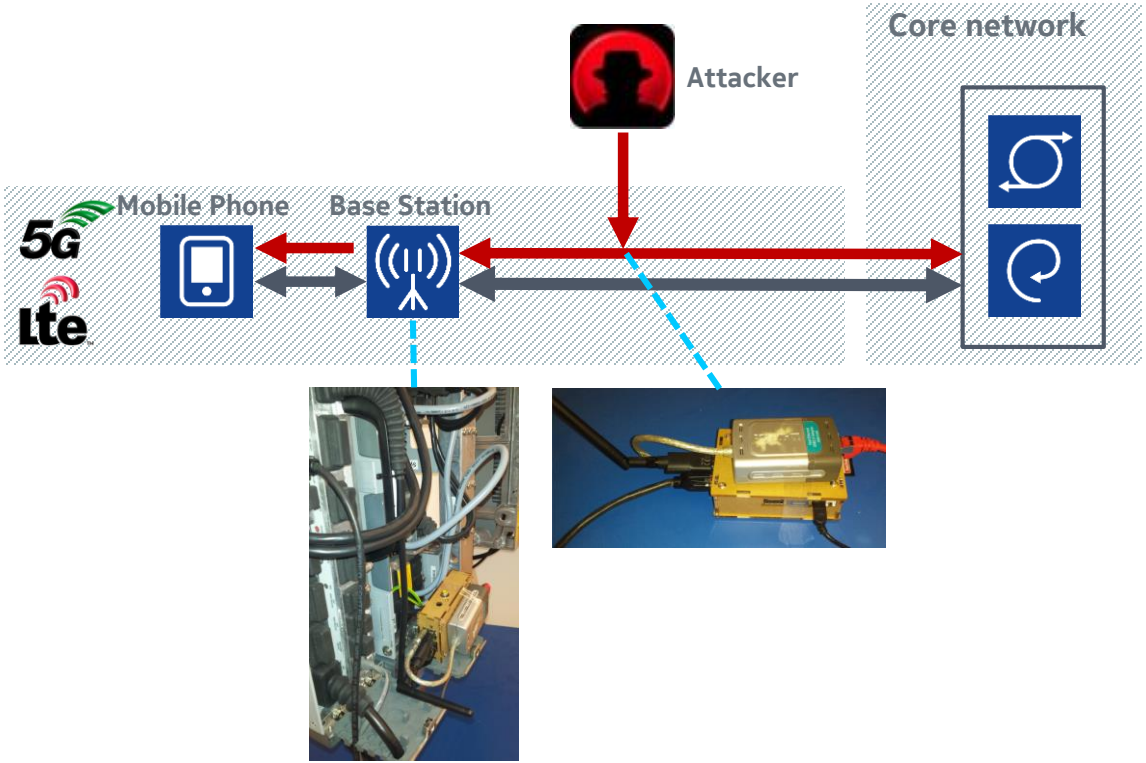
- Trust in system configurations and security compliance (NIST, 2701 .. etc.)
- Trust in administrators accessing the network
- Trust in communication between network layers (use of digital certificates)
- Automated system security status
- Automated system hardening

Endpoint Security

Network based malware, botnet and threat detection & traffic anomaly detection

- Connected devices monitoring
- DDoS Protection and mitigation

Radio Access Security



Vulnerabilities:

- Eavesdropping on subscriber data and voice
- Injection of malicious traffic (signaling and user plane)
- Unauthorized access to operator network, base station and mobile
- Denial of service attack against core network

Solution:

- 3GPP standardized solution using IPSec
- Not deployed in all mobile operators - Risk vs. investment decision

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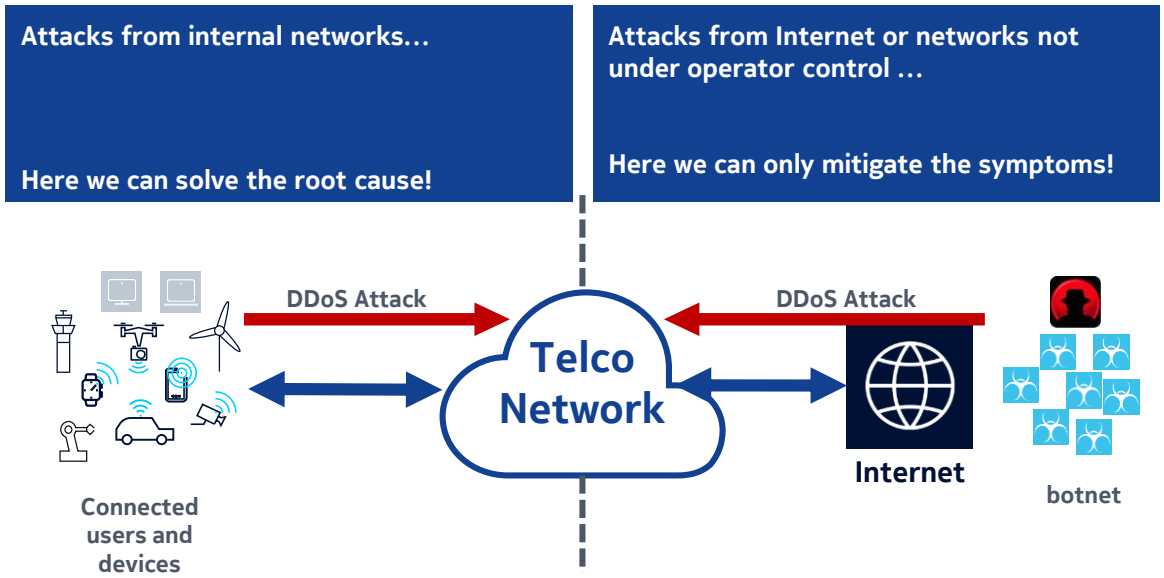
DDoS Attacks



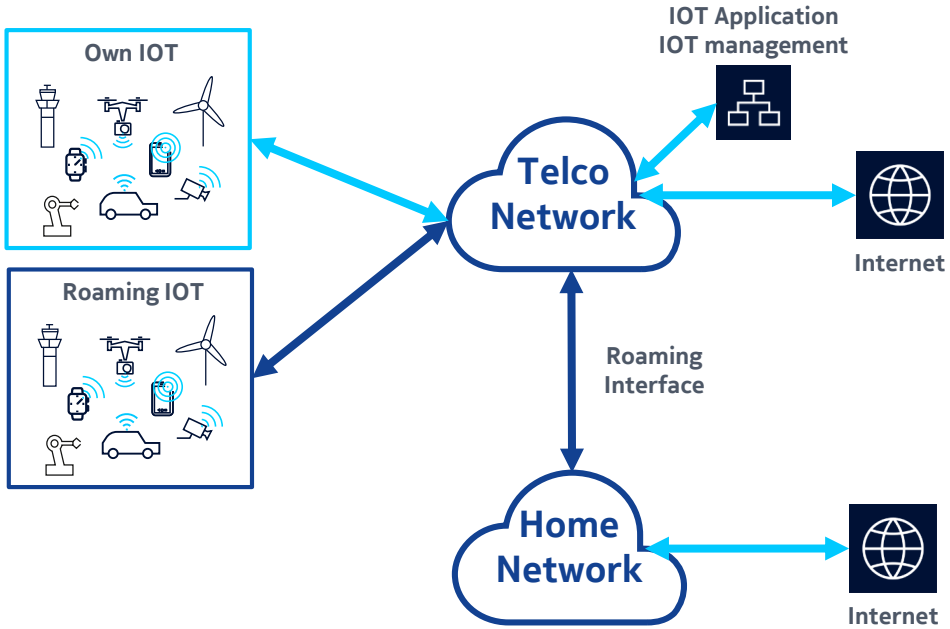
Internet DDoS Mitigation

- DDoS mitigation solutions
- Local scrubbing centers
- Global scrubbing centers

Internal DDoS Mitigation:

- Prevent the build up of a botnet inside the network
- Dedicated Telco based IDS systems
- Attacks detection
- Traffic anomalies detection based on traffic patterns
- Malware signature detection
- Recognition of end device MSISDN, IMSI, IMIE etc, from traffic flow

IoT Security



IoT in Telco networks

- Own IoT devices: covered by contracts and SLA'a
- IoT devices braking out locally to the internet
- Roaming IoT devices braking out via the roaming interface towards their home telco network

Mitigation:

- Dedicated Telco based IDS systems
- Attacks detection
- Traffic anomalies detection based on traffic patterns
- Malware signature detection
- Recognition of end device MSISDN, IMSI, IMIE etc., from traffic flow

Chance:

- Offer security as a service to IoT vendors and operators

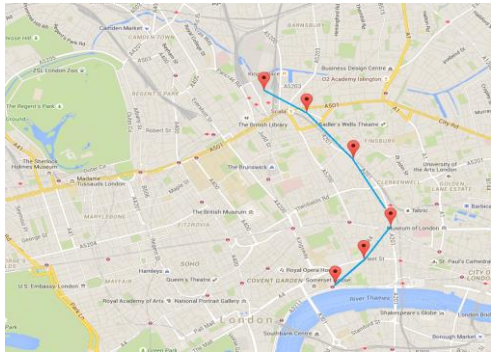
IoT Security
Dedicated Telco IDS System

Benefits of inspecting GTP session:

- Without any assistance, we can identify:
  - IMS of the device
  - IMEI of the device
  - MSISDN of the subscriber
  - Cell location
- Not only signature detection, also attacks detection from internet to subscribers or from subscribers to other subscribers or to the network
- Roaming attacks covered

IMSI: 4405014220222
MSISDN: 00818093111111
IMEI: 01234567890

Cell ID - location



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