Review of 3GPP Progress on 5G

Tao Sun (suntao@chinamobile.com)
China Mobile Research Institute
Department of Network IT Technologies
3GPP Celebrate 5G SA Completion!
# TSG Structure

## Project Co-ordination Group (PCG)

<table>
<thead>
<tr>
<th>TSG RAN</th>
<th>TSG SA</th>
<th>TSG CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Access Network</td>
<td>Service &amp; Systems Aspects</td>
<td>Core Network &amp; Terminals</td>
</tr>
<tr>
<td>RAN WG1 Radio Layer 1 spec</td>
<td>SA WG1 Services</td>
<td>CT WG1 MM/CC/SM (Iu)</td>
</tr>
<tr>
<td>RAN WG2 Radio Layer 2 spec</td>
<td>SA WG2 Architecture</td>
<td>CT WG3 Interworking with external networks</td>
</tr>
<tr>
<td>RAN WG3 Iub spec, Iur spec, Iu spec UTRAN O&amp;M requirements</td>
<td>SA WG3 Security</td>
<td>CT WG4 MAP/GTP/BCH/SS</td>
</tr>
<tr>
<td>RAN WG4 Radio Performance Protocol aspects</td>
<td>SA WG4 Codec</td>
<td>CT WG6 Smart Card Application Aspects</td>
</tr>
<tr>
<td>RAN WG5 Mobile Terminal Conformance Testing</td>
<td>SA WG5 Telecom Management</td>
<td></td>
</tr>
<tr>
<td>RAN WG6 Legacy RAN radio and protocol</td>
<td>SA WG6 Mission-critical applications</td>
<td></td>
</tr>
</tbody>
</table>
Release 15 Planning

Past, present and future milestones, including RAN’s “drops”:

• June 2017 (TSG #76):
  • Stage 1 freeze

• December 2017 (TSG#78):
  • Stage 2 freeze
  • Stage 3 RAN’s “early drop” (Non-Stand Alone (NSA)) and CT’s EDCE5 freeze

• March 2018 (TSG #79):
  • ASN-1 freeze for 5G RAN’s “early drop” (NR NSA)

June 2018 (TSG#80):
  • Rel-15 Stage 3 and RAN ’s “normal drop” freeze

• September 2018 (TSG #81):
  • ASN-1 freeze for RAN ’s “normal drop”
  • Completion of Stage 3 for late items

• December 2018 (TSG #82):
  • RAN’s “late drop” freeze

• June 2019 (TSG #83):
  • ASN-1 freeze for 5G RAN’s “late drop” aspects
On-going Releases

Release 15 (5G Phase 1)

- Rel-15 Stage 1
- Rel-15 Stage 2
- Rel-15 Stage 3
- Extension
- Rel-15 ASN.1

Next main target: Rel-15 check extensions

Note: RAN's early/normal/late drops not shown

Release 16 (5G Phase 2)

- Rel-16 Stage 1
- Rel-16 Stage 2
- Rel-16 Stage 3
- Rel-16 ASN.1 (TSG#87)

Now
Release 16 Planning and Status

Release 16 (aka "5G phase 2") tentative dates:

- Dec 2018 (TSG#82): Stage 1 freeze
- June 2019 (TSG#84): Stage 2 freeze
- Dec 2019 (TSG#86): Stage 3 freeze
- March 2020 (TSG#87): ASN-1 freeze

Release 16 Status:

- Studies: 65 Studies being progressed (including 6 from SA4 just moved from Rel-15 during SA#80), not shown in this presentation
System Architecture and Procedures

1 System Architecture for the 5G System (TS 23.501): Specifies the overall system architecture reference model including network functions and description of high level functions.

2 Policy and Charging Control Framework for the 5G System (TS 23.503): the architecture reference model and concepts for roaming and non-roaming scenarios for the policy and charging related control framework.

3 Procedures for the 5G System (TS 23.502): as the companion specification to TS 23.501 and TS 23.503, specifies the Stage 2 procedures and Network Function Services for the 5G system architecture.

Completed by 3GPP SA2, in 2017 Dec. But still doing some update/correction
Key Features of 5GS

- Common Core Network
- Separated Control/User Plane
- Policy framework
- QoS Model
- Network Slicing
- Edge Computing

SBA

Computing and storage separate
Protocol design for 5GC

The services provided by 5G NFs are designed as a set of APIs based on the following protocol stack:

OpenAPI 3.0.0 is adopted as the Interface Definition Language
Serialization protocol is JSON as specified in IETF RFC 8259
Application layer protocol is HTTP/2 as specified in IETF RFC 7540
Transport layer security protection is supported with TLS
Transport layer protocol is TCP as specified in IETF RFC 793

IETF QUIC?
Protocols Defined by 3GPP CT Groups

TS 24.501  Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3
TS 24.502  Access to the 5G Core Network (5GCN) via non-3GPP access networks; Stage 3
TS 24.526  5G System –Phase 1, UE policy; CT WG1 Aspects
TS 23.527  5G System; Restoration Procedures; Stage 2
TS 29.500  5G System; Technical Realization of Service Based Architecture; Stage 3
TS 29.501  5G System; Principles and Guidelines for Services Definition; Stage 3
TS 29.502  5G System; Session Management Services; Stage 3
TS 29.503  5G System; Unified Data Management Services; Stage 3
TS 29.504  5G System; Unified Data Repository Services; Stage 3
TS 29.505  5G System; Usage of the Unified Data Repository services for Subscription Data; Stage 3
TS 29.507  5G System; Access and Mobility Policy Control Service; Stage 3
TS 29.508  5G System; Session Management Event Exposure Service; Stage 3
TS 29.509  5G System; Authentication Server Services; Stage 3
TS 29.510  5G System; Network Function Repository Services; Stage 3
TS 29.511  5G System; Equipment Identity Register Services; Stage 3
TS 29.512  5G System; Session Management Policy Control Service; Stage 3
TS 29.513  5G System; Policy and Charging Control signalling flows and QoS parameter mapping; Stage 3
TS 29.514  5G System; Policy Authorization Service; Stage 3
TS 29.518  5G System; Access and Mobility Management Services; Stage 3
TS 29.519  5G System; Usage of the Unified Data Repository Service for Policy Data, Application Data and Structured Data for Exposure; Stage 3
TS 29.520  5G System; Network Data Analytics Services; Stage 3
TS 29.521  5G System; Binding Support Management Service; Stage 3
TS 29.522  5G System; Network Exposure Function Northbound APIs; Stage 3
TS 29.531  5G System; Network Slice Selection Services; Stage 3
TS 29.540  5G System; SMS Services; Stage 3
TS 29.551  5G System; Packet Flow Description Management Service; Stage 3
TS 29.554  5G System; Background Data Transfer Policy Control Service; Stage 3
TS 29.561  5G System; Interworking between 5G Network and external Data Networks; Stage 3
TS 29.571  5G System; Common Data Types for Service Based Interfaces; Stage 3
TS 29.572  5G System; Location Management Services; Stage 3
TS 29.594  5G System; Spending Limit Control Service; Stage 3
eSBA

1. Optimizing the modularization of the system to improve its agility.
2. Extending the service concept from 5GC control plane to the user plane function(s).
3. Further improvements to service framework related aspects.
4. Architectural support for highly reliable deployments, considering.
5. Study backward and forward compatibility implications resulting from the above bullets
All are software, all are service

Software + 5G = A Perfect Match
Andre Fuetsch, president of AT&T Labs and Chief Technology Officer