Catalyzing 5G Launch in India

3GPP 5G System Architecture Overview and Roadmap

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Outline

- Partnership & Eco-system
- The work split within 3GPP
- 3GPP 5G timeline
- 5G Service Based Architecture
- 5G SBI Protocols
- Network Capability Exposure
- Network Slicing
- 5G QoS Model
- Session and Service Continuity
- Future Roadmap
Partnership (1/2)

Organizational Partners (SDOs)

- ARIB (Japan)
- ATIS (USA)
- CCSA (China)
- ETSI (Europe)
- TTA (Korea)
- TTC (Japan)
- TSDSI (India)
Market Representative Partners

- 17 Market partners representing the broader industry:

- 5G Americas,
- 5G Infrastructure Association,
- COAI (India),
- CTIA,
- GCF,
- GSA,
- GSMA,
- IPV6 Forum,

- MDG (formerly CDG),
- NGMN Alliance,
- Public Safety Communication Europe (PSCE) Forum,
- Small Cell Forum,
- TCCA,
- TD Industry Alliance,
- TD-Forum,
- Wireless Broadband Alliance

NEW: 5G Automotive Association (5GAA)
The 3GPP Eco-system

- Developing Recommendations
  - ITU-R/T
  - Developing internet protocol specs
  - Developing Mobile application specs

- Reference to 3GPP specs
  - Cross reference of specs
  - Cross reference

- Requirements
  - Referring to specs

- 3GPP Market Partners

- Partners referring to 3GPP specs for the local use
  - Terminal certification based on 3GPP specs

- EU
- Japan
- Korea
- China
- North America
- India
3GPP Facts and Figures

- ~400 Companies from 39 Countries
- 50,000 delegate days per year
- 40,000 documents per year
- 1,200 specs per Release
- New Release every ~18 months

Participation by Region (by TSG#77)

Europe: 36%
North America: 22%
Asia: 42%

Approved CRs per year per Release

R99
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
Work split for phase 1 within 3GPP

Services & Architecture (SA) WG1: Service Requirements
Services & Architecture (SA) WG2: Overall System Architecture

Radio Access Network (RAN)
- WG1: radio layer 1
- WG2: radio layers 2 and 3
- WG3: RAN and RAN-Core Network interfaces

SA WG3: Security
SA WG5: Operation and Maintenance
3GPP 5G Timeline

Release 14
- Extensio

Release 15 (5G Phase 1)
- St.3
- Non-Stand Alone (NSA)
- Radio and EDCE5
- REL-15 Stage 2
- REL-15 Stage 1
- REL-15 Extensi
- REL-15 ASN.1

Next main target: Rel-15 Stage 3

Release 16 (5G Phase 2)
- Completi
- Meets ITU IMT-2020 submission requirements

Today

Release 15 (5G Phase 1)
- Completion by June 2018
- for first phase of 5G deployments in 2020

Release 16 (5G Phase 2)
- Completion by December 2019
- Meets ITU IMT-2020 submission requirements
5G SBI Protocols

- REST-style service design whenever possible
- Open-API based specification
- HTTP/2 adopted as the application layer protocol
- TCP adopted as the transport layer protocol
- QUIC will be evaluated in Rel-16
- JSON adopted as the serialization protocol
Network Capability Exposure

3GPP Interface represents southbound interfaces between NEF and 5GC Network Functions e.g. N29 interface between NEF and SMF, N30 interface between NEF and PCF, etc.
Network Slicing – the concept

Network Slicing enables the network operator to deploy multiple separate end-to-end logical networks sharing the same or using separate infrastructure. Each network slice can be customized independently for different application and/or business scenarios/usages (SLAs).

- Smartphone Slice 1 (e.g. for the network operator’s subscribers)
- Smartphone Slice 2 (e.g. for a virtual operator’s subscribers)
- Vehicle Services Slice 1 (e.g. for a truck manufacturer’s fleet assistance)
- M2M Service Slice 1 (e.g. for a goods or container tracking system)
Network Slicing – deployment aspects

Features are not always independent from each other. E.g. (very) UE low battery power consumption competes with obtaining services via multiple network slices. As an example, network slices #1 and #2 are for different IoT usages with on the same UEs sharing common NFs. While network slice #3 could be for smartphones.
5G QoS model

Application / Service Layer

Data packets from applications

QoS rules
(mapping UL packets to QoS flows
and applying QoS flow marking)

QoS flow
(all packets marked with
the same "QoS flow ID")

Mapping QoS flows
to AN Resources

UE

AN Resources

AN

PDU session

SDF templates
(classify packets to SDFs)
for QoS flow marking

Source: 3GPP TS 23.501
Session and Service Continuity

Session and Service Continuity (SSC) modes

SSC mode 1

SSC mode 2

SSC mode 3
Future Roadmap

- **Enablers for new verticals**: Communication for automation support for vertical domains, 5G LAN service, Advanced V2X services, Future Railway Mobile Communication services.

- **Support for other Access** – Satellite Access in 5G, Wireless – Wireline convergence, maritime communication services over 3GPP.

- **Support for new services** – 5G messaging services for massive IoT, Location/Positioning services, Multimedia proximity services, Multicast & broadcast services.

- **Further optimizations** – Service Based Architecture enhancements, IMS enhancements, Network slicing enhancements, URLLC enhancements.
For more and up-to-date information:

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Search for WIDs at http://www.3gpp.org/specifications/work-plan and http://www.3gpp.org/ftp/Information/WORK_PLAN/ (See excel sheet)