5G CORE – A NOT FINISHED REVOLUTION

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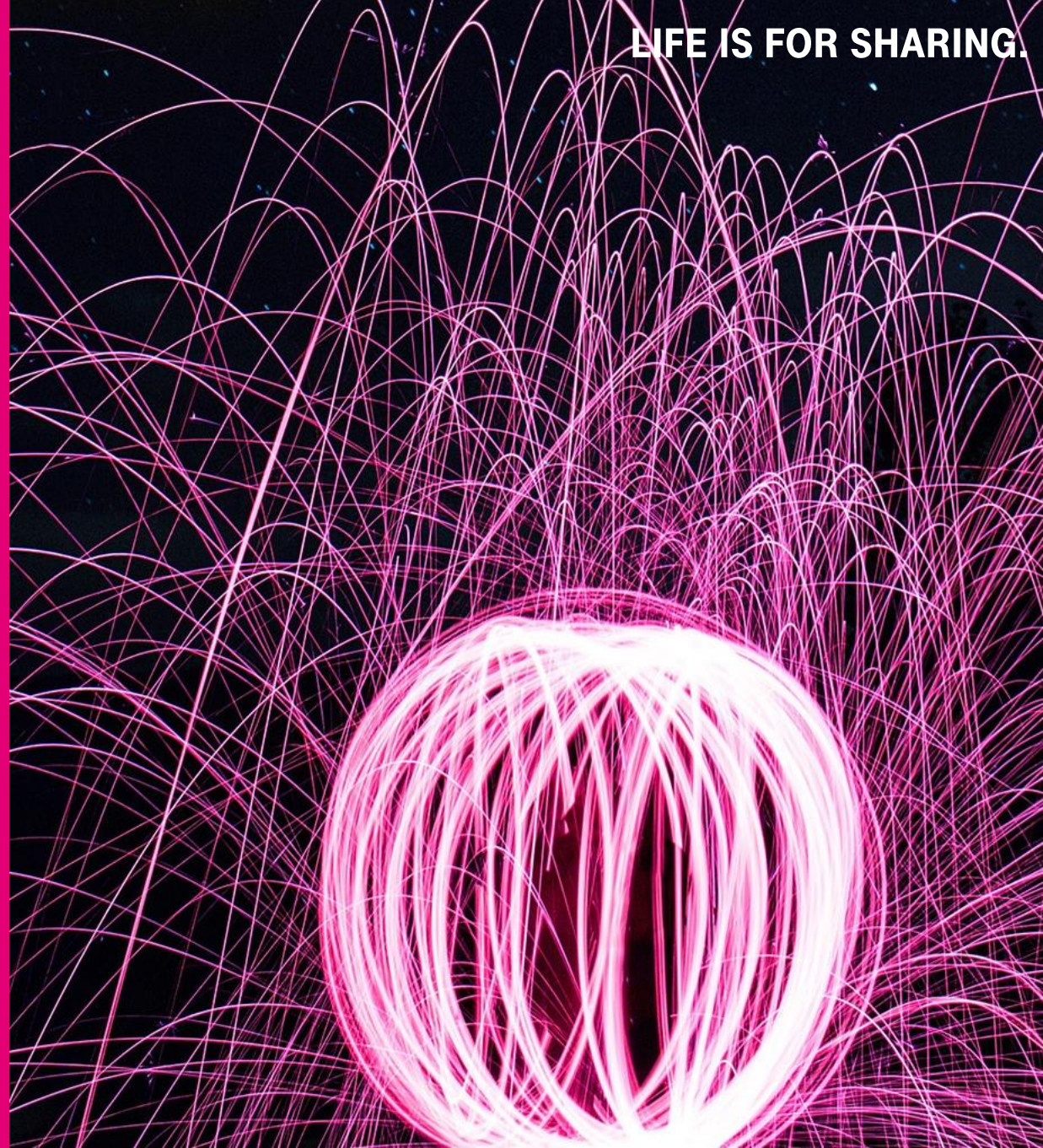


OUTLINE

WHY 5GC - DRIVERS

BRIEF OVERVIEW OF DT‘S CLOUD JOURNEY

HOW 5GC - CLOUD NATIVE EXPECTATIONS

SOME LESSONS LEARNED

STANDARDIZATION

WHY 5GC?

ARCHITECTURAL CHANGES

- Designed for the Cloud: Service Based Architecture, Auto-discovery of Network Components
- Network Slicing
- Edge Deployment
- Standardized Network Exposure, Analytics

PERFORMANCE

- Higher speed, lower latency
- Higher reliability, higher security
- Faster time to market

VERTICALS AND OPERATOR USE CASES

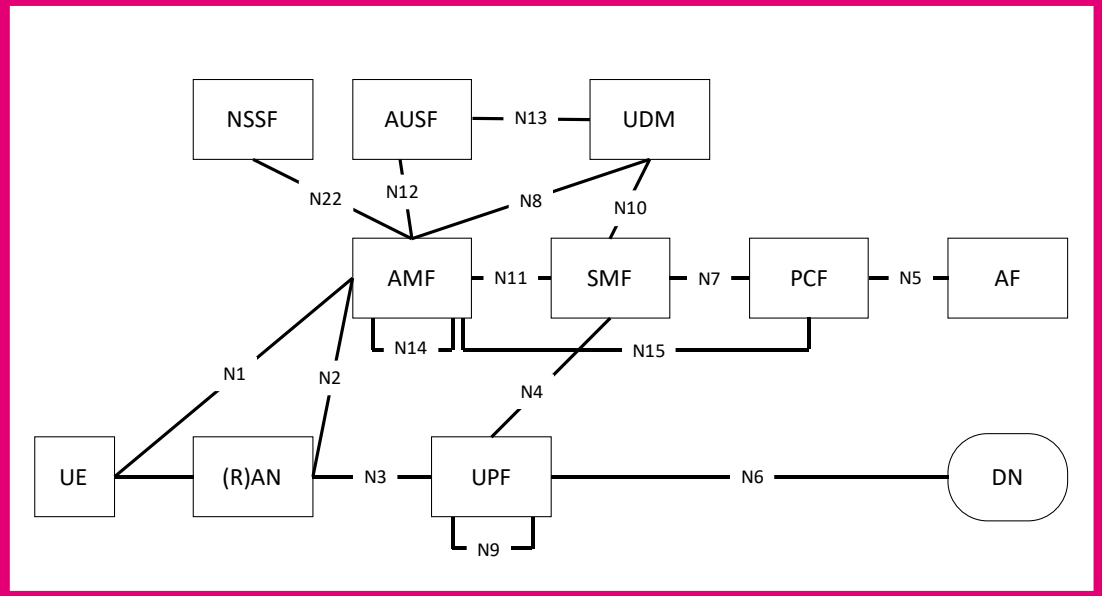
- Campus, private networks, industrial use, V2X, Drones
- Fixed Mobile Convergence (FMC)

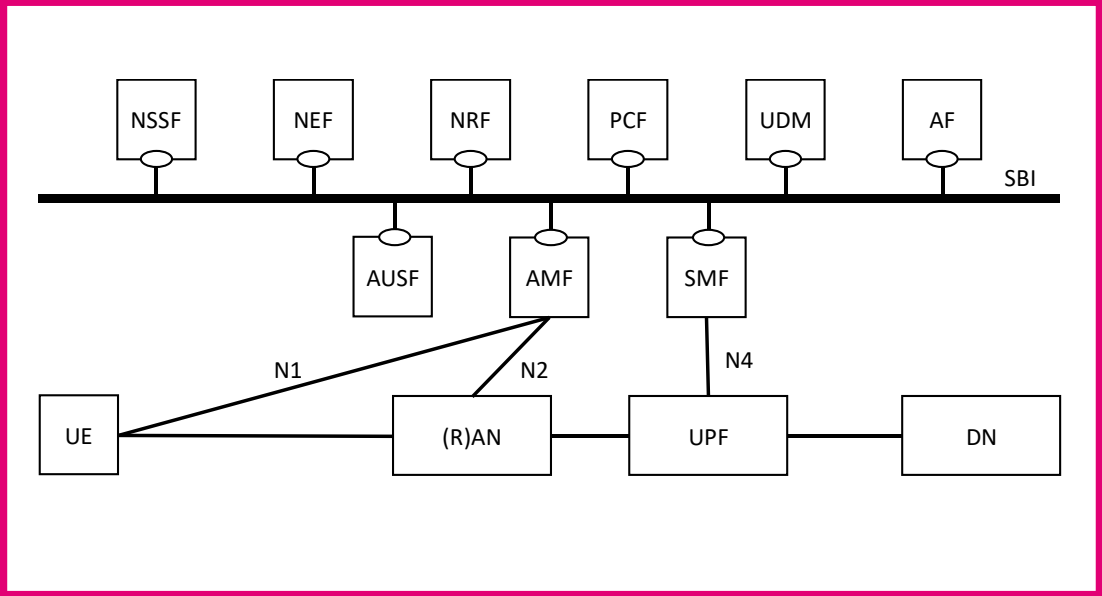
SOME FEATURE DIFFERENCES

	EPC	5GC
SLICING SUPPORT	UE can connect to different EPC instance possible/APNs	Natively supported. UE can connect to multiple network slices
NON-PUBLIC NETWORK SUPPORT	Same as slicing support	Yes (Standalone or via slicing)
VERTICALS SUPPORT	–	TSN, 5G-LAN, low-latency QoS, MEC
USER PLANE TRAFFIC HANDLING	P-GW sticky for lifetime of user session (days)	UPF can be flexibly assigned/changed
INTER-NODE COMMUNICATION	Point-to-Point-based, sticky (SCTP)	API-based, Service Based Interface (HTTP/2)
DISCOVERY OF CORE COMPONENTS	No	Yes (NRF, NSSF)
STANDARDIZED CORE EXPOSURE	SCEF (Service Capability Exposure Function)	NEF (exposure), NWDAF (analytics)
IOT POWER SAVING (MICO MODE)	No Mobile-triggered transmission mode	Yes

5G CORE - A CHANGE IN THE MINDSET

FROM FUNCTIONAL THINKING TOWARDS SERVICE-BASED ARCHITECTURE AND CLOUD NATIVE THINKING





3GPP Release 15 core network architecture

WE STRONGLY BELIEVE IN THE **BENEFITS** OF A TRULY **CLOUDIFIED 5GC**

HOWEVER, WE **LEARNED** AND **MODIFIED** OUR APPROACH ON THE WAY

CLOUD JOURNEY

WHILE WE ACHIEVED A LOT, THE ROAD TO CLOUDIFICATION HAS BEEN CHALLENGING

2017

DT telco cloud scales across the EU footprint

2018

Cloudification of heavy duty network functions in DE has started at scale

2019

Automation works: complex deployments take minutes/ hours instead of weeks/months

2020

Cloudified NW access (mini cloudlets on bare metal) to 900 DE sites

2020+

5G Core - Stand Alone Deployment: based on cloud principles (Service-Based Architecture, stateless services,...)

LIFE IS FOR SHARING.

CLOUD NATIVE: EXPECTATIONS

SOFTWARIZATION

CLOUD NATIVE ARCHITECTURE

Service Based Architecture

State & processing separation, statelessness

Network Data Layer

µ-services, containerization

LEVERAGE OPEN SOURCE SW

CLOUD DEPLOYMENT

Vendor Software

open source™

Cloud Platform

COTS Hardware

LOWER BARRIER OF ENTRY

VENDOR FOCUS ON VALUE-ADD

MORE COMPETITION

MORE PLAYERS

MORE INNOVATION

CLOUDIFICATION

Lower barrier of entry | Vendor focus on value-add | More competition | Richer vendor ecosystem | More innovation | Cloud Native Architecture

Advanced automation

Advanced tracing & monitoring

Highly-automated operation

FASTER EVOLUTION REDUCE TTM

LOWER CAPEX

FLEXIBLE DEPLOYMENTS

LOWER OPEX

5GC

ADDRESS NEW VERTICAL BUSINESS AND CURRENT BUSINESS TO ENABLE NEW REVENUE STREAMS

CAMPUS

PRIVATE NETWORKS

...

INDUSTRIAL USE

V2X

DRONES

FMC

5GC LANDSCAPE: SAME INGREDIENTS DO NOT GUARANTEE SAME RESULTS

open source

COMPONENTS

VENDOR SW

+ many more...

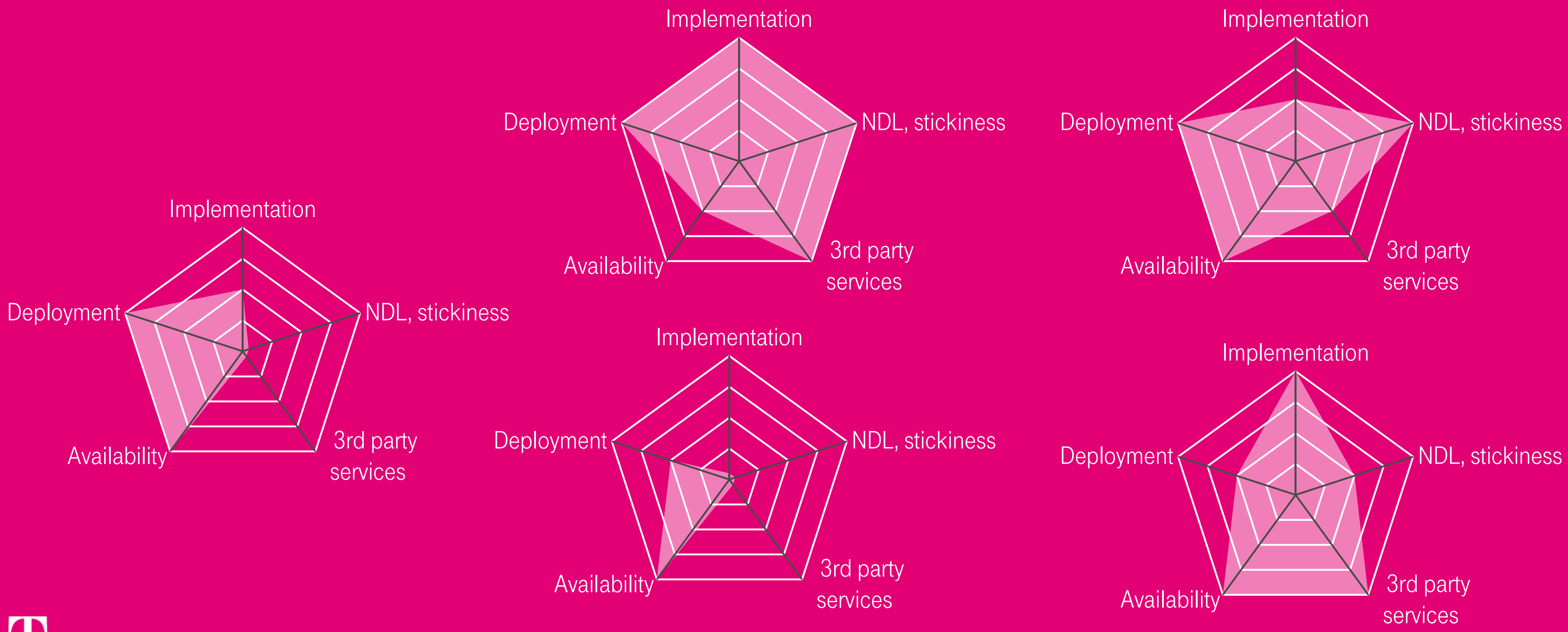
?

=

https://www.monsieur-cuisine.com/fileadmin/_processed_/c/3/csm_25963_Rezeptfoto_d6f6c20524.jpg

https://www.metzgerei-kieffer.de/fileadmin/user_upload/100g_Schwartenmagen.jpg

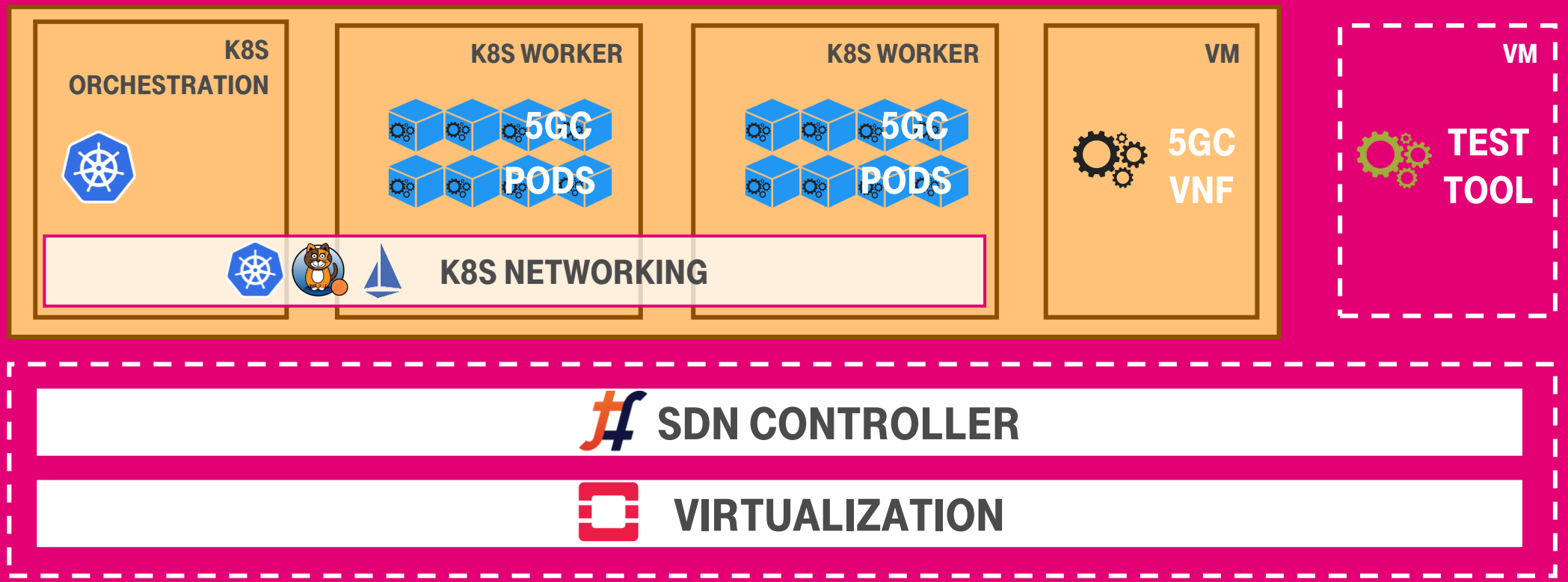
5GC IMPLEMENTATIONS: SIMILAR INGREDIENTS, DIFFERENT RESULTS



NDL: Network Data Layer (https://www.ngmn.org/publications/a-network-data-layer-concept-for-the-telco-industry.html)

DT'S TRIAL SETUP.

VENDOR APPLICATIONS



CLOUD PLATFORM

TARGETED TELCO SETUP

VENDOR APPLICATIONS

CLOUD PLATFORM

KEY LEARNINGS ...

CROSS LAYER DEPLOYMENT

→ AUTOMATION IS KEY RIGHT FROM THE START.

MAJOR CHALLENGES

INTEGRATION ON OPERATOR CLOUD

IMPLEMENTATION MATURITY

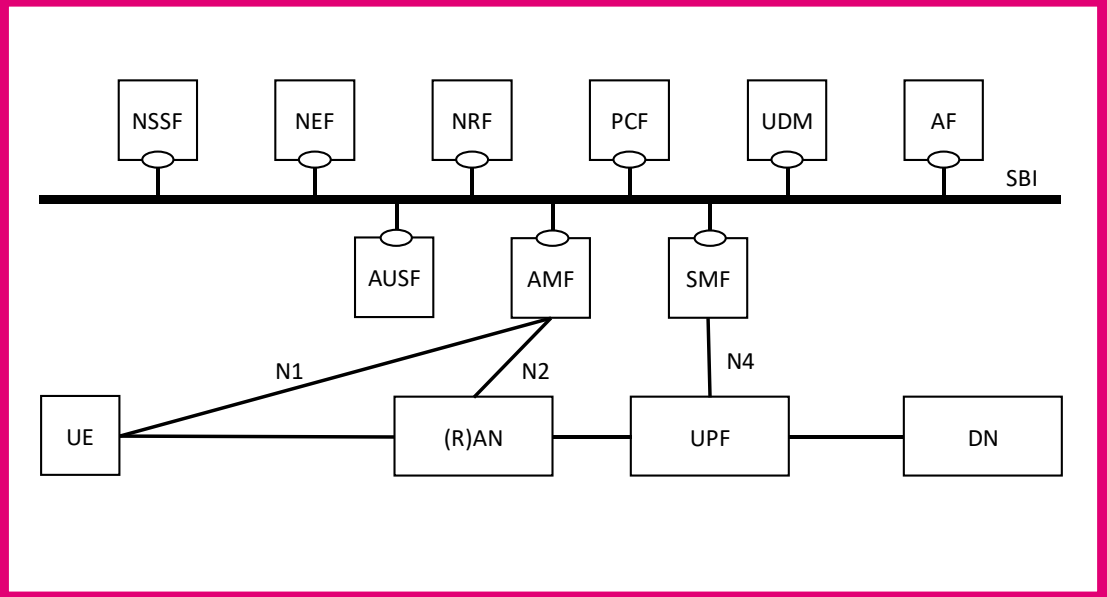
END-TO-END MONITORING

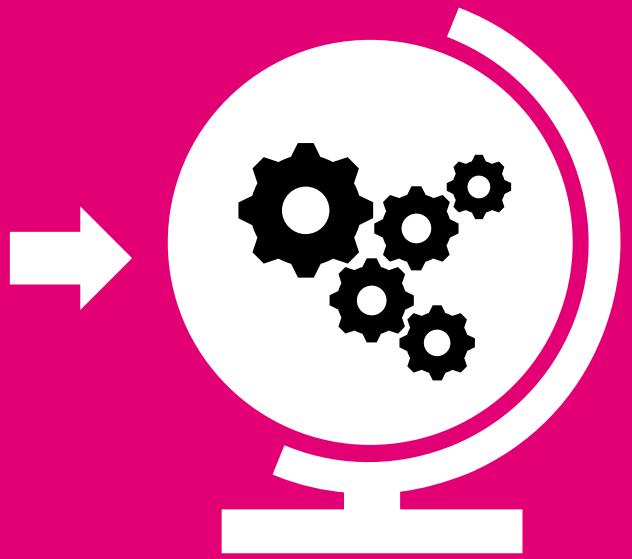
CROSS-LAYER NETWORKING

... AND MORE TO COME.

STANDARDIZATION IS IMPORTANT!

WITH 5G, WE HAVE A GLOBAL STANDARD

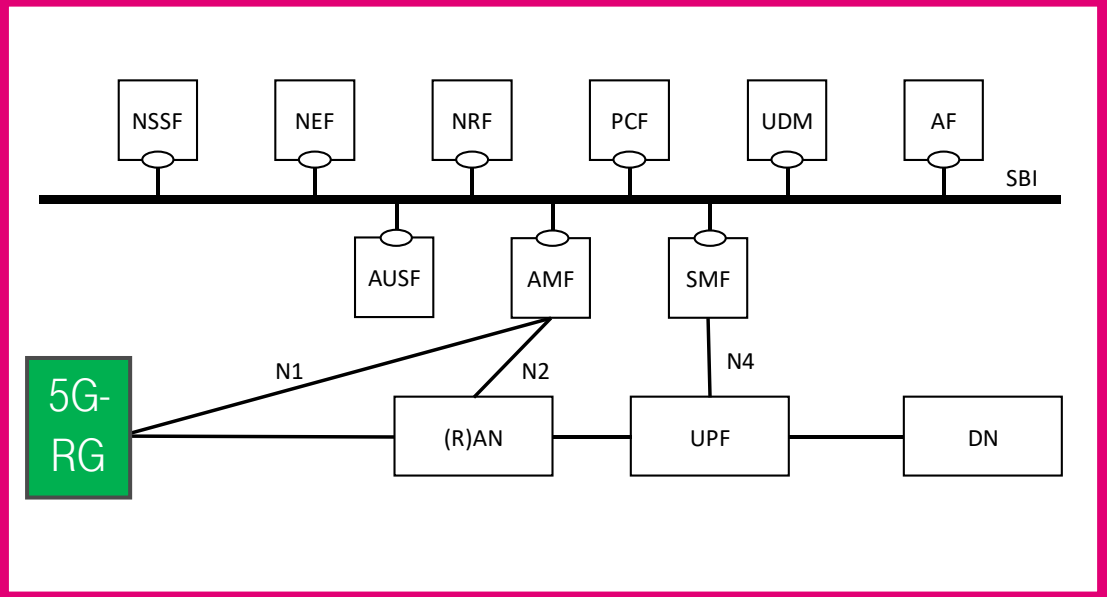




KEY FUNCTIONALITIES SHOULD BE STANDARDIZED

GLOBAL STANDARD

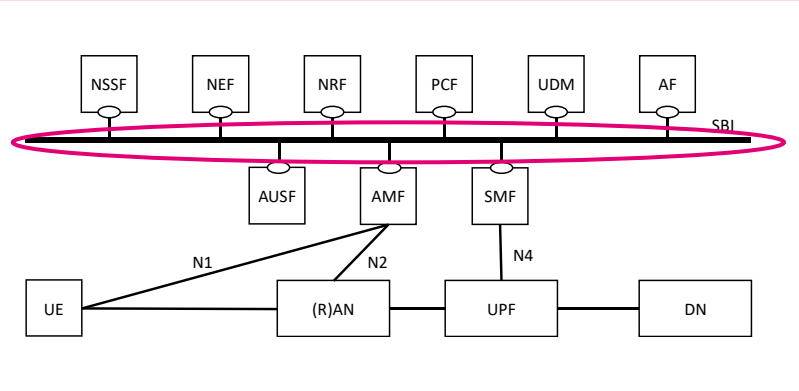
5G CORE BECOMES THE CORE FOR FIXED NETWORKS



broadband forum

5G RESIDENTIAL GATEWAY (5G-RG) BEHAVES LIKE A UE

NETWORK FUNCTION COMMUNICATION



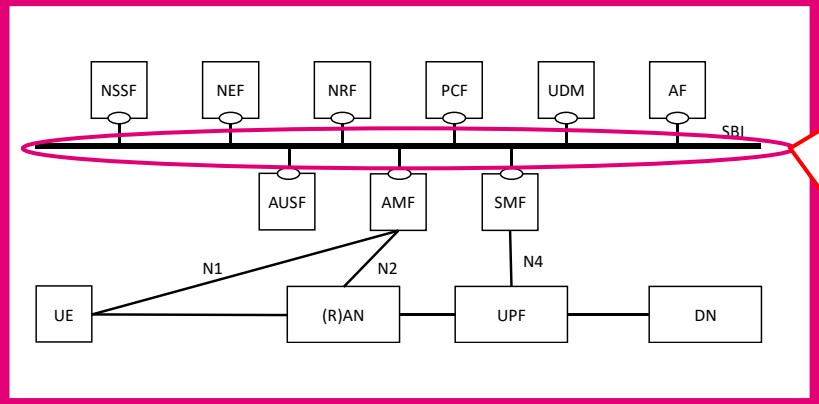
COMMUNICATION BETWEEN THE NETWORK FUNCTIONS (NFS) ENSURED THROUGH THE SERVICE-BASED INTERFACE (SBI)

QUESTION: HOW SHOULD IT LOOK LIKE?

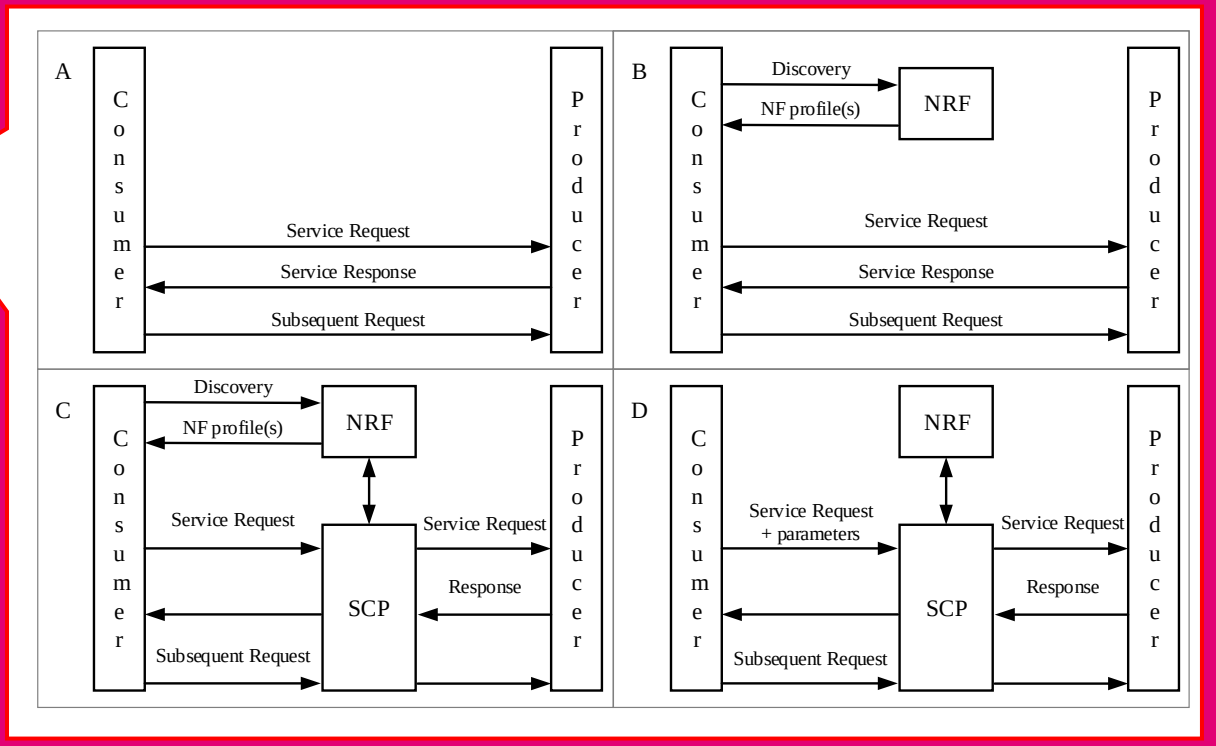
QUESTION: SHOULD IT BE A 3GPP INVENTION?

QUESTION: CAN WE USE SOMETHING EXISTING?

SERVICE COMMUNICATION PROXY



3GPP HAS DEFINED THE SERVICE COMMUNICATION PROXY (SCP) IN RELEASE 16



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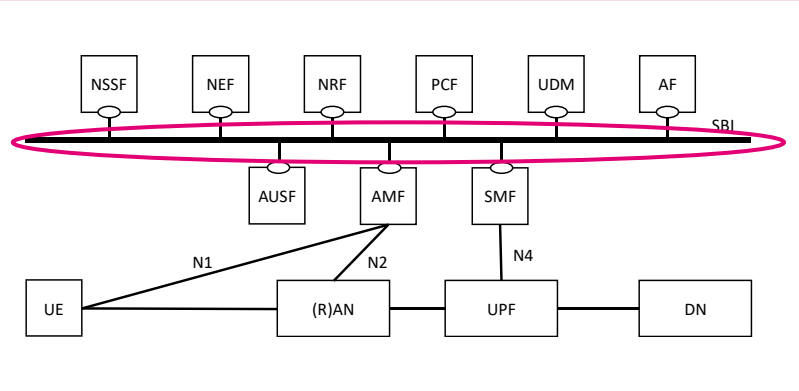
https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3493

BUT THERE IS NO NEED FOR IT!



5G CORE IS A SERVICE-BASED ARCHITECTURE/CLOUD NATIVE APPLICATION ON TOP OF A CONTAINER SYSTEM.

KUBERNETES IS WIDELY USED WITH ISTIO AS A SUPPORT FUNCTION.

NOT EVERYTING HAS TO BE STANDARDIZED!
LIST OF REQUIREMENTS IS SUFFICIENT!

Q & A

LIFE IS FOR SHARING.