Anticipations for the Final IMT-2020 Submission: Rel-16 Outlook for System and Core Network Aspects

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IMT-2020 Submission Non-Radio Aspects

- As in past IMT submissions, 3GPP will include an informative list of all non-RAN specifications.
  - It is important to emphasize that the 3GPP system is much more than the 3GPP radio aspects.
- This list will not include the same specifications as in past submissions, as the 5G system explicitly does not support full backward compatibility with the 2G and 3G system (IMT-2000).

5G 3GPP Specifications

- 5G specifications began in Release 15.
  - These specifications include not only the new 5G components, but also the continuing evolution of the 4G system.
- New 5G specifications have been introduced across 3GPP.
- Some 4G specifications are now 5G specifications, from Rel-15
  - The Enhanced Packet Core and other 4G standards are important components of 5G.
  - Operators will deploy and integrate 5G functionality in different ways, including continuing use of the EPC for some time.
  - **See TS 21.205 – which links to a list of 1113 specifications.**

System and Core Network Aspects

- System and Core Network Aspects, as discussed in this presentation, include everything in scope of 3GPP standardization *except* Radio Access Network aspects.
- **System Aspects** include: Security, Media and Codecs, Operations and Management, Applications, Terminal and End to End Aspects, Interworking with External Networks and Smart Card Application Aspects
- **Core Network Aspects** include: all functions to support for services provided by the 3GPP system.
  - These categories are somewhat arbitrary. Some functions could be considered both Core Network and System Aspects.

Overview of 5G System and Core Network Aspects

- The following slides offer a brief introduction to the major 5G specifications and what they include.
- Though not a comprehensive introduction, this is a starting point to understand 5G.
- This overview considers the **output** of Rel-15.
- Following this overview, we will summarize the **areas of ongoing study** for Rel-16.
  - Normative specification for System and Core Network Aspects of Rel-16 will occur in 2019.

Overview of System Aspects (1/3)

- Stage 1 – Service Requirements for 5G
  - TS 22.261 “New Services and Markets Technology Enablers”
- Stage 2 – 5G System defined in
  - TS 23.501 “System Architecture for the 5G System”
  - TS 23.503 “Policy and Charging Control Framework for the 5G System”
  - TS 33.501 “Security architecture and procedures for 5G System”

Overview of System Aspects (2/3)

- Stage 2, continued
  - Application : TS 23.222 “Common API Framework for 3GPP Northbound APIs”
  - Media: TS 26.118 “3GPP Virtual reality profiles for streaming applications”
  - Charging*: TS 32.291 “5G System Charging Service”
  - OAM*: TS 28.530..554 “Management and orchestration”, many aspects
  - OAM*: TS 28.304..306 “Control and Monitoring of Power, Energy and Envirnomental Parameters”

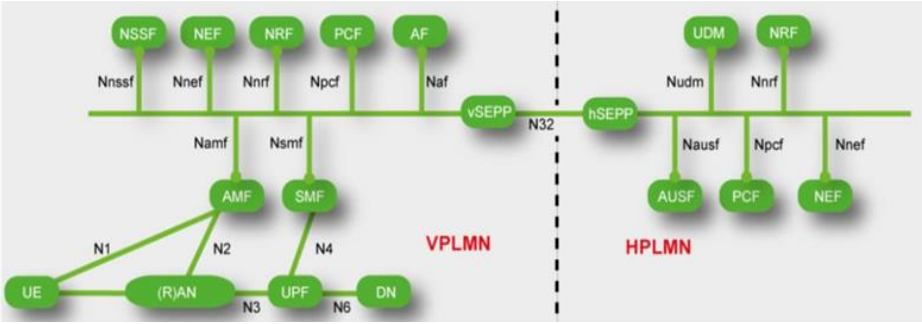
* All stages (1, 2 and 3) were completed for these specifications

Overview of System Aspects (3/3)

- Stage 3
  - TS 24.501 “Non-Access-Stratum (NAS) protocol for 5G System”
  - TS 24.502 “Access to the 3GPP 5G Core Network via non-3GPP access networks”
  - TS 29.522 “Network Exposure Function Northbound APIs”

Overview of Core Network Aspects

- Stage 3
  - TS 29.500 “Technical Realization of Service Based Architecture”
    - Each service defined in TS 23.501 and 23.502 (Procedures) is specified a new TS.
    - All control plane and user plane functions and interactions are specified at the protocol level in new TSs, including centralized state repositories.



3GPP Rel-16: Ongoing Studies (1/3)

Common 5G focus areas across Radio Access Network and System / Core Network

Focus Area	System Studies	RAN Studies
URLLC for 5G	Enhancement of URLLC support in 5G, Enhanced support of Vertical and LAN Services, Cyber-physical control applications in vertical domains	Physical layer enhancements for NR UR Low Latency Cases, NR-based access to unlicensed spectrum, NR Industrial Internet of Things
V2X for 5G	Architecture enhancements for 3GPP support of advanced V2X services	NR Vehicle-to-Everything (V2X)
Positioning	Enhancement to the 5GC Location Services, 5G positioning services	NR positioning support
UE Capabilities	Optimisations on UE radio capability signalling	Optimisations on UE radio capability signalling – NR/E-UTRA Aspects
5G Satellite Aspects	Architecture aspects for using satellite access in 5G, Integration of Satellite Access in 5G	Solutions for NR to support non-terrestrial networks (NTN)

Many other features have *impacts* across the system (both in RAN and non-RAN areas), however, these are mainly handled on one side or the other. They require alignment not significant coordination.

3GPP Rel-16: Ongoing Studies (2/3)

- Stage 1 (Rel-17): Asset tracking, Critical Medical Applications, Unmanned Aerial Vehicles, Audio Visual Service Production…
- Stage 2 (Rel-16) (beyond the previous slide)
  - Efficiency: Enablers for Network Automation for 5G, Access Traffic Steering, Switch and Splitting support in the 5G System
  - New Capabilities: Wireless Wireline Convergence, Enhancements to Network Slicing, to Service Based Architecture, CIoT for 5G
  - Security for each aspect on this slide and the previous slide

3GPP Rel-16: Ongoing Studies (3/3)

- Media
  - eXtended Reality (XR) in 5G, QoE metrics for VR, V2X Media Handling and Interaction…
- OAM
  - Self-Organizing Networks, Tenancy in 5G network and network slicing management, Integration of ONAP and 3GPP aspects, Management of edge computing, …
- Application
  - Mission Critical services support over the 5G System

Summary

- In Rel-15 5G specifications supported the foundation for many services enablers – mainly for eMBB and some URLLC.
- In Rel-16
  - 5G specifications will support URLLC and mIoT extensively, and increasing OAM and media capabilities.
  - We have extensive and fruitful collaboration with different business sectors, e.g. fixed networking, satellite communications, automotive, industrial automation.
- In Rel-17 we already see even more engagement, e.g. in logistics, e-health, unmanned aerial vehicles and more.

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