



RWS-210032

Deutsche Telekom & T-Mobile USA views on 3GPP RAN Rel-18 focus & content

Rel-18 Workshop: 5G-Advanced | June 28th – July 2nd 2021

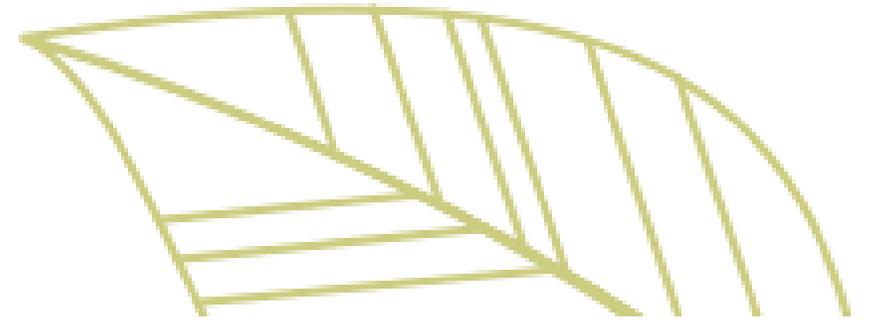


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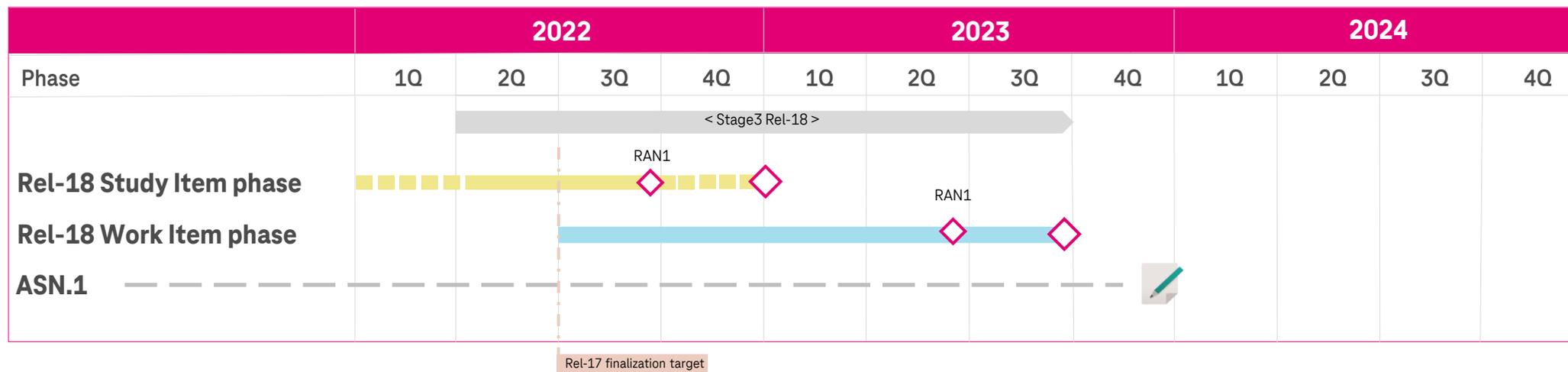
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3GPP Rel-18: New Radio evolution.

Proposed Rel-18 timing for RAN*



- **Stage 1 (Requirements and Service aspects) freeze in Dec. 2021**
- **Stage 2 (Architecture and Technical design) freeze in Sept. 2022**
- **Stage 3 (Detailed Specification) freeze June 2023 (R1) / Sept. 2023 (R2/3/4)**
- **ASN.1 freeze in Dec. 2023**

Commercialization status of 3GPP features is years behind standard – rethink the release approach ?



This time 5G evolution is focussed on NR ...!



No topic for LTE evolution identified

Rel-17 was potentially **the last release of evolution for the LTE based radio interface**



Increase operational efficiency

Still missing **Operational, Network Management, Security and Environmental optimizations** should be addressed with priority, targeting:

- Allow further deployment flexibility incl. further spectrum arrangements
- Improved Spectral Efficiency
- Significant minimization of energy consumption (network & UE)
- Enable Service Based RAN Architecture



Evolve 5G NR reach

Enhancements based on learnings from commercial 5G SA deployments **incl. new vertical domains** should be the baseline focus, incl.:

- Continuation of new NR bands / band combinations (for final re-farming)
- Enhance NR for scenarios, use cases and verticals (Automotive, Industrial, ...)
- Continue open API evolution, under consideration of security and privacy

... to enable a true 5G user experience at significantly reduced complexity.

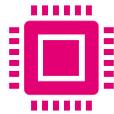
Next level for simplified & sustainable operation.



“ **LARGE SCALE
AUTOMATION FOR
DIVERSE, FLEXIBLE
AND ESPECIALLY
SUSTAINABLE,
MASSIVE 5G NETWORK
DEPLOYMENT,
OPERATION AND
OPTIMISATION** ”



Open Interfaces / APIs to retrieve all data required for automation / optimization processes incl. SBA RAN aspects



Machine Learning & Artificial Intelligence as tools for “touchless” operation, optimization and energy consumption minimization



Further RAN deployment flexibility with open interfaces incl. further decomposition enhancements / alignments



Further deployment flexibility with additional NR spectrum and arrangement (i.e., full UL/DL decoupling & TDD configuration)



Address vertical’s needs with enhanced (local) network-based positioning @cm-level and enhanced time services

Our RAN Rel-18 focus areas.



T... Focus topic for Deutsche Telekom / Europe

T-Mobile Focus topic for T-Mobile USA

End-2-End topics (RAN - SA)

X More details provided in the backup

(SA1) Enhanced Access to and Support of Network Slices

T... NG-RAN enhancements (inter-gNB-DU coordination, gNB-CU resiliency)

A Additional NR bands & combinations; arrangement flexibility

XR enhancements (“L4S*/AML**”)

(SA1) Enhancements for Residential 5G

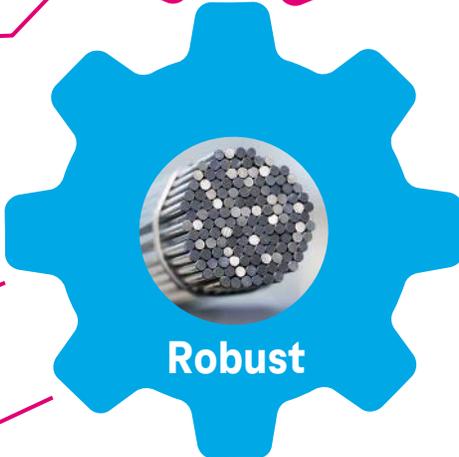
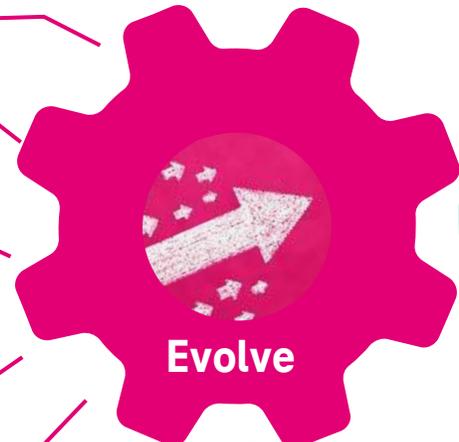
T... Enhancements for HAPS, ATG & Satellite NR

T... (SA1) Ranging-based Services (-> SL based positioning)

Smart NR repeaters for robust coverage

D **T...** (SA1) 5G Timing Resiliency System – enh. Time Sync via UE as a Service”

T... Low Power, Secure & Integer Positioning with cm-level accuracy



Aspects to minimize/manage/measure EMC*** (focus on gNB) **C**

Develop methods to avoid densification of macro radio networks

RAN and UE Power consumption reduction

Automation for RAN Energy consumption minimization

ML / AI Enablers

Data collection based on open APIs / interfaces

Service Based Architecture (SBA) for selected RAN functions **B**



* Latency, Low Loss, Scalable Throughput service architecture
 ** Adaptive Managed Latency
 *** Electro Magnetic Compatibility

Final remark.

Rel-18 should be a **fixed 18 months release !**

**-> Let's honestly identify content for 18 months
and do a proper job for workload management.**

Happy to discuss new approaches of 3GPP project management other than 18 – 21 months cycles.

QUESTIONS ?



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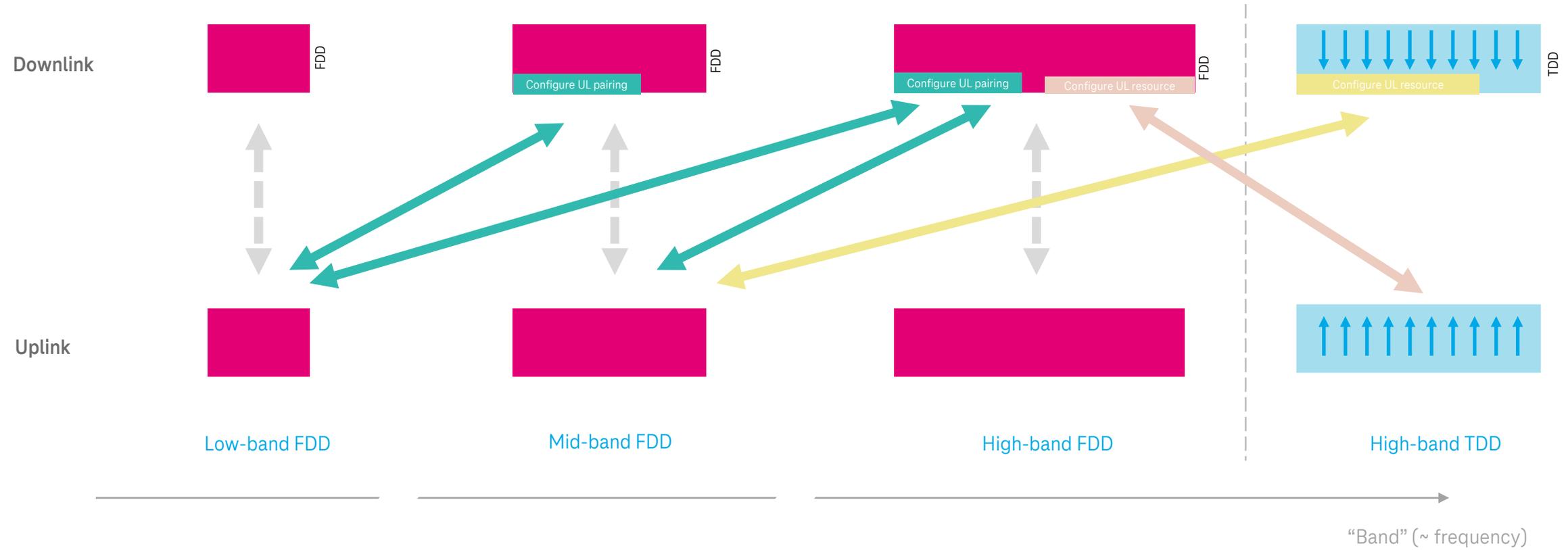
FEEL CONNECTED ALL OVER EUROPE.

THE WORLD

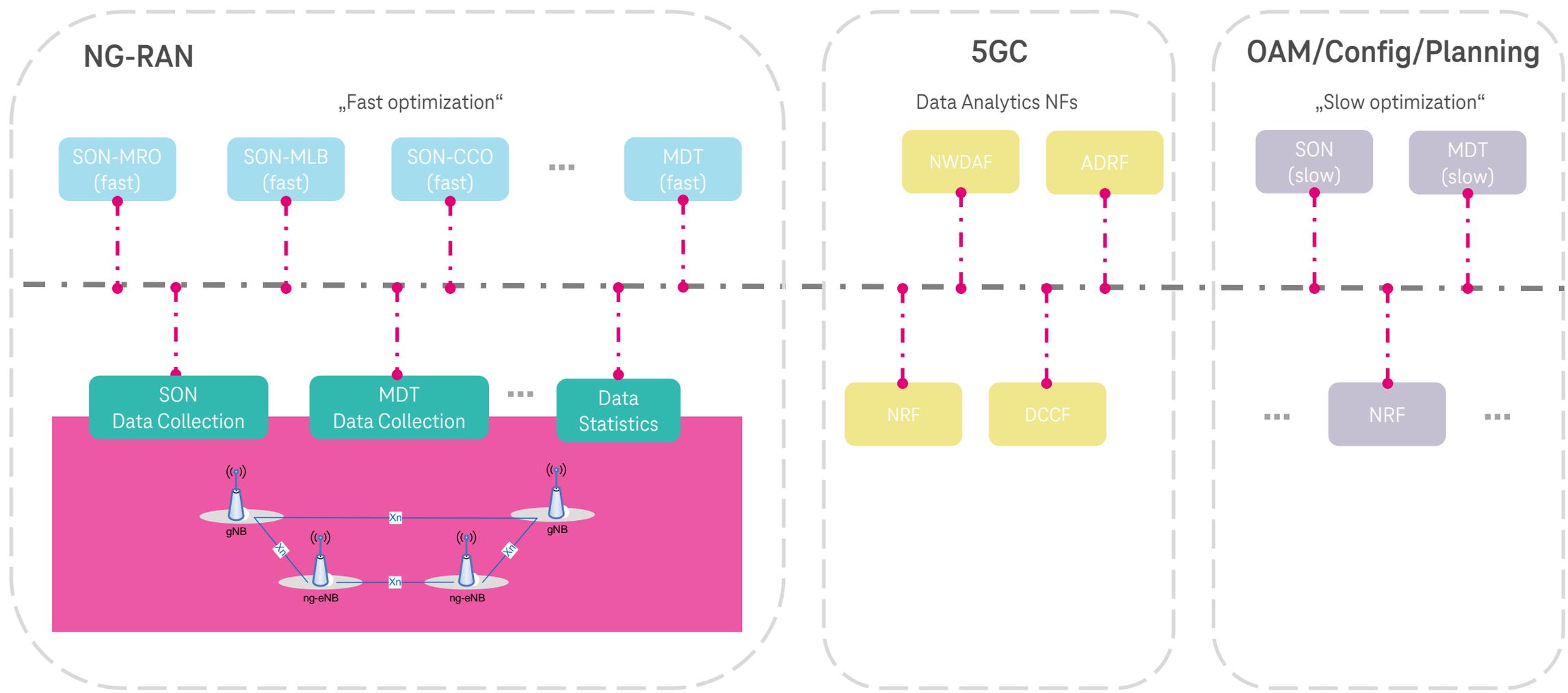


Future spectrum flexibility

From fixed duplex to dynamically configurable pairs

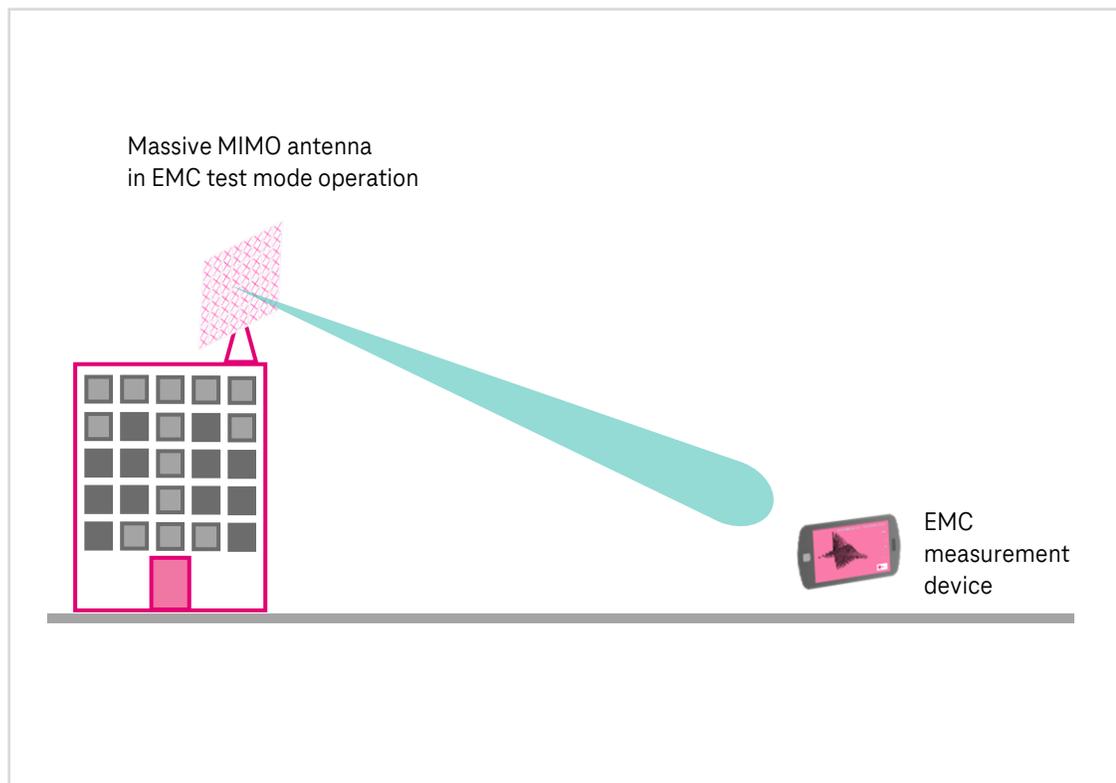


Service Based Architecture (SBA) in NG-RAN



Aspects to minimize/manage/measure EMC

(focus on gNB)



- In many countries strict EMC limits shall be complied with at base stations.
- If the EMC limit is exceeded - based on computational methods - the real exposure is measured by the authority locally.
- Standardized EMC measurements of massive MIMO antennas are currently not possible.
- A standardized approach should be specified, which enables EMC measurements of massive MIMO antennas.
- This might be a configurable beam at the gNB or a specific mode configured by the EMC measurement device.
- A specified part of the maximum power density has to be achieved at the EMC measurements device over a certain time period.

Timing as a Service via 5G

FS_5TRS

USE CASE ON RESILIENT 5GS TIME SYNC

- User *) has GNSS as source for timing & synchronization of his own application.
- GNSS service degradations or outages take place e. g. by jamming & spoofing **), GNSS is not available anymore, a backup is needed.
- The 5G system can supply accurate independent timing and synchronization as backup ***) , delivered from operator's timing and synchronization network

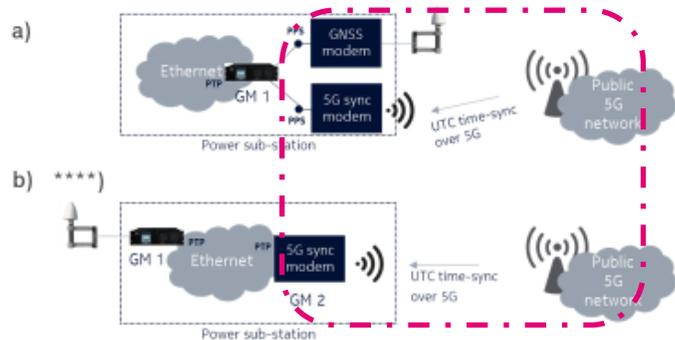


Figure source: 3GPP TR 22.878 V18.0.0 (2021-03)



- **Deutsche Telekom's RAN has high accuracy UTC related timing and synchronization available, based on a resilient synchronization network with atomic clocks.**
- **Objective: Accurate time information made available via NR to customer systems.**
- **Offer "resilience" to GNSS errors, spoofing and jamming.**
- **Enable wide area time, phase and frequency dissemination incl. necessary delay compensation via NR.**

*) Potential users as of 5G feasibility document (3GPP TR 22.878 V18.0.0 (2021-03)) are: Smart Grid / power sub-stations, server systems, devices and application servers, finance sector, time sensitive networks (TSN), IoT, or, simply as backup system for GNSS

***) „Spoofing“ = To send wrong GNSS satellite information on purpose to interfere

„Jamming“ = Intentional or unintentional interference by other transmitters

****) Or, as only source

*****) 5G only reduces power consumption, GNSS receiver is not needed, e. g. relevant for low-power IoT systems



we care for our Planet.

Deutsche Telekom is playing its part in protecting the environment and resources and is supporting the 1.5 degrees target laid down in the Paris Climate Agreement.*

Company emissions to be reduced by 90% by 2030 compared to 2017

100% green energy in Germany since 2020
Group-wide from 2021

Carbon-neutral by 2050 at the latest

25% lower emissions per customer by 2030 for manufacture and use of products

Conserving resources – **sustainable packaging** for all our own new devices



Green shop initiatives

Protecting the environment and safeguarding resources – for example with cellphone collection boxes and sustainable workwear. Using 100% recycled bags and doing away with paper materials will save 75 metric tons of paper in 2020 alone.



Products and packaging

From the packaging to the device, everything is designed with sustainability and resource efficiency in mind. That's why the Speedport Pro router and new MagentaTV box, for example, are made from recycled plastic.



Recycling devices

Our sustainable recycling scheme ensures smartphones and other devices are put to further use or recycled instead of landing in the garbage. Every year, Deutsche Telekom refurbishes around one million returned routers and takes back more phones than any other company in Germany.



E-charging stations

Reducing CO₂ emissions with e-cars – Telekom subsidiary Comfort Charge is installing and operating charging stations for e-cars throughout Germany. With more than 150 so-called "fast chargers", it offers one of the largest fast charging networks in Germany. The cars charge 100% green energy.



Biere data center

Deutsche Telekom's data center in Biere, Germany, is one of the most efficient in the world, consuming around 30% less power than conventional data centers. Thanks to cutting-edge technology, the facility is cooled using just ambient air more than 80% of the time.



Green network

All the energy Deutsche Telekom consumes in Germany comes from renewable sources, meaning the network our customers use for surfing and making calls is not only the best – it's also green.



Green Pioneers

Some 250 eco-conscious employees are devising measures in our in-house ambassador program to promote responsible management and conduct. They share their experiences, organize workshops, and come together with staff from other disciplines to work on projects.