

5G Vertical User Workshop 3GPP RAN Release 18 for Industry Verticals

23 June 2021

Michael Bahr (Siemens)
5G-ACIA WG1 Chair

Xueli An (Huawei)
5G-ACIA WG1 Vice Chair

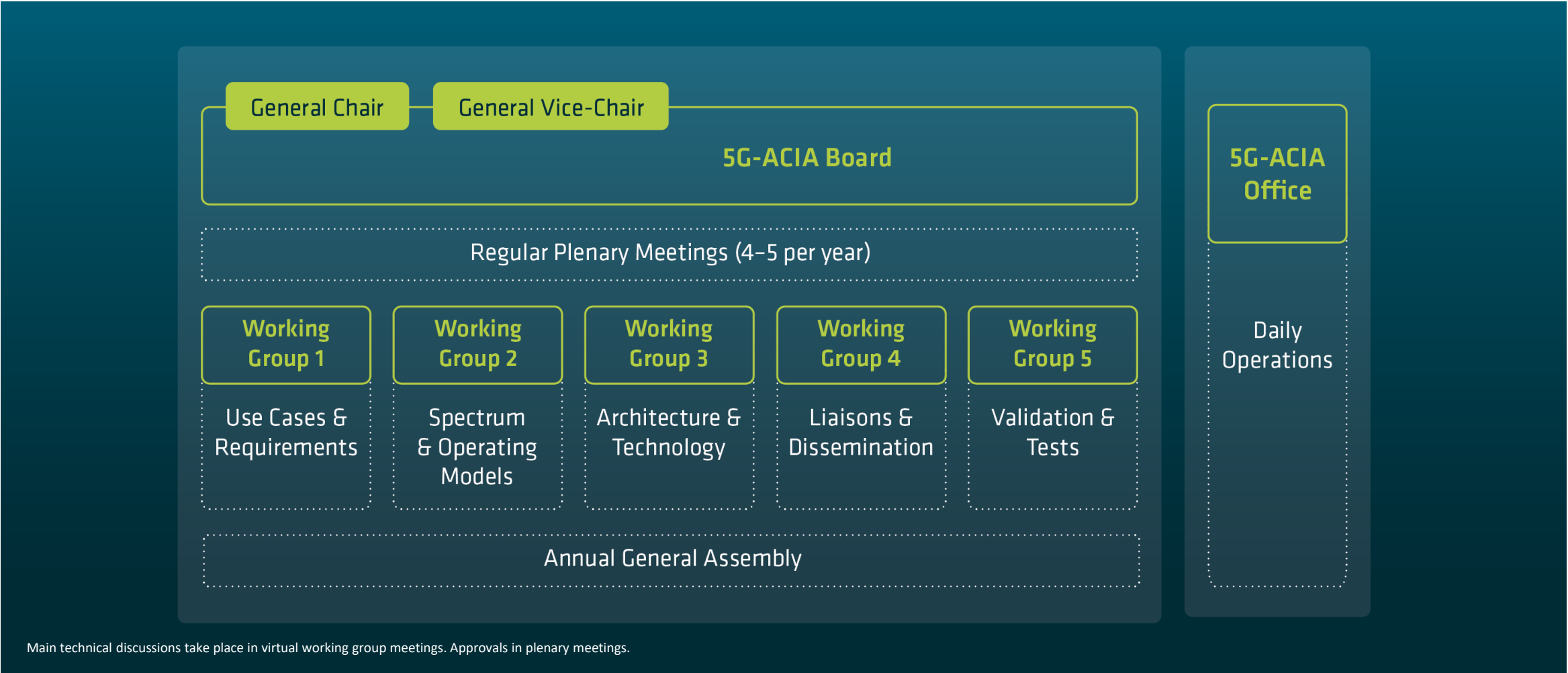


5G-ACIA | Introduction of speaker



- Michael Bahr
 - Siemens Technology in Munich, Germany
 - 5G-ACIA
 - Working Group Chair of WG1 „Use Cases & Requirements“
 - Rapporteur of 5G-ACIA work item on 5G-ACIA-related use cases, requirements, and KPIs for 3GPP SA1
 - 3GPP SA1
 - Rapporteur of work items cyberCAV and (FS_)eCAV – TS 22.104, TR 22.832; Rel-17

5G-ACIA | Working Group Structure



3GPP Market Representation Partnership



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



5G for future industry

November 9, 2018

This week, the 5G Alliance for Connected Industries and Automation (5G-ACIA) has been approved as a Market Representation Partner (MRP) in 3GPP.

The 5G-ACIA membership base includes a number of industrial equipment suppliers and end-users as well as ICT companies; with the automotive, energy, industrial manufacturing and production sectors all represented.

As 3GPP technology is now being applied to a diverse number of 'verticals', this is the best possible time for the 5G-ACIA to bring a coordinated industry based approach to the standards process, one that will help to align 3GPP to the 5G-ACIA vision to bring the "best possible applicability of 5G technology and 5G networks for the manufacturing and process industries".

After the formal approval process, by the seven 3GPP Organizational Partners (National and Regional SDOs), 5G-ACIA has been accepted as a 3GPP Market Representation Partner, as of November 2, 2018.

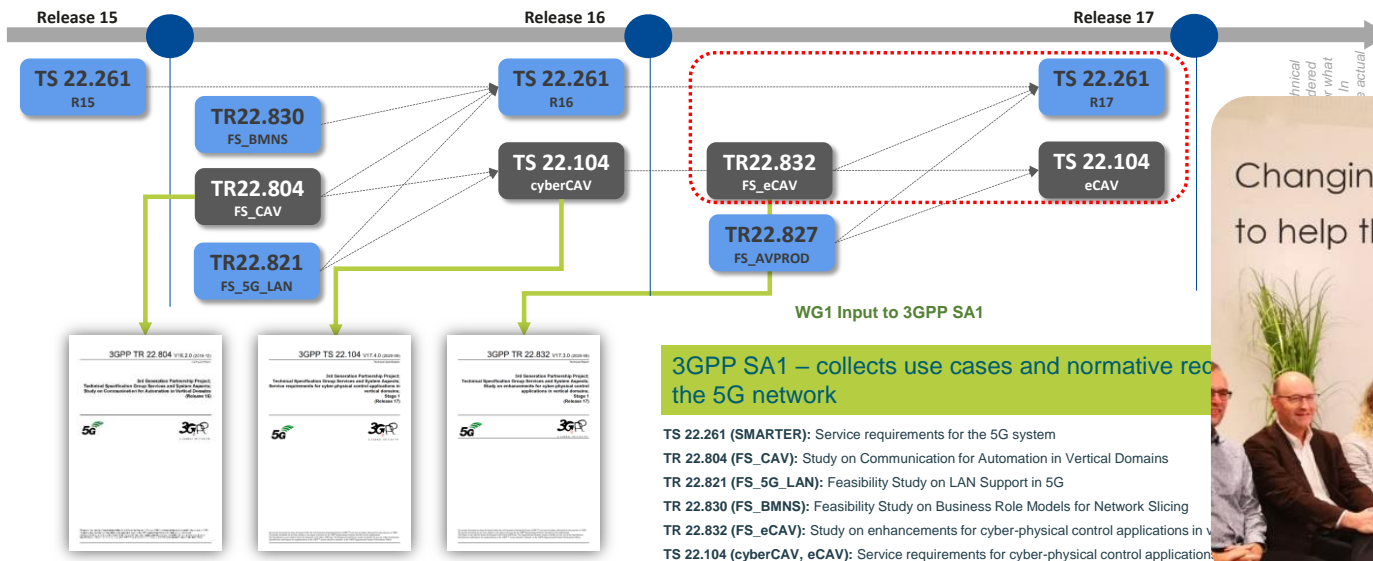
Source: www.3gpp.org



5G-ACIA | Contributions to 3GPP



- Contribution of industrial use cases and requirements to 3GPP



3GPP TS 22.104 V18.0.0 (2021-03)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Service requirements for cyber-physical control applications in vertical domains;
Stage 1
(Release 18)



3GPP TR 22.832 V17.1.0 (2019-12)

Technical Report

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Study on enhancements for cyber-physical control applications in vertical domains;
Stage 1
(Release 17)



- Contribution to evaluation models in 3GPP
 - Contribution to channel model for industrial environments
 - Contribution to simulation model for industrial use cases

General Thoughts on Rel-18 Requirements



- Many industrial requirements are included in Rel-16/17 3GPP SA1 documents (CAV studies and work items)
 - Not all requirements already covered
- Dependability and determinism are key
 - Guaranteed KPIs are important
- Current status: Rel-15 hardware is currently rolled out – testing of Rel-15/16 hardware will provide insights on required enhancements and improvements of 5G Advanced
 - However, testing of Rel-16 industrial 5G features has not been possible yet
- New industrial 5G use cases and ongoing 5G-ACIA work lead to further specific requirements for enhancements
- → traceability/tracking of vertical requirements in 3GPP work would be helpful for verticals to follow and participate

Example use cases with potential Rel-18 relevance



Most of them currently under detailed investigation

- Increased demand on uplink services
 - Example: several assembly lines per zone, ~16 UE per assembly line, 80 Mbit/s UL per UE (video, data streams, ...) → ~6 Gbit/s uplink data rate per zone (URLLC requirements apply)
 - Currently discussing whether already supported or enhancements are needed
- Low-power positioning device with high precision
 - 5G positioning is a promising solution, worthwhile to improve power consumption and UE complexity for broader usability of 5G positioning
- Enhanced URLLC
 - Efficiently support real time use cases (e.g. E2E 4 ms cycle time and 99.9999% reliability) in arbitrary deployments and with increasing UE numbers and capacity requirements
 - effectively support mixed-service co-existence
- Network exposure interface, further QoS monitoring
 - 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/>
- ProSe / Sidelink communication for industrial IoT
 - for special deployments such as cooperative carrying by a group of mobile robots

Template for session 1 on Inputs to 3GPP



Name: Michael Bahr

Affiliation: Siemens

Association/project representing: 5G-ACIA

Our priority inputs to RAN	Have been taken up	Still relevant ones not covered
URLLC communication	✓ - but only use of hardware will show finally	Increased capacity of URLLC communication?
Time sensitive communication (time synchronization, TSN support)	(✓) – many functionalities of time synchronization and TSN support	Further TSN functionalities, distributed TSN configuration model, better time synchronization
Non-public networks	✓	Further QoS monitoring, some architectural aspects
QoS monitoring / network exposure interface	(✓) partially	Further QoS monitoring, network exposure interface
ProSe/Sidelink communication for IIoT	×	ProSe/Sidelink communication for IIoT
Positioning	(✓) first positioning levels	improvements

Template A for Interactive session 2



Name: Michael Bahr
Affiliation: Siemens
Association/project representing: 5G-ACIA

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

- Non-public networks
- IIoT and URLLC
- Positioning enhancements
- QoS monitoring (other) **Note: Ranking and specific requirements are still under investigation.**
- Sidelink enhancements **Update provided later this year.**
- NR multicast broadcast
- Edge support (other)
- Predictive QoS
- Scenarios for satellite usage

Template B for Interactive session 2



Name: Michael Bahr

Affiliation: Siemens

Association/project representing: 5G-ACIA

Explain your ranking (free text):

Ranking and specific requirements are still under investigation and preliminary.

List of industrial Rel-18 requirements is under discussion and still work in progress.

Update will be provided later this year.

Template A for Interactive session 2



Vital Importance

- NPN enhancements for private 5G networks
- increased capacity of 5GS for URLLC (higher number of #UEs)
- URLLC device/UE complexity reduction (RedCap)
- Improved positioning accuracy

Important

Note: Work in Progress, preliminary only.

- Higher (UL) capacity (high bandwidth uplink data streams, many UEs)
- IIoT: improved time synchronization (smaller 5G time sync budget)
- Low power high accuracy positioning
- further QoS monitoring of RAN parameters
- Sidelink enhancements to industrial communication
- IIoT: Distributed TSN configuration (probably no relevance to RAN, SA topic)

List of industrial 5G Rel-18 requirements is under discussion. Update provided after summer.

- Sidelink positioning for indoor scenarios
- Enhancements to multicast data communication
- Edge support (RAN relevance to be clarified)

Nice to have

- Predictive QoS
- Scenarios for satellite usage (only in specific outdoor deployments)

Further potential requirements also to be investigated, e.g.

- Network Exposure interface for industrial users in non-public networks
- effectively support mixed-service co-existence (e.g. as in support of tactile and multi-modality communication services, (FS_)TACMM)

Thank you!

Michael Bahr (Siemens)
Working Group 1 Chair

5G Alliance for Connected Industries and Automation
Lyoner Strasse 9
60528 Frankfurt am Main
Germany

www.5g-acia.org

© ZVEI

The work, including all of its parts, is protected by copyright. Any use outside the strict limits of copyright law without the consent of the publisher is prohibited. This applies in particular to reproduction, translation, microfilming, storage, and processing in electronic systems. Although ZVEI has taken the greatest possible care in preparing this document, it accepts no liability for the content.

