6GStart

Online Event

5G Vertical User Workshop

5G Vertical User Workshop
Requirements & Gaps of Vertical Industries for the future 3GPP Releases

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5G-ACIA | Major Objectives

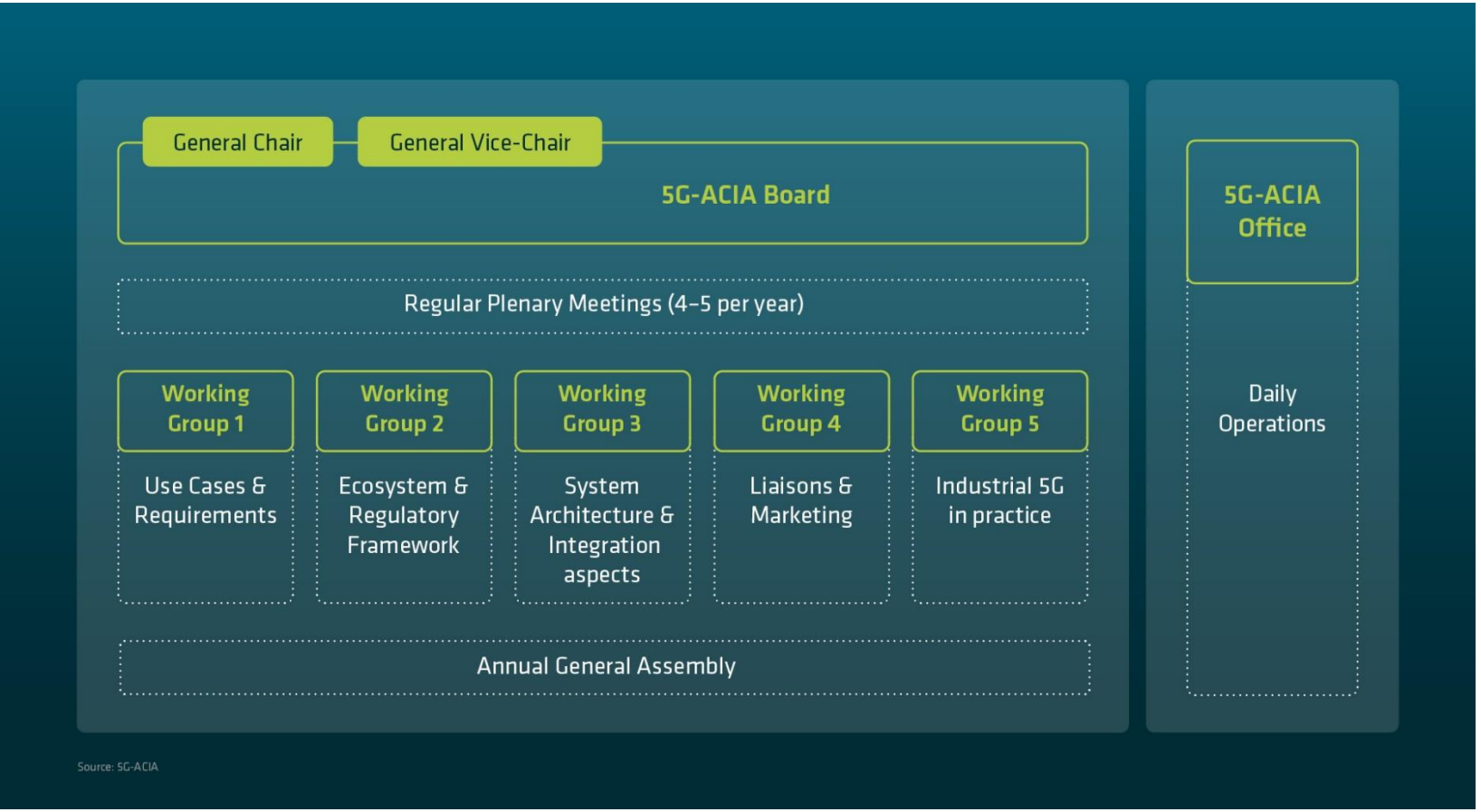
OT Industry

ICT Industry

1. Establish a common language btw. ICT & OT
2. Reflect OT needs in standardization & regulation
3. Analyze how 5G may enhance the Industrial IoT
4. Identify relevant certification & testing needs
5. Develop a sustainable Industrial 5G ecosystem
6. Promote Industrial 5G worldwide

5G-ACIA as the globally leading organization for driving and shaping Industrial 5G

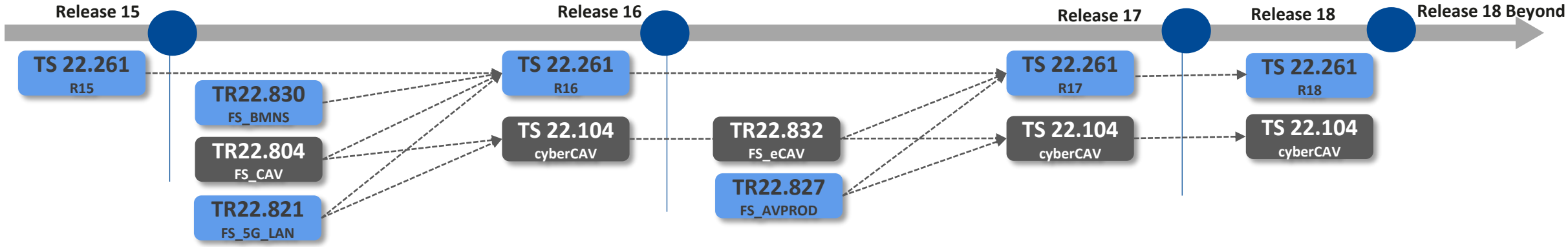
5G-ACIA | Overview



3GPP Market Representation Partnership

5G-ACIA was approved as 3GPP Market Representation Partner in Nov 2018

5G-ACIA General Thoughts and Recommendations



General thoughts

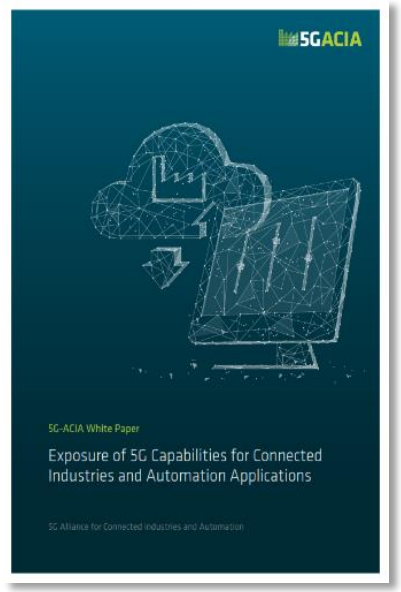
- Many industrial requirements are included in Rel-16/17 3GPP SA1 (CAV studies/work items, TS 22.104/22.261), but **not all requirements are covered**.
- Dependability and determinism are the key, and **guaranteed KPIs are important.**
- Rel-15 5G hardware is available – **testing of Rel-15/16 hardware will provide (first) insights on required enhancements and improvements in 5G-Advanced**.
- Looking forward to Rel-16 hardware/industrial 5G features being available and providing industrial features.
- **New industrial 5G use cases and ongoing 5G-ACIA work** lead to further specific requirements for enhancements in 5G-Advanced.

Important areas for Industrial 5G

- Non-public networks
- IIoT – Industrial IoT
  - URLLC – ultra-reliable low-latency communication
  - TSC – time-sensitive communication (time sync and TSN support)
  - 5G-VN – 5G-Virtual Networks, 5G-LAN
- Positioning
- Sidelink use in industrial environments
- QoS Monitoring

Industrial 5G-Advanced Requirements

- 5G-ACIA is collecting and investigating industrial 5G-Advanced requirements continuously.
- Past, current, and proposed future work in 5G-ACIA potentially identifies further industrial 5G-Advanced requirements and input to 3GPP, for instance in areas of:
  - 5G edge computing
  - 5G sidelink communication for industrial usage
  - Non-public networks
  - Support of machine vision in industrial 5G applications
  - …
- Liaison Statements e.g. to inform 3GPP about findings, contributions to 3GPP by 5G-ACIA members
  - Liaison statements on e.g. network exposure, 5G edge computing, sidelink in industrial
  - Contributions e.g. on network exposure requirements in 3GPP SA1
  - Whitepapers with further information e.g. on “Exposure of 5G Capabilities for Connected Industries and Automation Applications” https://5g-acia.org/whitepapers/exposure-of-5g-capabilities-for-connected-industries-and-automation-applications/
- Importance ranking of industrial 5G-Advanced requirements under evaluation in 5G-ACIA.



Industrial 5G-Advanced Requirements

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importance level/ranking of these industrial 5G-Advanced requirements is under evaluation in 5G-ACIA

Improved positioning accuracy (corresponding to 3GPP positioning service levels 6 and 7 in 3GPP TS 22.261)

- for absolute positioning towards 0.3 m / 2 m horizontal/vertical positioning accuracy, 99.9 % availability of position measurements within the accuracy limits, and ≤ 10 ms latency of position estimation;
- for relative positioning towards 0.2 m horizontal/vertical positioning accuracy, 99% availability of position measurements within the accuracy limits.

Enhancement of localization service output with accuracy of UE position

- Provided to application at UE

Low-power high-accuracy positioning

- Energy efficient provision of positioning services to allow battery-constrained UEs to sustain a long battery live time

Manipulation-protected positioning

- Secure, uncompromised localization information for reliable position information of a UE

Sidelink ranging (relative positioning)

- e.g. for asset/tool tracking use cases (e.g. indoor, horizontal accuracy ≤ 1 m, 99% availability, ≤ 1 s latency of position estimation

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IIoT: Improved time synchronization (smaller 5G time synchronization budget)

- Stable time synchronization of the 5G system of 700-800 ns with two wireless links

IIoT: Support of distributed TSN stream establishment

- The 5G system needs to be able to interwork with distributed protocols in use in order to support deployments using distributed TSN stream establishment, e.g., the Link-local Registration Protocol (LRP, IEEE 802.1CS-2020) and the upcoming Resource Allocation Protocol (RAP, IEEE P802.1Qdd).

IIoT, Sidelink: Support of direct device communication (sidelink) for Industrial IoT in standalone NPNs

QoS monitoring: Access to Network Exposure Function (NEF) at the UE

QoS monitoring: Access to Service Enabler Architecture Layer (SEAL) at the UE

QoS monitoring: Further QoS monitoring enhancements

- Enlarge the functionalities of QoS monitoring: additional parameters, QoS monitoring of groups of UEs, enhanced event logging, configurability of QoS monitoring parameters by the user
- See also 5G-ACIA White Paper “Exposure of 5G Capabilities for Connected Industries and Automation Applications” https://5g-acia.org/whitepapers/exposure-of-5g-capabilities-for-connected-industries-and-automation-applications/

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Support of multi-modality/mixed communication services

- 5G network assistance for coordinated transmission of multiple, related communication services with similar or different data characteristics (multi-modal/mixed, e.g. URLLC data, multiple audio/video, tactile information, sensor data) involving one or multiple UEs.

Enhanced predictive analytics

- Predictive QoS allows the mobile network to provide notifications about predicted QoS changes to enable in-advance adjustment of the application behaviour.

Ambient IoT

- Support of communication with ambient IoT devices (using energy harvesting producing a limited amount of energy)
- Device energy consumption, radio range for indoor (e.g. >25 m for automobile manufacturing) and outdoor (e.g. >100 m), message sizes (e.g. 96 bits from the Electronic Product Code standard used for asset and material tracking, inventory, etc.).

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Thanks!

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