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Report on standardization activities Y3

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Abstract

The document reports the standardization activities undergone by the 5G-ALLSTAR project partners over the third year of the project.

Keywords

Multi-Connectivity, Standardization, 3GPP, ITU, V2X

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Executive Summary

5G-ALLSTAR WP6 includes standardization activities for inclusion of technologies developed by the project in the 5G system definition, mainly at 3GPP level.

The deliverable D6.5 “Standardization Action Plan” defines these activities and the associated actions to be undergone by the 5G-ALLSTAR consortium partners all along the 3+ years of the project life.

This document is the third of a series of 3 reports that were delivered and it covers standardization activities lead by the 5G-ALLSTAR project team from M25 (July 2020) to M40 (October 2021).

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List of Abbreviations

3GPP	3rd Generation Partnership Project
5G	Fifth Generation of cellular network technology
CRAT	Consortium for the Research in Automation and Telecommunication
DL	Downlink
eMBB	Enhanced Mobile BroadBand
ETRI	Electronics and Telecommunications Research Institute (South Korea)
ETSI	European Telecommunication Standards Institute
GEO	Geostationary Earth Orbit
IEEE	Institute of Electrical and Electronics Engineers
IMT	International Mobile Telecommunications
ITU	International Telecommunication Union
ITU-R	ITU Radio communication Sector
LEO	Low Earth Orbit
LLS	Low Latency Services
Mxy	Month xy
NR	New Radio
NTN	Non-Terrestrial Network
PRACH	Physical Random Access CHannel
RAN	Radio Access Network
RRM	Radio Resource Management
SA	System Architecture
SG	Specification Group
SI	Study Item (SI)
TAS	Thales Alenia Space
TDOC	Temporary DOCument
UE	User Equipment
V2X	Vehicle-to-everything
WI	Work Item (3GPP)
WP	Work Package

1 Introduction

5G-ALLSTAR WP6 includes standardization activities for inclusion of technologies developed by the project in the 5G system definition, mainly at 3GPP.

One of the project's objectives is indeed to contribute to the definition of 5G system as part of Rel-16 and beyond with the inclusion of 5G satellite access, mobile wireless backhaul and multiple access/connectivity.

The initial plan, as defined in D6.5 (Standardization Action Plan) was to try to leverage ongoing standardisation on eMBB and 5G satellite access. Additional standardization activities in bodies such as ETSI, IEEE and ITU, were also identified as to be possibly carried out in complement to 3GPP activities. Contributions were meant to be provided to selected groups in order to support product adoption and interoperability developed in the context of the project.

Opportunities related to the project scope as well as the standardization strategy were meant to be reconsidered and updated all along the project's course.

The initial Standardization Action Plan defined a series of relevant activities and the associated actions to be undergone by the consortium all along the 3 years of project lifetime.

Every 12 months, a standardization activity report was issued.

This document is the third and last of the 3 reports that were delivered. It covers standardization activities led by the 5G-ALLSTAR project team from M25 (July 2020) to M40 (October 2021).

2 Standardization action plan reminder

The Standardization Action Plan (deliverable D6.5) proposed an action plan for standardization activities on the 5G-ALLSTAR project to support the inclusion of technologies developed by the project in 5G systems. These activities were meant to be mainly undergone at 3GPP level.

This standardization action plan:

- Presented the rationale for a new standardization approach for Satcom based on the analysis of the current standardization context in Satcom market and the on-going standardization context for 5G;
- Proposed an approach to integrate satellite in the 5G related standards including the identification/justification of the potential standardization requirements arising from 5G-ALLSTAR;
- Identified a standardization action plan including the timeline, the Standardization Organizations and groups where 5G-ALLSTAR plans to contribute and the 5G-ALLSTAR members involved;

This plan had to be revised during the course of the project to take into account the progress on the project, especially at architecture and research pillars (e.g. RRM) levels, the evolving 5G standardization context… and the unexpected COVID-19 crisis that impacted not only the 5G-ALLSTAR project, but also the 3GPP Releases issuing process.

The table below gives the initial standardization actions list intended to be taken over the 5G-ALLSTAR project duration.

Table 2-1: Standardization actions list

Standardisation body/group	Action description	Deadline
3GPP RAN1	Contribute to the study of physical layer issues of NR V2X-based vehicle communication	Early 2019
ITU-R SG4 & SG5	Inform relevant ITU-R Working Parties on activities in 3GPP	Mid 2019
3GPP RAN3	Study procedures for hand-over/multi connectivity between 2 satellite accesses or between satellite and cellular access and identify/describe solutions	Mid 2019
3GPP RAN2 & 3	Study enablers for coordinated radio resource management between satellite/cellular access	Mid 2019
3GPP RAN1	Contribute to the study of issues associated to NR physical layer support non-terrestrial network	End 2019
3GPP RAN1	Contribute to the specification of NR V2X physical layer design regarding vehicle communication	End 2019
3GPP RAN2	Study access layer protocol impacts associated to hand-over/multi connectivity between 2 satellite accesses or between satellite and cellular access and identify/describe solutions	End 2019
3GPP RAN3	Specify procedures for hand-over/multi connectivity between 2 satellite accesses or between satellite and cellular access	Mid 2020
3GPP RAN2	Specify NR access layer protocol modifications enabling support of hand-over/multi connectivity between 2 satellite accesses or between satellite and cellular access	Mid 2020
3GPP RAN1	Specify NR physical layer protocol modifications enabling support of non-terrestrial network	Mid 2020
3GPP RAN2 & 3	Specify enablers for coordinated radio resource management between satellite/cellular access	Mid 2020
ITU-R SG4 & SG5	Contribute to ITU-R Recommendation(s) on NTN integration in IMT-2020 networks	Mid 2020

3 Standardization actions undergone over Year 3+

No precise standardization action for the 3rd year of 5G-ALLSTAR Project was identified when the Standardization Action Plan was initially established as it was expected to identify a last set of standardization actions based on the results obtained through the different project's simulations and test campaigns.

Unfortunately, the Project had to face unexpected difficulties, mostly related to COVID-19 crisis that, in particular, delayed many development activities, shifting especially the WP5 Testbeds and Trial Platforms validations to the very end of the project. This prevented partners to proceed then to a real and extensive testing campaign, as initially planned, with data collecting which could have motivated and justified some relevant and truly impacting standardization actions during the 3rd Project's year.

Despite these difficulties, the 5G-ALLSTAR partners actively participated in the different 3GPP working groups studying the integration of Non-Terrestrial Networks into future 5G Systems.

These contributions to 3GPP include the submission of Temporary Documents (TDOCs), focusing on different topics in the relevant 3GPP working groups.

Thus, the Partner's most noticeable contributions during the 3rd year project period, were made at 3GPP SA5 level for the 3GPP TR 28.808 document.

The aim was to further improve the use cases and solutions to the multi-RAT load balancing associated with satellite and terrestrial RANs.

- Use case modification: In the document S5-205149, ETRI proposed to revise the use case for monitoring of satellite components, especially on the multi-RAT load-balancing associated with both a satellite RAN and a terrestrial RAN, which is described in Figure 3-1.

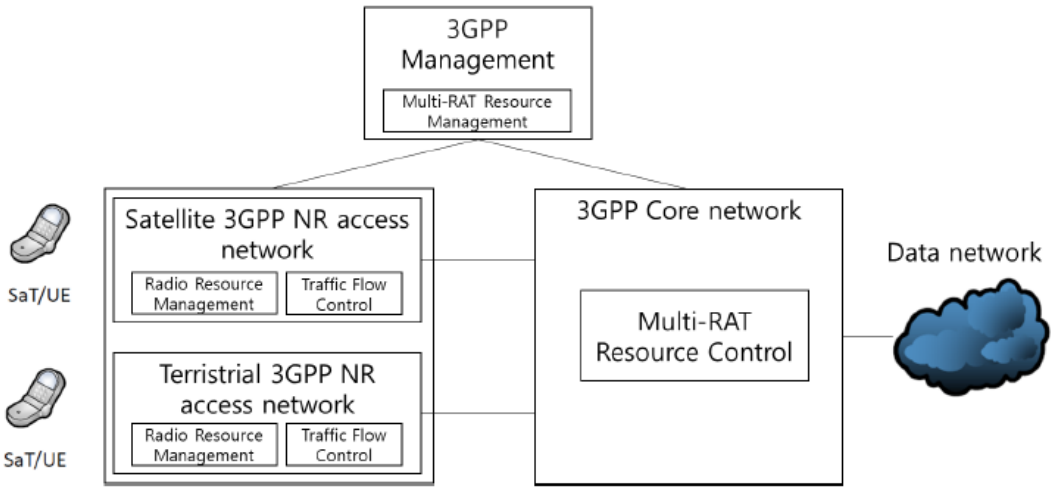

Figure 3-1: Multi-RATs load-balancing for satellite and terrestrial RANs

- Solution addition: In the document S5-205150, ETRI proposed to add a solution for multi-RAT load-balancing associated with satellite and terrestrial RANs, including traffic switching from currently active RAT to another RAT and traffic splitting into two RATs.

4 Conclusions

Partner's standardization actions at 3GPP level are overwhelming the sole 5G-ALLSTAR Project's scope and will obviously continue in the coming years.

Even if the 5G-ALLSTAR Project, due to the different difficulties it had to face, especially the unprecedented COVID-19 crisis, couldn't contribute to the 5G standardization process with actual collected data and test measurements, as initially expected, the different European and Korean Partners contributions all along its course, were for sure of a valuable impact at 3GPP level.

More importantly, the 5G-ALLSTAR Project laid the foundations of a strong and sustainable collaboration that will continue in the future with the same initial target of allowing seamless and valuable integration of Satellite Systems into Terrestrial Networks, 5G for sure, but also beyond.