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# 5G-Sicherheit kann einfach sein

Zugänglichkeit zum Thema 5G Sicherheit erhöhen!



tomorrow  
belongs to those who embrace it  
today



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# Nokia warns 5G security ‘breaches are the rule, not the exception’

A majority of 5G network operators experienced up to six cyber incidents in the past year. Defenses are especially lacking for ransomware and phishing attacks.

By Lily Hay Newman

## New security flaws in

...ues to LTE  
...were new.

### Handy-Spähattacken

## 5+ Wie ein Schweizer IT-Unternehmer weltweite Überwachung ermöglicht

Sicherheitslücken im Telefonnetz gefährden die Daten von Millionen Handynutzern weltweit. Die Infrastruktur für die Angriffe der Hacker liefert oft ein Basler Unternehmer mit einem bizarren Geschäftsmodell.

Privacy

## New flaws in 4G, 5G allow attackers to intercept calls and track phone locations

Zack Whittaker @zackwhittaker / 5:39 PM GMT+1 • February 24, 2019

Search Q

TechCrunch+

LILY HAY NEWMAN SECURITY AUG 9, 2022 6:46 PM

## One of 5G's Biggest Features Is a Security Minefield

New research found troubling vulnerabilities in the 5G platforms carriers offer to wrangle embedded device data.



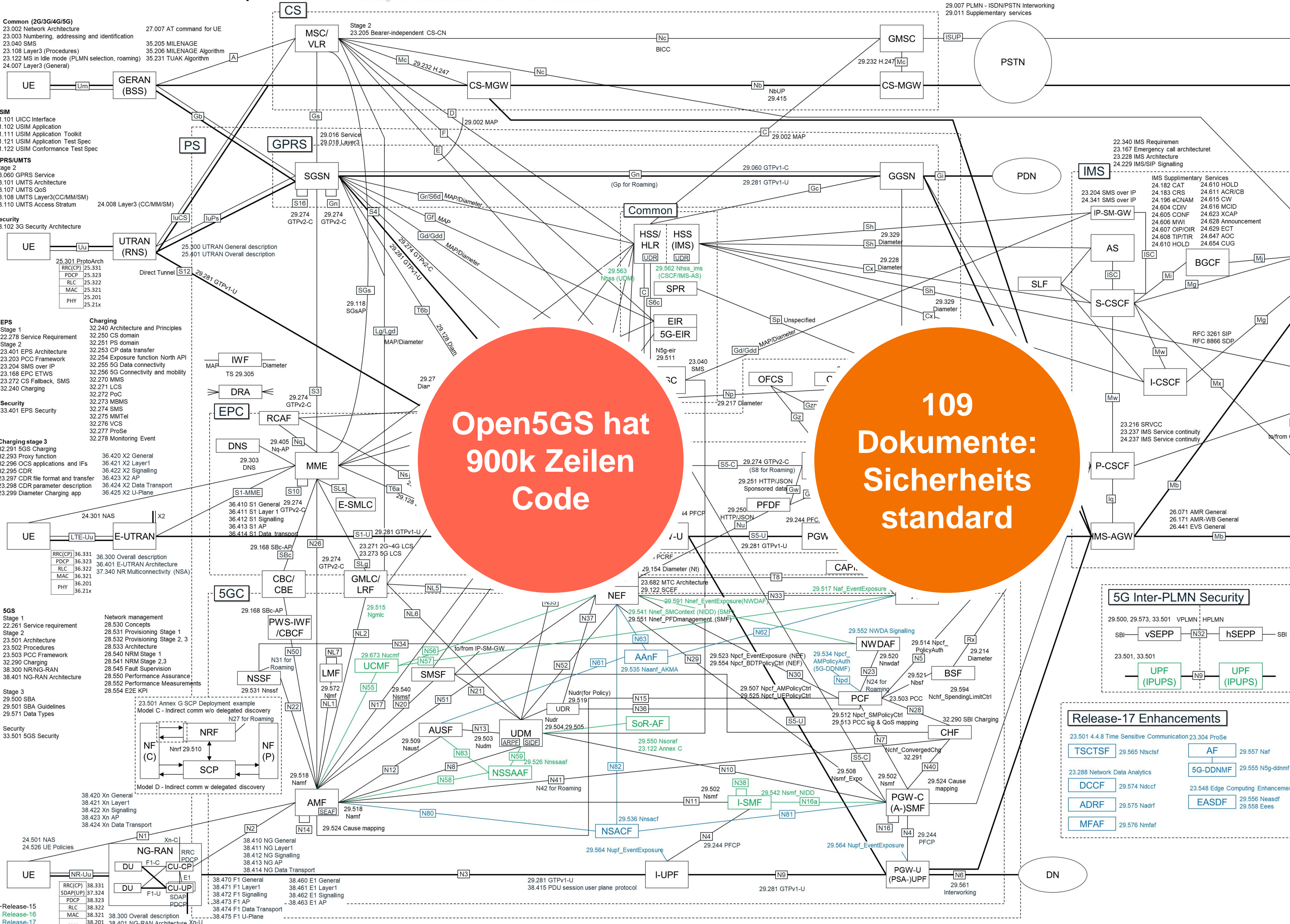
**75%** Sicherheitsbewusst

**50%** Sicherheit integriert

**+350** Campus-Netz-Lizenzen

# 3GPP Overall Architecture and Specifications

Copyright © 2021 Muneaki Ogawa (twitter: @nickel0, GitHub: @nickel0)  
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### 4G and 5G Identifier mapping

4G Identifier	5G Identifier
IMSI - International Mobile Subscriber Identity	SUPI - Subscription Permanent Identifier
NAI - Network Access Identifier	SUPI - Subscription Permanent Identifier
n/a	SUPI - Subscription Permanent Identifier
IMEI - International Mobile Equipment Identity	PEI - Permanent Equipment Identifier
GUTI - Globally Unique Temporary UE Identity	5G-GUTI - 5G Globally Unique Temporary UE Identity
APN - Access Point Name	DNN - Data Network Name
ECGI - E-UTRA Cell Global Identifier	NCGI - NR Cell Global Identifier
ECI - E-UTRA Cell Identity	NCI - NR Cell Identity
MSISDN - Mobile Station ISDN	GPSI - Generic Public Subscription Identifier
External Identifier	GPSI - Generic Public Subscription Identifier
n/a	S-NSSAI - Single-Network Slice Selection Assistance Information

### 5G Network Function Abbreviations

**Release-15**

- 5G-EIR - 5G-Equipment Identity Register
- AAf - AKMA (Authentication and Key Management for Applications) Anchor Function
- AF - Application Function
- AMF - Access and Mobility Management Function
- AUSF - Authentication Server Function
- ARPF - Authentication credential Repository and Processing Function
- BSF - Binding Support Function
- CAPf - Common API Framework for 3GPP northbound APIs
- CHF - Charging Function
- I-UPF - Intermediate UPF
- LMF - Location Management Function
- LRf - Location Retrieval Function
- N3IWF - Non-3GPP InterWorking Function
- NEF - Network Exposure Function
- NRF - Network Repository Function
- NSSF - Network Slice Selection Function
- NWDAF - Network Data Analytics Function
- PCF - Policy Control Function
- SCP - Service Communication Proxy
- SEAF - Security Anchor Function
- SEPP - Security Edge Protection Proxy
- SIDF - Subscription Identifier De-concealing Function
- SMF - Session Management Function
- SMF - Short Message Service Function
- TNAP - Trusted Non-3GPP Access Point
- TNGF - Trusted Non-3GPP Gateway Function
- Twf - Trusted WLAN Interworking Function
- UDM - Unified Data Management
- UDR - Unified Data Repository
- UDSF - Unstructured Data Storage Function
- UPF - User Plane Function

**Release-16**

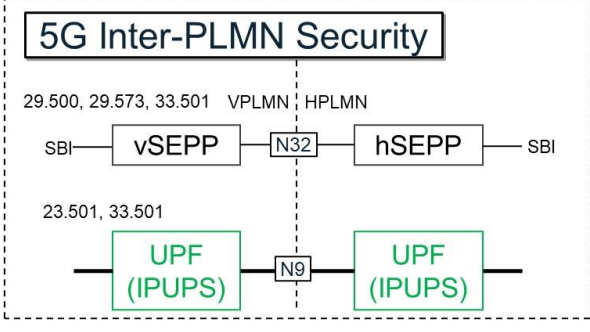
- IPUPS - Inter PLMN UP Security
- I-SMF - Intermediate SMF
- NSSAAF - Network Slice-specific and SNPN Authentication and Authorization Function
- UCMF - UE radio Capability Management Function
- SoR-AF - Steering of Roaming Application Function

**Release-17**

- 5G DDNMF - 5G Direct Discovery Name Management Function
- ADRF - Analytics Data Repository Function
- EASDF - Edge Application Server Discovery Function
- MFAF - Messaging Framework Adaptor Function
- DCCF - Data Collection Coordination Function
- NSACF - Network Slice Admission Control Function
- TCTSF - Time Sensitive Communication and Time Synchronization Function

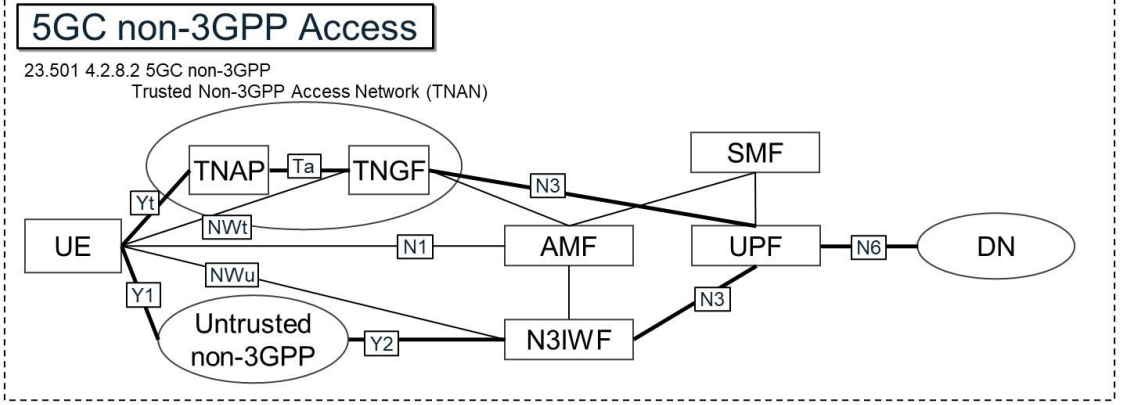
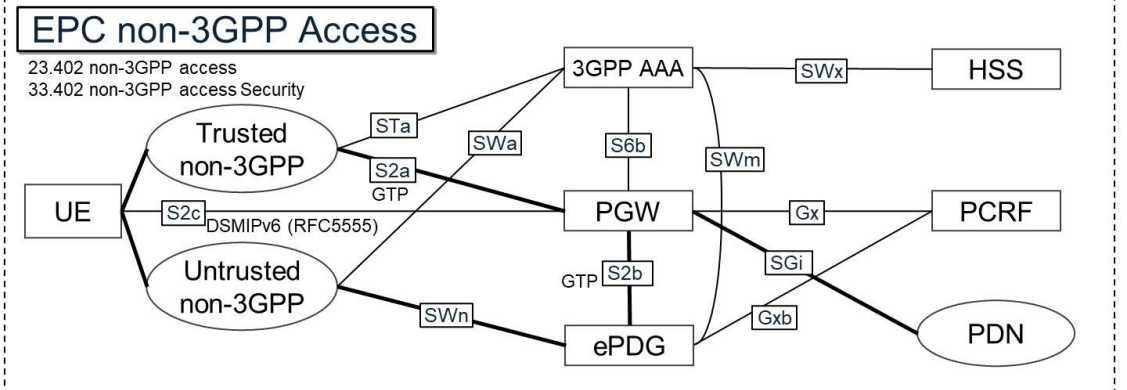
Open5GS hat  
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Code

109  
Dokumente:  
Sicherheits  
standard



### Release-17 Enhancements

TSCTSF	29.565 Ntsctsf	AF	29.557 Naf
DCCF	29.574 Ndcdf	5G-DDNMF	29.555 N5g-ddnmf
ADRF	29.575 Nadr	EASDF	29.556 Neasdf
MFAF	29.576 Nmfa		



$\{x_n\} + \{y_n\} \stackrel{\text{dfL}}{=} \{x_n + y_n\}; \beta \{x_n\} \subset \mathbb{R} \downarrow n \rightarrow \infty$   
 $\downarrow n \rightarrow \infty; y_n \quad \beta = g; x: \rho \quad \sqrt[4]{4} \cdot \sqrt[4]{13^n};$

$\lim_{n \rightarrow \infty} \sqrt[n]{A} = 1$   
 $x: \rho$

$N \rightarrow \mathbb{R} \quad n \geq n_0: (x_n - g) < \varepsilon$

$\sqrt[4]{4} \cdot \sqrt[4]{13^n} \quad \sqrt[4]{13^n}$

$\sqrt[4]{4^n + \cos 2n} \left( \frac{n^2 + n - 1}{n^2 - 2n + 3} \right)^5$   
 $n \geq n_0: (x_n)$

$N \rightarrow \mathbb{R} \quad n \geq n_0: (x_n - g) < \varepsilon$

$\{x_n\} + \{y_n\} \stackrel{\text{dfL}}{=} \{x_n + y_n\}$

$\beta_y \quad \beta_x$

$x_n + y_n \quad \alpha_y \quad \alpha_x \quad N \rightarrow \mathbb{R}$

## 5G Sicherheit bleibt komplex



## Zugang zu 5G Sicherheit vereinfacht

# Lösungsansatz



**Sicherheit beginnt  
bei der Netzentwicklung**



**Schulung erhöht das  
Verständnis von 5G  
Sicherheit**



**Regelmäßige  
Sicherheitstest des  
operativen 5G**

# Breakout Session

**Vor wem muss  
ich mich als  
Operator  
schützen?**

**Woher  
kommen  
Angriffe auf 5G  
Netze?**

**Welche  
Maßnahmen  
helfen Angriffe  
abzuwehren?**

Vielen Dank und bis nachher!