3GPP MRP Mini Workshop: 3GPP Rel-18. Requirements from industry verticals 23 June 2021 (virtual and by invitation only)

5GAA Automotive Association

5G ACIA 5G Alliance for Connected Industries and Automation

5G IA INFRASTRUCTURE ASSOCIATION

PSCEurope Public Safety Communication Europe

Template for session 1 on Inputs to 3GPP

Name: A. Di Giglio, G. Romano, M.P. Galante

Affiliation: TIM - Italy

Association/project representing: 5G-SOLUTIONS

- List below your priority inputs to RAN:
  - Taking into account that the life cycle in living lab is 5-10 years,
    - The design of the UEs should be future proof to ensure the capability to operate in radio networks based on future releases (e.g., capability to upgrade over-the-air the device to a new Release)
    - The design of the UEs should be future proof to ensure the capability to operate with different Core Networks (e.g., by upgrading over-the-air the device)
  - Improve upload throughput: several use cases are UL unbalanced (upload requirements higher than download) and must operate in macro-cells with DL unbalanced frame structure
  - Manage a mix of deterministic and non-deterministic networks: Optimize performance of the deterministic slice taking into consideration
    - The devices are not moving; the traffic pattern is known in advance; a device can support applications requiring both deterministic and non-deterministic communications
  - Network management functions should be exposed via open interfaces
  - Orchestration of radio resources should be supported in a multi-tenant network (e.g., radio owned by the factory, Core owned by the public operator)
- Which of these have been taken up?
  - Support of deterministic traffic patterns is in theory supported by 3GPP specifications, but enhancements needs to be specified
  - UL performance requirements are supported by current 3GPP specifications, but they do not take into account regulatory constraints (e.g., fixed TDD frame format) and, in general, cannot be used in macro cells
- Which requirements are not covered that are still relevant?
  - All of the above need consideration / optimization in 3GPP RAN

DISCLAIMER: 5G-SOLUTIONS is dealing with use cases provided by Verticals using 5G networks infrastructure built by ICT-17 projects (5G-EVE and 5G-VINNI). RAN impacts are derived by implementing the use cases

Interactive session 2

Name: A. Di Giglio, G. Romano, M.P. Galante
Affiliation: TIM - Italy
Association/project representing: 5G-SOLUTIONS

Rank your priority requirements, where 1 is your top priority, 2 the next priority etc.

1. IIoT and URLLC (including deterministic traffic patterns)
2. Future proof devices (upgradable to future 3GPP Releases/technologies)
3. Improve UL performance
4. Positioning enhancements
5. NR multicast broadcast
6. Non public networks
7. Predictive QoS
8. Sidelink enhancements
9. Scenarios for satellite usage
10. Other (**see priority 1-3**)

Interactive session 2

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Explain your ranking (free text): 5G-SOLUTIONSliving labs are Industry, Energy, Smart City & Ports and Entertainment. The majority of these case studies levarages on IIoT and, as consequence with high reliability and very accurate positioning.

Taking into account that the life cycle in living lab is 5-10 years, solutions to update the devices without substituting them manually have to be taken into consideration.

Many use cases are UL unbalanced (high UL throughput required) and need to operate in macro cells.

Furthermore, the entertainment use cases can take advantageous from NR multicast broadcast and specifically some Industrail plant will use non public networks

SA1 Rel18 work of potential interest to 5GSolutions

- 5G **Smart Energy** and Infrastructure
- 5G **Railway** Communication System (Smart Stations)
- Guidelines for Extra-territorial 5G systems (**HAPS, Satellite**, Aeronautical, …)
- Enhancements to interconnected Mission Critical service Systems

Expansion to New Verticals

- **AI/ML** model transfer and distribution
- **Tactile and multi-modality** communication services (immersive realtime experience)
- Low Power High Accuracy Positioning for **industrial IoT** scenarios (1~2 years battery lifetime)
- **5G Timing Resiliency System** (Timing and synchronization as a service for Transportation, Energy, Finance…)

Even more Extreme KPIs

- **Ranging** services («point your phone & play»)
- Enhanced Support of Network **Slice**
- Data Integrity (to protect IoT communication)
- Support for Service Function Chaining
- Evolution of IMS multimedia telephony service (**XR**)

New System Enablers

- Enhancements for **Residential 5G** (devices behind Residential Gateway, small indoor base stations, …)
- **Personal IoT** Networks (home IoT, wearables, …)
- Vehicle mounted **Relays**
- Access to Localized Services ("on demand", temporary **Neutral Host** scenarios …)

New Networking Scenarios

- **Factory of the Future**
- **Smart Energy**
- **Smart Cities & Ports**
- **Media & Entertainments**

Background slides: 3GPP Rel-18. Requirements from industry verticals

Sample of requirements for Rel-18 (1/2) collected by 3GPP MRPs

- **Automotive (5GAA)**: Enhance existing Predictive QoS mechanism so the network can:
  - Send information about QoS prediction directly to the UE through standard interfaces.
  - Enable co-existence of reactions to QoS predictions in parallel in the network and in the application.
  - Predict future QoS demands (e.g. per location) to manage resources efficiently.
  - Enable a vehicle running a V2X application to pre-check alternative routes depending on the requested QoS.
  - Support the collection of sidelink QoS measurement data to the network, for more accurate QoS prediction on the sidelink.
- **Manufacturing**: Many Industrial requirements in Rel-16/-17 in SA1 (CAV studies and work items) – No need for extensive Rel-18 study and TR in SA1 but traceability/tracking of vertical requirements in stage 2/3 work is needed.
  - Promote industrial requirements in Rel-18 not selected for Rel-17 prioritisation: 1) Fully decentralised TSN configuration model and 2) generalised concept for ProSe/sidelink usable across diverse industry verticals.
  - Specific further requirements based on first deployments and 5G hardware testing.
  - New industrial 5G use cases lead to further specific requirements, e.g. machine vision use case with a focus on uplink video communication, e.g. for quality control.
  - Specific requirements based on on-going work in 5G-ACIA, e.g. 5G network exposure interface; industrial 5G device; contributions to evaluation models.
  - Small, specific requirements specifications.

Sample of requirements for Rel-18 (2/2) collected by 3GPP MRPs

- **Media (5G-MAG):** Further enhancements of NPNs and QoS delivery for multicast service.
  - Satellite: Integrated access backhaul; enhancements on multicast/broadcast support; continuation of work on NR-NTN, including additional architectural options for NTN cfr. Rel-17.
  - Terrestrial: Continuation of work in NR Multicast/Broadcast with other potential topics still under discussion.
  - Edge computing: Distributed computing; traffic awareness; adaptation to device capabilities; NWDAF, ML/AI.
- **Energy (EUTC)** – smart energy infrastructure in SA1 with four types of inputs so far: Energy services and their requirements, resiliency, operations and management of communications for energy operations; support of essential communication functions for energy services with consolidation of other potential requirements still pending.
  - **High availability** e.g. 99.999% for Feeder Automation and other distribution automation use cases, 99.999-99.9999% for Power Line differential protection.
  - **Low latency** e.g. differential protection in distribution 5ms with accuracy of latency <1ms and <2ms asymmetry.
  - **Management** incident, performance, configuration change and problem reporting interfaces. These include **RAN parameters** (as available from the UE.)
  - Regulatory (logical and physical isolation requirements)
  - Network services**: QoS policy aspects** and monitoring for 5GLAN (VLAN) service
  - Density: 10,000 per square km (e.g. advanced metering)
  - More requirements with greater specifity will emerge as the study progresses.