



PROJECT "LOCUS": LOCalization and analytics on-demand
embedded in the 5G ecosystem, for Ubiquitous vertical applications

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DELIVERABLE D7.2

Report on Communication, Dissemination Actions, Standardization and Open Source Contributions, v1

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Short Abstract:	Report on communication and dissemination actions, on the progress



against initial plans, as well as on awareness and advice inferred from these activities. Standardization and open-source contributions until the release date of each version, the impact that these have been perceived to have, and the plans for further standardization and open-source contributions

Keyword List: Communication, Dissemination, Standardization, Open-Source Contributions

Executive Summary

This deliverable has the objective to report LOCUS activities and plan the ones for the upcoming year in three main areas: (1) Communication and dissemination; (2) Data management; (3) Standardization.

VERSION CONTROL TABLE			
VERSION N.	PURPOSE/CHANGES	AUTHOR (s)	DATE
1.0	First draft with ToC	CNIT, Stefania Bartoletti	25-08-2020
1.2	Inclusion of the Standardization Plan	CNIT, Stefania Bartoletti, Natascia De Fenzo, Flaminia Saratti SAMS, Mythri Hunukumbure ERI, Sara Modarres Razavi	16-10-2020
2.0	Second draft, after the meeting with Reviewers. Addressing some of their comments while waiting for the official report to include more comments	CNIT, Stefania Bartoletti, Raffaele Bolla	8-11-2020
2.1	Internal Review	OTE, Maria Belesiotti INCE, Athina Ropodi	25-01-2021
2.2	Final Draft	CNIT, Stefania Bartoletti, Natascia De Fenzo	29-01-2021
3.0	Final Review from the Project Coordinator	Nicola Blefari Melazzi	31-01-2021



INDEX

EXECUTIVE SUMMARY	3
1. INTRODUCTION.....	5
1.1 TABLE INDEX.....	7
2. REPORT ON FIRST YEAR'S ACTIVITIES	8
2.1 THE COVID-19 OUTBREAK	8
2.2 REPORT ON FIRST YEAR'S COMMUNICATION AND DISSEMINATION ACTIVITIES.....	9
2.2.1 LOCUS Website	9
2.2.2 LOCUS Social Media	10
2.2.3 Internal Communication	12
2.2.4 Scientific Publications	12
2.2.5 Exhibitions, workshops, congresses.....	15
2.2.6 Related Projects	18
3. PLAN FOR THE COMMUNICATION AND DISSEMINATION ACTIVITIES IN THE NEXT YEAR (JAN-DEC 2021)	21
3.1 JOINT COMMUNICATION AND DISSEMINATION PLAN.....	21
3.2 INDIVIDUAL DISSEMINATION AND COMMUNICATION PLAN	22
4. STANDARDIZATION ACTIVITIES	24
4.1 3GPP	24
4.1.1 Monitoring and Contribution.....	24
4.1.2 Work plan in 3GPP	25
4.2 ETSI.....	26
4.3 FIRA CONSORTIUM	27
4.4 OPEN-SOURCE CONTRIBUTIONS	27
4.4.1 OPEN AIR INTERFACE (OAI)	28
4.4.2 Open-Source MANO (OSM)	28
4.4.3 O-RAN Alliance	28
5. ADDENDUM – UPDATE OF THE EXPLOITATION PLAN: INTEGRATION TO D7.5.....	30
REFERENCES	32

1. Introduction

This deliverable deals with the communication, dissemination and standardization aspects of the LOCUS project, which are part of WP7 activities. More specifically, WP7 is structured in three main tasks related to (i) communication and dissemination, (ii) standardization and open-source contributions, and (iii) innovation and commercial exploitation.

In this deliverable, we focus on how LOCUS research outcomes, after a proper IPR analysis described in D7.3, are disseminated and communicated to the external world, and how the data is managed within the project, as shown in Figure 1

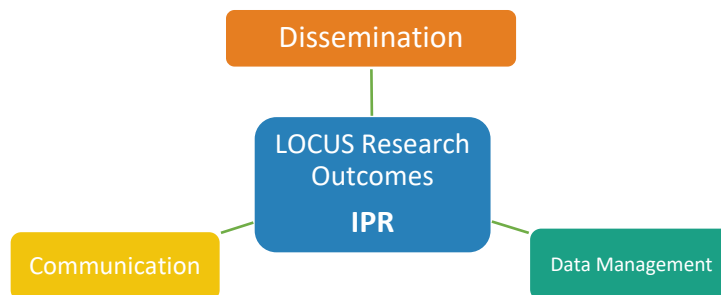


Figure 1: Dissemination, Communication and Data Management

Figure 2 presents the roadmap for the monitoring and reporting of WP7 activities, including the Four-monthly reports and the future versions of D7.x

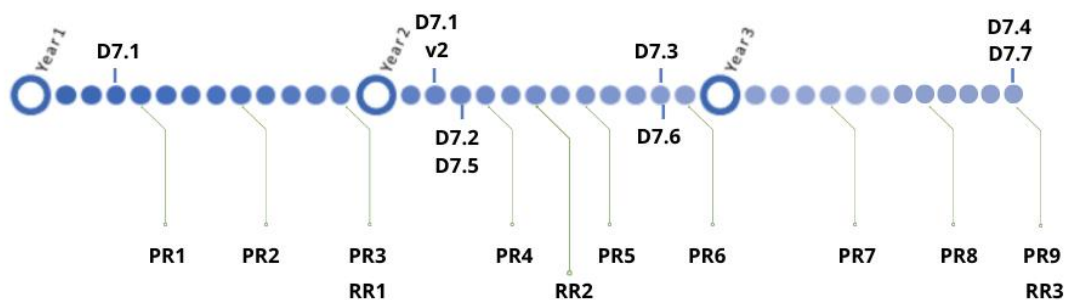


Figure 2: Roadmap of Communication and Dissemination Monitoring

In D7.1v2 we reported the general plan for communication and dissemination. Here, we will detail the plan for the second year of the project by leveraging the individual plans from each partner, the planned joint activities, and the experience gained during the first year of the project. We will also report the main activities, the management and implementation of the plan that has been carried out within the first year of the project.



Secondly, we will give a description of the main standardization activities in progress and the main activities planned for the upcoming year of the project, focusing on the main standardization bodies where LOCUS partners are active: ETSI and 3GPP.

Finally, we will provide an integration of D7.5 by updating the exploitation plan for the partner Orange.

List of Abbreviations

ABBREVIATION	FULL NAME
5G-PPP	5G Infrastructure Public Private Partnership
API	Application Programming Interfaces
AGV	Automated Guided Vehicles
BMB	Business and Marketing Board
CA	Consortium Agreement
CAM	Connected and Automated Mobility
CFS	Certificate on Financial Statement
DOA	Description of the Action
DMP	Data Management Plan
DPO	Data Protection Officer
EB	Executive Board
FAIR	Findable, Accessible, Interoperable and Reusable
GA	Grant Agreement
GB	General Board
GDPR	General Data Protection Regulation
HDPa	Hellenic Data Protection Authority
ICT	Information and Communication Technologies
INEA	Innovation and Networks Executive Agency
ITS	Intelligent Transport System
IoT	Internet of Things
KPI	Key Performance Indicators
KOM	Kick off Meeting
NDA	Non-Disclosure Agreement



NFV	Network Functions Virtualization
PC	Project Coordinator
PO	Project Office
PR	Public Relations
OAI	Open Air Interface
O-RAN	Open Radio Access Network
RAN	Radio Access Network
RSS	Received Signal Strength
RB	Review Board
SRS	Sounding Reference Signals
SB	Scientific Board
GitLab	Subversion
VRU	Vulnerable Road User
UE	User Equipment
V2X	Vehicle-To-Everything
WPL	Work Package Leader
WPT	Work Package Team

Table 1: Abbreviation List

1.1 Table Index

Table 1: Abbreviation List.....	7
Table 2: Scientific publications.....	14
Table 3: Exhibitions, workshops, congresses	18
Table 4: Collaborations for research and development activities	20



2. Report on First Year's Activities

In this Section, we report the communication and dissemination activities carried out during the first year of the project. Specifically, we first comment and describe the effects of the Covid-19 outbreak on LOCUS communication and dissemination, and then report the activities that have been successfully completed.

2.1 The Covid-19 Outbreak

During the first year of the project LOCUS, we experienced important issues, with the spread of the COVID-19 pandemic, which has rapidly changed the dissemination and communication activities in the field. For this reason, in D7.1v2, we presented a contingency plan for the risks related to the communication and dissemination activities.

For example, LOCUS coordinated a workshop proposal together with all the other ICT-20 projects participating in the 5G-PPP for the EUCNC2 2020. Although the workshop proposal was accepted, it was later cancelled as the conference was held remotely. Similarly, the workshop organized at ICC 2020, as well as the presentation of the article on LOCUS at EUCNC 2020, did not obtain the same participation that they could have had in the case of being held with a full in-person attendance.

If the impact of the pandemic was quite uniform with respect to the different targets of LOCUS dissemination and communication activities, also in terms of virtual activities, the inability to organize in person events was the main problem affecting conferences, workshops, and events targeting, for example, public administration and general public. The LOCUS consortium and specifically the WP7 team follows very closely the evolution of the organization of the main events in the sector.

This situation called for an update of the communication and dissemination plan and most of all an increase of effort for the management of such activities. For example, one of the LOCUS' strengths is a large and diverse consortium with a big potential of reaching a diverse set of audiences. However, their integration and the reciprocal transfer of knowledge, especially in a pandemic context, required specific measures and the direct involvement of partners in task forces targeting different audiences. The efforts are reflected in the plan for the second year in Sec. 3 and concern the following:

- A remarkably increased effort towards the communication through the social media and the official website to reach general public, public administration, and industry.
- Tracing activity to analyse the audience of the social media channels and the website and to decide how to increase the number of people for the aforementioned audiences.



- The establishment of a task force with a Public Relations (PR) person for each partner, to create and share content on a weekly basis through the various channels.
- An increased effort towards dissemination through joint papers within the consortium and with other projects.

In addition, as the target events (e.g., EUCNC) have been adapted to the current virtual participation and will include virtual workshops, LOCUS will propose and adapt a new workshop together with the other 5G-PPP projects (see the Second Year Plan) and a new workshop at Globecom in the 2021 editions of the conferences.

2.2 Report on First Year's Communication and Dissemination Activities

All the communication activities have, as main focus, to promote the LOCUS project, sharing its objectives, achievements and publications with the public. In D7.1v2 we have presented the management, strategy, and tools of LOCUS communication and dissemination activities. We recall that the main tools, which are mostly managed by the LOCUS communication team, are:

- Social media: Twitter and LinkedIn account
- Website
- Zenodo

In some cases, they are used directly by the individual partners for the internal and external communication of their activities, events, and/or research products.

2.2.1 LOCUS Website

The main Key Performance Indicators (KPIs) monitored for measuring the success of the websites are the number of visits and unique visitors per day and the top 10 pages visited. To this date, the average number of visits is above 100 per day, whereas the number of visitors is close to 40 per day. The most visited page is the homepage, followed by the review page. As an example figure of merit, we show the hit statistics for the month of January 2021 in Figure 3 and Figure 4.

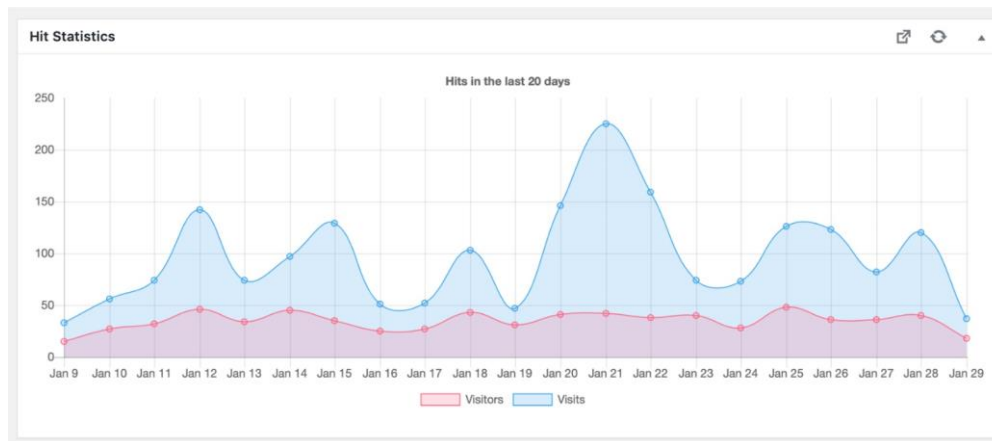


Figure 3: Hit statistics of the website.

ID	Title	Link	Visits
1	Home Page	/	3,844
2	White paper on "Empowering Vertical Industries through 5G Networks – Current Status and Future Trends"	/white-paper-on-empowering-vertical-industries-through-5g-networks-current-status-and-future-trends/	262
3	Contacts	/contacts/	218
4	Specific Objectives	/about/specific-objectives/	196
5	About	/about/	177
6	WPs Description	/about/wps-description/	176
7	Download	/download/	163
8	Step by Step	/about/step-by-step/	163
9	Benefits and Impacts	/about/benefits-and-impacts/	154
10	LOCUS Project at the industrial event ITSF2020	/locus-project-at-the-industrial-event-itsf2020/	152

Figure 4: Top 10 pages visited.

2.2.2 LOCUS Social Media

LinkedIn

A LOCUS LinkedIn account has been created at the beginning of the project and is available at: <https://www.linkedin.com/in/locus-project-h2020/>. Here, many updates about deliverables, use cases, participations to international events and publications are being posted. The LinkedIn account currently accounts for 249 contacts (222 more than the beginning of September) with an average of one post per week. From a deeper analysis in terms of target, days, and views, it emerges that, in general, the most active contacts of LOCUS are **engineers, software developers and academics (i.e., researchers and professors)**. It also emerges that the most suitable days to be active on social network are Monday and Friday, considering the number of interactions and the number of views. The aim is to double the number of contacts by the end of the second year.

For each post, LinkedIn analyses the target of the interactions (see Figure 5)



Your post posted on December 13, 2020
16 reactions



Figure 5: Single post target analysis

Twitter

The twitter account currently has 169 followers (increased by 150 from the beginning of September) with an average of one post per week. A more specific monitoring of the interactions will be ready for the next reporting period based on the monitoring strategy that has been recently activated and described above.

Twitter provides a tool called Analytics, which is used by the Communication Team to keep track of all the activity done so far, including the interactions and profile visits. Figure 6 shows an example of twitter analytics summary for the months December 2020 and January 2021.



Figure 6: Twitter analytics

In addition, an analysis is performed on the social media channels to monitor on a daily basis the number of visits and unique users. Figure 7 shows an example of *tracing of the social media interactions* for each post, including the weekdays of publications and the type of reactions, number of shares, and post views. This tracing is particularly important for analysing the audience and plan the future posts accordingly.



Date	Reactions	Shares	Post Views	Connections	Week day	Hashtags
3-Nov-20	13	1	592		Tuesday pm	#industrial, #ITSF2020, #synchronization, #localization, #timing, #online
5-Nov-20	5		128		Thursday am	#article, #pencil, #beamforming, #electromagnetic
13-Nov-20	10		310		Friday am	#5GItaly2020, #free, #online
16-Nov-20	6		263		Monday pm	#technologies, #lives, #global, #pandemic, #location, #intelligence
24-Nov-20	7	1	284		Tuesday pm	#cybersecurity, #awareness, #5G
30-Nov-20	10		294		Monday am	#progress, #5G, #RecoveryFund, #SkyTG24
				214		

Figure 7: Tracing of the interactions on Social Media

2.2.3 Internal Communication

Internal communication is being done mainly online, on the GoToMeeting app, due to the COVID-19 outbreak. This involves biweekly general calls where all partners participate, plenary meetings at regular intervals and WP and/or FG-specific calls.


Each Partner's PR will communicate to WP7 leader all the communication activities related to LOCUS project and other relevant results related to it, which they want to share to strategically collaborate together and promote our achievements.

A periodic e-mail is sent to each PR to give continuity to the communication activity through LOCUS social networks. Another periodic e-mail is sent to all LOCUS partners, asking for a continuous update on the dissemination activities reported on the Excel file and any available pre-print to publish on Zenodo: <https://zenodo.org/communities/locus-project/?page=1&size=20>.

2.2.4 Scientific Publications

A total number of 13 scientific publications in peer-reviewed conferences or journals has been reported by the partners during the first year of the project, with three journal publications on IEEE journals. Other papers have been submitted and are currently under review.

Specifically, **two joint magazine papers have been submitted** and are currently under review. The main scientific publications (i.e., already appeared) from the LOCUS consortium are reported in the following table:

Title	Authors	Target venue
Indoor Clutter Characterization for UWB Sensor Radar Networks	Flavio Morselli, Stefania Bartoletti, Andrea Conti	IEEE Workshop on Advances in Network Localization and Navigation (ANLN) 
Group-In: Group Inference from Wireless Traces of Mobile Devices	Gurkan Solmaz, Jonathan Fuerst, Samet Aytac, Fang-Jing Wu	19th ACM/IEEE Conference on Information Processing in Sensor Networks (IPSN'20)

		IPSN 2020
LSTM-based GNSS Spoofing Detection Using Low-cost Spectrum Sensors	Roberto Calvo Palomino, Arani Bhattacharya, Gerome Bovet, Domenico Giustiniano	IEEE WoWMoM 
A Context-Aware Data-Driven Algorithm for Small Cell Site Selection in Cellular Networks	Juan Luis Bejarano Luque, Matías Toril, Mariano Fernández Navarro, Antonio Jesús García, Salvador Luna Ramírez	IEEE Access 
Location Inference Based on Channel Impulse Response	Zehao Yu, Zhenyu Liu, Florian Meyer, Andrea Conti, Moe Z. Win	2020 IEEE/ION Position, Location and Navigation Symposium (PLANS)
Spectrum Occupancy and Interference Model based on Network Experimentations in Hospital	Lorenzo Mucchi, Risto Vuhtoniemi, Hasnain Virk, Andrea Conti, Matti Hamalainen, Jari Linatti, Moe Z. Win	IEEE Transactions on Wireless Communications 
Beam Search Strategy for Millimeter Wave Networks with Out-of-Band Input Data	Maurizio Rea, Domenico Giustiniano, Guillermo Bielsa, Danilo De Donno, Joerg Widmer	IEEE MedComNet 2020 
LOCUS: Localization and analytics on-	Nicola Blefari Melazzi et Al.	IEEE EUCNC 2020 


demand embedded in the 5G ecosystem		
A Sparse Learning Approach to the Detection of Multiple Noise-Like Jammers	Linjie Yan, Pia Addabbo, Yuxuan Zhang, Chengpeng Hao, Jun Liu, Jian Li, Danilo Orlando	IEEE Transactions on Aerospace and Electronic Systems
A conversation with Gürkan Solmaz: situation classification in the internet of things (IoT).	B. Anjum	ACM Ubiquity Magazine, August 2020.
Virtual Inertial Sensors with Fine Time Measurements	M. Rea, D. Giustiniano, J. Widmer	IEEE Mass
The diverse and variegated reactions of different cellular devices to IMSI catching attacks	I. Palamà, F. Gringoli, G. Bianchi, N. Blefari-Melazzi	Proceedings of the 14th International Workshop on Wireless Network Testbeds, Experimental evaluation & Characterization
Indoor 3D localization in emergency scenarios through drone based rapid 5G deployment	Mythri Hunukumbure, Oluwatayo Kolawole, Shangbin Wu, Yinan Qi	IEEE Globecom 2020 workshops, Taiwan, 7-11 Dec. 2020








Table 2: Scientific publications



2.2.5 Exhibitions, workshops, congresses

Table 3 reports the main exhibitions, congresses and workshops attended by the LOCUS participants and where the LOCUS research outcomes have been presented in terms of tutorial, invited talk, or other types of dissemination activities.

Of particular significance is the conference 5G Italy (<https://www.5gitaly.eu/>), which is organized by CNIT. 5G Italy is the Italian national reference event on 5G, where politics, regulatory authorities, research, businesses, economy and PA meet, addressing the challenges and opportunities of the upcoming 5G network. The main conference features speakers including ministers of the Italian government, CEOs of operators and vendors and a wide representation of both TELCO industries and “users” (i.e. verticals) of the 5G technology, and lasts three days. The event hosts also an international PhD School, scientific sessions featuring leading international experts, and specific sessions where researchers and newly established companies can present their solutions in the field. The 2020 edition has been held online because of the pandemic, but it attracted a record number of attendees: more than 2500 people registered and followed the event. 5G is of course key to the localization functionality and to LOCUS and the topic of localization has been dealt with on several occasions throughout the conference. The project coordinator of LOCUS is also the general chair of 5G Italy and the LOCUS project has been presented to several players in the field.

Exhibition, Congress, Workshop	Partner Involved/ Proposer	Name of the activity	Type of activity	Location	Date
IEEE Milcom 2019 	CNIT	Positioning, Navigation, and Timing for Information Superiority: From Foundation to Operation	Tutorial	Norfolk, VA, USA	November 12, 2019
3rd High Frequency Technologies for 5G Workshop	CNIT	Localization of Things	Invited Talk	Milan, Italy	November 18, 2019
21st Infocom World 2019, «Economy 4.0: Connected Future»	OTE	LOCALization and analytics on-demand embedded in the 5G ecosystem, for Ubiquitous vertical applicationS: The Case of LOCUS Project	Dissemination	Athens	November 26, 2019

<p>5G Italy</p> 	SAMS	Smart transport: smart mobility and autonomous driving	Dissemination	Rome	December 2019
<p>5G Italy</p> 	TEI	Synchronization and Positioning: Critical functions for 5G; Empowering OTT technologies	Dissemination and Technical Sponsor	Rome	December 2019
<p>Ph.D. Course at the University of Florence</p> 	CNIT	Localization of Things	Ph.D. Course	Florence	January 2020
<p>ACM/IEEE IPSN 2020</p>	NEC	Group-In: Group Inference from Wireless Traces of Mobile Devices	Dissemination	Virtual	April 21-24, 2020
<p>5GFORUM</p> 	UMA	H2020 LOCUS Project: Localization and Data Analytics in 5G Systems	Dissemination	Málaga, Spain	May 6-7, 2020
<p>IEEE ICC 2020</p> 	CNIT	Advances on Network Localization and Navigation	Organizer	Dublin	June 7, 2020
<p>IEEE ICC 2020</p> 	CNIT	Localization-of-Things: from Foundation to Operation	Tutorial	Dublin, Ireland	June 11, 2020
<p>IEEE ICC 2020</p> 	CNIT	Indoor Clutter Characterization for UWB Sensor Radar Networks	Dissemination	Dublin, Ireland	June 11, 2020
<p>IEEE EUCNC 2020</p> 	CNIT, IMDEA, UMA, INCE, NEC, SAMS, NXW	LOCUS: Localization and analytics on-demand embedded in the 5G ecosystem	Dissemination	Dubrovnik, Croatia	June 16, 2020

<p>IEEE – MEDCOMNET 2020</p> <p>IEEE – MedComNet 2020 17-19 JUNE 2020 ABUJA, NIGERIA</p>	IMDEA	Beam search strategy for millimeter wave networks with out-of-band input data			June 17, 2020
<p>ISIF International Conference on Information Fusion</p> 	CNIT	Localization-of-Things: Foundations and Data Fusion	Tutorial	Sun City, South Africa	July 6, 2020
<p>IEEE WOWMOM 2020</p> 	IMDEA	LSTM-based GNSS spoofing detection using low-cost spectrum sensors	Participation to a conference and presentation of a paper	Online	August 31, 2020
<p>XXXV Simposium Nacional de la Unión Científica Internacional de Radio (URSI 2020)</p>	UMA	Fusion of LTE and UWB ranges for trilateration	Participation to a conference	Online	September 3, 2020
URSI 2020	UMA	Predicción de métricas de red celular basada en información social	Participation to a conference	Online	September 4, 2020
URSI 2020	UMA	Análisis del efecto del número de beams sobre un escenario 5G	Participation to a conference	Online	September 4, 2020
URSI 2020	UMA	Sistema de Compensación de Eventos Sociales en Redes Celulares Basado en Balanceo de Carga	Participation to a conference	Online	September 4, 2020
URSI 2020	UMA	Sonda experimental de monitorización de redes móviles para eventos.	Participation to a conference	Online	September 4, 2020




 ECAI 2020	NEC	Spotlight Tutorial: Combining IoT and ML for Situation Classification	Tutorial	Virtual	September 5, 2020
 1st Post- IRACON Meeting	UMA	Location-Aware Compensation System for Load Balancing in Cellular Networks	Disseminatio n	Online	September 14, 2020
 ITSF 2020	CNIT/ERI	Synchronization and Positioning: 5G Critical Functions Supporting Various Applications	Disseminatio n	Virtual	3-5 November 2020
Workshop of the Technical Board of 5G- PPP	NXW, CNIT	Network Management aspects in LOCUS	Participation to a workshop	Virtual	20 November 2020

Table 3: Exhibitions, workshops, congresses

2.2.6 Related Projects

The collaboration between LOCUS and other research projects is classified in two main cases: (a) individual collaboration from partners to specific projects in research and common development topics, or (b) the collaboration of LOCUS as a whole in the area of 5G-PPP. The second type of activity is coordinated by CNIT and involves also other partners from the consortium.

2.2.6.1 Collaborations for research and development activities

LOCUS is collaborating with other EU projects in the framework of the 5G-PPP program and with projects of the ICT calls, as shown in Table 4.



Joint Collaboration with LOCUS	Partner Involved/Proposer	Type of activity	Target (e.g., R&D collaboration)	Location	Date
5G-SMART	Ericsson	Getting positioning advices from LOCUS team on IIoT scenario	Close relation with industries, and taking the inputs to real testbeds	Sweden	20-Aug
CEF ODALA	NEC	Using location-based services for assessing the mobility patterns	Close relation with Heidelberg City and possible testbed in the near future	Germany	11-Sep
Privately-owned Campus Landfried	NEC	Creating a smart campus with IOT	The campus will collaborate with the City of Heidelberg. Activities to create a Digital Innovation Hub including tour through the area, design thinking sessions for citizens' need finding.	Heidelberg, Germany	11-Sep
5GPos	Ericsson	Aligning 5G positioning views for both projects	R&D collaboration	Sweden	Jul-20



PinPoint5G+	IMDEA	Positioning and network management	R&D collaboration	Spain	14-Sep
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Table 4: Collaborations for research and development activities

2.2.6.2 Collaboration with 5G-PPP

The 5G Infrastructure Public Private Partnership (5G-PPP) is a joint initiative between the European Commission and European ICT industry (ICT manufacturers, telecommunications operators, service providers, SMEs and researcher Institutions).

The coordinator of the project is part of the steering board committee of 5G-PPP, attending periodical meetings with the coordinators of other ICT projects.

The scientific supervisor of the project, coordinating the scientific team, is also part of the technical board committee of 5G-PPP, attending periodical meetings and phone calls to organize dissemination events together with other ICT projects and present LOCUS results.

Within the 5G-PPP, LOCUS is part of the Automotive and Architecture working group. In terms of communication, the main activities carried out within 5G-PPP are:

1. Participation to the Annual Journal in 2019
2. Coordination of a joint workshop proposal at EUCNC 2020 with other ICT-20 projects of 5G-PPP
3. White paper on “Empowering Vertical Industries through 5G Networks – Current Status and Future Trends”, presented on 9th September at a webinar co-organized by 5GPPP and 5G IA.
4. Preparation of a Brochure for the presentation of the 5G-PPP projects
5. Participation to the workshop of the 5G-PPP technical board with a presentation on network management and LOCUS architecture
6. Presentation of LOCUS and Use Cases at the Automotive Working Group
7. Preparation of a white paper focusing on indoor applications is in progress.



3. Plan for the Communication and Dissemination Activities in the Next Year (Jan-Dec 2021)

In the recently submitted D7.1v2, we have defined the main KPIs to measure LOCUS' success in conveying research outcomes. For each KPIs, we have also presented target values for the second and third year of the project. In this Section, we detail the plan for the second year, by presenting the main joint communication and dissemination activities that the consortium intends to carry out, and the individual dissemination and communication plan for each partner, i.e. the activities that are planned individually, in addition to the joint ones.

3.1 Joint Communication and Dissemination Plan

A number of activities have been planned for the next reporting period as joint activities among multiple partners. The main joint activities follow:

- The proposal of a Feature Topic entitled “Location Awareness for 5G and Beyond” for IEEE Communication Magazine, focusing on localization and analytics aspects. The Feature Topic, which is led by CNIT and includes the Orange partner in the editorial board, has been formally approved by the Editor in Chief of the journal on 31st January, and it will accept submissions up to 1st May 2021;
- The proposal of a Research Topic for the newly launched journal “Frontiers in Communications and Networks”, focusing on the networking aspects together with localization, e.g. location-based network management. The proposal will be led by CNIT and other partners will join the editorial board.
- The proposal of a special issue for the MDPI journal Applied Science, focusing on 5G network planning and design. The proposal will be led by Incelligent.
- The proposal of a joint workshop together with other ICT-20 projects at EUCNC 2020. The proposal will be led by CNIT and NXW and in case of acceptance, a talk will be organized with other partners.
- The proposal of a workshop at the IEEE Globecom conference. The proposal will be led by CNIT, while the participation from other partners will be incentivized as keynote speakers or through the submission of a proposal.
- The participation to the 5G-PPP Annual Journal.
- The submission of a magazine paper jointly with the project 5GPOS, focusing on vehicular use cases of interest for both the projects.
- A talk at the WSTS conference, from the collaboration between Ericsson and CNIT.
- The submission of joint technical papers will be incentivized during general and internal calls.

3.2 Individual Dissemination and Communication Plan

In addition to the joint activities involving multiple partners, each partner provided a dissemination plan, considering the main activities and proposing an expected number of activities for each category related to the second year, as detailed in the following table:

Activity	CNIT	ERI	IBM	IMD	Ince	NEC	NXW	ORA	OTE	SAM	VIA	UMA
Journal papers on international peer-reviewed journals	5		1	2	1			2				5
Participation to international conferences	5	1	2	4	2	3	2	2	2	3	2	3
Number of events targeting the general public.	1 (5G-Italy)								1 (Infocom World)			
Press articles	1	2		1								
Number of policy-makers, societal, and environmental stakeholders and institutions reached	3 (Italian Government, Regional Government)					3 (Stakeholders in City of Heidelberg, ICRC)	1 (wholesale infrastructure operator)			2 (Developing UK ESN stakeholders, European EENA)		
Number of participations to industry events.	2				1	1				2		
Number of demonstrations through PoCs tested in relevant environments (TRL 5).						1	1			1		1
Number of people involved from general public	>100	>100				>100	>100			>100		

Several partners are planning to collaborate with peer projects also during the second year, i.e.

- CNIT is leading the LOCUS activities within 5G-PPP, within the technical and advisory board, as well as the Automotive Working Group.
- INCE is representing LOCUS within the 5G-PPP Architecture Working Group
- NXW is co-organizing a workshop at EUCNC 2021 together with CNIT.



- IMDEA is collaborating with the projects 5GPos and 5GSmart.

In addition, several partners are participating to working groups within standardization bodies and will propose specific contributions based on LOCUS research outcomes. A detailed standardization plan is presented in Section 4.

LOCUS follows EC recommendations in terms of research data management. The LOCUS Data Management Plan (DMP) observes FAIR (Findable, Accessible, Interoperable and Reusable) Data Management Protocols and has been presented in D7.1v2. To date, there are no main updates with respect to the latest version.

As an important note, we recall that a detailed definition of the testbeds and Proof of Concepts (PoCs) has started in January 2021 with the kick-off of WP6. Within the WP6 internal meetings, the partners are in the process of agreement on the definition of a common platform of the software, hardware, and data sharing according to the guidelines from the DMP described in D7.1v2. Each PoC will be associated with a responsible internal to the consortium. At the end of such definition, which will be shared in a dedicated internal workshop with the consortium, the DMP and the included data catalogue will be updated together with the personal data officer and the responsible from each PoC.



4. Standardization Activities

There is a number of important standardisation activities happening around localization and the LOCUS project has managed to contribute to many of them. These activities range from the planned activities in 3GPP which aim to enhance localization accuracy for enabling 5G vertical applications to the new efforts in ETSI related to track and trace applications as a response to the COVID-19 pandemic. The open standards, particularly O-RAN and OAI, are looking at supporting localization applications in a more virtualized and open manner. The project is closely following these developments and will contribute to these where possible. Details of the first-year activities in these fronts are provided in the sections below.

4.1 3GPP

4.1.1 Monitoring and Contribution

With localization related topics in 3GPP 5G-NR standardisation, there is a clear emphasis to improve the localisation accuracies and other KPIs from the levels required for traditional outdoor and indoor emergency use cases to more commercial applications in 5G verticals. In this regard, there is a number of related activities in the RAN and SA working groups.

In RAN (mainly in RAN1), the NR-positioning study and work items in release 16 defined the simulation parameters and the basic positioning signals of PRS (positioning reference signal for downlink) and SRS (sounding reference signal for uplink) respectively. In the subsequent NR-positioning enhancements study item in release 17 (https://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_86/Docs/RP-193237.zip), the high precision localization for Industry IoT applications is studied. In RAN2 of NR Rel.17 work, it is the first time that the topic of positioning integrity is being discussed and studied. While until now, 3GPP has been mainly focusing on positioning accuracy, currently in Rel.17 both latency and integrity are being also studied, together with other KPIs. Ericsson on behalf of LOCUS has been contributing to the integrity topic in RAN2 and the following contributions are with respect to the work carried in LOCUS:

- [R2-2006954](#), “POSITIONING INTEGRITY KPIs”, RAN2 CONTRIBUTION, ERICSSON.
- [R2-2006955](#), “FACTORS IMPACTING RAT DEPENDENT POSITIONING INTEGRITY”, RAN2 CONTRIBUTION, ERICSSON.
- [R2-2006957](#), “LPP SIGNALING FOR INTEGRITY SUPPORT”, RAN2 CONTRIBUTION, ERICSSON.

Figure 8 shows the 3GPP positioning anatomy history for RAN1 and RAN2 positioning study items and work items throughout different releases.

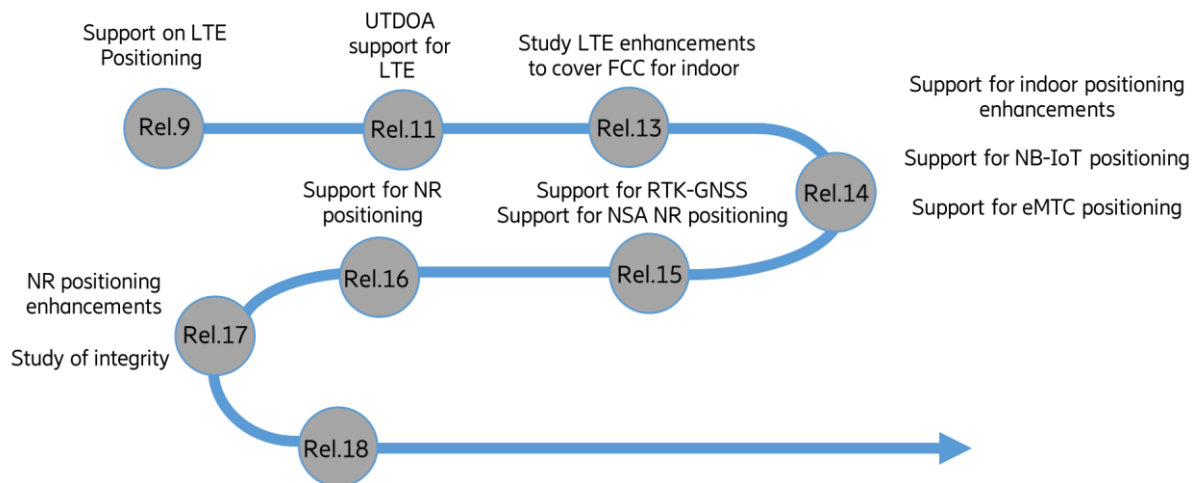


Figure 8:3GPP positioning anatomy.

The Rel.17 SI for RAN1 has been finalized in 2020, and now the Rel-17 WI is being started from Jan. 2021. Therefore, for the second year of LOCUS, within the project we will be monitoring and contributing to the Rel-17 WI. The objectives for RAN2 work in Rel-17 will be approved in the 3GPP RAN plenary in March 2021.

In SA2, there are concurrent work items as enhanced Localisation Services (eLCS) and eLCS phase 2 for release 16 and 17 respectively. These work items define the architectural framework for 5G-NR localisation services and for high precision Industry IoT applications, respectively. Samsung is actively participating in this SA2 eLCS phase 2 topic and plans to provide a number of contributions in 2021. In SA5, there is a study item on the use of data analytics for network management and the localization related data is used as a key input in many of the management processes. The LOCUS project is closely following many of these 3GPP activities and has devised a methodology to effectively contribute to these, as detailed below.

4.1.2 Work plan in 3GPP

It was identified that WP3 work is well aligned with the NR-positioning enhancements study item in 3GPP RAN working groups and steps have been taken even from the early preparation of the 3GPP enabler technology task (T3.1) to be compatible with this. The NR-positioning work in Rel.16 was introduced to the partners and they were encouraged to follow the simulation specifications of TR 38.855. A 3GPP focus group was created with the joint leadership of Samsung and Ericsson, the two industry partners active in the 3GPP NR-positioning enhancements study and in LOCUS T3.1. There have been many discussions in the focus group targeting to identify and agree on potential areas that technical contributions to 3GPP RAN can be made. The positioning integrity topic in RAN2 and the use of multiple reference signals (to broaden the scope than the PRS and SRS reference signals defined as per



3GPP release 16 specs) are two of the areas that have emerged. So far Ericsson has made 3 technical contributions to the 3GPP RAN2 working group on the topic of positioning integrity. Discussions are underway in the focus group to agree on contributions to RAN1 in near future. This group will also discuss and manage the potential contributions to the SA2 eLCS ph2 work item in release 17. This work item is likely to continue till May 2021, giving some opportunity for LOCUS partners to contribute. As noted above, Samsung is already planning some contributions.

A similar focus group has been created with the participation of LOCUS WP2 and 4 partners to take steps to contribute to the 3GPP SA5 study item on 'data analytics for network management'. These two work packages produce results which are most relevant to this 3GPP study item. This focus group is led by Orange and Incelligent as leaders of WP4 and WP2 respectively. It is expected that this work will progress rapidly in the second year of the project, in-line with the developments in the SA5 study item.

Moreover, LOCUS is involved in 3GPP RAN3 activities related to Self-Organized Networks (SON) and Minimization of Drive Tests (MDT), topics that involve the exploitation of geolocation information for RAN management and optimization. In particular, Orange is supporting an ongoing work item on enhancement of data collection for SON/MDT in NR which can be fed with LOCUS WP4 activity.

4.2 ETSI

During the first year, the LOCUS project actively contributed to various standardization activities in ETSI. The partner Samsung was the one leading this activity, and this encompassed the following groups:

a) **ETSI Intelligent Transport Systems (ITS) Technical Committee:** From the beginning of the project both in WP4 and WP5, LOCUS championed topics related on how improved 5G localization and analytics mechanisms developed by LOCUS could contribute to novel 5G verticals applications such as Connected and Automated Mobility (CAM), including Vehicle-To-Everything (V2X) communications, taking into account their specific characteristics such as importance of road users, safety aspects etc. In WP5 this work, in collaboration with other partners resulted in developing Vulnerable Road User (VRU) use case (NSE-UC3) and other technical contributions on corresponding new functionalities and their data models such as 'Vulnerable Road Users clustering', which aim to improve V2X communication system performance by leveraging improved 5G location accuracy. In addition, the 'Time-To-Collision as a service in V2X' functionality (described in D5.1) is also applicable to Logistics in a seaport terminal using AGVs use case (NSE-UC4). These solutions may be the future enabler for new applications in CAM leveraging 5G analytics. It is worth highlighting, that proposed



mechanisms were developed based on the current progress of V2X technology standardization in Europe, in ETSI ITS. This includes ongoing VRU standard development for ITS standard [1] and for V2X globally (5G Automotive Association), where Samsung is actively involved, seeking potential relevance and contribution opportunities for LOCUS research and technology. So far, this activity ensured technical insights and direct relevance of LOCUS work into recent developments in the automotive vertical ecosystem.

b) ETSI Europe For Privacy-Preserving Pandemic Protection (E4P) Industry Specification Group: This new group, formally created in May 2020, has been developing COVID-19 proximity tracing systems as an interoperability framework for contact tracing applications. The current standardization work is focused on smartphone-based proximity systems using Bluetooth technology for proximity detection, however later on, the group will explore other systems including cellular based solutions. Samsung as rapporteur of one of the core technical specifications [2] provided periodic E4P progress and roadmap updates to LOCUS partners facilitating potential contribution of developed solutions addressing COVID-19 to E4P in Q2 2021. In addition, Samsung indicated challenges and technical areas not fully addressed by currently deployed Bluetooth based solutions, enabling better Health Authority insight into pandemic development. This could be addressed further by LOCUS research activities and platform development, leveraging improved 5G location accuracy and analytics. This activity supports corresponding COVID-19 focused research in WP5, demonstrates consortium flexibility and proactive approach as far as timely addressing of global challenges posed by the coronavirus. It should be mentioned that this action is beyond the initial scope of the project.

4.3 FiRa consortium

Recently, Ultra-Wideband (UWB) based positioning has gained much attention due to the very high accuracy levels it can provide (up to 10 cm accuracy). The FiRa (or Fine Ranging) consortium [5] promotes the use of UWB for a number of localization applications and has seen a rapid growth of its membership over the past year. It develops specifications for the higher management and application layers but uses the specs of IEEE 802.15.4z for the PHY and MAC layers of the UWB based localization solutions. Samsung is a member of the FiRa consortium and will closely follow its developments. If there is an opportunity, Samsung will contribute, citing the LOCUS project, from the T3.2 UWB based study.

4.4 Open-Source Contributions

This section presents a brief introduction of some existing open standards emphasizing on their compatibility to the LOCUS project. It also shows how the work carried out within the LOCUS project can contribute to these standards.



4.4.1 OPEN AIR INTERFACE (OAI)

OAI [3] is a flexible software platform providing 3GPP compliant reference implementations of key elements of 4G and 5G Radio Access Network (RAN). The current focus of OAI is in the development of a 5G NSA solution using the EN-DC architecture where the eNB handles all the control-plane traffic and the gNB only needs to handle the user-plane traffic.

The physical layer already implements 4G features according to 3GPP 36.211, 36.212, 36.213 specification and 5G features according to 3GPP 38.211, 38.212, 38.213 specification under development. These features support all downlink and uplink channels including sounding reference signals (SRS) which can be used to retrieve location information.

Within the LOCUS project, IMDEA Networks is planning to use OAI to implement a 5G link between the UE and BS in the context of WP3 for fast and low-overhead localization for URLLC service. This link will allow the testing of the proposed fast localization strategies.

4.4.2 Open-Source MANO (OSM)

OSM [4] is an operator-led ETSI community with the objective to deliver production-quality open-source solutions for Network Functions Virtualization (NFV) Management and Orchestration (MANO). The solutions are closely aligned with ETSI NFV Information Models and are versatile, easily applied in both laboratory and field (real-world) trials.

As regards LOCUS, the ETSI MANO architecture is very relevant as it offers application programme interfaces (APIs), data models and workflow logic for building complex services.

The LOCUS platform can be implemented and deployed as a specific case of NFV. In particular, Nextworks is planning to re-use ETSI OSM in the context of WP4 and WP5 for lifecycle management of localization analytics functions and services. As participants in the ETSI OSM community, there is the potential to contribute, e.g., by proposing a Proof-of-Concept (PoC).

4.4.3 O-RAN Alliance

The Open-Radio Access Network (O-RAN) alliance is a community of network operators, vendors, and research institutions working on the RAN industry [6]. The main focus of the O-RAN alliance is to build the virtualized RAN on open hardware and cloud, with embedded AI-powered radio control. To this aim, an O-RAN architecture is conceived, based on standards defined by the alliance itself, which are aligned and complimentary to standards promoted by 3GPP and other industry standards organizations.

Orange is a founding member of O-RAN and is actively involved in the definition and standardization of several use cases. In this context, the Orange division involved in LOCUS is focusing on data enrichment for use cases involving geolocation data. These can include geolocation, user context information for mobility management, application layer data etc.



The work performed in WP4, i.e., the use of geolocation for smart network management, will be exploited for contributing to location-based use cases in O-RAN standardization. The selection of LOCUS outcomes to be proposed in O-RAN is under discussion within WP4 and led by Orange and VIAVI. Based on such discussion, specific contributions will be agreed with the consortium at the beginning of the second year of the project.

5. Addendum – Update of the Exploitation Plan: Integration to D7.5

As an addendum to this deliverable, we provide an integration to the exploitation plan presented in D7.5. In particular, we add the exploitation plan for Orange, which integrates Table 3 of D7.5.

<p>ORA</p>	<p><i>The team involved in the LOCUS project is part of the Technology and Global Innovation division of Orange Group. This division’s mission is to prepare for Orange’s future in each country and ecosystem, by building competitive advantages for the Group and supporting Orange affiliates in the 26 countries where Orange networks are deployed. In particular, the team involved in LOCUS is supporting Orange affiliates on RAN engineering and optimization including geo-location and analytics for RAN management. The activity of the team covers three axes: building expertise, including input to standardization; development of inhouse solutions adapted to Orange affiliates needs, and support for the affiliates for sourcing of external solutions. The output of LOCUS project will be exploited by the team as follows:</i></p> <p><i><u>Building expertise</u> on the potential of 5G geolocation algorithms to support affiliates in building their strategy and in their discussions with suppliers.</i></p> <p><i><u>Standardization and open source:</u> Orange is contributing to 3GPP RAN3 activity related to Self-Organized Networks (SON) and Minimization of Drive Tests (MDT) topics that involve the exploitation of geolocation information for RAN management and optimization. In particular Orange is supporting an ongoing work item on enhancement of data collection for SON/MDT in NR which can be fed with LOCUS WP4 activity.</i></p> <p><i>Orange is also strongly involved in O-RAN alliance, where ongoing studies are focusing on data enrichment use cases including geolocation data. These can include geolocation, user context information for mobility management, application layer data etc.</i></p> <p><i><u>In-house development</u> of new algorithms based on LOCUS WP4 activity in network optimization tools, to exploit geolocation data for enhancing network operation and performance.</i></p>
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In addition, the following table integrates Table 4 of D7.5, which summarizes the impacts of LOCUS project on the business and missions for each partner.

<p>ORA</p>	<p><i>The research conducted in LOCUS is strengthening the Orange team expertise in 5G localization and its applications for network management. In addition to performing high class research and publications, the expertise developed thanks to LOCUS project feeds Orange strategy and developments related to the exploitation of geolocation information for RAN management. On the one hand,</i></p>
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	<p><i>understanding the ecosystem and the potential of geolocation techniques allows our teams to support the Group on geolocation solutions sourcing and deployment. On the other hand, the exploitation of WP4 outputs allows developing customized algorithms to enhance network management with geolocation information.</i></p>
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