A child speaks on the phone as he says goodbye to a relative looking out the window of a train carriage waiting to leave for western Ukraine at the railway station in Kramatorsk, Ukraine on March 2, 2022. | Andriy Andriyenko/AP Photo

https://www.politico.com/news/2022/03/07/ukraine-phones-internet-still-work-00014487

What is the mobile miracle, and how 5G will change the world for good?

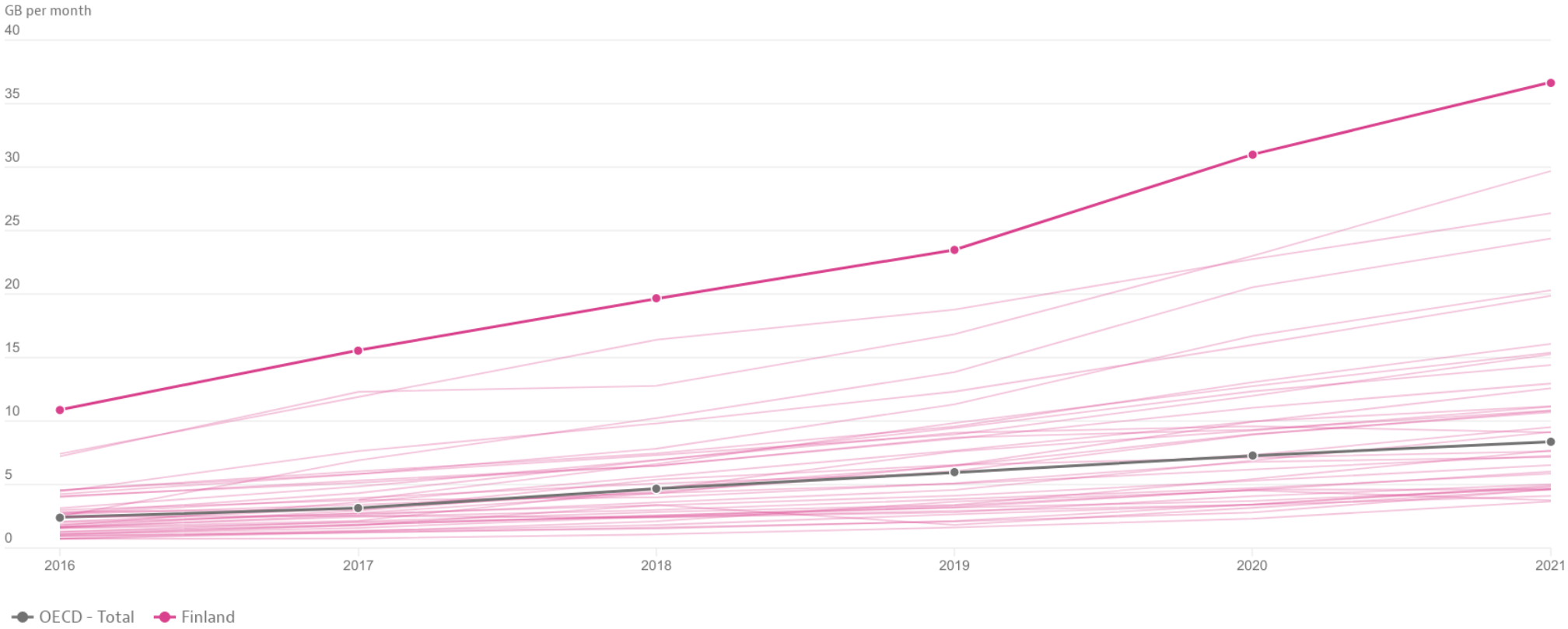
Mikko Karikytö
Chief Product Security Officer
Ericsson

@mikkokarikyto

Average monthly mobile data usage per mobile broadband subscription

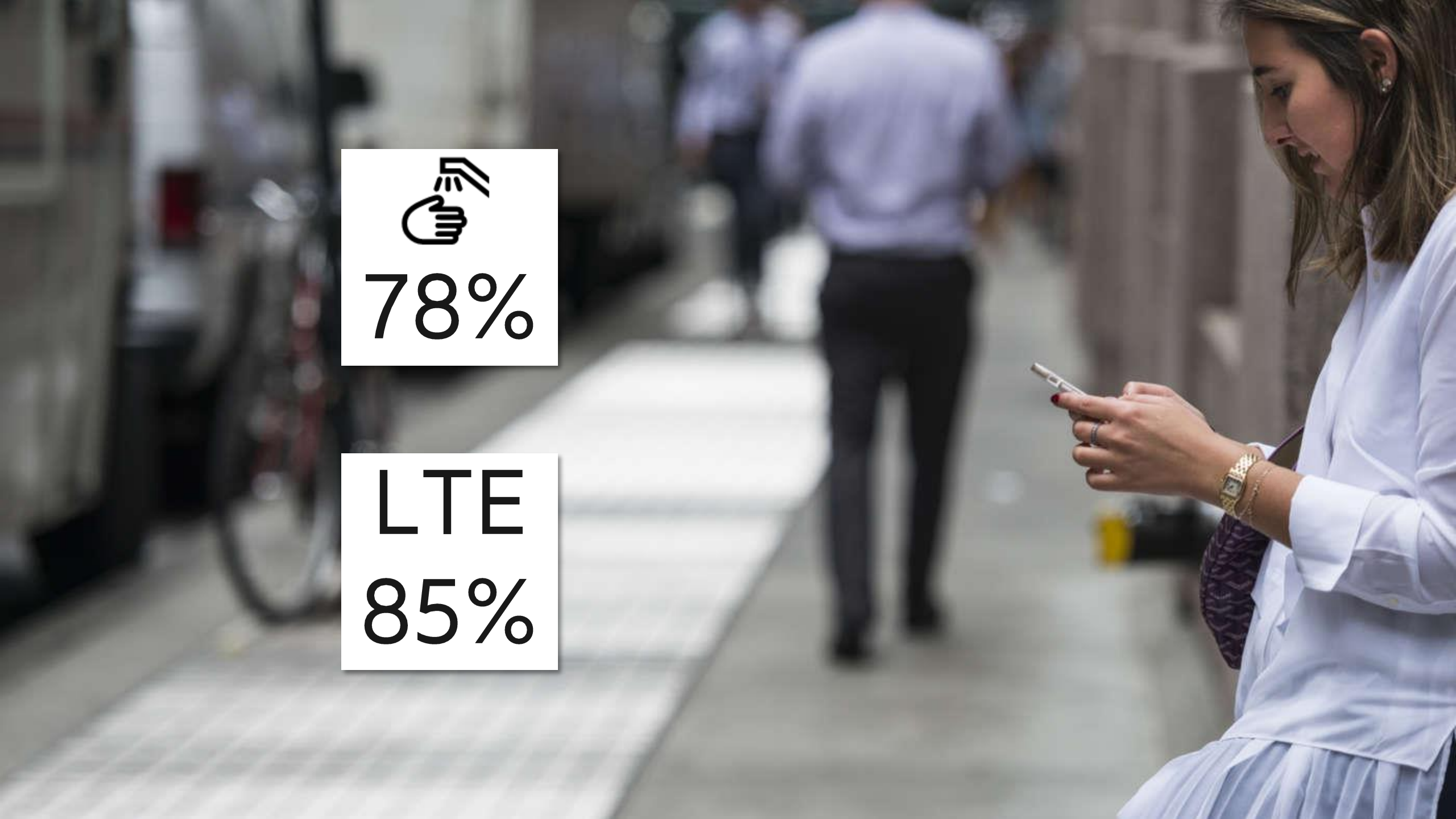
Network capacity needs to continue to expand to meet the rapidly increasing demand for mobile connectivity. This indicator measures the average monthly data usage per mobile broadband subscription, which provides an indication of the extent to which mobile broadband is enabling users to access online services and content.

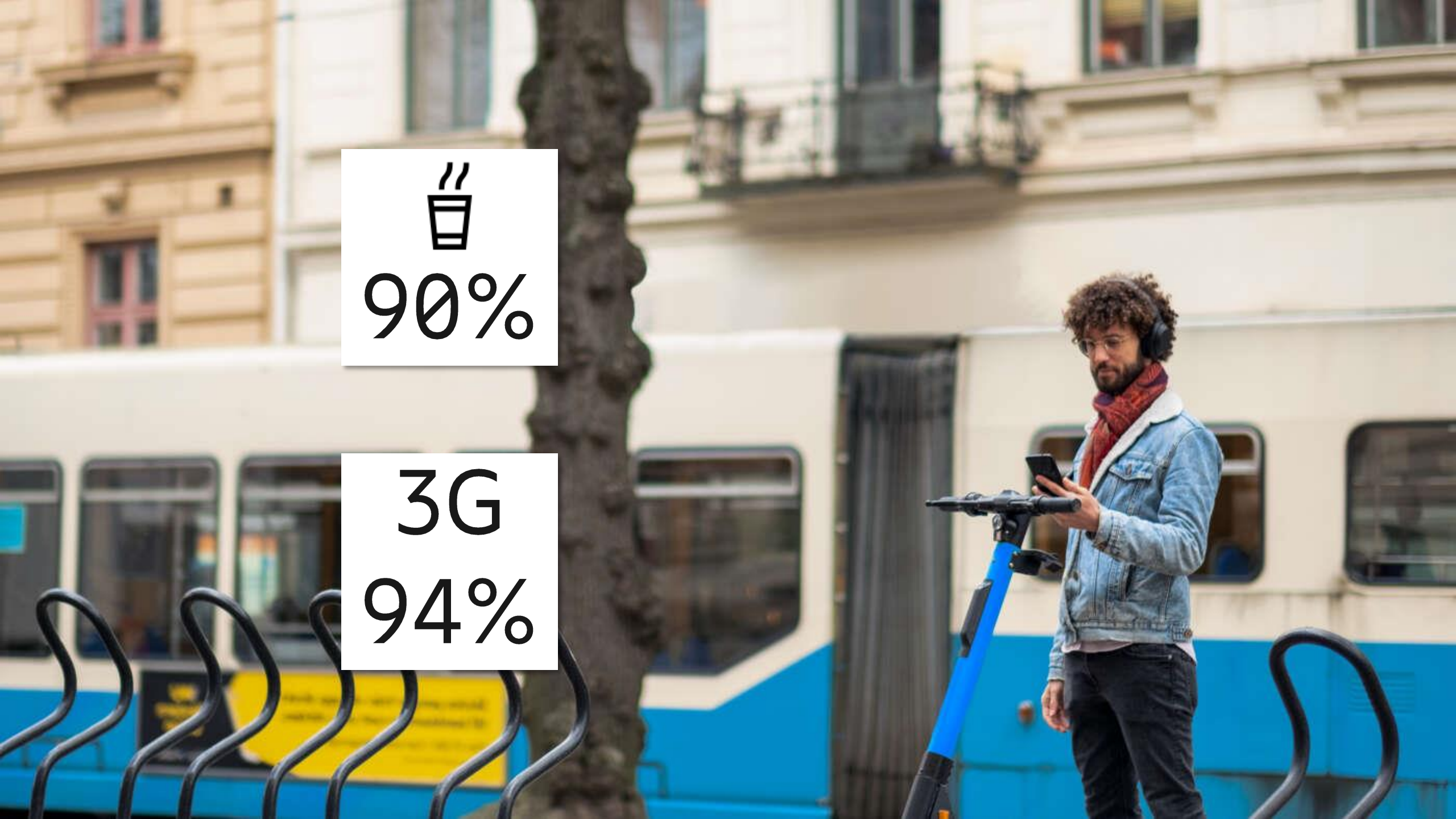
For more information on this indicator visit https://goingdigital.oecd.org/indicator/15



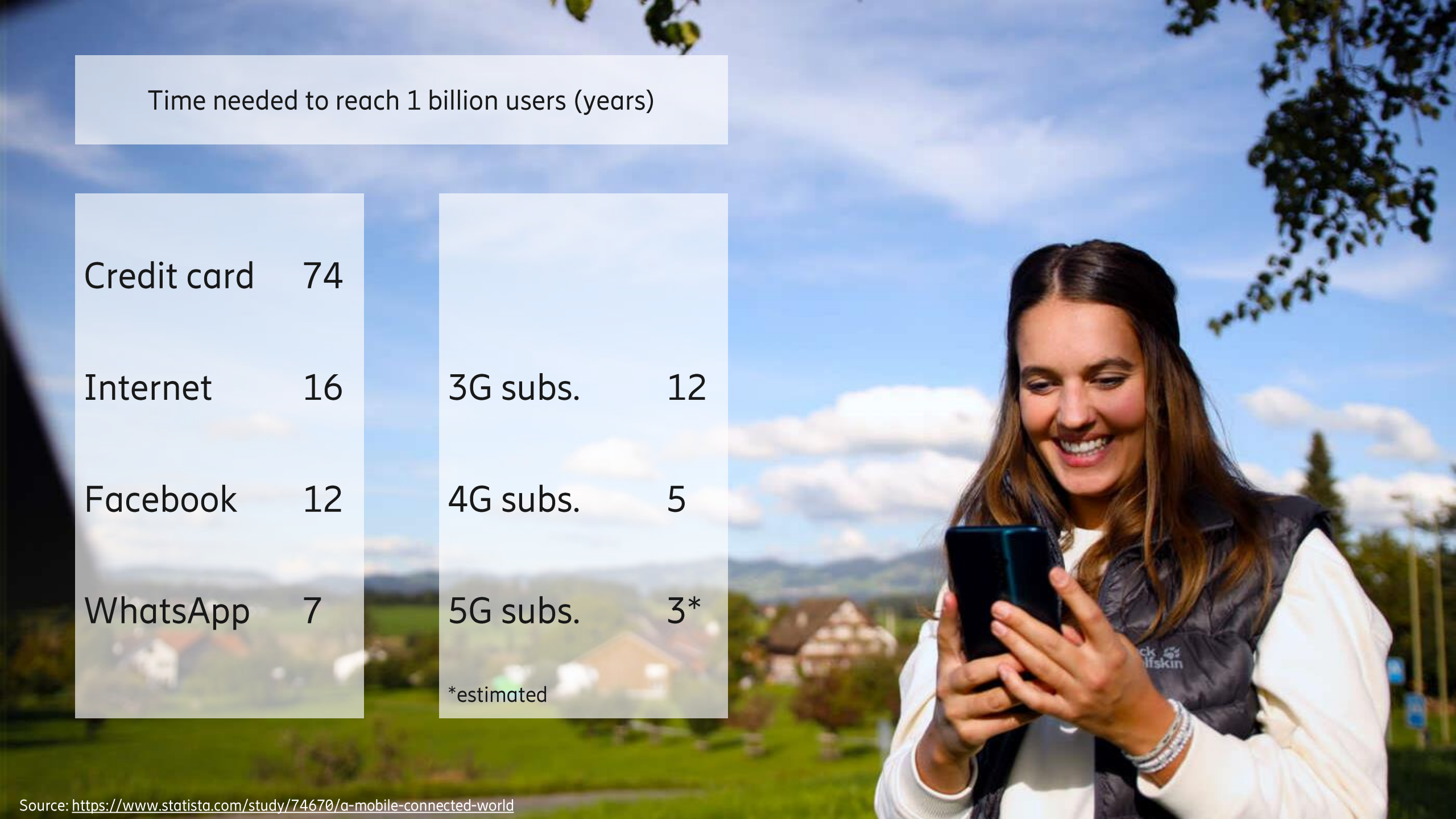
Source: The OECD Going Digital Toolkit, based on the OECD Broadband portal, http://www.oecd.org/sti/broadband/broadband-statistics. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

OECD Going Digital Toolkit


78%
LTE
85%


90%
3G
94%

90%
97%



Time needed to reach 1 billion users (years)

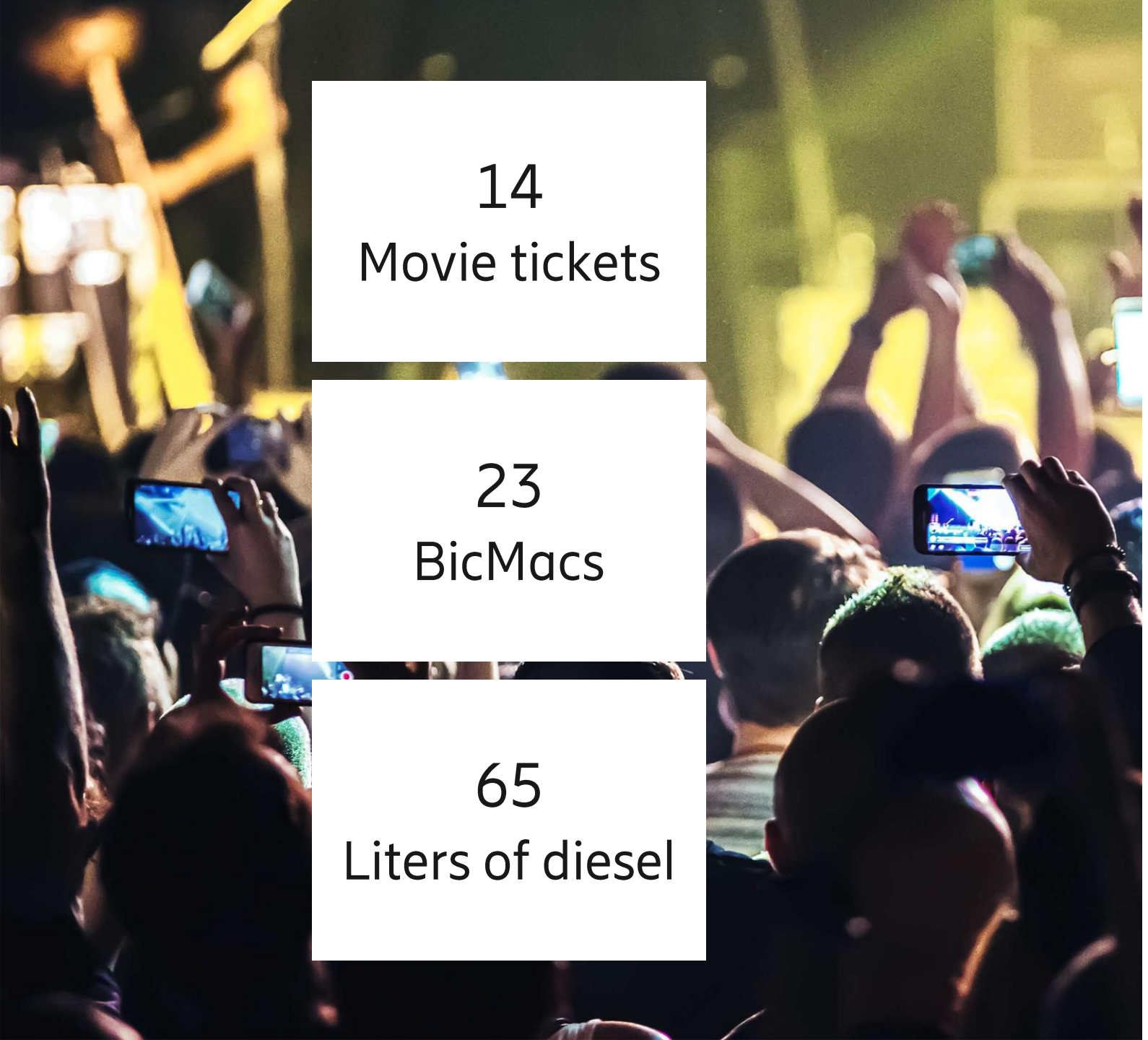
Credit card	74
Internet	16
Facebook	12
WhatsApp	7

3G subs.	12
4G subs.	5
5G subs.	3*

*estimated

Source: https://www.statista.com/study/74670/a-mobile-connected-world

10 years ago

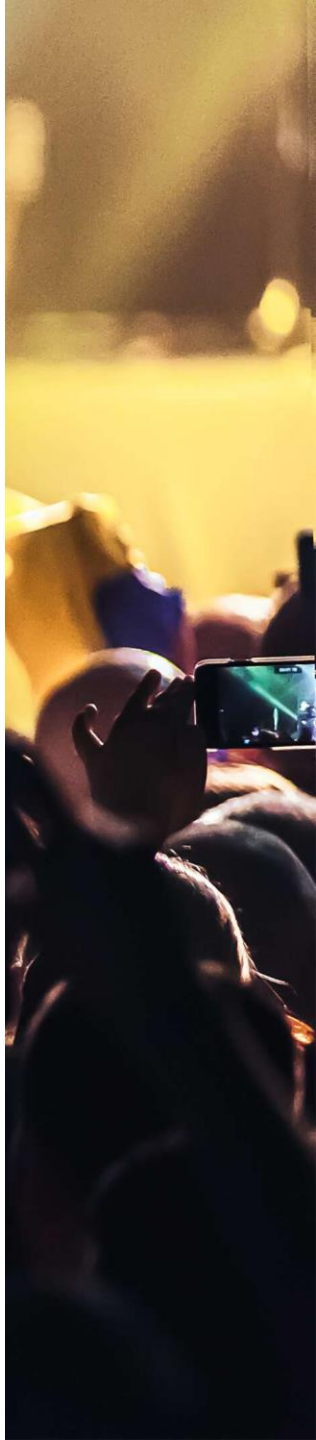


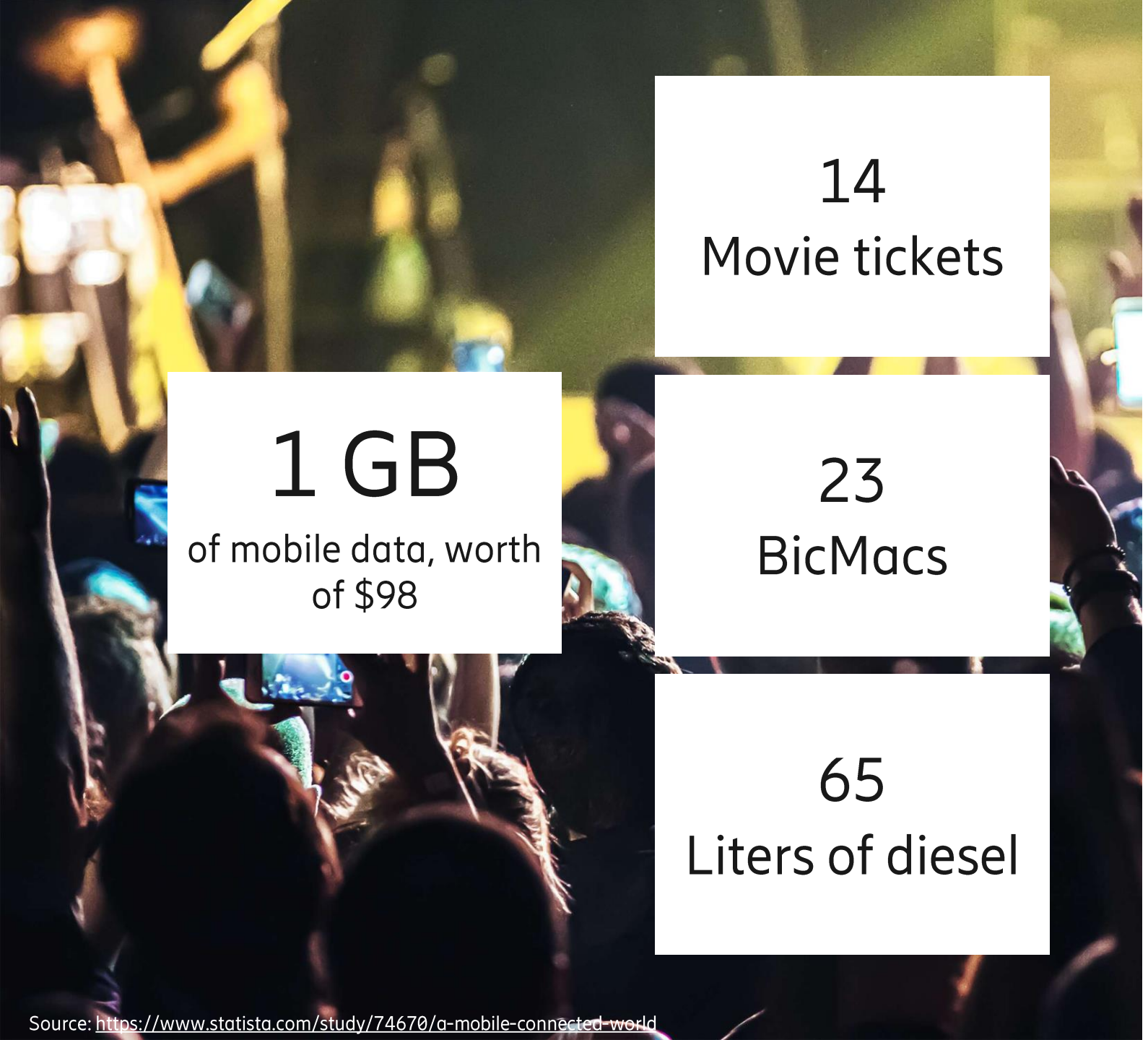
14
Movie tickets

23
BicMacs

65
Liters of diesel

10 years ago





14
Movie tickets

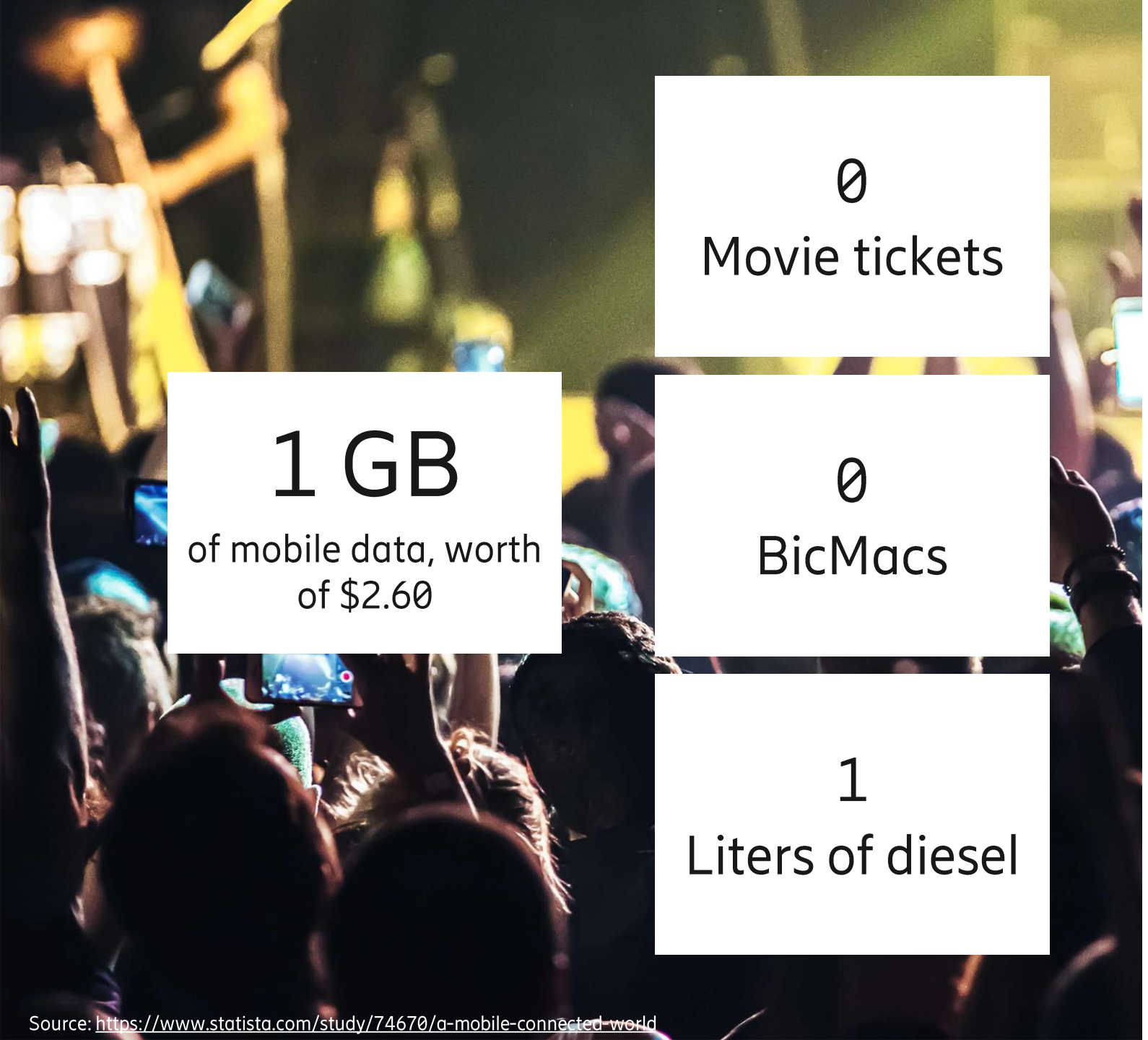
1 GB
of mobile data, worth of $98

23
BicMacs

65
Liters of diesel

10 years ago

Source: https://www.statista.com/study/74670/a-mobile-connected-world



0
Movie tickets

1 GB
of mobile data, worth of $2.60

0
BicMacs

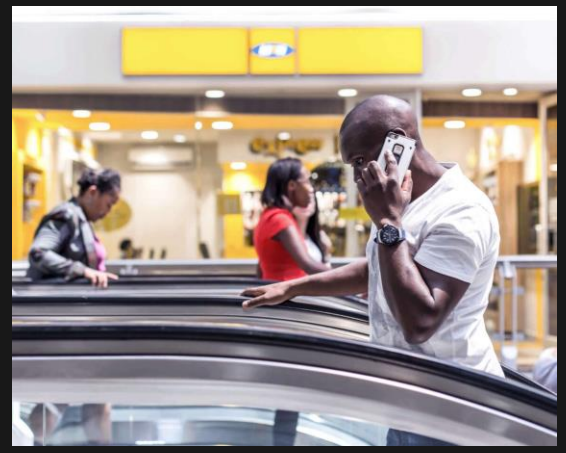
1
Liters of diesel

Today

Source: https://www.statista.com/study/74670/a-mobile-connected-world

So, how does this amazing technology touch our lives?

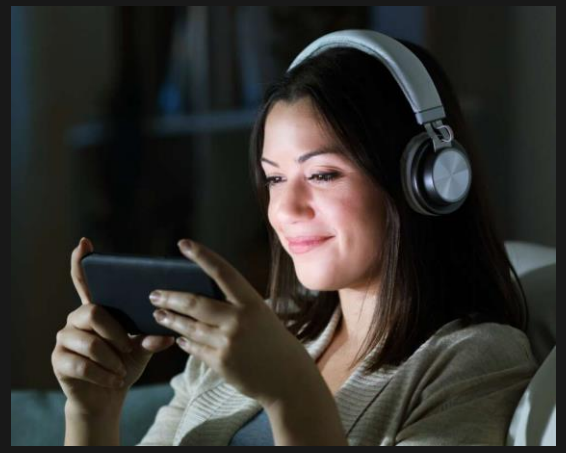
Mobile technology – part of every aspect of our life



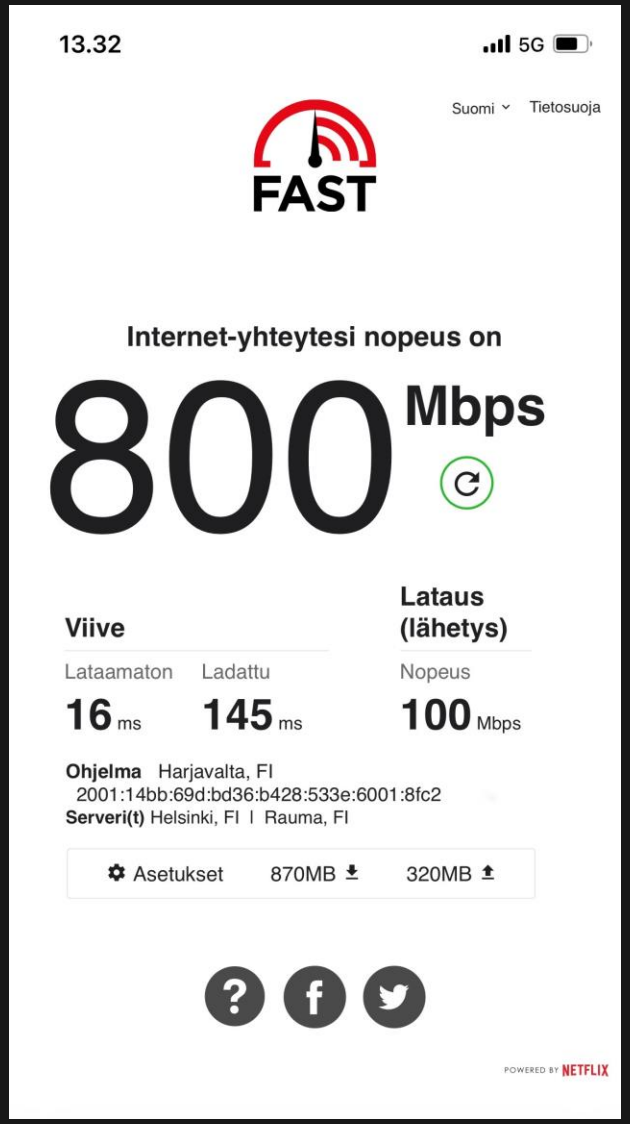
With us on the go

At work

When we need to win



When we relax

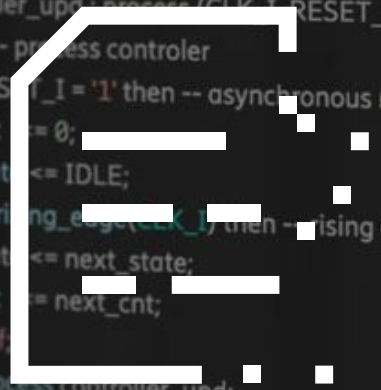

13.32
5G
Suomi
Tietosuoja
FAST
Internet-yhteytesi nopeus on
800 Mbps
Viive
Lataaamaton
16 ms
Ladattu
145 ms
Lataus (lähetys)
Nopeus
100 Mbps
Ohjelma Harjavalta, FI
2001:14bb:69d:bd36:b428:533e:6001:8fc2
Serveri(t) Helsinki, FI I Rauma, FI
Asetukset
870MB
320MB
POWERED BY NETFLIX

The use of mobile expanding to mission critical and business critical

The value is understood by the bad as well

Telecom networks under attack

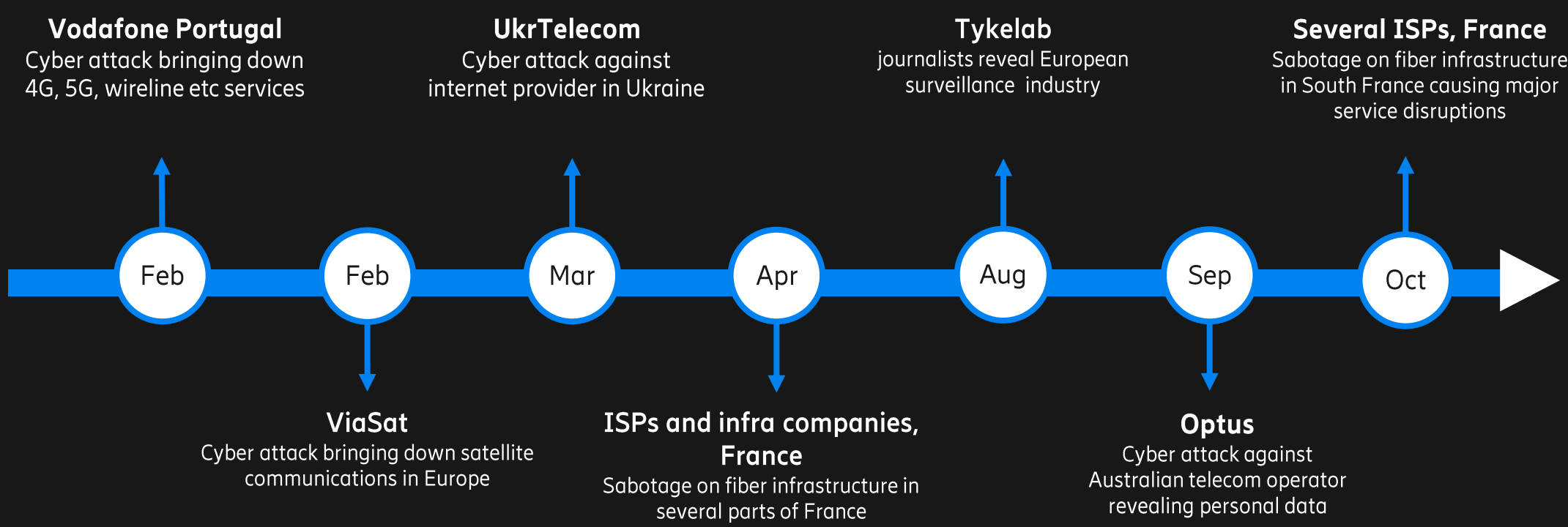
Money



Information

Service Disruption

Notable attacks and breaches – 2022



Secure by design

Robust network design

3GPP Overall Architecture and Specifications

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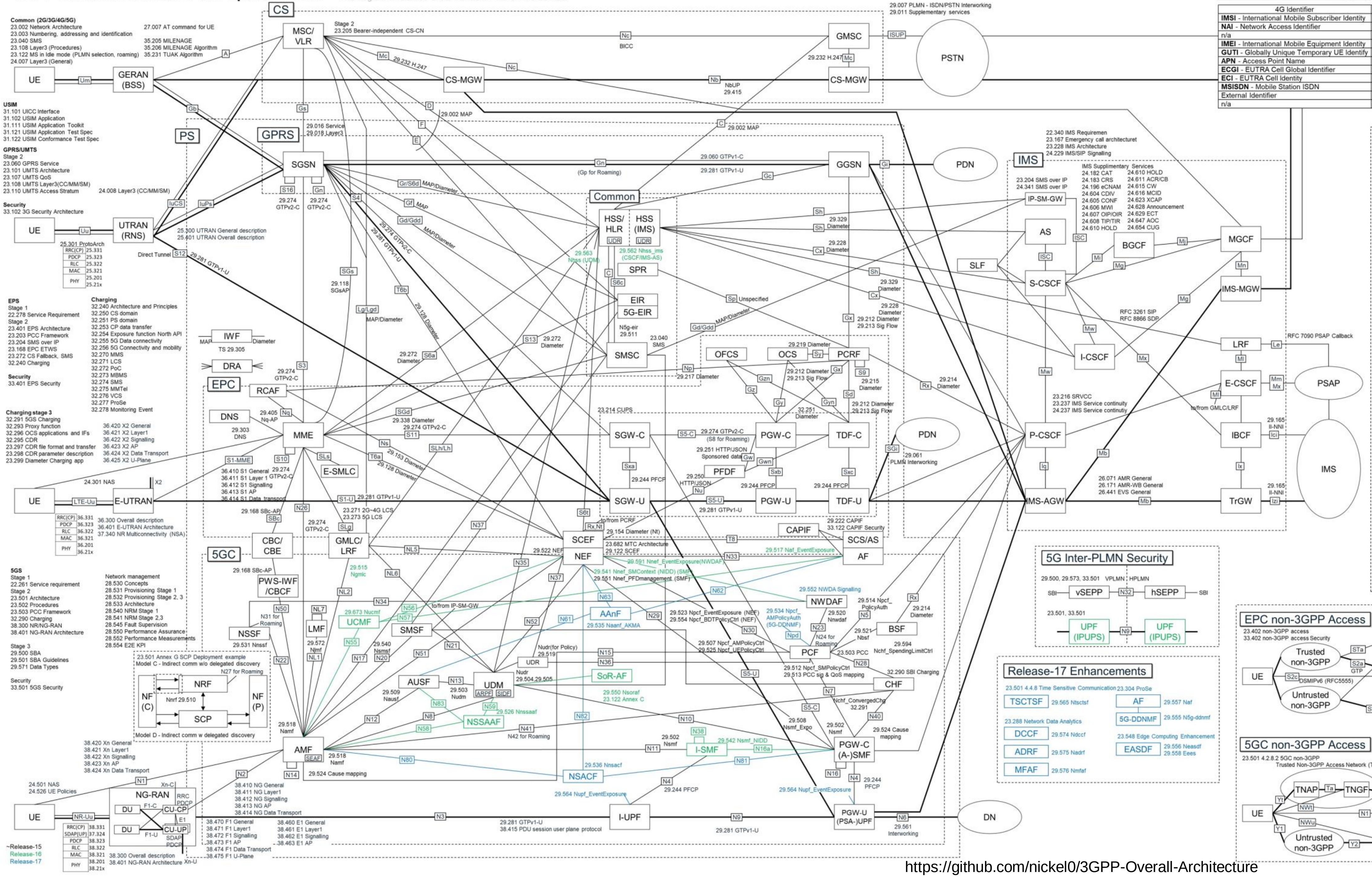


4G and 5G Identifier mapping

4G Identifier	5G Identifier
IMSI - International Mobile Subscriber Identity	**SUPI** - Subscription Permanent Identifier
NAI - Network Access Identifier	**SUPI** - Subscription Permanent Identifier
n/a	**SUCI** - Subscription Concealed Identifier
IMEI - International Mobile Equipment Identity	**PEI** - Permanent Equipment Identifier
GUTI - Globally Unique Temporary UE Identify	**5G-GUTI** - 5G Globally Unique Temporary UE Identify
APN - Access Point Name	**DNN** - Data Network Name
ECGI - EUTRA Cell Global Identifier	**NCGI** - NR Cell Global Identity
ECI - EUTRA 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

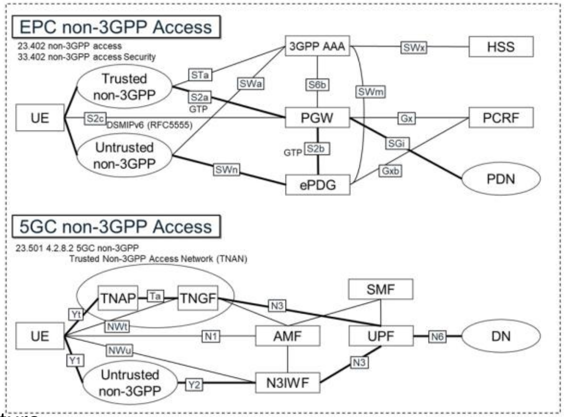
- **5G-EIR** - 5G-Equipment Identity Register
- **AAnF** - AKMA (Authentication and Key Management for Applications) Anchor Function
- **AF** - Application Function
- **AMF** - Access and Mobility Management Function
- **AUSF** - Authentication Server Function
- **ARPF** - Authentication credential Repository and Processing Function
- **BSF** - Binding Support Function
- **CAPIF** - 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
- **SMSF** - Short Message Service Function
- **TNAP** - Trusted Non-3GPP Access Point
- **TNGF** - Trusted Non-3GPP Gateway Function
- **TWIF** - 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

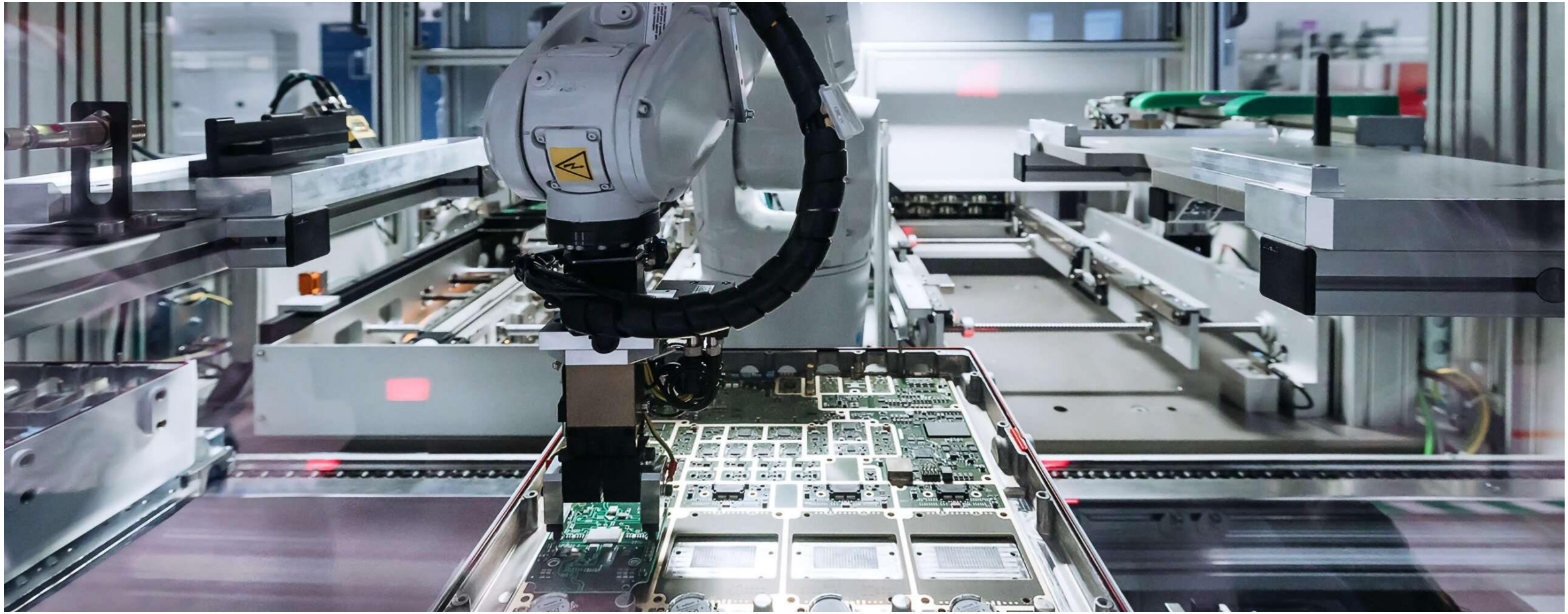
- **5G DDNMF** - 5G Direct Discovery Name Management Function
- **ADRF** - Analytics Data Repository Function
- **EASDF** - Edge Application Server Discovery Function
- **MFAF** - Messaging Framework Adaptor Function
- **DCCF** - Data Collection Coordination Function
- **NSACF** - Network Slice Admission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



https://github.com/nickel0/3GPP-Overall-Architecture

Solid operations

Security and identity in hardware



5G and the future

3GPP 5G security standard key features

Improved subscriber authentication

Preventing spoofed phone calls, false billing or eavesdropping

Enhanced subscriber privacy

Preventing IMSI catchers, tracking of subscriber is significantly more difficult

Defense-in-depth for virtual network deployments

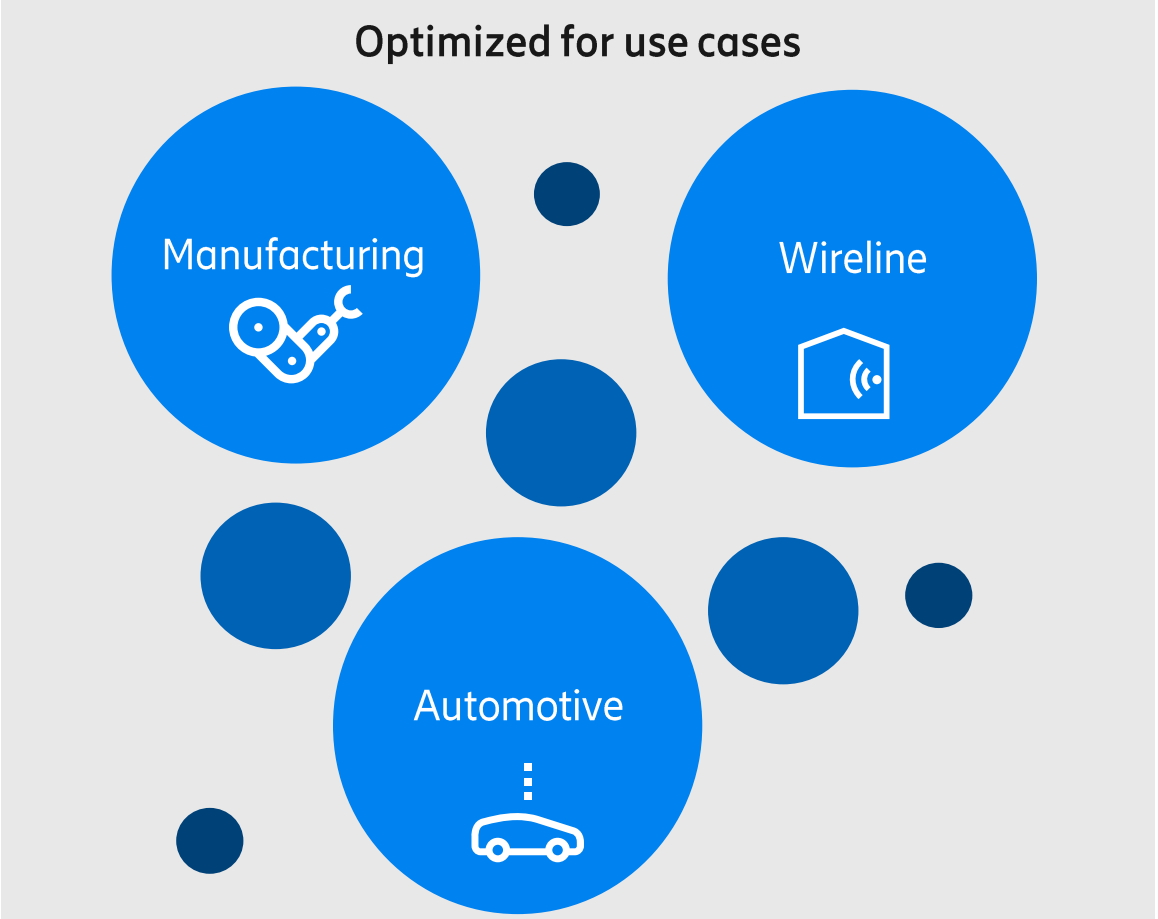
Protecting traffic over transport network makes wiretapping more difficult

Integrity protection of user plane

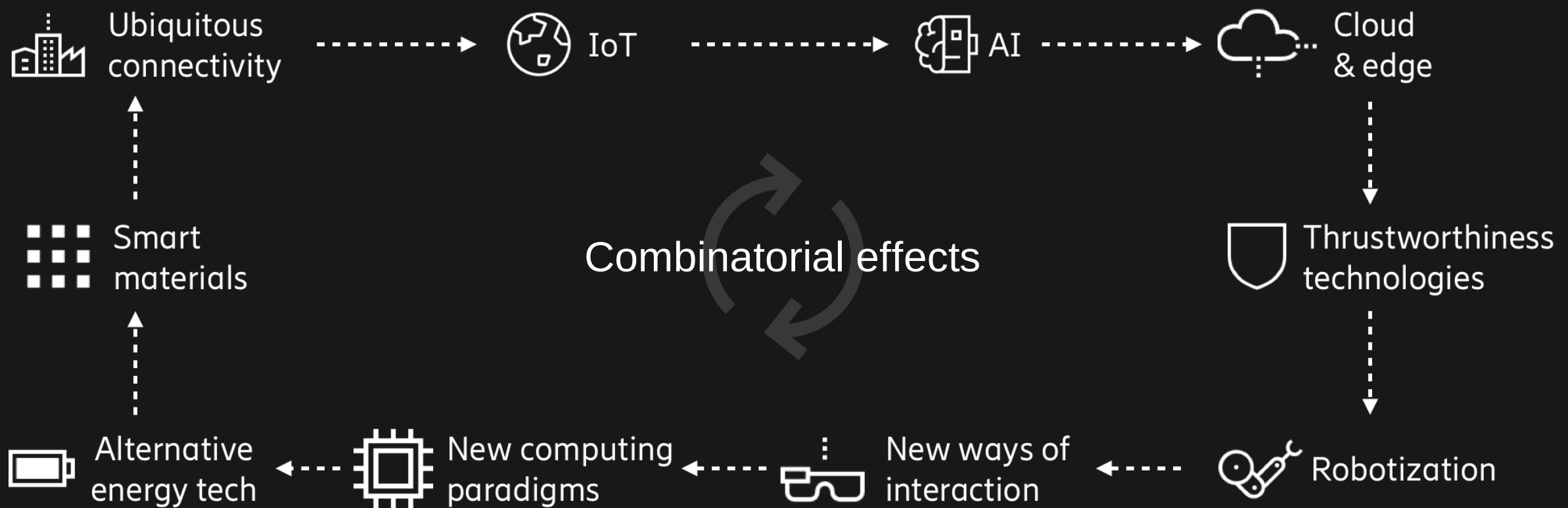
The origin and authenticity of data can be cryptographically guaranteed

Interconnect security

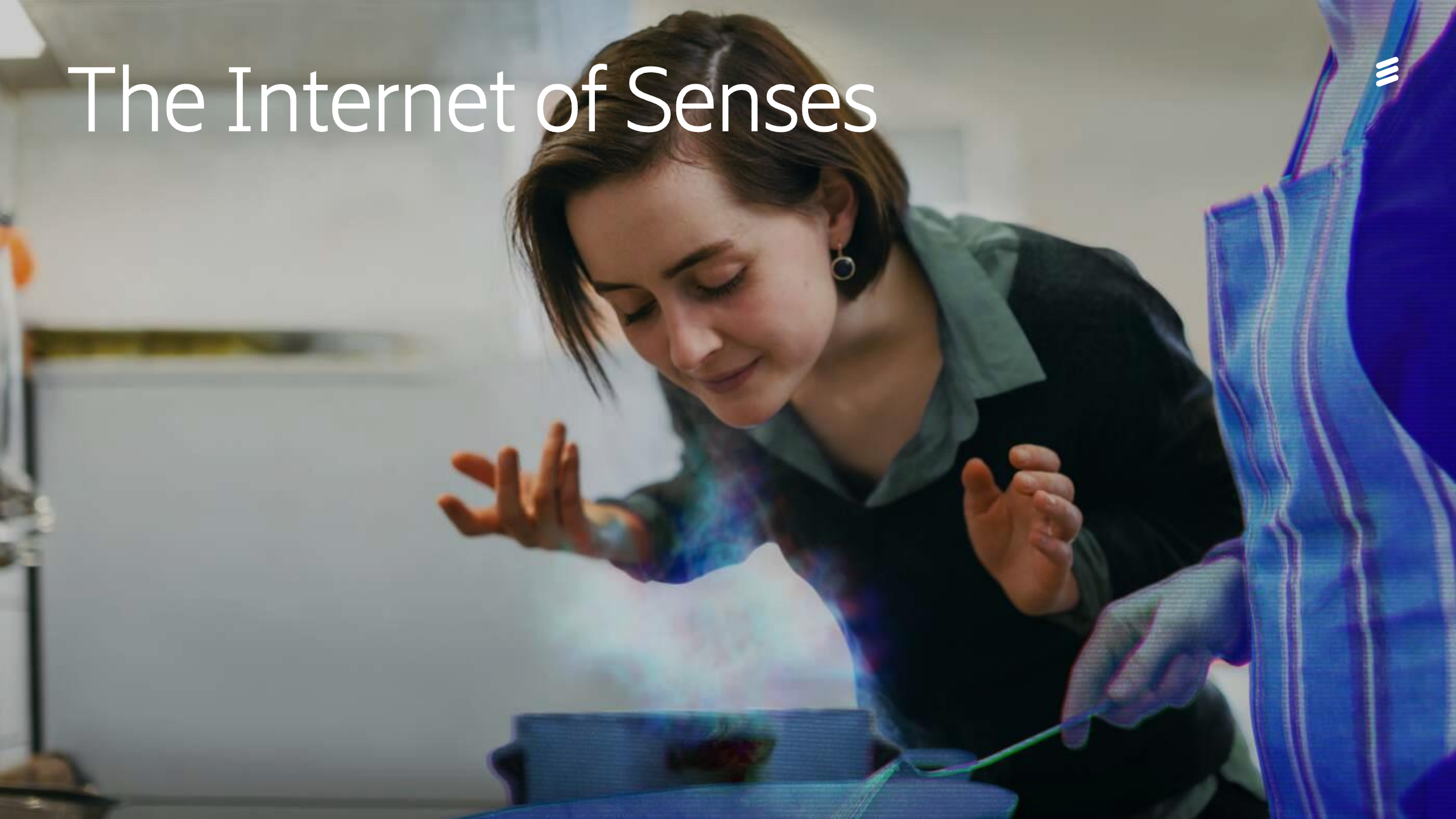
Additional security layer inside and between the core networks



10 exponential technological forces



The Internet of Senses

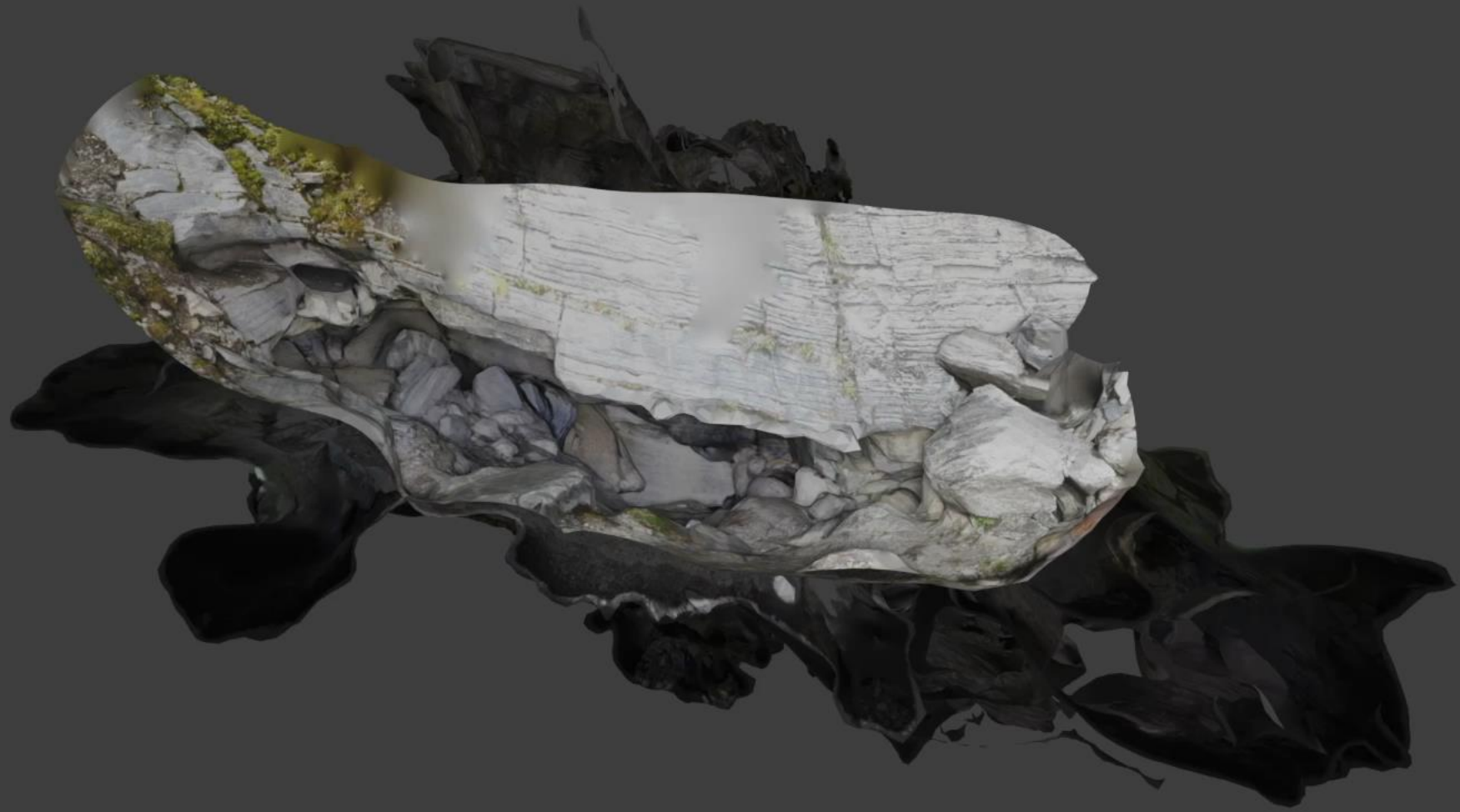


Connected Sustainable World

A child speaks on the phone as he says goodbye to a relative looking out the window of a train carriage waiting to leave for western Ukraine at the railway station in Kramatorsk, Ukraine on March 2, 2022. | Andriy Andriyenko/AP Photo

https://www.politico.com/news/2022/03/07/ukraine-phones-internet-still-work-00014487

https://www.ericsson.com/en/security



https://arkko.com/austria-caves/