Space Systems for Safety and Security | 4S





Satellite Connectivity for Autonomous Land Vehicles Safety

Intended Tender

28 September 2022 Roberta Mugellesi Dow, Guillaume Dauron – ESA Susanne E. Schulz – Die Autobahn GmbH des Bundes, Germany Oaf Edkart – BMW Group, Germany

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Agenda

- ESA and ESA Space solutions
- ESA ARTES 4.0 Space Systems for Safety and Security (4S) Strategic Programme Line
- 4S Intended Tender "Connectivity for Autonomous Land Vehicles Safety"
 - Background and Objectives
 - Guest Speakers : Susanne E. Schulz (Deutsche Autobahn), Olaf Eckart (BMW),
 - Areas of application, Activities, Funding
- How to apply?
- Open Questions & Answers session



THE EUROPEAN SPACE AGENCY

Purpose of ESA

To provide for and promote, for exclusively peaceful purposes, cooperation among European states in space research and technology and their space applications.

Facts and figures

- Over 50 years of experience
- 22 Member States
- 8 sites across Europe and a spaceport in French Guiana

Over 80 satellites designed, tested and operated in flight



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Space Transportation

Earth Observation

Science

Operations

Telecommunications and Applications

Human Spaceflight



Navigation

Technology

Exploration



ESA SPACE SOLUTIONS

The largest space innovation network in the world

- The go-to place for great business involving space to improve everyday life.
- Supporting European start-ups and SMEs to develop businesses using space technology and data.
- Offering funding, business and technical support to help to generate successful business and create jobs.

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SPACE SOLUTIONS

ESA SPACE SOLUTIONS OFFERS



Zero-equity funding (from €50k to €2M+ per activity)



Technical support and commercial guidance

Tailored project management support

Access to our international network of ESA and partners

Access to our network of investors

Credibility of the ESA brand

Project web pages: business.esa.int/projects

Space tech, users & markets



Space Technology...



Satellite Ŀ \square

Navigation



Satellite Communication



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Spaceflight Technologies

Space Weather ... coupled with...

Big Data analytics VR/AR Artificial Intelligence Mega-constellations Crowdsourcing IoT Cybersecurity Blockchain

5G (https://artes.esa.int/esa-5g6g-hub)







SPACE SYSTEMS FOR SAFETY AND SECURITY



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SPACE SOLUTIONS



NEXT GENERATION OF SECURE SATCOM AND QKD SOLUTIONS

RESILIENCE

Satcom solutions for crises & emergencies

SECURITY

Protection against cyber security threats

AUTONOMY

Increasing ESA MS technology non-dependence

→ THE EUROPEAN SPACE AGENCY

4S SATCOM DRIVING SAFE AND SECURE SOCIETIES





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4S INVITATION TO TENDER

SATELLITE CONNECTIVITY FOR AUTONOMOUS LAND VEHICLES SAFETY

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Satellite Connectivity for Autonomous Land Vehicles Safety



Satellite communications play an important role for autonomous land vehicles safety:

- to ensure ubiquitous accurate coverage, even in remote and rural areas, or in case of a failure, thereby maintaining safety functionality;
- to deliver common content from one-to-many vehicles everywhere with extraordinary levels of resiliency and security;
- for real-time high-precision GNSS positioning allowing the GNSS corrections to be sent to the rover receiver and enhance navigation performance;
- to guarantee that mobility services such V2X (Vehicle-to-Infrastructure) connectivity are available;
- to support the development of cyber resilient connectivity systems;
- paving the way for faster deployment of future connected and autonomous vehicles.

The combination of terrestrial and satellite communication networks is making possible intelligent and ubiquitous V2X systems with enhanced reliability and security, hyper-fast wireless access, as well as much seamless communication coverage.

Objective: to foster the development and showcase of innovative applications which embedded satellite communications for the safe and secure deployment and management of autonomous and connected land vehicles



Satellite Connectivity for Autonomous Land Vehicles Safety – Use Cases



Use cases elaborated with Stakeholders:

- 1. Use Case 1: Connected cars performance parameters remote collection and processing
- 2. Use Case 2: Seamless transition between 4G/5G and satellite communication
- 3. Use Case 3: Traffic management in disaster situation
- 4. Use Case 4: Commercial Fleet management and logistics (including truck platoons)
- 5. Use Case 5: Internet of Things (IoT) providing connected devices for on field monitoring and connected vehicles
- 6. Use case 6: Real-time hazard warning
- 7. Use Case 7: Hazard information collection and sharing
- 8. Use case 8: High-Definition map update
- 9. Use case 9: Harmonization of satellite spectrum allocation and communications standardisation
- 10. Use case 10: Support the transmission of data and information between the vehicle and the Cloud or other infrastructures in urban and rural areas

Satellite Connectivity for Autonomous Land Vehicles Safety – Timeline





Call open planned from 30 September 2022 to 28 February 2023 for OP submission. Companies are invited to submit the OP at any time within this period.

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Connectivity for Autonomous Land Vehicles Safety



Stakeholders involved are: Government, Municipalities, Road management operators, Automotive associations

Discussions and Use cases provision from 5GAA, Deutsche Autobahn and automotive representatives, e.g. BMW and Jaguar Land Rover

Webinar planned 28 September 2022 10:00 – 11:00 GMT



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Guest speaker

Susanne Elizabeth Schultz, Deutsche Autobahn, Germany



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Guest speaker

Olaf Eckart, BMW, Germany



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ESA Webinar NTN Connectivity to support autonomous land vehicles. - Use Cases -

NTN and TN are complimentary technologies.

By Design NTN offers a certain bandwidth per area. The number of devices is in direct correlation with the available bandwidth.

Coverage extension for ubiquitous connectivity Sustaining bandwidth capacity for seamless connectivity Network redundancy is greatly improved for small bandwidth services.

Broadband won't be available for everyone Connection limited to line-of-sight Frequency and landing right regulations are complex

NTN is an important resource of ubiquitous connectivity. A seamless NTN and TN product offer is key for a better (premium) connected life.



NTN must be integrated in Mobile Networks.



Ubiquitous Connectivity:

Filling the gaps of mobile networks.



Mobile Network Coverage around Palm Springs CA

In some areas there is no coverage at all. Even narrowband applications like Emergency calls or remote control or service applications can`t be guarantied.

Seamless connectivity: Balancing inconsistent coverage.



Mobile Network Coverage around Palm Springs CA

Mobile Networks are not able today to provide continuous connectivity even near-urban areas resulting in interrupted phone calls, streaming or entertainment services.

- No pure NTN Use cases have been identified. NTN acts as complementary extension of mobile networks.
- Integration of NTN and TN on the basis of 3GPP Standards is our key requirement.

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Key benefits that NTN can bring to support the autonomous land vehicles sector (1/2).





- 1. Connected cars performance parameters remote collection and processing identified from road testing and/or related to V2X connectivity status might adopt NTN communication to complement terrestrial networks.
- 2. Seamless transition between 4G/5G TN and NTN for V2X and info transmission, such as road and safety information in remote areas.
- 3. Traffic management in disaster situation. NTN communication could be used as backup to TN for small bandwidth services.
- 4. Commercial fleet management and logistics rely on availability of mobile networks. NTN communication could be a viable option to monitor health and condition of assets on wide geographic area.

Key benefits that NTN can bring to support the autonomous land vehicles sector (2/2).





- 5. Internet of Things (IoT) providing connected devices for on field monitoring and connected vehicles to empower connected operations throughout vehicles telematics and smart monitoring sensors.
- 6. Real time hazard warning allowing autonomous vehicles receiving information relevant for the road ahead like route obstruction, potholes, or others.
- 7. Hazard information collection and sharing where vehicles collect hazard and road event based sensor data. Sharing of this data can be done via satellite communication.
- 8. High Definition map update to receive the highly dynamics parts of a HD map updated in real time for accurate trajectory planning and collision avoidance.

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European Space Agency

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A tool at your disposal – the Ambassador Network

- Ambassadors are present in 9 countries
- They are your local interface for your ESA Space Solutions questions
- They can advise you on:
 - Preparation of the Activity Pitch Questionnaire
 - Give you an overview of ESA Space Solutions funding opportunities









Funding schemes BASS

Entry point	Type of activity	Total cost/price of activity & funding	
Direct Negotiation	Feasibility studies	Max 500k Eur, 50-80% funded by ESA (can be 100% for research contributions)	
	Demonstration projects	No max amount, 50-80% funded by ESA (depending of wishes of the delegation)	
Invitation to Tender (Open competition)	Feasibility studies	Max 200k Eur, 50-100% funded by ESA	
	Kick-Starts	60k price for ESA, 75-80% funded by ESA	

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Where to find the information

business.esa.int

 Scroll down to the part "Featured Opportunities" to see all activities currently open or in preparation





Where to find the information

business.esa.int

- Scroll down to the part "Featured Opportunities" to see all activities currently open or in preparation
- Opening and closing dates for Outline proposal submission
- Outline proposal template
- Call scope document

Satellite Connectivity for Autonomous Land Vehicles Safety

ome + Funding + Satellite Connectivity for Autonomous Land Vehicles Safety



OPPORTUNITY	Intended Tender	
ACTIVITY	Feasibility Study	
OPENING DATE	30 September 2022	
CLOSING DATE	28 February 2023	

THE OPPORTUNITY

The call "Connectivity for Autonomous land vehicles safety" aims to foster the development and showcase of innovative applications for the safe and secure deployment and management of autonomous and connected land vehicles by integrating satellite communications and other space assets with terrestrial and digital technologies.



Roadmap for Direct Negotiation for Demo Projects



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ELIGIBILITY

Funded participation to 4S Strategic Programme Line is open to any company and/or organisation residing in the following Member States:

Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Spain, Switzerland, and the United Kingdom





Thank you for your attention

https://business.esa.int

Open Questions & Answers Session

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