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

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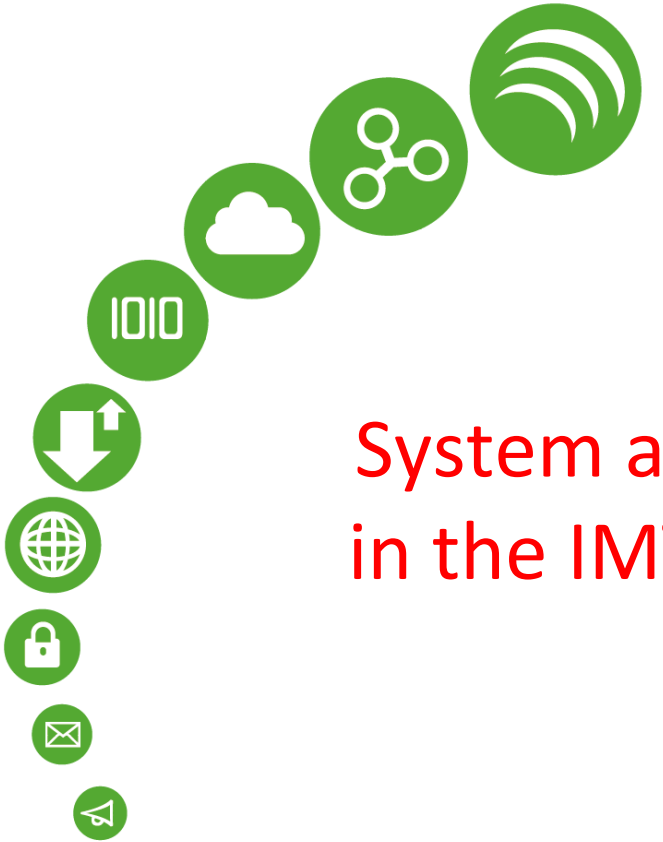


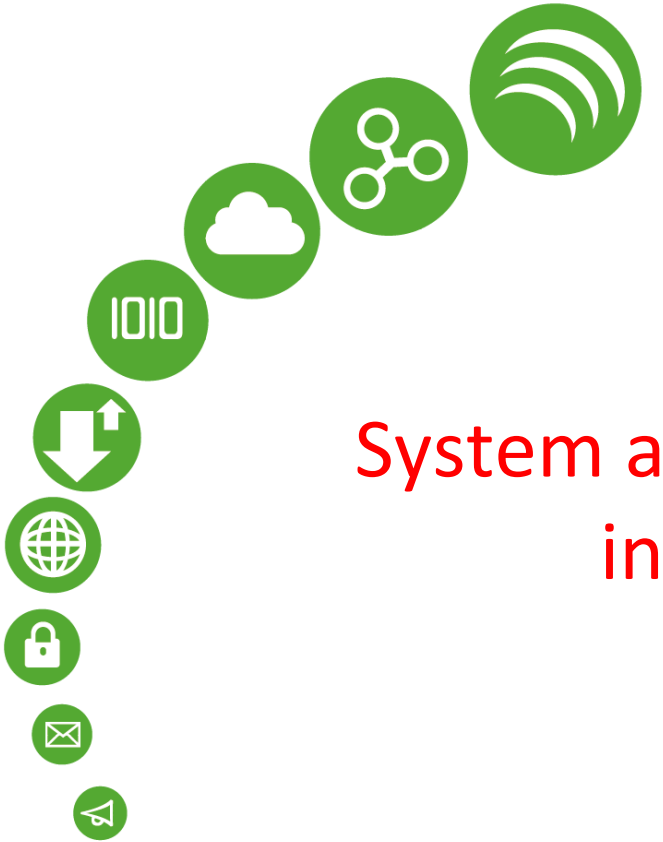
System and Service aspects in the IMT-2020 submission

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 include **fewer** specifications than 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 Service aspects in Release 16

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 System & CN Aspects (1/2)

Release 15 (5G Phase 1)

- 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 23.502 “Procedures”
  - TS 23.503 “Policy and Charging Control Framework for the 5G System”
  - TS 33.501 “Security architecture and procedures for 5G System”

Release 16 (5G Phase 2)

- Stage 1 – Service Requirements for 5G
  - Adds requirements for **verticals** from Industrial & Vertical automation, 5G Satellite, LAN support, High Precision Positioning, QoS Monitoring. New specification TS 22.104 on Cyber-Physical Control Applications.
- Stage 2 – 5G System expands in
  - Adds support to the TSs for **verticals:** URLLC, 5G LAN, 5GC Location Services, Enhanced V2X, Cellular IoT
  - Adds support for **new accesses:** Wireless Wireline Convergence, Satellite, SRVCC from 5GS to 3G
  - **Enhancements to the base system:** Network Automation, Traffic Steering/Switch/Splitting, Service Based Architecture, Network Slicing, Radio Capabilities, User Data Interworking…

Overview of System & CN Aspects (2/2)

Release 15 (5G Phase 1)

- 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”

Release 16 (5G Phase 2)

- Stage 2, continued
  - 5G Support for **verticals**: Mission Critical support over 5G (Spec TBD), V2X Application support (Spec TBD)
  - 5G support for **media**: coverage and handoff enhancements, QoE metrics for VR, 5G Mobile Broadband Media Distribution, V2X Media Handling, Extensions or 5G Conversational Services, Many enhancements, study on XR (Extended Reality) (Specs TBD)
  - **OAM support** extends to: ONAP interworking for Configuration Management, Data Collection, Analytics and Events, Self-Organizing Networks, QoE measurement collection, slice management, energy efficiency, orchestration & virtualization….

3GPP Rel-16: Ongoing RAN-SA Studies

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-17: Things to come

- Stage 1 (Rel-17): So far
  - Asset tracking
  - Critical Medical Applications
  - Unmanned Aerial Vehicles
  - Audio Visual Service Production
  - Maritime
  - Extended Reality
- Ongoing development will occur for
  - Automotive, Railway, Maritime sectors
  - Industrial Automation
  - Critical Communications
  - Fundamental enablers: IoT, Broadcast, Slicing, Network Automation, Orchestration and Management

Summary

- In Rel-16 adds 5G Vertical support
  - **Vehicle Communication, Mission Critical Communications, Industrial Automation and Verticals, Audio Visual Production,**
- Rel-16 also adds enhances the system
  - **5G LAN, High Precision Positioning, Cellular IoT for 5G, URLLC capabilities, Fixed and Satellite as 3GPP accesses, ONAP interworking, QoS Monitoring, Network Automation, protocol and core network improvements…**
- In Rel-17 – more verticals and service enablers
  - **logistics, e-health, unmanned aerial vehicles…**
  - **XR, …**

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