



# **Mobile Convergence Multi-Access Connectivity with 6G and WiFi**

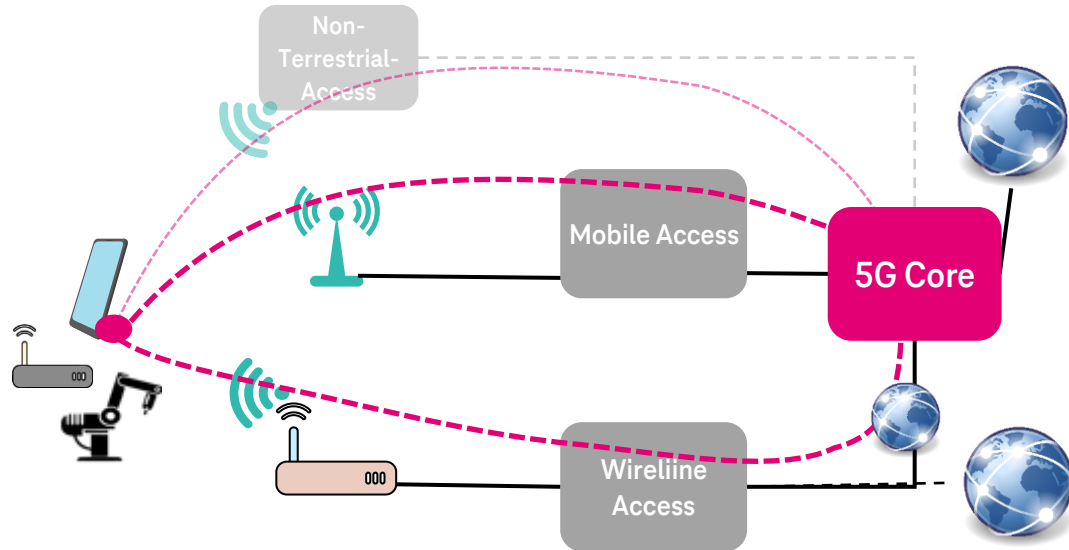
Dr. Markus Amend, VP Core & Network Services, Deutsche Telekom AG

# Key focus areas for Network & Service Convergence



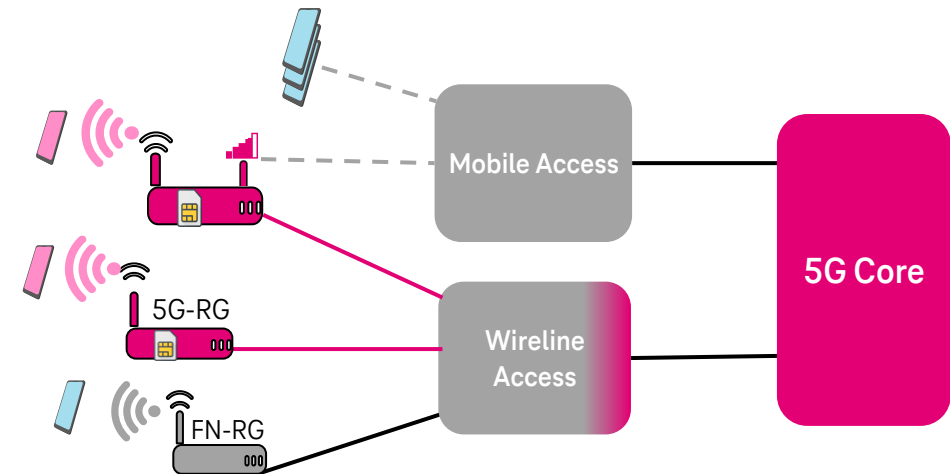
## Mobile Convergence

Supporting mobile services across cellular and WiFi access networks with the 5G Core Network



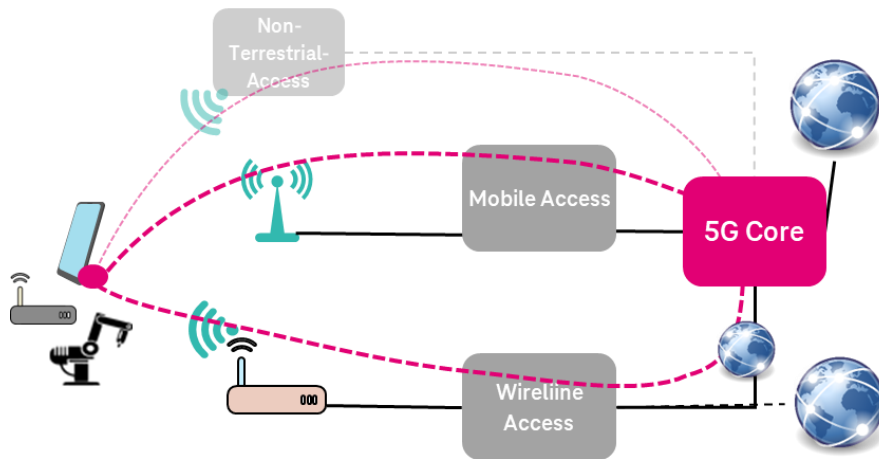
## Wireless-Wireline Convergence

Supporting fixed broadband services with a common 5G Core Network



# Mobile Convergence in a Nutshell

## Supporting services across multiple access networks with the 5G Core Network



- **Coordinated use of Cellular (4G/5G today, 6G tomorrow) and Wi-Fi access**
  - Supporting seamless handovers and combination of paths for higher reliability and throughput
  - Enabled in 5G by policies and multi-access features like URSP and ATSSS with 6G
  - Relevant for Consumer, Business, and Campus networks
- **Getting traction with 5G Stand-Alone deployments**
  - Well-defined global standards available (3GPP, ...)
  - Expected to evolve with 6G

# There are various Use Cases for Cellular and Wi-Fi Convergence

## Combining the high capacity of Wi-Fi with the coverage and mobility of cellular



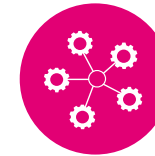
### Seamless Handover

Example: Mobile device leaves Wi-Fi coverage and is handed over to 5G network

Guided Workflows

Automated Guided Vehicles

Video Conferences



### Bandwidth Boost

Example: Videostream or bulk data upload with Gbps data rate using both 5G and Wi-Fi

Predictive Asset Diagnostics

Media/production



### Wi-Fi Offload

MNO network-controlled access selection to rationalize use of licensed spectrum



### Availability / Redundancy

Example: In case of a Wi-Fi network failure, end devices continue working in the 5G network without interruption

Production Automation

„Unbreakable Internet“



Consumer



Logistics



Aeronautics



Healthcare



Chemical



Manufacturing



Automotive

# The industry has made great strides to converge WiFi & Cellular



## Mobile Convergence Technology maturing

**Ecosystem adoption is important  
(core, devices, test equipment, ...)**

2025

**ATSSS solutions  
verified and solidified**

- 5G SA based multi-access solutions mature
- 3GPP enhancements (slice-awareness, procedures)
- WBA work on private 5G and Wi-Fi convergence, OpenRoaming advances

<2022

**ATSSS and URSP arrive  
with 3GPP Release 16,  
WBA & NGMN activities**

- ATSSS standardized across 3GPP and WLAN with Multi-Access PDU and beyond PDU-level selection.
- URSP over NAS defines per-flow multi-access route selection, complementing ANDSP

<2020

**Non-3GPP Access  
with Release 15**

- 5G System formalizes non-3GPP access integration
- N3IWF for untrusted WLAN with IPsec/IKEv2 and EAP-5G, enabling simultaneous 3GPP and Wi-Fi attachment anchored in the 5G Core

<2015

**Policy-driven  
Wi-Fi offload**

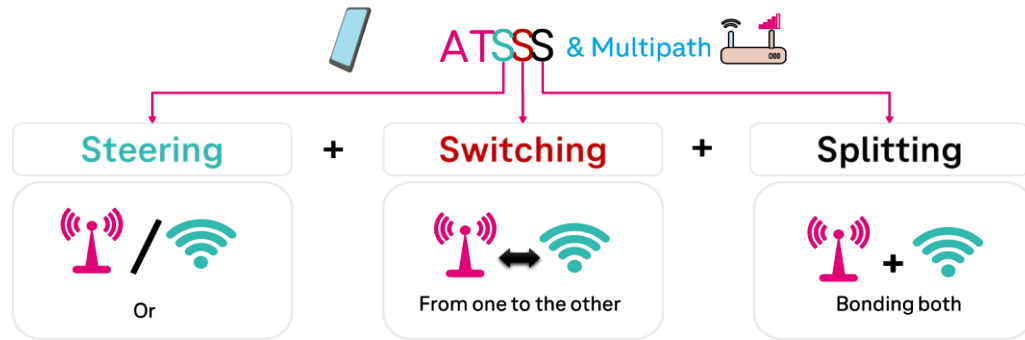
- ANDSP management objects and RAN-assisted selection specified for 4G
- IFOM/DSMIPv6/PMIPv6 underpin Wi-Fi offload and session continuity

<2010

**Early interworking  
foundations**

- GAN/IWLAN and ePDG for untrusted Wi-Fi, secure offload & authentication with EPC.
- ANDSF introduced, allowing operator policies to guide UE between 3GPP and WLAN access paths

# Industry demand and success of converged products have driven ATSSS technology and standards to maturity



**ATSSS for the 5G system is standardized by 3GPP (Release 16+) and works with 5G SA (RAN via both 5GC & EPC with Rel. 17)**

Steering & Switching (ATSSS) control points on terminals & 5GC  
Multipath/Splitting (ATSSS) use IETF protocols for encapsulation  
with 5GC-integrated fine-granular policy control and KPI monitoring

## Benefits

Customers/enterprise devices are smartly connected, the potential of Wi-Fi/wireline and radio access is maximized

Automated Steering

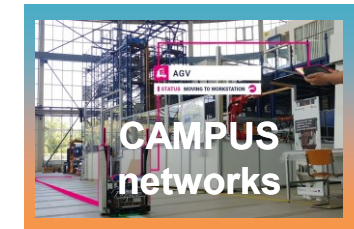
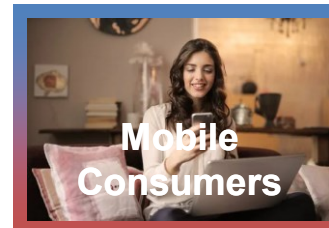
Seamless Handover

High Availability

Bandwidth Boost

**ATSSS is applicable to all industry segments**

Enabling smart connectivity for Consumers, Enterprises, and Campus



# Multi-Vendor Proof-of-Concepts conducted by Deutsche Telekom and partners



## Chipset/UE Support (2023)

MediaTek & Deutsche Telekom conducted the **world's-first proof of concept of the ATSSS standard** in a lab environment.

Demonstrating, in key exemplary scenarios with varying Wi-Fi coverage, how users can enjoy

- ✓ Improved gaming experience
- ✓ Seamless video call experience

and proving readiness to progress commercial device integration.

Reference: <https://corp.mediatek.com/news-events/press-releases/mediatek-to-showcase-5g-satellite-communications-computing-and-connectivity-technology-advancements-at-mwc>

## End-to-End Network Support (2024)

**Multi-vendor network implementation** of the ATSSS standard, conducted in Deutsche Telekom's testbed.

Demonstrating multi-access steering with seamless handovers between cellular and Wi-Fi, featuring

- ✓ Seamless video call experience on a consumer smartphone

and proving feasibility of a key value-adding feature to progress into deployment integration.

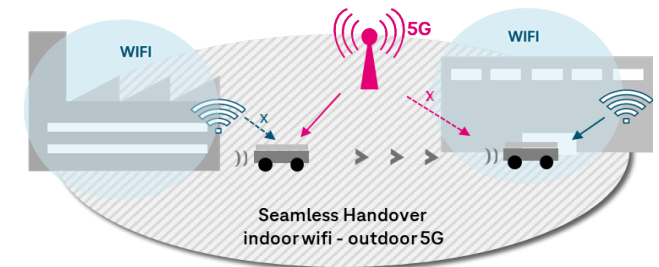
Reference: <https://mwc.telekom.com/session/atsss-seamless-multi-access-connectivity-for-converged-5g-wifi>

## Enterprise Use Case Support (2025)

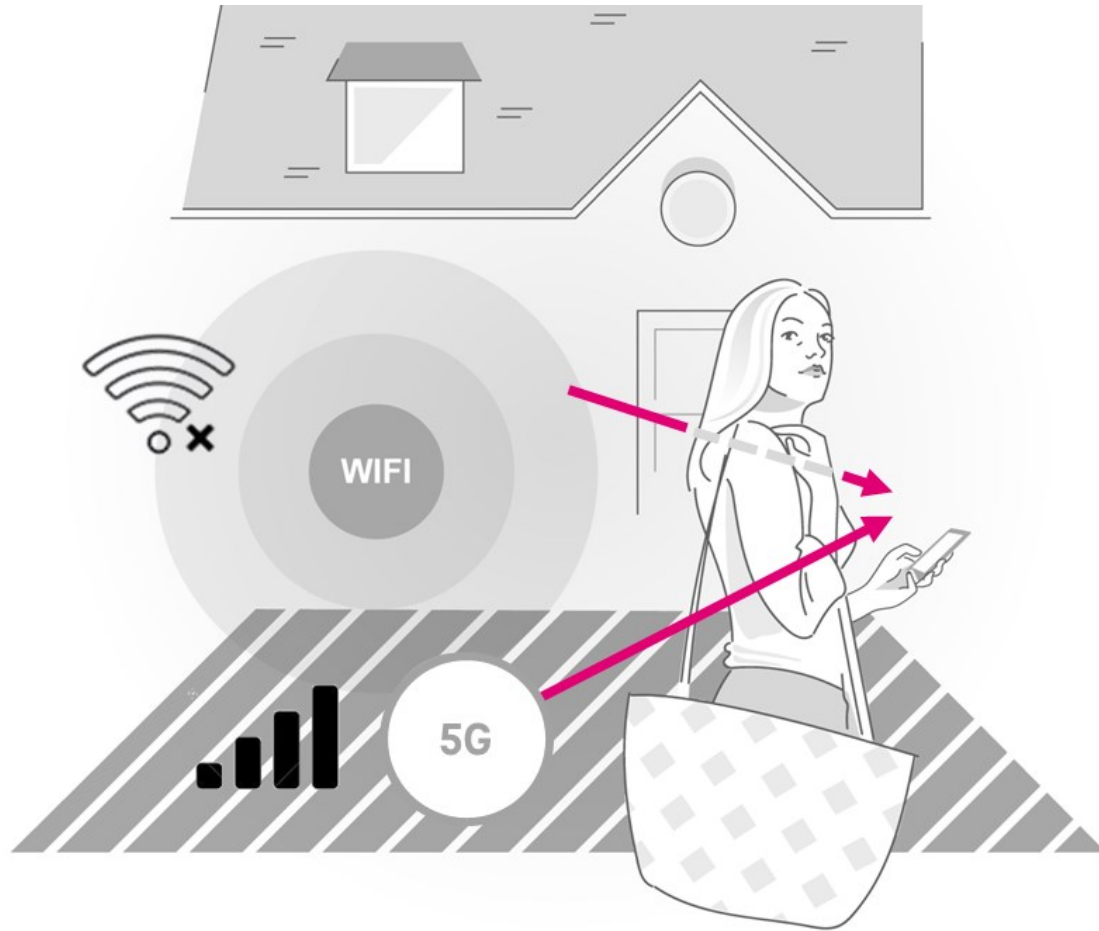
Extension of the multi-vendor network implementation in DT's testbed with an **ATSSS-capable IoT Gateway device**.

Demonstrating multi-access steering with seamless handovers between cellular and Wi-Fi for

- ✓ Enterprise and Campus Networks.

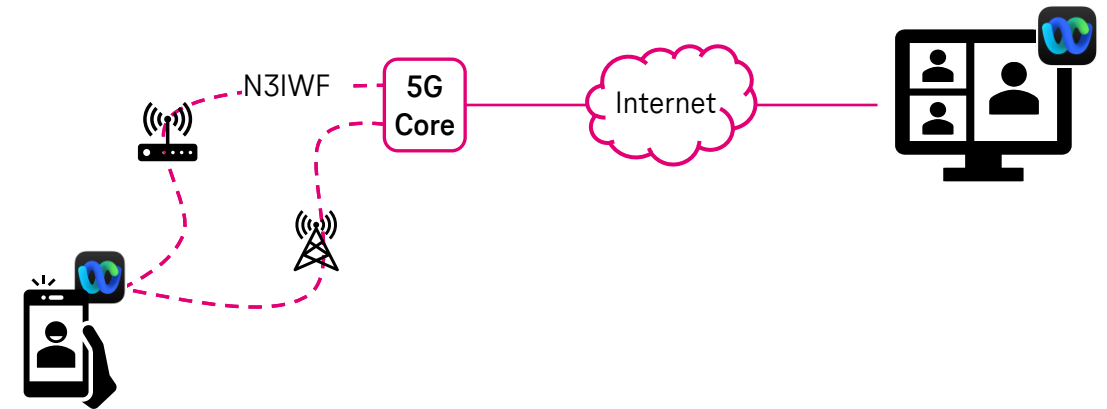


# Seamless Handover between Cellular & WiFi enabled for a major scenario

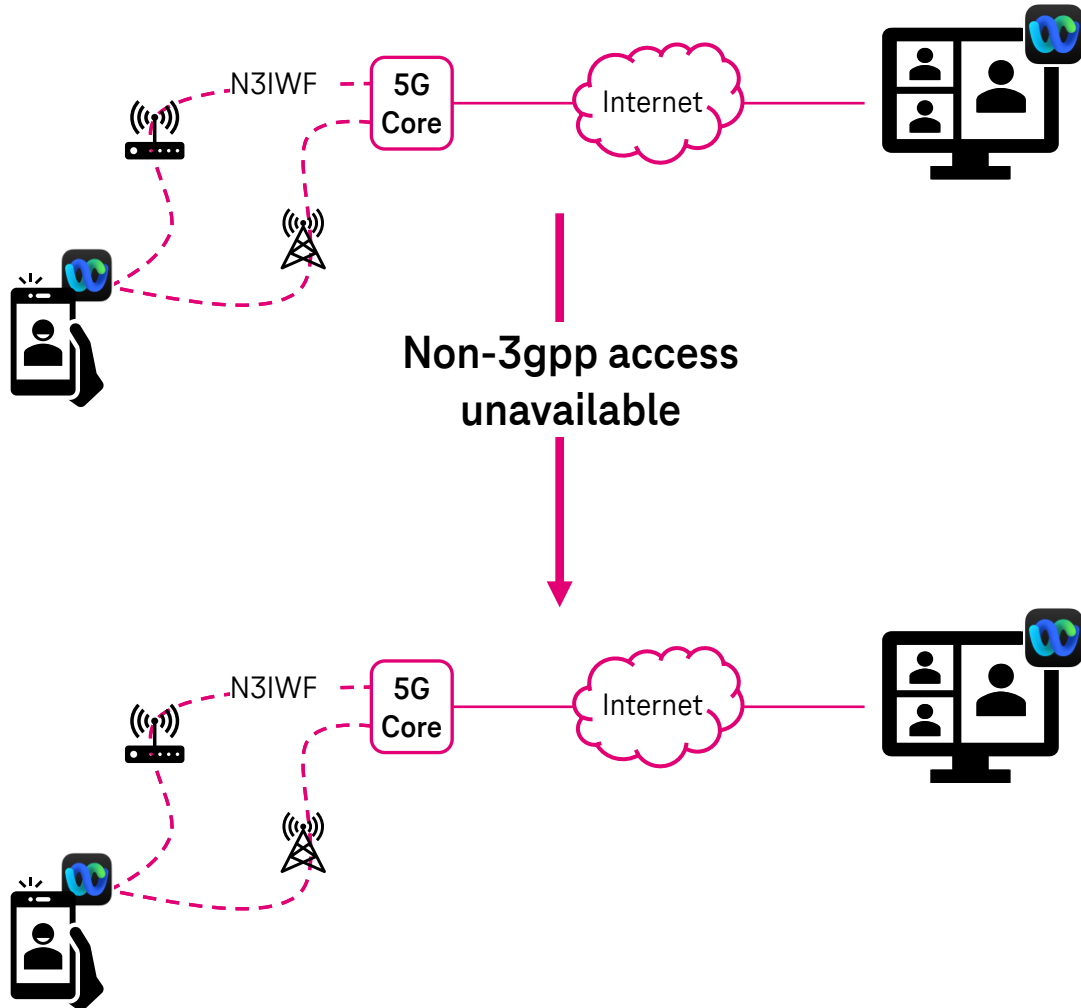


## Seamless Handover Wi-Fi / Cellular (n3gpp to 3gpp)

- Real time application
- ATSSS-LL Steering and Switching
- QoE comparison with and without ATSSS

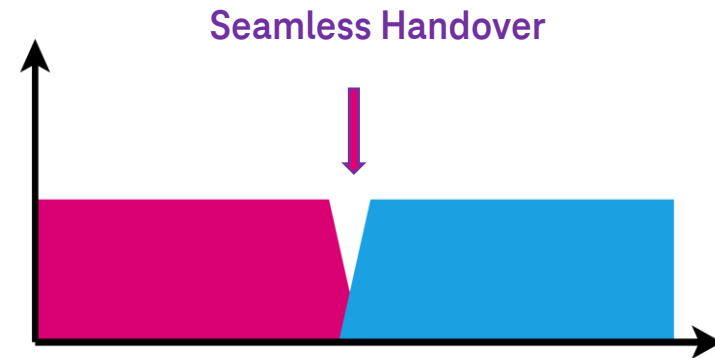


# ATSSS provides service and session continuity



## Configuration

- Active-Standby Steering mode
- Active Access: Non-3gpp (Wi-Fi)
- Standby Access: 3gpp
- Availability reported by PMF based on signal strength



06

# Demo Run

# What is next?

## Continue driving the adoption of Multi-Access solutions for key existing Use Cases

- Consumer and Business services: standardized solutions proven to work at scale are key
  - For enterprise , flexible combination with WiFi and customization for use cases and devices is key
- Support by Test Equipment important for conformance and performance testing for network deployments

## Enabling New Use Cases

- ❖ Non-Terrestrial Networks
  - ❖ Energy efficient network steering
  - ❖ ...
- 6G to enable a smooth evolution path

**DT is committed to continue related innovation and industry collaborations unlocking value of 5G and shaping 6G**

**THANKS**