INTERACT

Barcelona, Spain, 23-25 May 2023

SUBJECT | Annexes of the 5th Management Committee Meeting of COST Action CA20120 "The Intelligence-Enabling Radio Communications for Seamless Inclusive Interactions (INTERACT)"

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Country	Name	Surname
Lithuania	Rimvydas	Aleksiejūnas
Spain	Carles	Anton-Haro
LOS	Carles	Anton-Haro
Turkey	Hüseyin	ARSLAN
Serbia	Dragana	Bajić
Romania	Vasile	Bota
Ireland	Conor	Brennan
Italy	Chiara	Buratti
UK	Alister	Burr
SUBSTITUTE	Sara	Cavallero
Poland	Krzysztof	Cichoń
France	Laurent Clavier	Clavier
Portugal	Luis M	Correia
SUBSTITUTE	Krzysztof	Cwalina
Poland	Agnieszka	Czapiewska
Germany	Andreas	Czylwik
Belgium	Margot	Deruyck
Germany	Diego	Dupleich
Denmark	Wei	Fan
France	Davy	Gaillot
Spain	Ana	Garcia Armada
Austria	Golsa	Ghiaasi
fYR Macedon	Atanas	Hristov
Cyprus	Konstantinos	Katzis
Poland	Pawel	Kulakowski
Norway	Per Hjalmar	Lehne
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SUBSTITUTE	Roman	Marsalek
SUBSTITUTE	Yang	Miao
Finland	Konstantin	Mikhaylov
SUBSTITUTE	Tomi	Mlinar
Spain	Jose-Maria	Molina-Garcia-Pardo
Austria	Raheeb	Muzaffar
Belgium	Claude	Oestges
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Montenegro	Milica	Pejanovic-Djurisic
UK	Sana	Salous
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Italy	Marco	Skocaj
Germany	Carsten	Smeenk
Czech Rep	Jan	Sykora
SUBSTITUTE	Valentina	Timcenko
Portugal	Fernando José	VELEZ
France	Guillaume Villemaud	Villemaud
Switzerland	Jean Frederic	Wagen
Austria	Thomas	Wilding
Netherland	Haibin	Zhang

Delivered	TD Number	TD Author	TD Title	TD Abstract	TD WG	TD Data	Nome	Cognome	Email	Acronimo
Y	TD(23)05001	Reiner S. Thom¨a, Carsten Andrich, Saw James Myint, Christian Schneider, Gerd Sommerkorn	Characterization of Multi-Link Propagation and Bistatic Target Reflectivity for Distributed ISAC	Integrated sensing and communication (ISAC) qualifies mobile radio systems for detecting and localizing of passive objects by means of radar sensing. Advanced ISAC networks rely on meshed mobile radio access nodes (infrastructure and/or user equipment, resp.) establishing a distributed, multistatic MIMO radar system in which each target reveals itself by its bistatic backscattering. Therefore, characterization of the bistatic reflectivity of targets along their trajectories of movement is of highest importance for ISAC performance prediction. We summarize several challenges in bistatic modeling and measurement of extended, potentially time-variant radar targets. We emphasize the specific challenges arising for distributed (hence multi-link) ISAC networks and compare to the state of the art in propagation modeling for mobile communication.	Sub-WG2	2023-04-05 13:51:59	Reiner	Thomä	reiner.thor	TUIL
Y	TD(23)05002	Dong Yan, Ke Guan, Danping He, Junhyeong Kim, Heesang Chung, Dao Tian, Zhangdui Zhong, and Andrej Hrovat	Blockage Effects of Road Bridge on mmWave Channels for Intelligent Autonomous Vehicles	Vehicular communication and sensing technologies are key to enabling 6G Intelligent Autonomous Transportation Systems (IATS). With the introduction of massive sensors and artificial intelligence (AI) fusion applications, IATS is needed to support data transmission rates up to 10 Gb/s. Millimeter-wave (mmWave) technology has attracted extensive attention owing to abundant spectrum resources, which can support the timely transmission of massive data. However, performance degradation of mmWave due to signal blockage has become one of the critical technical challenges. Road bridges as one of the common obstacles in urban scenarios, which has severe blockage effects on communication links. Therefore, this paper comprehensively studies the impact of road bridge blockage effects on mmWave vehicle-to-infrastructure (V2I) links and proposes an empirical model that can accurately characterize the bridge blockage effect. First, we use a self-developed mmWave channel sounder to carry out channel measurements on typical urban roads. Measurement results indicate that a maximum extra propagation loss of up to 23 dB is caused by road bridges. In addition, to address the deficiencies of existing propagation prediction models, the Single Road Bridge (SRB) model is proposed in this work. This model reveals for the first time the extra propagation loss caused by the road bridge to the channel. Compared with existing models, the SRB model can make the mean absolute error (MAE) and root mean square error (RMSE) within 5 dB. The proposed SRB model is of great value for accurately simulating real-world road bridge blockage events when designing future IATS.	WG1,Sub-WG1.1,VT2	2023-04-11 14:56:33	Ke	Guan	kguan@bj	BJTU
Y	TD(23)05003	Andres Navarro, Leonardo Vargas and Christian Amu	5G Optimization Model Formal Description Using MiniZinc	MiniZinc is an Open Source tool designed to model constraint satisfaction and optimization models in a high level, solver independent way. In this work, we propose a traditional optimization model for 4G/5G networks using a combination between a constraint based optimization and Lineal Integer Programming, combined with a planning tool that serves as the coverage cost function and some initial idea of Digital Twin. The main objective is to show the use of MiniZinc as modelling tool, independent of the solver and discuss the use of different solvers and an optimization model using distributed tools, which also could include Deep Learning.	WG3,VT4	2023-04-12 02:04:09	Andres	Navarro	anavarro@	ICESI

Y	TD(23)05004	Nicolas Salazar, Juan Gallo and Andres Navarro	Filtering Techniques Comparison in Gait Analysis using Depth Cameras	During the gait analysis using depth cameras, a filtering process is applied before procesing the signals, in order to reduce noise, fill null data and improve the gait parameters extraction. Such filtering process may alter the signal in a non desirable way and we consider important to verify if the processing we are using is adequate. It means that reduces enough noise without altering the esential parameters of the signal. For such task, we use two algorithms and compare both, in order to decide which one is the most reliable for the gait variables extraction with high confidence. In this paper, we compare both methods (interpolation and mean average) using a Pearson correlation and continuous concordance test between the captured signals before filtering and after filtering for each filter type. We found that both filtering methods produce similar results and are reliable.	VT1	2023-04-12 02:22:43	Andres	Navarro	anavarro@	ICESI
Y	TD(23)05005	Nopphon Keerativoranan, Kentaro Saito, Jun-ichi Takada	Non-stationary Site-Specific to Standard Channel Parameter Mapping for Performance Evaluation of Wireless Channel Emulator	A wireless channel emulator (WCE) with a deterministic channel model has been recently developed for virtual drive testing the communication system in the site-specific scenario. Asserting the performance of communication links in a higher layer typically utilizes the standard channel model, and thus may not be applicable in predicting the site-specific fading characteristic. WCE requirement in real-time processing also introduces a challenge for performance evaluation with a non-standard deterministic channel via numerical computation. To address this issue, the parameter mapping technique is introduced to map the site-specific fading characteristic into the Rician fading channel model. Relationship between the site-specific fading parameters and the Rician's power delay profile and Doppler power spectrum are analytically derived for the parameter mapping scheme in a narrowband and wideband channel. The simulation was conducted to comparatively evaluate the capability of the mapped Rician fading channel in producing the site-specific fading statistic in terms of time correlation and frequency correlation functions.	WG1	2023-04-18 08:00:26	Nopphon	Keerativoranan	nopphon.k	TITECH
Y	TD(23)05006	M. Drozdowska, S. J. Ambroziak, K. K. Cwalina, P. Rajchowski, and N. Cardona	Channel Impulse Response Measurements at mmWave Band in Office and Conference Rooms	In this paper, the measurements of the channel impulse response at mmWave band in office and conference rooms are described. The central frequency is 27 GHz with a bandwidth of 400 MHz. The description of the used measurement stand and considered environments are presented. The initial analysis of the power delay profile, mean delay, and RMS delay spread allow preliminary conclusions to be drawn that there is a significant impact of the dimensions of the rooms on these parameters.	WG1	2023-04-18 13:25:13	Monika	Drozdowska	mdrozdo@	UPV

Y	TD(23)05007	Pawel Skokowski, Michał Kryk, Krzysztof Malon, Piotr Rajchowski, Krzysztof Maslanka, Jan M. Kelner	Practical Trial for Low-Energy Effective Jamming on 5G Private Network	Fourth-generation mobile networks are successively replaced by fifth generation (5G) New Radio networks based on the 3rd Generation Partnership Project (3GPP) standard. This standard is dedicated to civilian users, and the conducted analytical work shows that it has numerous technological gaps that prevent its direct implementation in military communication systems. From the military operation viewpoint, jamming of civil and military systems is one of the essential elements of electronic warfare. This paper focuses on a practical trial of low-energy effective jamming on 5G private network. The proposed method is based on jamming the 5G signal pilots. It characterizes by high energy efficiency and prevents establishing a connection between the user equipment and 5G base station (gNB). Energy savings allow the jammer to work longer and be implemented on a small unmanned aerial vehicle (UAV), which prevents uplink connection when placed near the gNB. On the other hand, the generation of low-power jamming signals in the gNB vicinity makes detecting the jammer by enemy electronic reconnaissance systems challenging. The proposed solution is compared with the test results for other types of jamming	WG2	2023-04-18 14:10:14	Piotr	Rajchowski	piorajch@	PG
Y	TD(23)05008	Faruk Pasic, Markus Hofer, Mariam Mussbah, Herbert Groll, Thomas Zemen, Stefan Schwarz, Christoph F. Mecklenbräuker	Statistical Evaluation of Delay and Doppler Spreads in sub-6 GHz and mmWave High Speed Channels	One of the key research directions to increase the capacity of new radio (NR) vehicle-to-everything (V2X) communication systems is extension of employed frequency bands from sub-6 GHz to millimeter wave (mmWave) range. To investigate different propagation effects between sub-6 GHz and mmWave bands in high-mobility scenarios, one needs to conduct channel measurements in both frequency bands. Using a suitable testbed setup to compare these two bands in a fair manner, we perform channel measurements at center frequencies of 2.55 GHz and 25.5 GHz, velocities of 50 km/h and 100 km/h, and at 126 different spatial positions. Furthermore, we conduct a comparative study of the multi-band propagation based on measurement results. We estimate the power delay profile (PDP) and the Doppler power spectral density (DSD) from a large set of measurements collected in a measurement campaign. Finally, we compare measured wireless channels at the two employed frequency bands in terms of root-mean-square (RMS) delay spread and RMS Doppler spread.	WG1	2023-04-19 13:16:11	Faruk	Pasic	faruk.pasic	TU WIEN
Y	TD(23)05009	Parisis GALLOS, Rance DeLONG, Nicholas MATRAGKAS, Allan BLANCHARD, Chokri MRAIDHA, Gregory EPIPHANIOU, Carsten MAPLE, Konstantinos KATZIS, Jaime DELGADO, Silvia LLORENTE, Pedro MALÓ, Bruno ALMEIDA, Andreas MENYCHTAS, Christos PANAGOPOULOS, Ilias MAGLOGIANNIS, Petros PAPACHRISTOU, Mariana SOARES, Pau	MedSecurance Project: Advanced Security- for-Safety Assurance for Medical Device IoT (MIoT)	The MedSecurance project, is an EU funded project focusing on identifying new challenges in cyber security with focus on hardware and software medical devices in the context of emerging healthcare architectures. In addition, the project will review best practice and identify gaps in the guidance, particularly the guidance stipulated by the medical device regulation and directives. Finally, the project will develop comprehensive methodology and tooling for the engineering of trustworthy networks of inter-operating medical devices, that shall have security-for-safety by design, with a strategy for device certification and certifiable dynamic network composition, ensuring that patient safety is safeguarded from malicious cyber actors and technology “accidents”. This work is co-funded by the HORIZON.2.1 - Health Programme of the European Commission, Grant Agreement number: 101095448 - Advanced Security-for-safety Assurance for Medical Device IoT (MEDSECURANCE).	VT1	2023-04-19 13:49:42	Konstantinos	Katzis	k.katzis@e	EUC

Y	TD(23)05010	Thomas Feys, Xavier Mestre, Emanuele Peschiera, François Rottenberg	Deep Unfolding for Fast Linear Massive MIMO Precoders under a PA Consumption Model	Massive multiple-input multiple-output (MIMO) precoders are typically designed by minimizing the transmit power subject to a quality-of-service (QoS) constraint. However, current sustainability goals incentivize more energy-efficient solutions and thus it is of paramount importance to minimize the consumed power directly. Minimizing the consumed power of the power amplifier (PA), one of the most consuming components, gives rise to a convex, non-differentiable optimization problem, which has been solved in the past using conventional convex solvers. Additionally, this problem can be solved using a proximal gradient descent (PGD) algorithm, which suffers from slow convergence. In this work, in order to overcome the slow convergence, a deep unfolded version of the algorithm is proposed, which can achieve close-to-optimal solutions in only 20 iterations as compared to the 3500 plus iterations needed by the PGD algorithm. Results indicate that the deep unfolding algorithm is three orders of magnitude faster than a conventional convex solver and four orders of magnitude faster than the PGD.	WG2	2023-04-20 13:54:08	Emanuele	Peschiera	emanuele.	KU LEUVEN
Y	TD(23)05011	J.M. Molina-Garcia-Pardo, L. Rubio-Arjona, M. T. Martinez-Ingles, A. Mateo-Aroca, E. Egea-Lopez, Vicent-Miquel Peñarrocha and Juan Reig	Wireless Channel Characterization from 1 to 28 GHz in an outdoor parking-lot	This TD presents wideband measurement and simulations ranging from 1 to 30 GHz in a parking lot, considering the absence and presence of vehicles. Measurements have been carried out considering a transmitter in an elevated position, with omni antenna. Receivers have been spread in the parking using omni antennas also. Furthermore, the scenario has been simulated by means of OPAL open-source ray launching tool. CI, FI and ABC models have been considered, showing a consistent value of n withing frequency. The presence of cars does not affect much one path loss along all frequencies.	WG1,Sub-WG1.1	2023-04-20 14:35:15	Jose-Maria	Molina-Garcia-Pardo	josemaria.	UPCT
Y	TD(23)05012	Anja Dakić, Benjamin Rainer, Markus Hofer, Thomas Zemen	Frame Error Rate Prediction for Non-Stationary Wireless Vehicular Communication Links	Wireless vehicular communication will increase the safety of road users. The reliability of vehicular communication links is of high importance as links with low reliability may diminish the advantage of having situational traffic information. The goal of our investigation is to obtain a reliable coverage area for non-stationary vehicular scenarios. Therefore we propose a deep neural network (DNN) for predicting the expected frame error rate (FER). The DNN is trained in a supervised fashion, where a time-limited sequence of channel frequency responses has been labeled with its corresponding FER values assuming an underlying wireless communication system, i.e. IEEE 802.11p. For generating the training dataset we use a geometry-based stochastic channel model (GSCM). We obtain the ground truth FER by emulating the time-varying frequency responses using a hardware-in-the-loop setup. Our GSCM provides the propagation path parameters which we use to fix the statistics of the fading process at one point in space for an arbitrary amount of time, enabling accurate FER estimation. Using this dataset we achieve an accuracy of 85 % of the DNN. We use the trained model to predict the FER for measured time-varying channel transfer functions obtained during a measurement campaign. We compare the predicted output of the DNN to the measured FER on the road and obtain a prediction accuracy of 78 %.	WG1,VT2	2023-04-21 07:21:08	Anja	Dakic	anja.dakic(	AIT

Y	TD(23)05014	Mohammed Mallik, Esteban Egea-Lopez, Joe Wiart,Davy P. Gaillot, Laurent Clavier	EME-CNTK : A fast method to reconstruct urban Electromagnetic Field Exposure by Matrix Completion	Electromagnetic field exposure (EMF) has grown to be a critical concern as a consequence of the ongoing installation of fifth-generation cellular networks (5G). The lack of measurements makes it difficult to accurately assess the electromagnetic field exposure in a specific urban area. Exposure map reconstruction techniques construct these maps from a set of measurements recorded by spatially distributed sensors. However, the spatial sampling rate is low. To overcome this issue, the exposure map estimation is addressed as an image inpainting/missing data imputation task. In this work, we use a convolutional neural tangent kernel (CNTK) for a fully connected and convolutional neural network in order to perform a matrix completion and estimate EMF exposure from a few sensor-measured values located in an urban environment. Experimental results show that the kernel adapts to the propagation characteristics of the electromagnetic field from the sensor data producing accurate estimates. It is a promising solution for exposure map reconstruction, which does not require training sets. The proposed method is compared with other machine learning approaches based on U-net and conditional generative adversarial networks, namely EME-Net and EME-GAN.	Sub-VT1	2023-04-21 12:03:28	Mohammed	Mallik	mohamme	CNRS
Y	TD(23)05015	Anna-Malin Schiffarth, Jörg Pamp, Dirk Heberling	Future exposure development with 5G massive-MIMO due to higher network utilisation	In order to predict the potential future development of instantaneous exposure considering the increased utilisation of 5G base stations at 3.6 GHz, long-term measurements have been performed using the selective radiation meter SRM-3006 at two base stations. Possible future utilisation scenarios have been simulated at three locations in the cell using a 5G-capable user equipment. The utilisation due to those usage scenarios indicates that the majority of currently feasible usage scenarios require only a minimal amount of data, resulting in a minimal increase in instantaneous exposure. However, generating high data rates, e.g. using Netflix services, results in a full utilisation of the site for a brief period of time. As the demand for such services will increase in the future, this will lead to a prolonged state of full site utilisation. If a Massive MIMO system is fully utilized by an active user requesting high data rates, the instantaneous exposure decreases significantly with increasing distance of the user to the measurement point. In terms of predicting future changes in instantaneous exposure, it can be concluded that upcoming applications will result in an increase in exposure for users, but this increase is expected to be lower with the use of massive-MIMO antennas compared to the use of passive antennas.	WG1,Sub-VT1	2023-04-21 12:21:46	Anna-Malin	Schiffarth	schiffarth@	RWTH

Y	TD(23)05016	Yejian Lyu, Zhiqiang Yuan, Mengting Li, Allan Wainaina Mbugua, Pekka Ky¨osti, and Wei Fan	Enabling Long-Range Large-Scale Channel Sounding at Sub-THz Bands: Virtual Array and Radio-Over-Fiber Concepts	Sub-Terahertz (sub-THz) (i.e., 100-300 GHz) communication is envisaged as one of the key building blocks for future communication systems due to its vast unexploited bandwidth. Knowledge of the radio channel characteristics is key to the design and development of new radio systems and air interfaces. Reliable channel sounding is essential to build accurate and realistic channel models. Virtual antenna array (VAA) has been a popular channel sounding strategy to obtain accurate directional characterization due to its low-cost and simple system implementation. However, this concept has not yet been realized for sub-THz bands in the state-of-the-art works due to difficulty in accurate phase control. The measurement range has been rather limited at sub-THz due to significant signal loss, especially in the radio frequency (RF) cables, compared to microwave or millimeter-wave frequencies. In this paper, we focus on vector network analyzer (VNA)-based channel sounders, highlighting frequency extension with sub-THz frequency extenders, measurement range extension with radio-over-fiber (RoF) schemes, and angular resolution improvement by VAA implementation with phase-compensation scheme. These techniques enable and enhance sub-THz channel characterization. The performance of the proposed long-range phase-compensated sounder is also experimentally demonstrated by the VAA-based channel measurements at 100 GHz in an indoor scenario.	WG1,Sub-WG1.1	2023-04-24 08:40:14	Wei	Fan	wfa@es.aa	AAU
Y	TD(23)05017	Yifa Li, Fengchun Zhang, Kim Olesen, Zhinong Ying, and Wei Fan	Over-the-Air Diagnosis of Reconfigurable Intelligent Surface Based on Complex Signal Measurements	The reconfigurable intelligent surface (RIS), which can reconfigure the radio propagation environment to a favorable state based on programmable metamaterial, is seen as a promising technology for 6G to improve wireless system performance. The RIS design should be cost-effective and it typically consists of a large number of RIS elements. RIS diagnosis, i.e. to identify the faulty RIS elements, is essential to ensure the RIS radiation charateristics. In this letter, a low-cost, robust, generic, fast, yet highly effective over-the-air (OTA) diagonsis method based on complex signal measurements is proposed to detect the faulty phase shifters in the passive RIS. The proposed algorithm only requires phase inversion operation (i.e. 0o and 180o phase states) for each RIS element, which is fast and supported by 1-bit RIS. The algorithm is experimentally validated using a 10×10 RIS prototype operating at 3.5 GHz in a near-field setup, demonstrating its effectiveness and robustness in practical setups.	WG1,Sub-WG1.2	2023-04-24 08:41:03	Wei	Fan	wfa@es.aa	AAU

Y	TD(23)05018	Zhiqiang Yuan, Jianhua Zhang, Vittorio Degli-Esposti, Yuxiang Zhang, and Wei Fan	Efficient Ray-tracing Simulation for Near-field Spatial Non-stationary mmWave Massive MIMO Channel and Its Experimental Validation	(mmWave) frequencies is envisioned as a key technology for beyond 5G communication. Accurate channel modeling is essential for the design and evaluation of such systems. Ray-Tracing (RT) is employed for accurately simulating propagation channels. However, state-of-the-art RT for multi-antenna systems typically uses plane-wave extension under far-field conditions, which cannot capture Near-Field (NF) and Spatial non-Stationary (SnS) properties observed in measurements on real-world, mmWave massive MIMO systems. This work aims at massive MIMO RT simulations in an accurate and efficient manner. First, we employ the brute-force strategy to simulate channels for each array element to accurately capture the NF and SnS channel properties and provide a baseline to evaluate other methods. Second, a novel coarse-refinement strategy is proposed. The channel is simulated using RT on a few sparsely located array elements and then interpolated onto other elements using spherical/astigmatic-wave approximations and the Uniform Theory of Diffraction, thus significantly reducing simulation complexity while maintaining accuracy. The proposed strategy is demonstrated to offer almost the same simulation accuracy as the brute-force method, with a dramatic reduction in simulation complexity through	WG1,Sub-WG1.1	2023-04-24 08:43:36	Wei	Fan	wfa@es.aa	AAU
Y	TD(23)05019	Cedric De Cock, Emmeric Tanghe, Wout Joseph, David Plets	Robust IMU-based Mitigation of Human Body Shadowing in UWB Indoor Positioning	Ultra-wideband (UWB) indoor positioning systems have the potential to achieve sub-decimeter-level accuracy. However, the ranging performance degrades significantly under Non-Line-of-Sight (NLoS) conditions. Detection and mitigation of NLoS conditions is a complex problem, and has been the subject of many works over the past decades. When localizing pedestrians, human body shadowing (HBS) is a particular and specific cause of NLoS. In this paper, we present an HBS mitigation strategy based on the orientation of the body and tag relative to the UWB anchors. Our HBS mitigation strategy involves a robust range error model, interacting with a tracking algorithm. The model consists of a bank of Gaussian Mixture Models (GMMs), from which an appropriate GMM is selected based on the relative body-tag-anchor orientation. The relative orientation is estimated by means of an Inertial Measurement Unit (IMU) attached to the tag, and a candidate position provided by the tracking algorithm. The selected GMM is used as likelihood function for the tracking algorithm to improve localization accuracy. Our proposed approach is realized for two tracking algorithms. We validate the implemented algorithms on dynamic UWB Two Way Ranging measurements, performed in an industrial lab environment. The proposed algorithms outperform other state-of-the art algorithms, achieving a 39 % reduction of the p75 error.	WG2	2023-04-24 10:26:27	David	Plets	david.plets	UGENT

Y	TD(23)05020	Valentina Timčenko, Sandra Lagén Morancho, Biljana Bojović, Katerina Koutlia, Slavica Boštjančič Rakas, Carles Anton Haro	Attack identification and classification in V2X scenarios	The latest technological advancements in the area of the vehicular wireless communications have enabled smooth, timely and location independent communication and exchange of information between vehicles and other vehicular communication elements, such as position and speed of the vehicle, traffic information, alarms, etc. This advanced concept is known as the vehicle-to-everything (V2X) communication, and it encompasses techniques for safe and efficient operation of cooperative intelligent transportation system (ITS) applications. It enables real-time wireless communication between vehicles to vehicles (V2V), vehicles and infrastructure (V2I), and vehicles and pedestrians (V2P), paving the way towards full driving automation and advanced driver-assisted systems. There are numerous V2X-enabled services already implemented, covering mostly scenarios that rely on the need for efficient, real-time and secure traffic management (e.g., smart roads, smart cities). The V2X communication highly relies on wireless environment characteristics, which are vulnerable to unlawful interception, eavesdropping, hacking and a range of other cyber security issues. In this context, vehicles have to react in real time to changes in the driving environment, by exploiting complete environmental awareness obtained through secure V2X communication, with low latency, high reliability and high accuracy. This research is related to the analysis of the security and privacy concerns of the V2X scenarios, focusing on the diversity of the vulnerabilities, attacks, and the means for the network traffic attack detection and identification. It is based on the use of the 5G-LENA and NR V2X modules of the ns-3 discrete-event network simulator, openly available to the research community, for the exploration of V2X attack case studies scenarios. This research provides the most relevant results from the STSM realized in	WG3,VT2, VT4	2023-04-24 15:37:18	Valentina	Timcenko	valentina.t	PUPIN
Y	TD(23)05022	Ebubekir Memisoglu, Talha Yılmaz, Huseyin Arslan	Waveform Design with Constellation Extension for OFDM Dual-Functional Radar-Communications	Orthogonal frequency division multiplexing (OFDM) is widely used and works efficiently for the communication, but emerging applications requires OFDM to be flexible to meet sensing requirements. The time-frequency waveform design of OFDM for dual-functional radar-communications (DFRC) is critical to achieve the future communication and sensing requirements. Therefore, we propose a novel method to minimize Cram´er-Rao bounds (CRBs) of the delay and Doppler estimation to improve radar performance of an OFDM DFRC system. Although some methods are proposed in the literature to improve the CRBs, these methods either require feedforward signaling or subcarrier reservation. However, it is possible to exploit the constellation extension of quadrature amplitude modulation (QAM) to achieve lower CRBs without these requirements. Therefore, the proposed method provides a transparent communication along with the CRB minimization for conventional OFDM systems. For the evaluation of the proposed method, CRB and symbol error rate (SER) are considered in the simulation results. Furthermore, the theoretical SER analysis of the proposed method is derived to understand the effects of CRB minimization on the communication performance.	WG1,WG2, Sub-WG2	2023-04-25 07:48:59	Hüseyin	ARSLAN	arslan.usf@	IMU

Y	TD(23)05023	Hamid Taramit, Luis Orozco Barbosa, Abdelkrim Haqiq, José Jaime Camacho Escoto, Javier Gomez	Load-Aware Channel Allocation for Rayleigh Fading Wi-Fi HaLow Networks	Most wireless communication technologies for Internet of Things (IoT) applications face the bottleneck of dense and large-scale use cases. One solution to this problem is a periodic channel reservation strategy, in which only a small group of stations can compete for channel access during a given period. The IEEE 802.11ah standard, a.k.a. Wi-Fi HaLow, deploys this idea in its channel access protocol, named Restricted Access Window (RAW). A single RAW consists of one or more RAW slots during which only designated stations can contend for channel access. This paper considers an IEEE 802.11ah-based network with randomly distributed stations around the Access Point (AP), operating under a Rayleigh-fading channel with capture enabled. We develop an analytical model to evaluate the contention of a group of stations and propose a Load-Aware Channel Allocation (LACA) algorithm for the RAW slot period. The LACA algorithm ensures the delivery of all packets that designated stations carry, allowing for the allocation of load-aware RAW slots, which is effective in enhancing the Age of Information (AoI). Extensive simulations are used to validate our analytical results. We then evaluate the Packet Delivery Ratio (PDR) and channel usage within a pre-allocated RAW slot to prove the effectiveness of our proposal. We further study the impact of the spatial distribution of the stations around the AP and the capture effect under a Rayleigh channel on the performance of the proposed LACA algorithm.	WG3,VT4	2023-04-25 10:13:15	Hamid	Taramit	hamid.tara	UCLM
Y	TD(23)05025	Florin Radu, Petru A. Cotfas, Marian Alexandru, Titus C. Bălan, Vlad Popescu and Daniel T. Cotfas	Signals Intelligence System with Software-Defined Radio	In this paper, we present the implementation of a system that identifies the modulation of complex radio signals. This is realized using an artificial intelligence model developed, trained, and integrated with Microsoft Azure cloud. We consider that cloud-based platforms offer enough flexibility and processing power to use them instead of conventional computers for signal processing based on artificial intelligence. We tested the implementation using a software-defined radio platform developed in GNU Radio that generates and receives real modulated signals. This process ensures that the solution proposed is viable to be used in real signal processing systems. The results obtained show that for certain modulation types, the identification is performed with a high degree of success. The use of a cloud-based platform allows quick access to the system. The user is able to identify the signal modulation using only a laptop that has access to the internet.	WG3	2023-04-26 04:46:59	Marian	Alexandru	marian.ale	TBV

Y	TD(23)05026	Hamed Radpour, Markus Hofer, Lukas Walter Mayer, Andreas Hofmann, Martin Schiefer and Thomas Zemen	Active Reconfigurable Intelligent Surfaces for the Millimeter-Wave Frequency Band: System Design and Measurement	Reconfigurable intelligent surfaces (RISs) will play a key role to establish millimeter wave (mmWave) ultra-reliable low-latency communication systems for sixth-generation (6G) applications. Currently, there are a few working prototypes of RISs operating in the mmWave frequency band and all of them are based on passive reflective elements. However, to fabricate an efficiently working RIS at mmWave frequencies, it is crucial to take care of the strong signal attenuation, reflective element losses and undesired radio frequency (RF) circuit effects. In this paper, we provide measurement campaign results for an active RIS in the mmWave frequency band as well as its analysis and system design. The obtained results demonstrate that an active RIS outperforms a RIS working in passive mode and provides a higher signal-to-noise-ratio (SNR). The active RIS consists of active reflective elements that amplify the impinging signal and reflect the signal to the desired beam direction. To obtain an efficient RIS in terms of power consumption and RIS state switch time, we design a hexagonal RIS with 37 elements working at 26 GHz. These elements are designed to work whether in passive state (binary phase shifting) or in active state (switch OFF or amplifying). We provide a comparison between the performance of a RIS working in passive and active mode using numerical simulations and empirical measurements. This comparison reveals that the active reflective intelligent surface (RIS) provides a received power that is at least 4 dB higher than that of the equivalent passive RIS. These results demonstrate the strong advantage of using active RISs for future ultra-reliable low-latency wireless communications.	Sub-WG1.1,Sub-WG1.2	2023-04-26 15:56:13	Hamed	Radpour	hamed.rad	AIT
Y	TD(23)05027	Dragana Bajic	On telescopic scaling of splitting codes	Splitting code (SpC) is defined on a finite ring Zp, where p = 2^m-1 and m is a binary size of ring elements. It is based on a process from discrete algebra called splitting: if S and E are subsets of an Abelian group G, and if every nonzero element g∈ G can be uniquely represented in the form s·ε, where ε∈ E and s∈S, then E is a multiplier set that splits G with splitting set S, with a trivial case S=G and E={1}. In SpC code, the multiplier set comprises integer weights of errors that can be corrected within a single code symbol, while the splitting set splits the code word into sub-words. The code is scalable, but also offers telescopic properties: its shortening enables increased error correction without altering the coding and error-correcting procedures. The purpose of the paper is to investigate the level of increase depending on the type of modulo. Modulo can be p - a Mersenne prime and c - a composite Mersenne number if m is a prime but c is not. In both cases |Zp\{0}| (or |Zc\{0}|) =|E|·|S|) according to Fermat's little theorem (| | denotes cardinality). If m is a non-prime integer, modulo n is an ordinary Mersenne number, yielding SpC codes that require more truncation to achieve increased correction capability.	WG2	2023-04-26 22:43:52	Dragana	Bajić	dragana.ba	UNS
Y	TD(23)05028	Wenfei Yang, Ziming Yu, Mate Boban, Jian Li	Indoor Channel Measurements at 10 GHz with Extremely Large Antenna Arrays	This paper introduces initial measurements for Extremely large antenna array (ELAA) channel at 10 GHz in two indoor environments: meeting room and classroom. A single-input multiple-output (SIMO) configuration was adopted with a virtual ELAA formed by positioning an antenna along specified grids on the Rx side. The paper summarizes environments where the measurements were conducted, the setup of the equipment, and initial results on observed channel spectral characteristics.	WG1	2023-04-28 07:41:45	Mate	Boban	mate.boba	HUAWEI

Y	TD(23)05029	Daniel Stanko, Michael Döbereiner, Gerd Sommerkorn, Daniel Czaniera, Carsten Andrich, Christian Schneider, Sebastian Semper, Alexander Ihlow, Markus Landmann	Time Variant Directional Multi-Link Channel Sounding and Estimation for V2X	We present our new scalable multi-channel and multi-node sounder, the ILMSoundG3. It is configurable in terms of the number of switched Tx and parallel Rx nodes. The basic structures of the Tx and Rx nodes are given with consideration of the measurement system requirements. The ILMSoundG3 is validated via a proof of concept measurement at 2.53 GHz in an urban environment. The system was configured as a sounder with two Tx nodes and one Rx node, which records two MIMO links simultaneously. Each node uses an antenna array. The transmitters were moved by cars whereas the receiver was elevated 20 m above the ground by a lifting platform acting as a base station. The used system configuration results in a snapshot rate of approx. 0.5 kHz, which covers the expected time variance of the chosen environment. The measurement results were analyzed using HRPE, providing a parametric description of the specular propagation paths of the radio channel per measurement link. Each estimated path is described by its directions of departure and arrival, delay, Doppler shift, and fully polarimetric complex path weights.	WG1,Sub-WG2	2023-04-28 09:13:09	Gerd	Sommerkorn	som@tu-il	TUIL
Y	TD(23)05030	Rubio, Lorenzo; Rodrigo-Peñarrocha, Vicent Miquel; Reig, Juan; Fernández, Herman; Pérez, Jesús Ramón; Torres, Rafael; Valle, Luis	Analysis of the Rician K-factor of a typical millimeter-wave office scenario	The Rician K-factor is a measure of small-scale variations of the received signal in fading channels. In this work, the K-factor is estimated in a typical office environment based on channel measurements carried out in millimeter-wave (mmWave) frequencies, covering the 25-40 GHz spectrum, in both Line-Of-Sight (LOS) and obstructed-LOS (OLOS). The classical moment-based method has been used as an estimator of the K-factor applied over wideband measurement snapshots, comparing the values with those extracted from the Power Delay Profile (PDP) in a small local area around the receiver position. These results are particularized to the potential 26, 28, 33 and 38 GHz frequency bands for the design and deployment of the future wireless communications in mmWave frequencies.	WG1,Sub-WG1.1	2023-04-28 10:36:47	Juan	Reig	jreigp@dc	UPV
Y	TD(23)05031	Danilo Radovic, Faruk Pasic, Markus Hofer, Herbert Groll, Christoph F. Mecklenbräucker, and Thomas Zemen	Stationarity Evaluation of High-mobility sub-6 GHz and mmWave non-WSSUS Channels	Analysis and modeling of wireless communication systems are dependent on the validity of the wide-sense stationarity uncorrelated scattering (WSSUS) assumption. However, in high-mobility scenarios, the WSSUS assumption is approximately fulfilled just over a short time period. This paper focuses on the stationarity evaluation of high-mobility multi-band channels. We evaluate the stationarity time, the time over which WSSUS is fulfilled approximately. The investigation is performed over real, measured high-mobility channels for two frequency bands, 2.55 and 25.5 GHz. Furthermore, we demonstrate the influence of user velocity on the stationarity time. We show that the stationarity time decreases with increased relative velocity between the transmitter and the receiver. Furthermore, we show the similarity of the stationarity regions between sub-6 GHz and mmWave channels. Finally, we demonstrate that the sub-6 GHz channels are characterized by longer stationarity time.	WG1,Sub-WG1.1	2023-04-28 13:36:16	Danilo	Radovic	danilo.rad	TU WIEN

Y	TD(23)05032	Saúl A. Torrico and Roger H. Lang	Space Correlation Function in a 2D-Trunk Dominated Forest – Exact Solution vs. High Frequency Approximation Solution	With the emergence of 5G wireless communications networks to be deployed in forested areas, there is the need to assess and improve the communication of these systems. One way of improving it is by using MIMO (Multiple Input Multiple Output) antennas to maximize the capacity of the system; the improvements therefore should not come just by meeting the required loss between the transmitter and the receiver, but should come from the possibility of using space diversity antennas at the receiver site. From this point of view, it is important to understand the space correlation function of the propagation channel. The objective of this presentation is to compare the exact solution with the high frequency approximation solution of a stochastic radiowave propagation model useful for assessing the effects of a 2D-trunk dominated forest on the space correlation function of a 5G communication system at the high frequency bands.	WG1	2023-04-29 17:06:43	Saul	Torrico	storrico@g	COMSEARCH
Y	TD(23)05033	Marco Skocaj, Pedro Enrique Iturria Rivera, Roberto Verdone, Melike Erol-Kantarci	Uplink Scheduling in Federated Learning: an Importance-Aware Approach via Graph Representation Learning	Federated Learning (FL) has emerged as a promising framework for distributed training of AI-based services, applications, and network procedures in 6G. One of the major challenges affecting the performance and efficiency of 6G wireless FL systems is the massive scheduling of user devices over resource-constrained channels. In this work, we argue that the uplink scheduling of FL client devices is a problem with a rich relational structure. To address this challenge, we propose a novel, energy-efficient, and importance-aware metric for client scheduling in FL applications by leveraging Unsupervised Graph Representation Learning (UGRL). Our proposed approach introduces a relational inductive bias in the scheduling process and does not require the collection of training feedback information from client devices, unlike state-of-the-art importance-aware mechanisms. We evaluate our proposed solution against baseline scheduling algorithms based on recently proposed metrics in the literature. Results show that, when considering scenarios of nodes exhibiting spatial relations, our approach can achieve an average gain of up to 10\% in model accuracy and up to 17 times in energy efficiency compared to state-of-the-art importance-aware policies.	WG3	2023-04-30 14:47:46	Marco	Skocaj	marco.sko	UNIBO
Y	TD(23)05034	Amar Al-Jazri and Sana Salous	Measurements and path loss models for 6G	Frequencies in the sub THz bands are envisaged for future wireless communications. This requires propagation models to predict coverage. The wideband channel sounder at Durham University was recently upgraded to cover the frequency bands 110 to 170 GHz and 235 to 300 GHz. Measurements in typical environments were conducted at 145 GHz and path loss parameters estimated. The TD will present results of Measurements in outdoor LoS and NLoS scenarios.	WG1	2023-05-01 07:53:48	Sana	Salous	sana.salou	DURHAM
Y	TD(23)05036	Thomas Wilding, Benjamin J. B. Deutschmann, Christian Nelson, Xuhong Li, Fredrik Tufvesson, Klaus Witrisal	Propagation Modeling for Physically Large Arrays: Measurements and Multipath Component Visibility	This paper deals with propagation and channel modeling for physically large arrays. The focus lies on acquiring a spatially consistent model, which is essential, especially for positioning and sensing applications. Ultra-wideband, synthetic array measurement data have been acquired with large positioning devices to support this research. We present a modified multipath channel model that accounts for a varying visibility of multipath components along a large array. Based on a geometric model of the measurement environment, we analyze the visibility of specular components. We show that, depending on the size of the reflecting surface, geometric visibility and amplitude estimates obtained with a super-resolution channel estimation algorithm show a strong correspondence. Furthermore, we highlight the capabilities of the developed synthetic array measurement system.	WG1,Sub-WG1.2,WG2	2023-05-02 07:12:35	Thomas	Wilding	thomas.wi	TUGRAZ

Y	TD(23)05037	Ana Valenzuela-Pérez David Pérez-Díaz-de-Cerio Silvia Ruiz Boqué Mario García-Lozano	A BLE Mesh Based Testbed System for Cyclists Safety	According to the European Road Safety Observatory, annual cyclist fatalities account for 2035 in 2019 (41% in rural areas), and the number of serious injuries is more than 30000. Innovative automotive systems and road solutions have been proposed to address many safety and emergency issues. These solutions usually include the introduction of sensors and wireless network communications, based majority on 5G, and lately 6G, or 802.11p technologies. However, mobile communication systems coverage in rural areas outside sparsely populated population centers is deficient. This causes many stretches, some very extensive, of rural and mountain roads to have no type of connectivity, which can create problems in terms of communication, navigation, and accessing emergency services. This paper proposes the use of Bluetooth technology to solve the lack of connectivity, implementing a real testbed and analyzing some key indicators as the coverage radio, packet error rate, and delay.	WG3,VT2	2023-05-02 09:26:20	Silvia	Ruiz Boqué	silvia.ruiz@	UPC
Y	TD(23)05038	Javier Otero Martínez, Ana García Armada	Liquid Antenna Channel Modelling: Spatial Correlation	Reconfigurable antennas are expected to play an important role in present and future communication systems. Following that trend, liquid antennas are able to change their topology in order to match different specifications and requirements. Unfortunately, it turns out that fewer details in hardware may imply that our current channel models cannot be applied successfully in this context. In particular, spatial correlation is key to understanding how this reconfiguration can be achieved and its strengths and limitations.	WG1	2023-05-03 09:09:48	Javier	Otero Martinez	jotero@ts	UC3M
Y	TD(23)05039	Eric Pierre Simon, Pierre Laly, Joumana Farah, Emmeric Tanghe, Wout Joseph, Davy Paul Gaillot	Measurement of the V2I Channel in Cell-free Vehicular Networks with the Distributed MaMIMOSA Channel Sounder	In this TD, we present a small, yet realistic, vehicular cell-free massive MIMO (multiple-input multiple-output) architecture deployed at the University of Lille in a typical suburban environment under both Line-of-Sight (LOS) and obstructed LOS (OLOS) shadowing conditions. The radio channels were acquired with a distributed RF-over-Fiber (RoF) upgrade of the real-time channel sounder MaMIMOSA. The system operates at 5.89 GHz with an 80 MHz bandwidth, which corresponds to the ITS frequency band offered by the ITS-G5 and CV2X technologies. Four omnidirectional receive antennas were placed on the roof of a van moving at a speed of 25 km/h. The propagation channel was measured for various transmit antenna configurations, ranging from co-located antennas to fully distributed antennas. The measurement results show a significant gain in the signal-to-noise ratio (SNR) as well as a more uniform coverage and smaller delay spread values with the distributed scenarios compared to the centralized ones. Finally, the path loss measurement results obtained for the cell-free network provide deployment guidelines for the distributed antennas.	WG1,VT2	2023-05-03 10:14:59	Davy	Gaillot	davy.gaillo	UNIVLILLE
Y	TD(23)05040	Mamadou NGOM - Laurent CLAVIER - Malcolm EGAN	Reliability control in IoT networks with a mixture of exponentials as interference model	In a context of low latency and high density of connected objects, ensuring global system coordination is not realistic. Under these conditions, the interference can vary significantly from one packet to another. We propose a method to choose a robust communication scheme in this type of environment. For this purpose, we model the interference by a mixture of exponentials. To ensure the reliability of the estimation of the mixture parameters, we use a bootstrap method. This allows us to choose the parameters of the transmission in order to ensure a probability of success on the transmitted packets.	WG2	2023-05-03 10:21:23	Mamadou	NGOM	grandngor	IMT

Y	TD(23)05041	Sławomir J. Ambroziak, Krzysztof K. Cwalina, Manuel M. Ferreira, Filipe D. Cardoso, Luis M. Correia	System Loss Model for Body-to-Body Networks in Indoor and Outdoor Environments	A system loss model for body-to-body networks in indoor and outdoor environments is proposed in this paper, based on measurements taken at 2.45 GHz. The influence of the type of environment, antenna visibility and user mobility on model parameters has been investigated. A significant impact of mutual antennas' placement and their visibility is shown. The proposed model fits well to empirical data, with the average root mean square error being 2.1 dB and the coefficient of determination being above 0.6 in the majority of cases. For designing purposes in generalised cases, it is recommended that the system loss exponent is set to 1.5, and the system loss at the reference distance is equal to 55.9 dB.	VT1	2023-05-03 10:44:21	Krzysztof	Cwalina	kkcwalina(	PG
Y	TD(23)05042	Syed Najaf Haider Shah, David Martín-Sacristán, Carlos Ravelo, Carsten Smeenk, Christian Schneider, Joerg Robert	Radar-Enabled Resource Allocation in 5G-V2X Sidelink Communication	Integrated Sensing and Communication (ISAC) has emerged as a key technology in future cellular networks as it allows the integration of radar sensing capabilities into mobile networks by sharing the same spectral and hardware resources. This paper discusses the integration of radar sensing capabilities into 5G Vehicle-to-Everything (V2X) sidelink communication to enable an ISAC-capable 5G-V2X system that requires high-precision radar sensing and highly reliable communication among vehicles and road infrastructure. To meet these requirements in a high-density environment where target objects are moving in close proximity to one another, a radio resource allocation algorithm, based on the sensing-based semi-persistent scheduling (SB-SPS) scheme, has been proposed that allocates additional available time and frequency (bandwidth) resources to the transmitting vehicle for high-resolution radar sensing. Further, to reduce the channel occupancy generated by the transmitting vehicle by occupying the additional resources to perform radar sensing tasks, the approach reserves only the communication resources for future transmissions. The proposed approach is evaluated through a set of performance metrics of both radar sensing and communication including the probability of detection, root mean squared error (RMSE) of range and velocity estimation of target objects under line-of-sight (LOS) conditions, and packet reception ratio. The simulation results demonstrate that the proposed approach allows each vehicle to perform radar sensing while maintaining good communication performance.	Sub-WG2	2023-05-03 11:21:27	Syed Najaf Haider	Shah	syed-najaf	TUIL
Y	TD(23)05043	Christina Larsson, Bengt-Erik Olsson, Henrik Asplund	Feasibility of High Throughput Wireless Communication Above 100 GHz in Indoor Scenarios	In this paper, we compare measured pathloss results from two indoor scenarios at 143 GHz with a simplified link budget to visualize the feasibility of high throughput wireless communication at these high frequencies. The paper concludes that the high-throughput communication can be achieved in indoor open areas, even if the Tx and Rx is not in LOS, but the increased penetration loss at these high frequencies together with a limited link budget make coverage though even thin indoor walls difficult and hence coverage predictions without floorplans difficult. The high penetration losses must also be considered if indoor stochastic propagation models above 100 GHz should be developed.	WG1	2023-05-03 11:31:58	Christina	Larsson	christina.c	ERICSSON

Y	TD(23)05044	Lianet Méndez-Monsanto Suárez, Kun Chen-Hu, M. Julia Fernández-Getino García, Ana García Armada	Orthogonal Time Frequency Space with Superimposed Pilots for Integrated Sensing and Communications	Emerging fifth generation (5G) and beyond technologies promise to operate in non-trivial high mobility conditions, such as in vehicle-to-vehicle communications scenarios or high-speed rail. In addition, the increasing demand for capacity and bandwidth leads to the use of higher frequencies. Under these conditions, the current orthogonal frequency-division multiplexing (OFDM) waveform has severe limitations. This motivates research into new robust waveforms, such as the promising orthogonal time-frequency space (OTFS), which uses the delay-Doppler domain. This waveform can also be exploited for the so-called integrated sensing and communications (ISAC), which further expands the range of possible new services. However, OTFS suffers from a large pilot overhead in channel estimation. In this paper, we propose a channel estimation and sensing technique based on OTFS and superimposed training (ST) to eliminate the pilot overhead while maintaining an affordable computational complexity.	Sub-WG2	2023-05-03 12:29:32	Lianet	Méndez-Monsanto Suárez	10038402(	UC3M
Y	TD(23)05045	François De Saint Moulin, Christophe Craeye, Luc Vandendorpe, Claude Oestges	Novel Electromagnetism-Based Radar Propagation Model for 5G and Beyond	In order to evaluate the performance of radar and communication systems in future wireless networks, accurate propagation models are needed to predict efficiently the received powers at each node, and draw correct conclusions. In this paper, we present a new radar propagation model based on the electromagnetism theory. It makes the link between the radar equation and the geometrical optics propagation model used in ray-tracing applications, and gives clues about the radar cross section modelling. It is then applied to popular automotive scenarios within the stochastic geometry framework to observe the impact of such modelling.	WG1,Sub-WG2	2023-05-03 15:11:08	François	De Saint Moulin	francois.de	UCLOUVAIN
Y	TD(23)05046	Adrian Agustin, Xavier Mestre	Near-Field MIMO Performance in Indoor Scenarios	We consider an Extra Large Aperture Array deployed in a indoor scenario and review the degrees of freedom of this system, taking into account the position of the antenna panel and the impact of the ground floor, or the walls on the system performance and its dependence with the communication region (near-field, intermediate-region or far-field). Furthermore, we analyze which is the received power level per antenna as a function of the user position in order to devise efficient methods to select antennas and design transceivers.	WG1,WG2	2023-05-04 06:52:12	Adrian	Agustin	adrian.agu	CTTC
Y	TD(23)05047	Flor Ortiz, Eva Lagunas, Symeon Chatzinotas	Energy and Performance Efficiency for On-Board Radio Resource Management in Satellite Communication Systems Using Neuromorphic Processors and Spiking Neural Networks	In satellite communication systems, efficient utilization of radio resources is critical for maximizing the quality of service and reducing operational costs. Recent advances in neuromorphic computing have shown promising results in various domains, including image and speech recognition, but their potential for radio resource management in satellite communication systems is yet to be fully explored. In this study, we evaluate the performance of two popular neural network architectures, namely, convolutional neural network (CNN) and spiking neural network (SNN), for on-board radio resource management in satellite communication systems. We compare the performance of these networks in terms of throughput and energy consumption when implemented on an AI accelerator (VCK5000) and a neuromorphic processor (Loihi 2). Our experimental results show that SNNs outperform CNNs in terms of throughput and energy consumption. Furthermore, we demonstrate that neuromorphic processors offer significant advantages in terms of processing time and energy consumption compared to traditional computing architectures, which makes them a promising candidate for on-board radio resource management in satellite communication systems.	WG1,WG2, WG3	2023-05-04 07:46:46	Flor	Ortiz	flor.ortiz@	UNILU

Y	TD(23)05048	Daniele Medda, Athanasios Iossifides, Periklis Chatzimisios	Study of Band Allocation Policies in IEEE 802.11be Networks with Devices of Different Capabilities	The upcoming IEEE 802.11be standard aims to provide extremely high bitrates to support next generation use cases. Among the proposed features, multi-link operation (MLO) is probably the one contributing most towards this goal. MLO enables new types of devices, i.e., multi-link devices (MLDs), to transmit simultaneously over multiple frequency bands to achieve massive bitrates (reaching 40 Gbps) and, consequently, lower latency. However, the coexistence of MLDs with legacy devices in existing and future wireless local area network (WLAN) deployments has not yet been explicitly investigated. In this work, we investigate different band management policies over a three-band densely populated WLAN, allowing MLDs to use one or more bands for the access procedure and data transfer. We evaluate, via extensive simulations, the access delay of the devices and the network throughput with respect to the ratio of legacy devices and MLDs. We show that by using different band allocation policies for MLDs, several trade-offs regarding throughput and access delay arise that need careful consideration to avoid performance degradation.	VT4	2023-05-04 09:38:50	Daniele	Medda	dmedda@	IHU
Y	TD(23)05051	Marc Amay, Joan Base	ON HYBRID FREE-SPACE OPTIC-RADIO SYSTEMS AS ENABLERS OF 6G SERVICES OVER NON-TERRESTRIAL NETWORKS	6G envisions new services such as holographic communica tions, virtual reality, digital twins, fiber on the sky, augmented reality to name a few of them. These new services will re quire a large capacity and so, they will be allocated in very high frequency bands, e.g., mmWave, TeraHertz, as well as the optical ones (i.e., fiber and optical wireless). Thus, it is foreseen that 6G will combine free-space optic (FSO) and ra dio frequency (RF) bands to offer more capacity, resilience to channel impairments and security (e.g. quantum and post quantum-based security). This paper provides analysis and results on the throughput, and outage probability for the ca pacity, resilient, and security architectures of hybrid optical radio systems. For more accuracy, this paper assumes that the optical and radio links have atmospheric impairments. In the optical link there is a strong turbulence modelled using Gamma-Gamma distribution whereas in the radio one there is a Nakagami-m fading.	WG1,WG2, VT1,HA2,HA3	2023-05-04 10:43:58	Marc	Amay	marc.amay	CTTC
Y	TD(23)05052	Conor Brennan, Kevin McGuinness and Fubin Zhang	Site-specific Deep Learning Path Loss Models	This temporary document describes deep learning models based on convolutional neural networks applied to the problem of predicting EM wave propagation in two scenarios, specifically over rural terrain and in urban areas. The deep learning solution is based on the U-NET architecture. In both scenarios synthetic training data is generated based on a suitable deterministic model. This comprises path loss data computed over randomly generated 1D terrain profiles and 3D urban regions. In the first scenario a surface integral equation formulation, solved with the method of moments and accelerated using the Fast Far Field approximation is used to generate the training data. In this scenario two networks are trained, one based on fractal profiles and one based on profiles generated using a Gaussian process. In the second scenario a ray launching tool is used to solve for field strength in a 1km by 1km environment containing random buildings. ML output is compared to measured data where available and good agreement is observed.	WG1	2023-05-04 11:04:18	Conor	Brennan	conor.bren	DCU

Y	TD(23)05053	Eneko Iradier, Iñigo Bilbao, Jon Montalban, Pablo Angueira	AI-based Self-Interference Cancellation for In-Band Full-Duplex Systems	The newest Radio Access Technologies (RATs) physical layers are already close to Shannon's limit. System efficiency should be sought today towards a more efficient and flexible use of spectral resources. In-Band Full-Duplex (IBFD) techniques are one of these research avenues, where the same time-frequency resource is used to achieve a simultaneous full-duplex operation. However, IBFD nodes face the challenge of canceling the strong loopback signal leaked at the receiver modules. The cancellation requirements of the loopback component up to 80 dB is a complex task requiring a multifaceted approach involving isolation techniques, innovative antenna systems, and a combination of analog and digital cancellation algorithms. Our work analyzes a choice of Convolutional Neural Networks (CNNs) for robust loopback cancellation. This alternative seems highly suitable for this task because loopback channels can be considered natural signals with different degrees of deterministic features. Convolutional Neural Networks were explicitly designed to handle natural signals. CNNs can relate time and frequency symbols to extract the interference straightforwardly. Indeed, the results indicate that the proposed super-resolution CNN architecture can reduce the loopback channel estimation error in the order of tenths of dB when compared to state-of-the-art signal processing methods.	WG2	2023-05-04 11:08:18	Eneko	Iradier	eneko.irad	EHU
Y	TD(23)05054	Krzysztof Skos, Josep Miquel Jornet, Pawel Kulakowski	Magnetic field localization for in-body nano-communication medical systems	Nano-machines circulating inside of a human body and gathering data about tissue conditions are a part of next generation medical diagnostic systems. However, in order to perform their functions properly, these devices should report not only their medical measurements, but also their positions. In this paper, a new localization approach for in-body nano-machines based on magnetic field is presented, taking advantage of a very good magnetic permeability for all human tissues. The whole proposed localization system is described, starting from 10x10 µm2 magnetometers to be integrated into the nano-machines, to a set of external wires generating the magnetic field. Mathematical equations for localization algorithm are also provided, assuming the nano-machines do not perform the calculations themselves, but they transmit their magnetic field measurements together with medical data outside of the body. The whole system is validated with computer simulations taking into account the measurement error of the magnetometers, the error induced by the Earth's magnetic field and a human body model assuming different possible positions of nano-machines. The results show a very good system accuracy with localization error even below 1 cm.	WG2,VT1	2023-05-04 12:26:43	Pawel	Kulakowski	kulakowsk	AGH
Y	TD(23)05055	Diego Dupleich, Alexander Ebert, Yanneck Völker-Schöneberg, Mate Boban	Latest results on the characterization of propagation at (sub-)THz for ISAC in industrial applications	In this TD, we present the latest results on measurement campaigns for the characterization of propagation at (sub-)THz for channel modelling with the focus on ISAC applications in industrial scenarios.	Sub-WG1.1,Sub-WG2	2023-05-04 14:05:28	Diego	Dupleich	diego-and	TUIL
Y	TD(23)05057	Richard Rudd	Propagation modelling in the ITU-R: challenges and evolution	This paper will give an overview of the propagation models developed within the ITU-R, their evolution (sometimes over several decades) and application in the often-controversial context of spectrum sharing and preparation for World Radio Conferences. Current issues and challenges will be discussed.	WG1	2023-05-04 14:12:11	Richard	Rudd	richard.ruc	PC

Y	TD(23)05059	Thomas Feys, Xavier Mestre, François Rottenberg	Self-Supervised Learning of Linear Precoders under Non-Linear PA Distortion for Energy-Efficient Massive MIMO Systems	Massive multiple input multiple output (MIMO) systems are typically designed under the assumption of linear power amplifiers (PAs). However, PAs are typically most energy efficient when operating close to their saturation point, where they cause non-linear distortion. Moreover, when using conventional precoders, this distortion coherently combines at the user locations, limiting performance. As such, when designing an energy-efficient massive MIMO system, this distortion has to be managed. In this work, we propose the use of a neural network (NN) to learn the mapping between the channel matrix and the precoding matrix, which maximizes the sum rate in the presence of this non-linear distortion. This is done for a third order polynomial PA model for both the single and multi-user case. By learning this mapping a significant increase in energy efficiency is achieved as compared to conventional precoders and even as compared to perfect digital pre-distortion (DPD), in the saturation regime.	WG1	2023-05-04 14:47:01	Xavier	Mestre	xavier.mes	CTTC
Y	TD(23)05060	Sara Cavallero, Nicol Sarcone Grande, Francesco Pase, Marco Giordani, Joseph Eichinger, Roberto Verdone, Michele Zorzi	A New Scheduler for URLLC in 5G NR IIoT Networks with Spatio-Temporal Traffic Correlations	This paper explores the issue of enabling Ultra-Reliable Low-Latency Communications (URLLC) in view of the spatio-temporal correlations that characterize real 5th generation (5G) Industrial Internet of Things (IIoT) networks. In this context, we consider a common Standalone Non-Public Network (SNPN) architecture as promoted by the 5G Alliance for Connected Industries and Automation (5G-ACIA), and propose a new variant of the 5G NR semi-persistent scheduler (SPS) to deal with uplink traffic correlations. A benchmark solution with a “smart” scheduler (SSPS) is compared with a more realistic adaptive approach (ASPS) that requires the scheduler to estimate some unknown network parameters. We demonstrate via simulations that the 1-ms latency requirement for URLLC is fulfilled in both solutions, at the expense of some complexity introduced in the management of the traffic. Finally, we provide numerical guidelines to dimension IIoT networks as a function of the use case, the number of machines in the factory, and considering both periodic and aperiodic traffic.	VT3	2023-05-04 15:05:52	Sara	Cavallero	s.cavallero	CNIT
Y	TD(23)05061	Yang Miao, Andre Kokkeler	Investigating the Bistatic Sensing Capability of a Broadcasting 5G-NR BS and a True-Time-Delay Array UE	This paper derives the theoretical sensing capability of the 5G NR synchronization signal (SS) with a True-Time-Delay (TTD) array configuration at UE side. The TTD beamformer separates subcarrier beams into different angular locations for wide-beam coverage, and could be used for opportunistic sensing of environment target during BS downlink synchronization (before communication data transmission). The bistatic sensing performance is described by the derived bistatic AoA(Angle of Arrival)-delay/range-Doppler ambiguity function. The unambiguous region in the delay-range domain with a slowly fluctuating environment target is observed to vary as a function of the number of array elements and of the different SS configuration.	Sub-WG2	2023-05-04 15:54:42	Yang	Miao	y.miao@u	UT

Y	TD(23)05062	Rimvydas Aleksiejunas, Karolis Stankevicius	Application of XDraw algorithm for diffraction modeling using 3D vector building data	Estimation of diffraction loss is essential in wireless network planning and optimization, where detailed building data is available. In the past, a raster-based building rooftop height data extracted from building footprints has been used down to 1 meter resolution. For numerical evaluation of diffraction loss in case of raster-based input data, fast approximate algorithms are used such as R2, XDraw and their various implementations. Currently vector-based 3D city models with high level of detail attract a lot of interest. However, the analysis algorithms with vector data are slow and there are no efficient fast numerical methods. The aim of this work is to create fast numerical diffraction algorithm working with high accuracy 3D vector building data. In the proposed model, diffraction loss is estimated according to ITU-R P.526-15 recommendation using XDraw approximation for fast numerical processing. The algorithm behaves as $\mathcal{O}(N^2)$ over time by analyzing propagation in rings starting at antenna location and progressing towards the edges of analysis area. In the work, performance and accuracy of diffraction prediction model is compared against traditional raster-based XDraw algorithm. The results are calculated using buildings data from 3D BAG open dataset of Amsterdam city.	WG1	2023-05-04 19:14:28	Rimvydas	Aleksiejūnas	rimvydas.a	VU
Y	TD(23)05063	CheChia Kang, Xin Du, and Jun-ichi Takada	Synchronized Dynamic Channel Measurement and Motion Capture for Sub-THz Radio Channel Affected by Human Presence	Sub-THz band's broad bandwidth availability enables the next generation of mobile systems. Because of the useage of the high-gain antennas, the communication link is highly directive and depends on line-of-sight (LoS) channel. As one of the main challenges, the LoS channel can be easily shadowed. Due to the short wavelength, even a limb of a pedestrian can obstruct the the first Fresnel zone and cause deep fading occasionally. To develop the propagation model for the dynamic scenarios, a detailed geometric information (GI) recognition is needed. This paper presents a synchronized time-variant channel measurement and motion capture at 300 GHz for human body shadowing (HBS) scenario. The captured GI of human body represented as point clouds is used to generate screen models of human body. The comparison of the shadowing gain measurement result and the prediction based on double knife-edge diffraction (DKED) and uniform theory of diffraction (UTD) shows that the precision of the 3D model dominants the accuracy of shadow timing prediction. The results serve as foundation for future development of ray-tracing simulation for dynamic scenarios.	WG1,Sub-WG1.1	2023-05-04 21:50:19	CheChia	Kang	kang.c.aa@	TITECH

Y	TD(23)05065	C. Gijón, T. Mahmoodi, M. Toril, S. Luna-Ramírez, J. L. Bejarano-Luque	SLA-Driven Traffic Steering in B5G Systems with Network Slicing	In 5G and beyond wireless systems, Network Slicing (NS) feature will enable the coexistence of extremely different services by splitting the physical infrastructure into several logical slices tailored for a specific tenant or application. In sliced Radio Access Networks (RANs), an optimal traffic sharing among cells is key to guarantee Service Level Agreement (SLA) compliance while minimizing operation costs. The configuration of network functions leading to that optimal point may depend on the slice, claiming for slice-aware traffic steering strategies. This work presents the first data-driven algorithm for slice-aware traffic steering by tuning handover margins (a.k.a. mobility load balancing). The tuning process is driven by a novel indicator, derived from connection traces, showing the imbalance of SLA compliance among neighbor cells per slice. Performance assessment is carried out with a system-level simulator implementing a realistic sliced RAN offering services with different throughput, latency and reliability requirements. Results show that the proposed algorithm improves the overall SLA compliance by 9% in only 15 minutes of network activity compared to the case of not steering traffic, outperforming two legacy mobility load balancing approaches not driven by SLA.	WG3	2023-05-05 07:58:45	Carolina	Gijon Martin	cgm@ic.ur	UMA
Y	TD(23)05066	A.Ziganshin, D.Czaniera, C.Schneider, R.Thomä	GBSCM Channel Modeling for ISAC Evaluation	Communications and sensing are two adjacent branches of radiowaves application. Nowadays, networks demand both to be combined in a unified device sharing the same hardware and spectrum. Such a system is known as integrated sensing and communication (ISAC). Geometry-based stochastic channel model (GBSCM), such as 3GPP TR38.901, is a common solution for testing traditional communications. However, this model has to be extended to meet other requirements of ISAC. Sensing algorithms demand the existence of objects in the channel model to be located, tracked, and recognized. Such objects should be described deterministically by their position in space, velocity, and acceleration, which is impossible within the standard stochastic channel model. That approach attempts to combine the accuracy of deterministic methods and the performance of stochastic modeling methods. An essential point of such a hybrid channel model is scalability, as the level of determinism can be adjusted to find a tradeoff. A model with a focus on stochastic modeling was proposed and discussed in the paper. The limitations of such a model were discussed and shown by simulations.	WG1,WG2, Sub-WG2	2023-05-05 08:24:02	Ainur	Ziganshin	ainur.zigar	TUIL
Y	TD(23)05068	Vukan Ninkovic, Dejan Vukobratovic, Adriano Pastore, Carles Anton-Haro	A Weighted Autoencoder-Based Approach to Downlink NOMA Constellation Design	End-to-end design of communication systems using deep autoencoders (AEs) is gaining attention due to its flexibility and excellent performance. Besides single-user transmission, AE-based design is recently explored in multi-user setup, e.g., for designing constellations for non-orthogonal multiple access (NOMA). In this paper, we further advance the design of AE-based downlink NOMA by introducing weighted loss function in the AE training. By changing the weight coefficients, one can flexibly tune the constellation design to balance error probability of different users, without relying on explicit information about their channel quality. Combined with the SICNet decoder, we demonstrate a significant improvement in achievable levels and flexible control of error probability of different users using the proposed weighted AE-based framework.	WG2,HA1	2023-05-05 08:45:38	Vukan	Ninkovic	ninkovic@	UNS

Y	TD(23)05069	Andreas Fuchs, Lukas Wielandner, Daniel Neunteufel, Holger Arthaber, Klaus Witrisal	Wideband TDoA Positioning Exploiting RSS-Based Clustering	The accuracy of radio-based time of flight (ToF)-positioning is heavily influenced by different restrictions/features depending on the technology used. Wideband (WB) and received signal strength (RSS) measurements for example are severely inhibited by a dense multipath (DM) channel. RSS based measurements have the disadvantage of a high, range-dependent uncertainty. This work proposes an approach for combining these two different measurement technologies, leading to a much more robust estimation combining the best of both technologies. We use RSS measurements to determine devices in the vicinity of each other. Based on those so-called 'clusters' we get access to multiple independent realisations of the DM-channel for a single estimated position and an information gain. In this work, we propose an algorithmic approach for the information fusion of those two technologies and derive the corresponding Cramér-Rao lower bound (CRLB) and performance bounds. We evaluate these bounds in simulations, and validate results with real-world measurement data. The results show that a clustering approach can significantly improve performance. In our measurement scenario, halving the root-mean-square error (RMSE) from about 2 m for a non-clustererd approach to about 1 m for the proposed algorithm.	WG2	2023-05-05 09:19:07	Andreas	Fuchs	afuchs@tu	TUGRAZ
Y	TD(23)05070	Davide Scazzoli, Francesco Linsalata, Dario Tagliaferri, Marouan Mizmizi, Damiano Badini, Maurizio Magarini, and Umberto Spagnolini	On the Experimental Demonstration of Joint Communication and Sensing Waveform Design	Integrated Sensing and Communication (ISAC) is recognised as one of the key enabling technologies of the upcoming sixth generation (6G) wireless network. The last research frontier of ISAC systems is the transmission of a single waveform through a completely shared hardware platform and an optimized frequency/time/space resources allocation that tunes the trade-off between the intended communication and sensing requirements. In this paper, we dwell on the experimental demonstration of the benefits of an ISAC waveform scheme that superposes onto the frequency-time domain both the legacy orthogonal frequency division multiplexing (OFDM) and a sensing signal that exploit Out-Of-Band (OOB) emission. This latter can be designed both with classical frequency-time chirp and with a delay-Doppler impulse. The experiments' results show that the tested ISAC co-design is capable of accurately scanning and mapping an indoor environment and estimating the tangential speed of the moving targets. Moreover, we demonstrate that the interference of the superimposed sensing signal at the communication receiver is low enough that the impact on the communication performance is imperceptible	WG2,Sub-WG2	2023-05-05 10:04:18	Francesco	Linsalata	francesco.	POLIMI

Y	TD(23)05072	Yann Maret, Mohsin Raza, Franck Legendre, Nik Bessis, Jean-Frédéric Wagen	Improving the performance of OLSRouting using PHY-IP information for realistic V2V/MANETs	Optimized routing algorithms are of most importance for Mobile Ad-hoc NETworks. The routing protocol offers a route to the destination and adapts the path when the network changes. The popular routing algorithm, Optimized Link State Routing (OLSRv2) is evaluated in realistic real time emulations using the open source EMANE platform and the open Anglova scenario. The effect of fading is analyzed to account for the mobile wireless environment. OLSR estimates the quality of each link by processing received HELLO packets. OLSR has limited performance in scenario with fading and can lead to a poor completion ratio: 67% for the 24-node Anglova company 1 scenario. The proposed solution called OLSR+PHY uses the physical layer estimate of the Signal to Interference and Noise Ratio (SINR) to drop the HELLO packets received with poor SINR. OLSR+PHY mitigates routes flapping and data packet loss. The completion ratio of acked-messages is improved to 79% while the Round Trip Time is only increased from 0.6 to 1s.	WG3	2023-05-05 13:33:34	Yann	Maret	yann.mare	HES SO
Y	TD(23)05073	Dheeraj Raja Kumar, Carles Anton-Haro, Xavier Mestre	Deep Learning-based Receivers for MIMO Rate Splitting Multiple Access	In this paper, we propose data-driven receivers for multi-input multi-output (MIMO) Rate Splitting Multiple Access (RSMA) system by using neural networks. The evolution of the neural network performance as the system size scales up in the underloaded regime has been thoroughly analyzed. Simulation results compare the performance of the proposed schemes against that of the conventional and exhaustive search receiver benchmarks.	WG2	2023-05-05 14:45:54	Dheeraj	Raja Kumar	drajakuma	CTTC
Y	TD(23)05074	Fred Wagen and Yann Maret	An analysis of Goodput and Delivery Ratio using simple simulations of a realistic MANET: Anglova.net	Multi-user system level simulations and emulations is increasingly important to optimize the use of a given radio spectrum resource. From the users perspective the optimization depends on the service or application. Typically either the highest possible Goodput (useful data user bit rate) is desired or, given a transmitted data rate, the highest possible Packet Delivery Ratio (or lowest Packet Error Rate) is desired. Latency can also be an important requirement. How to optimize and trade-off these metrics in a time varying environment is particularly complex in Vehicular to Vehicular (V2V) or MANET communication system due to the required routing, scheduling and flow control. This contribution considers a rather simple simulation of a realistic MANET (Anglova.net) to provide an analysis of Goodput and Delivery Ratio for several routing metrics. The Goodput-Delivery Ratio product is nearly optimal if the shortest path routes are based on the MANET Graph weighted by the inverse of the SINR. Using SINR is better than using the classical Link Quality which does not distinguish good links from very good and thus more stable links. The routes can be kept for 4 to even 20s in the realistic Anglova.net scenario. These observations hold for three propagation models (Holm, Longley-Rice, Bullington) and two fading models (abstract PHY, no fading+Rayleigh). Emulation results and measurements remain to be conducted to (dis)prove these conclusions.	WG3,VT2	2023-05-05 14:52:27	Jean Frederic	Wagen	jean-frede	HES SO

Y	TD(23)05075	Enrico M. Vitucci, Matteo Albani, Silvi Kodra, Marina Barbiroli and Vittorio Degli-Esposti	An Efficient Ray-Based Modeling Approach for Scattering from Reconfigurable Intelligent Surfaces	Reconfigurable intelligent surfaces (RIS), which can be implemented using metasurface technology or reflect/transmit antenna array technology, have garnered significant attention in research studies focused on both their technological aspects and potential applications. While various modeling approaches have been proposed - ranging from electromagnetic simulations and analytical integral formulations to over-simplified approaches based on scattering matrix theory - there remains a great need for efficient and electromagnetically-consistent macroscopic models that can accurately simulate scattering from RISs, particularly for realistic simulations of RIS-based wireless networks. Building on previous work based on the a characterization of the RIS through a surface impedance (or "spatial modulation") function and a few parameters, in the present paper we propose a fully ray-based approach for the computation of the re-radiated field that can be easily embedded in efficient, forward ray tracing (also known as "ray launching") models. We validate the proposed model by comparison to well established methods available in the literature. Results show that, although the considered method is based on a completely different formulation and is much more efficient than integral formulation methods, results are almost indistinguishable in a number of benchmark cases.	WG1,Sub-WG1.2	2023-05-05 16:53:07	Enrico Maria	Vitucci	enricomar	UNIBO
Y	TD(23)05076	Lutfi Samara, Mate Boban, Thomas Kürner	On the Capacity of Directional Terahertz Links	We investigate the potential capacity gains acquired by adopting an adaptive transmit power and rate approach when communicating in the terahertz (THz) band considering the peculiarities of the channel. Given the high path loss experienced at the THz band, highly directive communication links using high directional antennas are used, hence making antenna alignment a critical aspect to consider. Therefore, we highlight the impact of antenna misalignment on the potential gains brought by the adaptive power and rate schemes. Analytical expressions are provided taking into account the joint effects of the channel and antenna misalignment fading. The results confirm potential capacity gains of the adaptive power and rate scheme in the low signal-to-noise ratio (SNR) regime and when the antenna alignment error variance is high.	WG2	2023-05-05 17:38:59	Lutfi	Samara	lutfiz.sama	HUAWEI

Y	TD(23)05077	Silvi Kodra, Marina Barbiroli, Enrico Vitucci, Franco Fuschini, Vittorio Degli Esposti	Measurement based evaluation of outdoor to indoor and in-building losses at mm-waves	The fulfilment of requirements of 5G systems and beyond, brings the need for the deployment of mm-frequencies. Knowledge of the propagation channel characteristics is crucial for the correct design of wireless systems. As such, the impact of buildings on signal propagation, thus, Outdoor to Indoor and through floors attenuation, needs to be understood and carefully characterized at mm waves. To this aim, two measurement campaigns at 28 and 38 GHz were carried out to investigate the aforementioned issues. In order to evaluate Outdoor to Indoor losses, two different buildings were considered: the first being an old residential building and the second a modern office building. It was observed from the measurements that losses increase with around 20 dB when moving 5 meters inside the building with respect to the external illuminated wall. Measurements have also been compared with the 3GPP TR 138 901 model, which applies for frequencies up to 100 GHz. The other campaign, aiming to evaluate the propagation losses through building floors at 27 and 38 GHz, was conducted in four different buildings with different floor construction. The observed trend is that more modern the construction techniques become, more difficult it is for signals to propagate through the floors, due to the presence of metallic structures and reinforced concrete. The floor construction technique strongly affects the propagation through floors, in a such way that for most of the considered buildings it is impossible for the signal to penetrate after one floor. This brings the need for standardizations that accurately account for the through floor propagation at mm-wave frequencies.	Sub-WG1.1	2023-05-05 18:34:45	Silvi	Kodra	silvi.kodra1	UNIBO
Y	TD(23)05078	Rui R. Paulo and Fernando J. Velez	Impact of the Two-Slope Path Loss Model in the Service Quality of 4G and 5G Small Cells	Together with cell-free networks, small cells enable ultra-dense networks in 5G. Although small cell networks will be part of heterogeneous networks, the comparison of service quality of urban micro (UMi) small cells between 4G and 5G second phase scenarios is still of great relevance. Usage of video (VID), is considered. Quality of service is determined by considering a packet loss ratio (PLR) lower than 2%, for different sub-6 GHz frequency bands. The aim is to compare the system capacity between 4G and 5G New Radio (NR) enhanced mobile broadband in different bands. ITU defined two UMi cell scenarios for UMi cells that consider two-slope (TS) path loss models (PLMs). In this work, we have included TS-PLMs into the LTE-Sim (4G) and 5G-air simulator. The service quality and system performance bands have then been evaluated. Results shows that it is possible to support more user terminals (UTs) with 5G NR (up to 26 UTs) than with 4G (10 UTs only). When PLR<2%, the average delay decreases and the average goodput increases when 5G is considered. The maximum average goodput also increases with 5G NR.	WG3,VT4	2023-05-05 21:30:55	Fernando José	VELEZ	fjv@ubi.pt	UBI
Y	TD(23)05083	Malek Ali, Roman Marsalek, Jan Bolcek, Radim Zedka, Josef Vychodil, Ladislav Polak, Golsa Ghiaasi	Target detection methods from 2D delay-Doppler OTFS snapshots	Besides information sharing, the received wireless communication signals can be used to gather knowledge about the transmitting devices, about properties of the surrounding environment, or to track users in the monitored area. This temporary document presents our work in progress, focused on the application of selected machine learning and signal processing methods to estimate the number of targets, i.e., persons, from delay-Doppler images, and discusses the advantages and drawbacks of various approaches including machine learning or mathematical morphology methods.	Sub-WG2,VT3	2023-05-05 21:49:48	Roman	Marsalek	marsaler@	VUT

Y	TD(23)05084	Francesca Conserva, Nicol Sarcone Grande, Marco Skocaj, Roberto Verdone	A Theoretical and Experimental Analysis of 5G Network Latency: a Data-Driven Approach	The advent of novel 5G services and applications with binding latency requirements and guaranteed Quality of Service (QoS) hastened the need to incorporate autonomous and proactive decision-making in network management procedures. The objective of our study is to provide a thorough analysis of latency within 5G networks by utilizing real-world network data that is accessible to mobile network operators (MNOs). In particular, we present an analytical formulation of the user-plane latency as a Hypoexponential distribution, which is validated by means of a comparative analysis with empirical measurements. We test our framework using data gathered from scenarios of vehicular mobility, dense-urban traffic, and social gathering events.	WG3	2023-05-08 08:01:43	Francesca	Conserva	francesca.c	CNIT

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BARCELONA MEETING / 22-25 May 2023

Tuesday 23/05

08:30 Welcome

09:00 **PLENARY** — **Auditorium B6+B4 Online**

Management Comittee meeting
General Information

10:30 Coffee break

11:00 **PLENARY** — **Auditorium B6+B4 Online**

Keynotes — **Richard Rudd (TD 57)**, **Angel Lozano**

12:30 Lunch

13:30

	Video Recording	WIRS

14:00

Auditorium B6	HUB	E2
WG1 - Mes.	WG2 Coding - IA	WG3 - Res. Man.
6	27	47
63	10	33
77	53	51
16	59	65

15:30 Coffee break

16:00

Auditorium B6	HUB	E2
VT2-WG1 - Space	ISAC-WG2	WG3-VT2
31	44	72
8	22	74
38	42	20
32	70	25

17:30 **Newsletter** — **WIRS**

Auditorium B6 — **HUB** — **E2**

18:30 **Performance**

Wednesday 24/05

08:30 Welcome

09:00

Auditorium B6	HUB	E2	E3
WG1-WG2 Perf	WG1 - RT	VT4-WG3 Alloc.	VT1
43	30	**7**	4
5	62	48	9
46	18	23	41
76		78	54

10:30 Coffee break

11:00

Auditorium B6	HUB	E2	E3
VT2-WG1	WG2 - Mul. Acc.	WG3	EMF-WG1
29	40	3	14
2	73	37	15
12	68	Disc WG3	52
39			Disc EMF

12:30 Lunch

14:00

Auditorium B6	HUB	E2	E3
WG1 - Models	WG2-ISAC - Loc	VT3	
34	19	55	DISC VT4
11	69	84	
28	61	60	
36	83		

15:30 Coffee break

16:00

Auditorium B6	HUB	E2	E3
Disc WG1	Disc WG2	Disc VT1	Disc VT3
Disc THz Disc RIS	Disc ISAC	Disc EMF (Ctd)	

17:30

18:00 **Departure to social event and dinner**

Thursday 25/05

08:30 Welcome

09:00

Auditorium B6	HUB	E2
ISAC-WG1 Model	SWG1 - RIS	
66	26	Disc VT2
45	75	
1	17	
	Disc RIS (Ctd)	

10:30 Coffee break

11:00 **PLENARY** — **Auditorium B6+B4 Online**

Keynote — **Carles Anton**

MC meeting — Summary of WG activities

12:30 Lunch

MEETING ATTENDANCE LIST (CORE GROUP MEETING - 2023-05-22)

The attendance list provides the names of the participants who confirmed attendance via their personal e-COST invitation link.

Meeting Title: 5th MC and Technical Meeting	
Meeting Reference: E-COST-MEETING-CA20120-230523-2fc26c65	**Action Number: CA20120**
Meeting Administrator: Flaminia Saratti	**E-mail: flaminia.saratti@unibo.it**

Core Group - Core Group Meeting (Start Date: 2023-05-22 End Date: 2023-05-22)

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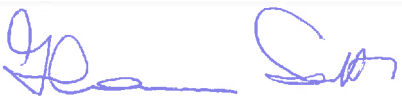
6	Deruyck, Margot margot.deruyck@ugent.be	BE	
7	Saratti, Flaminia flaminia.saratti@unibo.it	IT	
8			
9			
10			
11			

Core Group - Core Group Meeting (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
12			

Country Codes: Albania (AL), Austria (AT), Belgium (BE), Bosnia and Herzegovina (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Iceland (IS), Ireland (IE), Israel (IL), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Montenegro (ME), The Netherlands (NL), the North Republic of Macedonia (MK), Norway (NO), Poland (PL), Portugal (PT), The Republic of Moldova (MD), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), United Kingdom (UK).

Meeting Secretary

(Chair or local organiser)

Name + signature

MEETING ATTENDANCE LIST (OTHER COST RELEVANT MEETING - TRAINING DAY - 2023-05-22)

The attendance list provides the names of the participants who confirmed attendance via their personal e-COST invitation link.

Meeting Title: 5th MC and Technical Meeting	
Meeting Reference: E-COST-MEETING-CA20120-230523-2fc26c65	**Action Number: CA20120**
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Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

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19	Chatzinotas, Symeon schatzin@ieee.org	LU	
20	Cichoń, Krzysztof krzysztof.cichon@put.poznan.pl	PL	
21	Clavier, Laurent laurent.clavier@imt-nord-europe.fr	FR	
22	Conserva, Francesca francesca.conserva@unibo.it	IT	
23	Correia, Luis M luis.m.correia@tecnico.ulisboa.pt	PT	
24	Csatho, Botond Tamas csatho.botond@edu.bme.hu	HU	
25	Cwalina, Krzysztof kkcwalina@eti.pg.edu.pl	PL	
26	Czapiewska, Agnieszka agnieszka.czapiewska@pg.edu.pl	PL	

Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
27	Czylwik, Andreas czylwik@nts.uni-duisburg-essen.de	DE	
28	d'Orey, Pedro pdorey@fe.up.pt	PT	
29	Dakic, Anja anja.dakic@ait.ac.at	AT	
30	Das, Kallol kallol.das@tno.nl	NL	
31	De Saint Moulin, François francois.desaintmoulin@uclouvain.be	BE	
32	Degli-Esposti, Vittorio v.degliesposti@unibo.it	IT	
33	Deruyck, Margot margot.deruyck@ugent.be	BE	
34	Di Renzo, Marco marco.di-renzo@universite-paris-saclay.fr	FR	
35	Dittmann, Lars ld@com.dtu.dk	DK	
36	Drozdowska, Monika mdrozdo@upv.edu.es	ES	
37	Dupleich, Diego diego-andres.dupleich@tu-ilmenau.de	DE	
38	Ebert, Alexander alexander.ebert@tu-ilmenau.de	DE	
39	Ekman, Torbjörn torbjorn.ekman@ntnu.no	NO	
40	Fan, Wei wfa@es.aau.dk	DK	
41	Fontanesi, Gianluca fontanesi.gianluca@outlook.com	LU	

Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
42	Fuchs, Andreas afuchs@tugraz.at	AT	
43	Gaillot, Davy davy.gaillot@univ-lille.fr	FR	
44	Garcia Armada, Ana agarcia@tsc.uc3m.es	ES	
45	Garcia-Pardo, Concepcion cgpardo@iteam.upv.es	ES	
46	Gardasevic, Gordana gordana.gardasevic@etf.unibl.org	BA	
47	Ghiaasi, Golsa golsa.ghiaasi@silicon-austria.com	AT	
48	Gijon Martin, Carolina cgm@ic.uma.es	ES	
49	Guan, Ke kguan@bjtu.edu.cn	CN	
50	Haddad, Yoram haddad@g.jct.ac.il	IL	
51	Haneda, Katsuyuki katsuyuki.haneda@aalto.fi	FI	
52	Hannotier, Cédric cedric.hannotier@ulb.be	BE	
53	Hofer, Markus markus.hofer@ait.ac.at	AT	
54	Horvath, Balint horvath.balint@vik.bme.hu	HU	
55	Hristov, Atanas atanas.hristov@uist.edu.mk	MK	
56	Iradier, Eneko eneko.iradier@ehu.eus	ES	

Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
57	Ivashina, Marianna marianna.ivashina@chalmers.se	SE	
58	Joseph, Wout wout.joseph@ugent.be	BE	
59	Kang, CheChia kang.c.aa@m.titech.ac.jp	JP	
60	Katzis, Konstantinos K.Katzis@euc.ac.cy	CY	
61	Keerativoranan, Nopphon nopphon.keerativoranan@ap.ide.titech.ac.jp	JP	
62	Kliks, Adrian adrian.kliks@put.poznan.pl	PL	
63	Kocan, Enis enisk@ucg.ac.me	ME	
64	Kodra, Silvi silvi.kodra2@unibo.it	IT	
65	Kokkoniemi, Joonas joonas.kokkoniemi@oulu.fi	FI	
66	Kułakowski, Paweł kulakowski@agh.edu.pl	PL	
67	Kürner, Thomas kuerner@ifn.ing.tu-bs.de	DE	
68	Lager, Ioan Ernest i.e.lager@tudelft.nl	NL	
69	Lagunas, Eva eva.lagunas@uni.lu	LU	
70	Larsson, Christina christina.c.larsson@ericsson.com	SE	
71	Lehne, Per Hjalmar per-hjalmar.lehne@telenor.com	NO	

Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
72	Linsalata, Francesco francesco.linsalata@polimi.it	IT	
73	Liotou, Eirini eirini.liotou@iccs.gr	EL	
74	Lipovac, Adriana adriana.lipovac@unidu.hr	HR	
75	Machaj, Juraj juraj.machaj@feit.uniza.sk	SK	
76	Magarini, Maurizio maurizio.magarini@polimi.it	IT	
77	Mallik, Mohammed mohammed.mallik.etu@univ-lille.fr	FR	
78	Mangues, Josep josep.mangues@cttc.cat	n/a	
79	Manzoor, Hira hira.manzoor@pg.edu.pl	PL	
80	Maret, Yann yann.maret@hefr.ch	CH	
81	Marsalek, Roman marsaler@vut.cz	CZ	
82	Martin-Vega, Francisco J. fjmvega@ic.uma.es	ES	
83	Medda, Daniele dmedda@ihu.edu.gr	EL	
84	Méndez-Monsanto Suárez, Lianet 100384026@alumnos.uc3m.es	ES	
85	Mestre, Xavier xavier.mestre@cttc.cat	ES	
86	Miao, Yang y.miao@utwente.nl	NL	

Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
87	Mikhaylov, Konstantin konstantin.mikhaylov@oulu.fi	FI	
88	Mlinar, Tomi tomi.mlinar@fe.uni-lj.si	SI	
89	Molina-Garcia-Pardo, Jose-Maria josemaria.molina@upct.es	ES	
90	Muzaffar, Raheeb raheeb.muzaffar@silicon-austria.com	AT	
91	Navarro, Andres anavarro@icesi.edu.co	CO	
92	NGOM, Mamadou grandngom606@gmail.com	FR	
93	Ninkovic, Vukan ninkovic@uns.ac.rs	RS	
94	Oestges, Claude claude.oestges@uclouvain.be	BE	
95	Orozco, Luis luis.orozco@uclm.es	ES	
96	Ortiz, Flor flor.ortiz@uni.lu	LU	
97	Otero Martinez, Javier jotero@tsc.uc3m.es	ES	
98	Ozdemir, Mehmet Kemal mkozdemir@medipol.edu.tr	TR	
99	Papaj, Ján jan.papaj@tuke.sk	SK	
100	Pasic, Faruk faruk.pasic@tuwien.ac.at	AT	
101	Pedersen, Troels troels@es.aau.dk	DK	

Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
102	Pejanovic-Djurisic, Milica milica@ucg.ac.me	ME	
103	Peschiera, Emanuele emanuele.peschiera@kuleuven.be	BE	
104	Plets, David david.plets@ugent.be	BE	
105	Radovic, Danilo danilo.radovic@tuwien.ac.at	AT	
106	Radpour, Hamed radpour.hamed@gmail.com	AT	
107	Rainer, Benjamin benjamin.rainer@ait.ac.at	AT	
108	Raja Kumar, Dheeraj drajakumar@cttc.es	ES	
109	Rajchowski, Piotr piorajch@eti.pg.edu.pl	PL	
110	Reig, Juan jreigp@dcom.upv.es	ES	
111	Rudd, Richard richard.rudd@plumconsulting.co.uk	UK	
112	Ruiz Boqué, Silvia silvia.ruiz@upc.edu	ES	
113	Rumney, Moray moray@rumneytelecom.com	UK	
114	Salous, Sana sana.salous@durham.ac.uk	UK	
115	Samara, Lutfi lutfiz.samara@huawei.com	CN	
116	Saratti, Flaminia flaminia.saratti@unibo.it	IT	

Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
117	Sarrazin, Julien julien.sarrazin@sorbonne-universite.fr	FR	
118	Sayrafian, Kamran kamran.sayrafian@nist.gov	US	
119	Schiffarth, Anna-Malin schiffarth@ihf.rwth-aachen.de	DE	
120	Schneider, Christian christian.schneider@tu-ilmenau.de	DE	
121	Shah, Syed Najaf Haider syed-najaf-haider.shah@tu-ilmenau.de	DE	
122	Skachek, Vitaly vitaly.skachek@gmail.com	EE	
123	Skocaj, Marco marco.skocaj@unibo.it	IT	
124	Skoric, Tamara tamara.ceranic@gmail.com	RS	
125	Skos, Krzysztof krzysztof.skos@gmail.com	PL	
126	Skrivervik, Anja anja.skrivervik@epfl.ch	CH	
127	Smeenk, Carsten carsten.smeenk@iis.fraunhofer.de	DE	
128	Sommerkorn, Gerd som@tu-ilmenau.de	DE	
129	Spagnolini, Umberto Umberto.Spagnolini@polimi.it	IT	
130	Steinboeck, Gerhard Gerhard.steinbock@ericsson.com	SE	
131	Stojkoska, Biljana biljanastojkoska@yahoo.com	MK	

Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
132	Sykora, Jan jan.sykora@fel.cvut.cz	CZ	
133	Taramit, Hamid hamid.taramit@alu.uclm.es	ES	
134	TESFAY, Angesom angesom.tesfay@imt-nord-europe.fr	FR	
135	Thomä, Reiner reiner.thomae@tu-ilmenau.de	DE	
136	Timcenko, Valentina valentina.timcenko@pupin.rs	RS	
137	Tonyali, Samet samettonyali29@gmail.com	TR	
138	Torres, Renato rbtorres93@gmail.com	ES	
139	Torrico, Saul storrico@gwu.edu	US	
140	Vassiliou, Vasos vasosv@ucy.ac.cy	CY	
141	VELEZ, Fernando José fjv@ubi.pt	PT	
142	Verdone, Roberto roberto.verdone@unibo.it	IT	
143	Villemaud, Guillaume guillaume.villemaud@insa-lyon.fr	FR	
144	Vitucci, Enrico Maria enricomaria.vitucci@unibo.it	IT	
145	Wagen, Jean Frederic jfowagen@gmail.com	CH	
146	Wilding, Thomas thomas.wilding@tugraz.at	AT	

Other - Other COST relevant meeting - Training Day (Start Date: 2023-05-22 End Date: 2023-05-22)

Nr	Participant	Country	Signature
147	Witrisal, Klaus witrisal@tugraz.at	AT	
148	Yuan, Zhiqiang zhyu@es.aau.dk	DK	
149	Zammit, Joseph A. joseph.a.zammit@mcast.edu.mt	MT	
150	Zanaj, Elma ezanaj@fti.edu.al	AL	
151	Zentner, Radovan radovan.zentner@fer.hr	HR	
152	Zeydan, Engin engin.zeydan@cttc.cat	n/a	
153	Zhang, Haibin haibin.zhang@tno.nl	NL	
154	Zhang, Peize peize.zhang@oulu.fi	FI	
155	Ziganshin, Ainur ainur.ziganshin@tu-ilmenau.de	DE	
156	Cardona, Narcis ncardona@upv.es	ES	
157			
158			
159			
160			

Country Codes: Albania (AL), Austria (AT), Belgium (BE), Bosnia and Herzegovina (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Iceland (IS), Ireland (IE), Israel (IL), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT),

Montenegro (ME), The Netherlands (NL), the North Republic of Macedonia (MK), Norway (NO), Poland (PL), Portugal (PT), The Republic of Moldova (MD), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), United Kingdom (UK).

Meeting Secretary

(Chair or local organiser)

Name + signature

MEETING ATTENDANCE LIST (MANAGEMENT COMMITTEE MEETING - 2023-05-23)

The attendance list provides the names of the participants who confirmed attendance via their personal e-COST invitation link.

Meeting Title: 5th MC and Technical Meeting	
Meeting Reference: E-COST-MEETING-CA20120-230523-2fc26c65	**Action Number: CA20120**
Meeting Administrator: Flaminia Saratti	**E-mail: flaminia.saratti@unibo.it**

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
1	Aleksiejūnas, Rimvydas rimvydas.aleksiejunas@ff.vu.lt	LT	
2	ARSLAN, Hüseyin arslan.usf@gmail.com	TR	
3	Bajić, Dragana dragana.bajic@gmail.com	RS	
4	Berbakov, Lazar lazar.berbakov@pupin.rs	RS	
5	Bota, Vasile Vasile.Bota@com.utcluj.ro	RO	
6	Brennan, Conor conor.brennan@dcu.ie	IE	
7	Buratti, Chiara c.buratti@unibo.it	IT	
8	Burr, Alister alister.burr@york.ac.uk	UK	
9	Chatzimisios, Periklis pchatzimisios@ihu.gr	EL	
10	Chatzinotas, Symeon schatzin@ieee.org	LU	
11	Clavier, Laurent laurent.clavier@imt-nord-europe.fr	FR	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
12	Correia, Luis M luis.m.correia@tecnico.ulisboa.pt	PT	
13	Cwalina, Krzysztof kkcwalina@eti.pg.edu.pl	PL	
14	Czylwik, Andreas czylwik@nts.uni-duisburg-essen.de	DE	
15	Deruyck, Margot margot.deruyck@ugent.be	BE	
16	Dittmann, Lars ld@com.dtu.dk	DK	
17	Ekman, Torbjörn torbjorn.ekman@ntnu.no	NO	
18	Gaillot, Davy davy.gaillot@univ-lille.fr	FR	
19	Garcia-Pardo, Concepcion cgpardo@iteam.upv.es	ES	
20	Gardasevic, Gordana gordana.gardasevic@etf.unibl.org	BA	
21	Haddad, Yoram haddad@g.jct.ac.il	IL	
22	Haneda, Katsuyuki katsuyuki.haneda@aalto.fi	FI	
23	Horvath, Balint horvath.balint@vik.bme.hu	HU	
24	Hristov, Atanas atanas.hristov@uist.edu.mk	MK	
25	Ivashina, Marianna marianna.ivashina@chalmers.se	SE	
26	Katzis, Konstantinos K.Katzis@euc.ac.cy	CY	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
27	Kocan, Enis enisk@ucg.ac.me	ME	
28	Kułakowski, Paweł kulakowski@agh.edu.pl	PL	
29	Kürner, Thomas kuerner@ifn.ing.tu-bs.de	DE	
30	Lager, Ioan Ernest i.e.lager@tudelft.nl	NL	
31	Lagunas, Eva eva.lagunas@uni.lu	LU	
32	Lehne, Per Hjalmar per-hjalmar.lehne@telenor.com	NO	
33	Liotou, Eirini eirini.liotou@iccs.gr	EL	
34	Lipovac, Adriana adriana.lipovac@unidu.hr	HR	
35	Machaj, Juraj juraj.machaj@feit.uniza.sk	SK	
36	Marsalek, Roman marsaler@vut.cz	CZ	
37	Mikhaylov, Konstantin konstantin.mikhaylov@oulu.fi	FI	
38	Mlinar, Tomi tomi.mlinar@fe.uni-lj.si	SI	
39	Molina-Garcia-Pardo, Jose-Maria josemaria.molina@upct.es	ES	
40	Oestges, Claude claude.oestges@uclouvain.be	BE	
41	Ortiz, Flor flor.ortiz@uni.lu	LU	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
42	Ozdemir, Mehmet Kemal mkozdemir@medipol.edu.tr	TR	
43	Papaj, Ján jan.papaj@tuke.sk	SK	
44	Pedersen, Troels troels@es.aau.dk	DK	
45	Pejanovic-Djurisic, Milica milica@ucg.ac.me	ME	
46	Rainer, Benjamin benjamin.rainer@ait.ac.at	AT	
47	Salous, Sana sana.salous@durham.ac.uk	UK	
48	Saratti, Flaminia flaminia.saratti@unibo.it	IT	
49	Sarrazin, Julien julien.sarrazin@sorbonne-universite.fr	FR	
50	Skachek, Vitaly vitaly.skachek@gmail.com	EE	
51	Skrivervik, Anja anja.skrivervik@epfl.ch	CH	
52	Stojkoska, Biljana biljanastojkoska@yahoo.com	MK	
53	Sykora, Jan jan.sykora@fel.cvut.cz	CZ	
54	Timcenko, Valentina valentina.timcenko@pupin.rs	RS	
55	Vassiliou, Vasos vasosv@ucy.ac.cy	CY	
56	VELEZ, Fernando José fjv@ubi.pt	PT	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
57	Verdone, Roberto roberto.verdone@unibo.it	IT	
58	Villemaud, Guillaume guillaume.villemaud@insa-lyon.fr	FR	
59	Wagen, Jean Frederic jfowagen@gmail.com	CH	
60	Wilding, Thomas thomas.wilding@tugraz.at	AT	
61	Zammit, Joseph A. joseph.a.zammit@mcast.edu.mt	MT	
62	Zanaj, Elma ezanaj@fti.edu.al	AL	
63	Zentner, Radovan radovan.zentner@fer.hr	HR	
64	Zhang, Haibin haibin.zhang@tno.nl	NL	
65	CAVALIERO SARA		
66			
67			
68	CARDONA, NARCIS	ES	
69			

Country Codes: Albania (AL), Austria (AT), Belgium (BE), Bosnia and Herzegovina (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Iceland (IS), Ireland (IE), Israel (IL), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Montenegro (ME), The Netherlands (NL), the North Republic of Macedonia (MK), Norway (NO), Poland (PL), Portugal (PT), The Republic of Moldova (MD), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), United Kingdom (UK).

This information is collected for the purpose of checking eligibility for reimbursement of your expenses under the COST Annotated-Rules-for-COST-Actions-Level-C and, when the meeting takes place in COST premises, for safety purposes in compliance with our legal obligations under Belgian Law. It will be kept for the duration of COST audit obligations as mentioned in the privacy notice for e-COST. It won't be transferred to any third party except in case of use for safety purposes where it will be transferred to the landlord of the premises and emergency services.

Meeting Secretary

(Chair or local organiser)

Name + signature

MEETING ATTENDANCE LIST (MANAGEMENT COMMITTEE MEETING - 2023-05-24)

The attendance list provides the names of the participants who confirmed attendance via their personal e-COST invitation link.

Meeting Title: 5th MC and Technical Meeting	
Meeting Reference: E-COST-MEETING-CA20120-230523-2fc26c65	**Action Number: CA20120**
Meeting Administrator: Flaminia Saratti	**E-mail: flaminia.saratti@unibo.it**

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
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3	Bajić, Dragana dragana.bajic@gmail.com	RS	
4	Berbakov, Lazar lazar.berbakov@pupin.rs	RS	
5	Bota, Vasile Vasile.Bota@com.utcluj.ro	RO	
6	Brennan, Conor conor.brennan@dcu.ie	IE	
7	Buratti, Chiara c.buratti@unibo.it	IT	
8	Burr, Alister alister.burr@york.ac.uk	UK	
9	Chatzimisios, Periklis pchatzimisios@ihu.gr	EL	
10	Chatzinotas, Symeon schatzin@ieee.org	LU	
11	Clavier, Laurent laurent.clavier@imt-nord-europe.fr	FR	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
12	Correia, Luis M luis.m.correia@tecnico.ulisboa.pt	PT	
13	Cwalina, Krzysztof kkcwalina@eti.pg.edu.pl	PL	
14	Czylwik, Andreas czylwik@nts.uni-duisburg-essen.de	DE	
15	Deruyck, Margot margot.deruyck@ugent.be	BE	
16	Dittmann, Lars ld@com.dtu.dk	DK	
17	Ekman, Torbjörn torbjorn.ekman@ntnu.no	NO	
18	Gaillot, Davy davy.gaillot@univ-lille.fr	FR	
19	Garcia-Pardo, Concepcion cgpardo@iteam.upv.es	ES	
20	Gardasevic, Gordana gordana.gardasevic@etf.unibl.org	BA	
21	Haddad, Yoram haddad@g.jct.ac.il	IL	
22	Haneda, Katsuyuki katsuyuki.haneda@aalto.fi	FI	
23	Horvath, Balint horvath.balint@vik.bme.hu	HU	
24	Hristov, Atanas atanas.hristov@uist.edu.mk	MK	
25	Ivashina, Marianna marianna.ivashina@chalmers.se	SE	
26	Katzis, Konstantinos K.Katzis@euc.ac.cy	CY	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
27	Kocan, Enis enisk@ucg.ac.me	ME	
28	Kułakowski, Paweł kulakowski@agh.edu.pl	PL	
29	Kürner, Thomas kuerner@ifn.ing.tu-bs.de	DE	
30	Lager, Ioan Ernest i.e.lager@tudelft.nl	NL	
31	Lagunas, Eva eva.lagunas@uni.lu	LU	
32	Lehne, Per Hjalmar per-hjalmar.lehne@telenor.com	NO	
33	Liotou, Eirini eirini.liotou@iccs.gr	EL	
34	Lipovac, Adriana adriana.lipovac@unidu.hr	HR	
35	Machaj, Juraj juraj.machaj@feit.uniza.sk	SK	
36	Marsalek, Roman marsaler@vut.cz	CZ	
37	Mikhaylov, Konstantin konstantin.mikhaylov@oulu.fi	FI	
38	Mlinar, Tomi tomi.mlinar@fe.uni-lj.si	SI	
39	Molina-Garcia-Pardo, Jose-Maria josemaria.molina@upct.es	ES	
40	Oestges, Claude claude.oestges@uclouvain.be	BE	
41	Ortiz, Flor flor.ortiz@uni.lu	LU	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
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43	Papaj, Ján jan.papaj@tuke.sk	SK	
44	Pedersen, Troels troels@es.aau.dk	DK	
45	Pejanovic-Djurisic, Milica milica@ucg.ac.me	ME	
46	Rainer, Benjamin benjamin.rainer@ait.ac.at	AT	
47	Salous, Sana sana.salous@durham.ac.uk	UK	
48	Saratti, Flaminia flaminia.saratti@unibo.it	IT	
49	Sarrazin, Julien julien.sarrazin@sorbonne-universite.fr	FR	
50	Skachek, Vitaly vitaly.skachek@gmail.com	EE	
51	Skrivervik, Anja anja.skrivervik@epfl.ch	CH	
52	Stojkoska, Biljana biljanastojkoska@yahoo.com	MK	
53	Sykora, Jan jan.sykora@fel.cvut.cz	CZ	
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55	Vassiliou, Vasos vasosv@ucy.ac.cy	CY	
56	VELEZ, Fernando José fjv@ubi.pt	PT	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
57	Verdone, Roberto roberto.verdone@unibo.it	IT	
58	Villemaud, Guillaume guillaume.villemaud@insa-lyon.fr	FR	
59	Wagen, Jean Frederic jfowagen@gmail.com	CH	
60	Wilding, Thomas thomas.wilding@tugraz.at	AT	
61	Zammit, Joseph A. joseph.a.zammit@mcast.edu.mt	MT	
62	Zanaj, Elma ezanaj@fti.edu.al	AL	
63	Zentner, Radovan radovan.zentner@fer.hr	HR	
64	Zhang, Haibin haibin.zhang@tno.nl	NL	
65	CARDONA, NARCÍS ncardona@upv.es	ES	
66	CAVALIERO SARA CNIT	IT	
67			
68			
69			

Country Codes: Albania (AL), Austria (AT), Belgium (BE), Bosnia and Herzegovina (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Iceland (IS), Ireland (IE), Israel (IL), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Montenegro (ME), The Netherlands (NL), the North Republic of Macedonia (MK), Norway (NO), Poland (PL), Portugal (PT), The Republic of Moldova (MD), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), United Kingdom (UK).

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Meeting Secretary

(Chair or local organiser)

Name + signature

MEETING ATTENDANCE LIST (MANAGEMENT COMMITTEE MEETING - 2023-05-25)

The attendance list provides the names of the participants who confirmed attendance via their personal e-COST invitation link.

Meeting Title: 5th MC and Technical Meeting	
Meeting Reference: E-COST-MEETING-CA20120-230523-2fc26c65	**Action Number: CA20120**
Meeting Administrator: Flaminia Saratti	**E-mail: flaminia.saratti@unibo.it**

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
1	Aleksiejūnas, Rimvydas rimvydas.aleksiejunas@ff.vu.lt	LT	
2	ARSLAN, Hüseyin arslan.usf@gmail.com	TR	
3	Bajić, Dragana dragana.bajic@gmail.com	RS	
4	Berbakov, Lazar lazar.berbakov@pupin.rs	RS	
5	Bota, Vasile Vasile.Bota@com.utcluj.ro	RO	
6	Brennan, Conor conor.brennan@dcu.ie	IE	
7	Buratti, Chiara c.buratti@unibo.it	IT	
8	Burr, Alister alister.burr@york.ac.uk	UK	
9	Chatzimisios, Periklis pchatzimisios@ihu.gr	EL	
10	Chatzinotas, Symeon schatzin@ieee.org	LU	
11	Clavier, Laurent laurent.clavier@imt-nord-europe.fr	FR	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
12	Correia, Luis M luis.m.correia@tecnico.ulisboa.pt	PT	
13	Cwalina, Krzysztof kkcwalina@eti.pg.edu.pl	PL	
14	Czylwik, Andreas czylwik@nts.uni-duisburg-essen.de	DE	
15	Deruyck, Margot margot.deruyck@ugent.be	BE	
16	Dittmann, Lars ld@com.dtu.dk	DK	
17	Ekman, Torbjörn torbjorn.ekman@ntnu.no	NO	
18	Gaillot, Davy davy.gaillot@univ-lille.fr	FR	
19	Garcia-Pardo, Concepcion cgpardo@iteam.upv.es	ES	
20	Gardasevic, Gordana gordana.gardasevic@etf.unibl.org	BA	
21	Haddad, Yoram haddad@g.jct.ac.il	IL	
22	Haneda, Katsuyuki katsuyuki.haneda@aalto.fi	FI	
23	Horvath, Balint horvath.balint@vik.bme.hu	HU	
24	Hristov, Atanas atanas.hristov@uist.edu.mk	MK	
25	Ivashina, Marianna marianna.ivashina@chalmers.se	SE	
26	Katzis, Konstantinos K.Katzis@euc.ac.cy	CY	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
27	Kocan, Enis enisk@ucg.ac.me	ME	
28	Kułakowski, Paweł kulakowski@agh.edu.pl	PL	
29	Kürner, Thomas kuerner@ifn.ing.tu-bs.de	DE	
30	Lager, Ioan Ernest i.e.lager@tudelft.nl	NL	
31	Lagunas, Eva eva.lagunas@uni.lu	LU	
32	Lehne, Per Hjalmar per-hjalmar.lehne@telenor.com	NO	
33	Liotou, Eirini eirini.liotou@iccs.gr	EL	
34	Lipovac, Adriana adriana.lipovac@unidu.hr	HR	
35	Machaj, Juraj juraj.machaj@feit.uniza.sk	SK	
36	Marsalek, Roman marsaler@vut.cz	CZ	
37	Mikhaylov, Konstantin konstantin.mikhaylov@oulu.fi	FI	
38	Mlinar, Tomi tomi.mlinar@fe.uni-lj.si	SI	
39	Molina-Garcia-Pardo, Jose-Maria josemaria.molina@upct.es	ES	
40	Oestges, Claude claude.oestges@uclouvain.be	BE	
41	Ortiz, Flor flor.ortiz@uni.lu	LU	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
42	Ozdemir, Mehmet Kemal mkozdemir@medipol.edu.tr	TR	
43	Papaj, Ján jan.papaj@tuke.sk	SK	
44	Pedersen, Troels troels@es.aau.dk	DK	
45	Pejanovic-Djurisic, Milica milica@ucg.ac.me	ME	
46	Rainer, Benjamin benjamin.rainer@ait.ac.at	AT	
47	Salous, Sana sana.salous@durham.ac.uk	UK	
48	Saratti, Flaminia flaminia.saratti@unibo.it	IT	
49	Sarrazin, Julien julien.sarrazin@sorbonne-universite.fr	FR	
50	Skachek, Vitaly vitaly.skachek@gmail.com	EE	
51	Skrivervik, Anja anja.skrivervik@epfl.ch	CH	
52	Stojkoska, Biljana biljanastojkoska@yahoo.com	MK	
53	Sykora, Jan jan.sykora@fel.cvut.cz	CZ	
54	Timcenko, Valentina valentina.timcenko@pupin.rs	RS	
55	Vassiliou, Vasos vasosv@ucy.ac.cy	CY	
56	VELEZ, Fernando José fjv@ubi.pt	PT	

Management Committee - Management Committee Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
57	Verdone, Roberto roberto.verdone@unibo.it	IT	
58	Villemaud, Guillaume guillaume.villemaud@insa-lyon.fr	FR	
59	Wagen, Jean Frederic jfowagen@gmail.com	CH	
60	Wilding, Thomas thomas.wilding@tugraz.at	AT	
61	Zammit, Joseph A. joseph.a.zammit@mcast.edu.mt	MT	
62	Zanaj, Elma ezanaj@fti.edu.al	AL	
63	Zentner, Radovan radovan.zentner@fer.hr	HR	
64	Zhang, Haibin haibin.zhang@tno.nl	NL	
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69			

Country Codes: Albania (AL), Austria (AT), Belgium (BE), Bosnia and Herzegovina (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Iceland (IS), Ireland (IE), Israel (IL), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Montenegro (ME), The Netherlands (NL), the North Republic of Macedonia (MK), Norway (NO), Poland (PL), Portugal (PT), The Republic of Moldova (MD), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), United Kingdom (UK).

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Meeting Secretary

(Chair or local organiser)

Name + signature

MEETING ATTENDANCE LIST (WORKING GROUP MEETING - 2023-05-23)

The attendance list provides the names of the participants who confirmed attendance via their personal e-COST invitation link.

Meeting Title: 5th MC and Technical Meeting	
Meeting Reference: E-COST-MEETING-CA20120-230523-2fc26c65	**Action Number: CA20120**
Meeting Administrator: Flaminia Saratti	**E-mail: flaminia.saratti@unibo.it**

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
1	Agustin, Adrian adrian.agustin@cttc.cat	ES	
2	ahmadi, hamed hamed.ahmadi@ucd.ie	UK	
3	Ali, Mohsin engineermohsinali@gmail.com	PK	
4	Amay, Marc Jovan marc.amay@cttc.es	ES	
5	Anton-Haro, Carles carles.anton@cttc.es	ES	
6	Bas, Joan joan.bas@cttc.es	ES	
7	Blazek, Thomas thomas.blazek@silicon-austria.com	AT	
8	Boban, Mate mate.boban@huawei.com	DE	
9	Brown, Tim t.brown@surrey.ac.uk	UK	
10	Cichoń, Krzysztof krzysztof.cichon@put.poznan.pl	PL	
11	Conserva, Francesca francesca.conserva@unibo.it	IT	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
12	Csatho, Botond Tamas csatho.botond@edu.bme.hu	HU	
13	Czapiewska, Agnieszka agnieszka.czapiewska@pg.edu.pl	PL	
14	d'Orey, Pedro pdorey@fe.up.pt	PT	
15	Dakic, Anja anja.dakic@ait.ac.at	AT	
16	Das, Kallol kallol.das@tno.nl	NL	
17	De Saint Moulin, François francois.desaintmoulin@uclouvain.be	BE	
18	Degli-Esposti, Vittorio v.degliesposti@unibo.it	IT	
19	Di Renzo, Marco marco.di-renzo@universite-paris-saclay.fr	FR	
20	Drozdowska, Monika mdrozdo@upv.edu.es	ES	
21	Dupleich, Diego diego-andres.dupleich@tu-ilmenau.de	DE	
22	Ebert, Alexander alexander.ebert@tu-ilmenau.de	DE	
23	Fan, Wei wfa@es.aau.dk	DK	
24	Fontanesi, Gianluca fontanesi.gianluca@outlook.com	LU	
25	Fuchs, Andreas afuchs@tugraz.at	AT	
26	Garcia Armada, Ana agarcia@tsc.uc3m.es	ES	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
27	Ghiaasi, Golsa golsa.ghiaasi@silicon-austria.com	AT	
28	Gijon Martin, Carolina cgm@ic.uma.es	ES	
29	Guan, Ke kguan@bjtu.edu.cn	CN	
30	Hannotier, Cédric cedric.hannotier@ulb.be	BE	
31	Hofer, Markus markus.hofer@ait.ac.at	AT	
32	Iradier, Eneko eneko.iradier@ehu.eus	ES	
33	Joseph, Wout wout.joseph@ugent.be	BE	
34	Kang, CheChia kang.c.aa@m.titech.ac.jp	JP	CHECHIA KANG
35	Keerativoranan, Nopphon nopphon.keerativoranan@ap.ide.titech.ac.jp	JP	KEERATIVORANAN NOPPHON
36	Kliks, Adrian adrian.kliks@put.poznan.pl	PL	
37	Kodra, Silvi silvi.kodra2@unibo.it	IT	
38	Kokkoniemi, Joonas joonas.kokkoniemi@oulu.fi	FI	
39	Larsson, Christina christina.c.larsson@ericsson.com	SE	
40	Linsalata, Francesco francesco.linsalata@polimi.it	IT	
41	Lozano, Angel angel.lozano@upf.edu	n/a	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
42	Magarini, Maurizio maurizio.magarini@polimi.it	IT	
43	Mallik, Mohammed mohammed.mallik.etu@univ-lille.fr	FR	
44	Manzoor, Hira hira.manzoor@pg.edu.pl	PL	
45	Maret, Yann yann.maret@hefr.ch	CH	
46	Martin-Vega, Francisco J. fjmvega@ic.uma.es	ES	
47	Medda, Daniele dmedda@ihu.edu.gr	EL	
48	Méndez-Monsanto Suárez, Lianet 100384026@alumnos.uc3m.es	ES	
49	Mestre, Xavier xavier.mestre@cttc.cat	ES	
50	Miao, Yang y.miao@utwente.nl	NL	
51	Muzaffar, Raheeb raheeb.muzaffar@silicon-austria.com	AT	
52	Navarro, Andres anavarro@icesi.edu.co	CO	
53	NGOM, Mamadou grandngom606@gmail.com	FR	
54	Ninkovic, Vukan ninkovic@uns.ac.rs	RS	
55	Orozco, Luis luis.orozco@uclm.es	ES	
56	Otero Martinez, Javier jotero@tsc.uc3m.es	ES	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
57	Pasic, Faruk faruk.pasic@tuwien.ac.at	AT	
58	Peschiera, Emanuele emanuele.peschiera@kuleuven.be	BE	
59	Plets, David david.plets@ugent.be	BE	
60	Radovic, Danilo danilo.radovic@tuwien.ac.at	AT	
61	Radpour, Hamed radpour.hamed@gmail.com	AT	
62	Raja Kumar, Dheeraj drajakumar@cttc.es	ES	
63	Rajchowski, Piotr piorajch@eti.pg.edu.pl	PL	
64	Reig, Juan jreigp@dcom.upv.es	ES	
65	Rudd, Richard richard.rudd@plumconsulting.co.uk	UK	
66	Ruiz Boqué, Silvia silvia.ruiz@upc.edu	ES	
67	Rumney, Moray moray@rumneytelecom.com	UK	
68	Samara, Lutfi lutfiz.samara@huawei.com	CN	
69	Sayrafian, Kamran kamran.sayrafian@nist.gov	US	
70	Schiffarth, Anna-Malin schiffarth@ihf.rwth-aachen.de	DE	
71	Schneider, Christian christian.schneider@tu-ilmenau.de	DE	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
72	Shah, Syed Najaf Haider syed-najaf-haider.shah@tu-ilmenau.de	DE	
73	Skocaj, Marco marco.skocaj@unibo.it	IT	
74	Skoric, Tamara tamara.ceranic@gmail.com	RS	
75	Skos, Krzysztof krzysztof.skos@gmail.com	PL	
76	Smeenk, Carsten carsten.smeenk@iis.fraunhofer.de	DE	
77	Sommerkorn, Gerd som@tu-ilmenau.de	DE	
78	Spagnolini, Umberto Umberto.Spagnolini@polimi.it	IT	
79	Steinboeck, Gerhard Gerhard.steinbock@ericsson.com	SE	
80	Taramit, Hamid hamid.taramit@alu.uclm.es	ES	
81	TESFAY, Angesom angesom.tesfay@imt-nord-europe.fr	FR	
82	Thomä, Reiner reiner.thomae@tu-ilmenau.de	DE	
83	Tonyali, Samet samettonyali29@gmail.com	TR	
84	Torres, Renato rbtorres93@gmail.com	ES	
85	Torrico, Saul storrico@gwu.edu	US	
86	Vitucci, Enrico Maria enricomaria.vitucci@unibo.it	IT	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
87	Witrisal, Klaus witrisal@tugraz.at	AT	
88	Yuan, Zhiqiang zhyu@es.aau.dk	DK	
89	Zhang, Peize peize.zhang@oulu.fi	FI	
90	Ziganshin, Ainur ainur.ziganshin@tu-ilmenau.de	DE	
91	CARDONA, NARCÍS ncardona@upv.es	ES	
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95			

Country Codes: Albania (AL), Austria (AT), Belgium (BE), Bosnia and Herzegovina (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Iceland (IS), Ireland (IE), Israel (IL), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Montenegro (ME), The Netherlands (NL), the North Republic of Macedonia (MK), Norway (NO), Poland (PL), Portugal (PT), The Republic of Moldova (MD), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), United Kingdom (UK).

Meeting Secretary

(Chair or local organiser)

Name + signature

MEETING ATTENDANCE LIST (WORKING GROUP MEETING - 2023-05-24)

The attendance list provides the names of the participants who confirmed attendance via their personal e-COST invitation link.

Meeting Title: 5th MC and Technical Meeting	
Meeting Reference: E-COST-MEETING-CA20120-230523-2fc26c65	**Action Number: CA20120**
Meeting Administrator: Flaminia Saratti	**E-mail: flaminia.saratti@unibo.it**

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
1	Agustin, Adrian adrian.agustin@cttc.cat	ES	
2	ahmadi, hamed hamed.ahmadi@ucd.ie	UK	
3	Ali, Mohsin engineermohsinali@gmail.com	PK	
4	Amay, Marc Jovan marc.amay@cttc.es	ES	
5	Anton-Haro, Carles carles.anton@cttc.es	ES	
6	Bas, Joan joan.bas@cttc.es	ES	
7	Blazek, Thomas thomas.blazek@silicon-austria.com	AT	
8	Boban, Mate mate.boban@huawei.com	DE	
9	Brown, Tim t.brown@surrey.ac.uk	UK	
10	Cichoń, Krzysztof krzysztof.cichon@put.poznan.pl	PL	
11	Conserva, Francesca francesca.conserva@unibo.it	IT	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
12	Csatho, Botond Tamas csatho.botond@edu.bme.hu	HU	
13	Czapiewska, Agnieszka agnieszka.czapiewska@pg.edu.pl	PL	
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16	Das, Kallol kallol.das@tno.nl	NL	
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18	Degli-Esposti, Vittorio v.degliesposti@unibo.it	IT	
19	Di Renzo, Marco marco.di-renzo@universite-paris-saclay.fr	FR	
20	Drozdowska, Monika mdrozdo@upv.edu.es	ES	
21	Dupleich, Diego diego-andres.dupleich@tu-ilmenau.de	DE	
22	Ebert, Alexander alexander.ebert@tu-ilmenau.de	DE	
23	Fan, Wei wfa@es.aau.dk	DK	
24	Fontanesi, Gianluca fontanesi.gianluca@outlook.com	LU	
25	Fuchs, Andreas afuchs@tugraz.at	AT	
26	Garcia Armada, Ana agarcia@tsc.uc3m.es	ES	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
27	Ghiaasi, Golsa golsa.ghiaasi@silicon-austria.com	AT	
28	Gijon Martin, Carolina cgm@ic.uma.es	ES	
29	Guan, Ke kguan@bjtu.edu.cn	CN	
30	Hannotier, Cédric cedric.hannotier@ulb.be	BE	
31	Hofer, Markus markus.hofer@ait.ac.at	AT	
32	Iradier, Eneko eneko.iradier@ehu.eus	ES	
33	Joseph, Wout wout.joseph@ugent.be	BE	
34	Kang, CheChia kang.c.aa@m.titech.ac.jp	JP	
35	Keerativoranan, Nopphon nopphon.keerativoranan@ap.ide.titech.ac.jp	JP	
36	Kliks, Adrian adrian.kliks@put.poznan.pl	PL	
37	Kodra, Silvi silvi.kodra2@unibo.it	IT	
38	Kokkoniemi, Joonas joonas.kokkoniemi@oulu.fi	FI	
39	Larsson, Christina christina.c.larsson@ericsson.com	SE	
40	Linsalata, Francesco francesco.linsalata@polimi.it	IT	
41	Lozano, Angel angel.lozano@upf.edu	n/a	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
42	Magarini, Maurizio maurizio.magarini@polimi.it	IT	
43	Mallik, Mohammed mohammed.mallik.etu@univ-lille.fr	FR	
44	Manzoor, Hira hira.manzoor@pg.edu.pl	PL	
45	Maret, Yann yann.maret@hefr.ch	CH	
46	Martin-Vega, Francisco J. fjmvega@ic.uma.es	ES	
47	Medda, Daniele dmedda@ihu.edu.gr	EL	
48	Méndez-Monsanto Suárez, Lianet 100384026@alumnos.uc3m.es	ES	
49	Mestre, Xavier xavier.mestre@cttc.cat	ES	
50	Miao, Yang y.miao@utwente.nl	NL	
51	Muzaffar, Raheeb raheeb.muzaffar@silicon-austria.com	AT	
52	Navarro, Andres anavarro@icesi.edu.co	CO	
53	NGOM, Mamadou grandngom606@gmail.com	FR	
54	Ninkovic, Vukan ninkovic@uns.ac.rs	RS	
55	Orozco, Luis luis.orozco@uclm.es	ES	
56	Otero Martinez, Javier jotero@tsc.uc3m.es	ES	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
57	Pasic, Faruk faruk.pasic@tuwien.ac.at	AT	
58	Peschiera, Emanuele emanuele.peschiera@kuleuven.be	BE	
59	Plets, David david.plets@ugent.be	BE	
60	Radovic, Danilo danilo.radovic@tuwien.ac.at	AT	
61	Radpour, Hamed radpour.hamed@gmail.com	AT	
62	Raja Kumar, Dheeraj drajakumar@cttc.es	ES	
63	Rajchowski, Piotr piorajch@eti.pg.edu.pl	PL	
64	Reig, Juan jreigp@dcom.upv.es	ES	
65	Rudd, Richard richard.rudd@plumconsulting.co.uk	UK	
66	Ruiz Boqué, Silvia silvia.ruiz@upc.edu	ES	
67	Rumney, Moray moray@rumneytelecom.com	UK	
68	Samara, Lutfi lutfiz.samara@huawei.com	CN	
69	Sayrafian, Kamran kamran.sayrafian@nist.gov	US	
70	Schiffarth, Anna-Malin schiffarth@ihf.rwth-aachen.de	DE	
71	Schneider, Christian christian.schneider@tu-ilmenau.de	DE	

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

Nr	Participant	Country	Signature
72	Shah, Syed Najaf Haider syed-najaf-haider.shah@tu-ilmenau.de	DE	
73	Skocaj, Marco marco.skocaj@unibo.it	IT	
74	Skoric, Tamara tamara.ceranic@gmail.com	RS	
75	Skos, Krzysztof krzysztof.skos@gmail.com	PL	
76	Smeenk, Carsten carsten.smeenk@iis.fraunhofer.de	DE	
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Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

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Country Codes: Albania (AL), Austria (AT), Belgium (BE), Bosnia and Herzegovina (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Iceland (IS), Ireland (IE), Israel (IL), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Montenegro (ME), The Netherlands (NL), the North Republic of Macedonia (MK), Norway (NO), Poland (PL), Portugal (PT), The Republic of Moldova (MD), Romania (RO), Serbia (RS), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), Turkey (TR), United Kingdom (UK).

Meeting Secretary

(Chair or local organiser)

Name + signature

MEETING ATTENDANCE LIST (WORKING GROUP MEETING - 2023-05-25)

The attendance list provides the names of the participants who confirmed attendance via their personal e-COST invitation link.

Meeting Title: 5th MC and Technical Meeting	
Meeting Reference: E-COST-MEETING-CA20120-230523-2fc26c65	**Action Number: CA20120**
Meeting Administrator: Flaminia Saratti	**E-mail: flaminia.saratti@unibo.it**

Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

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Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

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Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

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Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

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Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

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Working Group - Working Group Meeting (Start Date: 2023-05-23 End Date: 2023-05-25)

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Meeting Secretary

(Chair or local organiser)

Name + signature

WG Co-Chair Contributions

WG1

During the Barcelona meeting WG1 had

- Three dedicated WG1 sessions, on measurements, modeling, and ray tracing
- Two shared sessions with VT2 on radio channels for vehicular communication
- One shared session with WG2 on performance evaluation
- One shared session with subWG EMF
- One shared session with subWG ISAC
- WG1-sourced keynote on ITU propagation models presented by R. Rudd

As the number of TDs in above session is large (30+), here are some trends we observed:

- The number of channel measurement TDs is increasing, with 10+ papers discussing measurements in mmWave/subTHz, with RIS, for ISAC, very large arrays, etc
- TDs are providing first complete solution for key channel modeling components (path loss, diffraction, RIS modeling)
- Research on vehicular channels remains strong
- Research on ISAC channels starting to pick up speed

In the WG1 discussion session, the following topics were discussed:

- WG1 White Paper: expected to be finished in July
- EuCAP 2024 COST INTERACT Convened Sessions: organizers for COST CS identified, several others announced
- ETSI ISG THz update: constant exchange between ISG-COST proposed
- Two workshops organized and related to WG1, at IEEE Meditcom and IEEE Globecom

WG2

There were 8 papers presented to WG2 alone, plus another 7 in joint sessions with SWG2 on ISAC and 4 jointly with WG1. Topics among the former group included novel codes, SIC for full duplex communications, effect of PA nonlinearities, interference in IoT networks, NOMA, and waveforms for 6G. Several issues of interest to WG2 also arose in the joint WG1 session (which was mainly related to sub-THz systems): notably the need for a realistic mapping function from SINR to rate, considering also relatively short codes, and also so-called “near-field MIMO”. In one of the ISAC sessions a discussion arose about what techniques qualify as ISAC – specifically, how integrated do the communications and sensing need to be?

We also had a discussion session jointly with the ISAC SWG, at which we mainly discussed preparations for the White Paper due in June 2024. We discussed potential topics across all three areas (physical layer, localisation, and ISAC), and obtained some volunteers to contribute, but agreed also to request further contributions via the reflector in advance of the next meeting in Poznan. By that meeting we hope to have

largely finalised the list of topics, and enlisted most of the contributors, so that we can have an early draft by the Lisbon meeting.

WG2 – ISAC

In this meeting, we had 8 TDs directly linked to ISAC. The TDs were scheduled in one pure ISAC session and two joint sessions together with localization topics, and channel topics.

In the pure ISAC session, we had very good and important discussions about possible future applications and concerns.

The topics covered by the TDs can be summarized in the following topics:

- Waveform design: OFDM/OTFS
- Time-frequency - array/beam Resource allocation
- Possible applications in 5G –NR (blockage prediction)
- Demonstrations of prototype and experiments
- ISAC Channel modeling/reflectivity models

In the Discussion session, we planned the WG2 whitepaper. Regarding ISAC, we agreed to write an ISAC section. We defined subsections based on topics covered in the past TDs. The next steps are to refinement topics and to find volunteers to contribute to the whitepaper. We also have plans for a magazine paper to summarize the ISAC contributions from both WG 1 and WG 2 white papers. Additionally, Yang and I planned to volunteer for the "propagation to ISAC Convened Session" at EuCAP 24 in cooperation with WG1.

VT1

During the INTERACT 5th MC and 5th Technical Meeting the VT1: Health and Well-Being held one session with 4 TDs. There were 12 on-site attendees and 3 on-line attendees. A summary of the presentations and discussion is provided in the following.

I. May 24th (09:00-10:30)

During the session four TDs (no. 4, 9, 41 and 54) were presented. In the first TD (no. 4), several low complexity filtering techniques in gait analysis using depth cameras have been compared. In particular, two algorithms have been selected and compared, in order to decide the most reliable choice for the gait variables extraction with high confidence. The authors concluded that both filtering methods (interpolation and mean average) produce similar results, and both are equally reliable. The second TD (no. 9) presented an overview of the MedSecurance Project: Advanced Security-for-Safety Assurance for Medical Device IoT (MIoT) This is an EU funded project focusing on identifying new challenges in the cyber security of hardware/software-based medical devices, especially in the context of emerging healthcare architectures. In the third TD (no. 41) a narrowband empirical system loss model for body-to-body networks operating at 2.45 GHz in indoor and outdoor environments has been proposed. The influence of the type of environment, antenna visibility and user mobility on the parameters of the model has been investigated. The significant impact of mutual antennas' placement and their visibility has also been shown. The authors of the last TD (no. 54) presented a new localization approach for in-body nano-machines based on magnetic

field. The approach takes advantage of the very good magnetic permeability of all human tissues. The TD describes the proposed localization system, starting from 10x10 μm^2 magnetometers to be integrated into the nano-machines, to a set of external wires generating the magnetic field. The results show a very good system accuracy with localization error even below 1 cm.

II. May 24th (16:00-17:30)

During the second session the VT1 discussion was held. The summary of the discussed topics is provided in the following.

1. Challenges

The challenges have been defined in TD(22)03070 "Technical Challenges in Vertical Team 1: Health & Well-Being" (meeting in Valencia). Five technical challenges have been identified as the baseline for VT1:

- Advanced Communications for Medical Implants, Wearables and Ingestible Implants
- Advanced Telemedicine including Remote Health and activity monitoring for diagnosis or rehabilitation
- Next Generation Technologies for Public Health and Emergencies
- Enhanced Privacy and Security in Health Data and patient safety
- Nano-Networks.

The above list captures the general technical challenges that are under discussion and research by VT1. The TDs that have already been presented by the participants in the past meetings of COST CA20120 are addressing some of the issues under these challenges. The technical topics in VT1 cover a wide spectrum of subjects; therefore, the challenges presented in this document is not meant to be an exhaustive list. Consequently, in the future, the content of this list is expected to evolve as more VT1 participants contribute their research ideas and results to the action and possibly new challenge areas are identified.

2. Training schools

a) Executed

- None

b) Planned

- None

VT1 members were asked to send information on planned or executed training schools to the VT1 Chairs.

3. Short Term Scientific Missions among participant institutions

a) Executed

- 26-30.09.2022, **UPV@PG**: "Measurements of the materials' properties (reflection and transmission losses) in classroom and meeting room environments at 26-65 GHz."

b) Planned

- 2024, **IPS@PG**: Radio channel measurements (including XPD) in public transport vehicles (buses, trams) at mmWaves

VT1 members were asked to send information on planned or executed STSMs to the VT1 Chairs.

4. Joint workshops and special sessions

a) Executed

- None.

b) Planned

- *IoT-Health 2023: 5th International Workshop on IoT Enabling Technologies in Healthcare* at IEEE International Conference on Communications, 28 May - 01 June 2023, Rome, Italy; Organizers: Kamran Sayrafian (NIST), Hamed Ahmadi (UOY), Konstantinos Katzis (EUC), Slawomir Ambroziak (PG)

- *COST CA20120 INTERACT: Measurement & Modelling of Radio Waves Propagation for Indoor Communications*, XXXVth General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS 2023), August 19 - 26 2023, Sapporo, Japan; Organizers: Slawomir Ambroziak (PG), Kamran Sayrafian (NIST).

VT1 members were asked to send information on planned or executed joint workshops and special sessions to the VT1 Chairs.

5. Collaboration

a) Ongoing

- **IST, PG, IPS, RWTH and OULU**: "Off-Body and Body-to-Body Radio Channel Modelling at UWB and mmWaves Bands";

- **PG and UPV**: "Measurements of the Channel Impulse Response at mmWaves for Conference Networks".

- **EUC and NIST**: "Remote Monitoring of Physiological Signals using LoRa".

c) Planned

- **PG and IST**: "Investigating the influence of the radio channel on synchronization and precision of position estimation of the user using the 5G / LTE / NB-IoT radio interfaces";

VT1 members were asked to send information on planned or ongoing collaboration to the VT1 Chairs.

6. Joint papers (with acknowledgements to INTERACT)

a) Published

- Ferreira M.M., Cardoso F.D., Ambroziak S.J., Correia L.M., *Bandwidth Dependence of the Propagation Channel in Circular Metallic BAN Environments*, IEEE Access, vol. 11, pp. 20159-20168, 2023, DOI: 10.1109/ACCESS.2023.3249466.

- Ferreira M.M., Cardoso F.D., Ambroziak S.J., Turbic K., Correia L.M., *Mobility's Influence on System Loss in Off-Body BAN Scenarios*, Joint European Conference on Networks and Communications & 6G Summit (EuCNC/6G Summit), 7-10 June, Grenoble, France, 2022;

- Ambroziak S.J., Cwalina K.K., Rajchowski P., Cardoso F.D., Ferreira M.M., Correia L.M., *A Cross-Polarisation Discrimination Analysis of Off-Body Channels in Passenger Ferryboat Environments*, IEEE Access, Vol. 10, pp. 55627-55637, DOI:10.1109/ACCESS.2022.3175009, 2022;

- Ferreira M. M., Cardoso F. D., Ambroziak S.J., Correia L.M., *Influence of User Mobility and Antenna Placement on System Loss in B2B Networks*, IEEE Access. Vol. 10, pp. 37039-37049, DOI: 10.1109/ACCESS.2022.3163859, 2022.

- Ambroziak S.J., Cardoso F.D., Kosz P., Ferreira M.M., Correia L.M., *Analiza zaników szybkozmiennych w radiowych sieciach BAN pracujących w rewerberacyjnym środowisku propagacyjnym*, Przegląd Telekomunikacyjny i Wiadomości Telekomunikacyjne, No. 4/2022, pp. 505-510, DOI 10.15199/59.2022.4.91, 2022 (in Polish).

b) Planned

- Ferreira M.M., Cardoso F.D., Ambroziak S.J., Särestöniemi M., Turbic K., Correia L.M., *Influence of User Mobility on System Loss and Depolarisation in a BAN Indoor Scenario* – submitted to IEEE TAP

- Drozdowska M., Ambroziak S.J., Cwalina K.K., Rajchowski P., Cardona N., *Channel Impulse Response Measurements at mmWave Bands in Offices and Conference Rooms*, URSI GASS 2023, Sapporo, Japan, 2023 – accepted

- Ferreira M.M., Cardoso F.D., Ambroziak S.J., Särestöniemi M., Turbic K., Correia L.M., *Depolarisation Model for a BAN Indoor Scenario*, European Conference on Networks and Communications (EuCNC & 6G Summit), Göteborg (Sweeden), June 2023 – accepted

- S.J. Ambroziak, K.K. Cwalina, M.M. Ferreira, F.D. Cardoso, L.M. Correia, *System Loss Model for Body-to-Body Networks in Indoor and Outdoor Environments*, IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC), Toronto, Canada, Sept. 2023 - submitted

- M.M. Ferreira, F.D. Cardoso, S.J. Ambroziak, M. Särestöniemi, K. Turbic, L.M. Correia, *System Loss Model for Body Area Networks in Room Scenarios*, IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC), Toronto, Canada, Sept. 2023 - submitted

VT1 members were asked to send information on accepted and/or published joint papers to the VT1 Chairs.

7. Liaisons

    - IEEE P2933: *Standard for Clinical Internet of Things (IoT) Data and Device Interoperability with TIPPSS - Trust, Identity, Privacy, Protection, Safety, Security* (Konstantinos Katzis, Irene Kilanioti)

    - IEEE 802.15 TG6ma: *Dependable Body Area Networks* (Kamran Sayrafian)

    - URSI Commission C: *Radiocommunication Systems and Signal Processing* (Krzysztof Cwalina)

    - EurAAP: *Working Group on Propagation* (Krzysztof Cwalina)

8. White papers

a) Published

- *None*.

b) Planned

- None.

VT1 members were asked to send information on planned and/or published white papers to the VT1 Chairs.

9. Datasets (HA1):
    - "System Loss in Body-to-Body BAN in Indoor and Outdoor at 2.45 GHz" – **PG & IST**
    - "System Loss in Off-Body BAN in Indoor at 2.45 GHz" – **PG & IST**
    - "Two-layer Phantom-Based UWB Channel Measurements for IB2OB Scenarios" – **UPV**
10. Dissemination

During IRACON a LinkedIn group (*IoT - Health Working Group*) has been created. This group is still active and has 72 members. It can be used as a venue to disseminate VT1 activities.

11. Discussion for VTs – requested by the INTERACT Chair

Further discussions were also held regarding STSM and training school initiation, cross-collaborative work with INTRACT participants at other WGs or VTs. Attendants were also encouraged to think about explicit VT1 contributions in the final report of the action.

12. Number of TDs submitted so far: **22**

- Feb. 2022, Bologna, Italy: 5 TDs
- Jun. 2022, Lyon, France: 4 TDs
- Sept. 2022, Valencia, Spain: 6 TDs
- Jan. 2023, Dubrovnik, Croatia: 3 TDs
- May 2023, Barcelona, Spain: 4 TDs

SWG EMF

The group had one session in which 2 TDs related to exposure were presented. The session was a joint session with WG1, and we have one more TD from that group. There were many attendees either on-site in Barcelona and remotely, that actively participated in the meeting.

Regarding EMF TDs, the first TD was related to the exposure prediction using neural networks, and the second one is based on 5G exposure measurements under different traffic assumptions. After the presentation, there was an open discussion about the scope of the group, joint activities and future plans. It is likely to have an EMF-convened session at EuCAP 2024 and a workshop at PIMRC 2024. A LinkedIn page has been also created to visualize the activity of the group.

VT4

In VT4 (Smart Cities and Buildings), together with WG3 (Network Architectures and Protocols), we have discussed temporary documents, with a lot of involvement from the participants. The first TD was TD **(23)05007,** on **"Practical Trial for Low-Energy Effective Jamming on 5G Private Network",** by Pawel Skokowski, Michał Kryk, Krzysztof Malon, Piotr Rajchowski, Krzysztof Maslanka and Jan M. Kelner, the second one was TD**(23) 05048,** on **"Study of Band Allocation Policies in IEEE 802.11be Networks with Devices of Different Capabilities",** by Daniele Medda, Athanasios Iossifides and Periklis Chatzimisios, the third one was on TD**(23) 05023,** on **"Load-Aware Channel Allocation for Rayleigh Fading Wi-Fi HaLow Networks",** by Hamid Taramit, Luis Orozco Barbosa, Abdelkrim Haqiq, José Jaime Camacho Escoto and Javier Gomez," and

the last one was **TD(23)06078,** on **"Impact of the Two-Slope Path Loss Model in the Service Quality of 4G and 5G Small Cells",** by Rui R. Paulo and Fernando J. Velez. During the discussion slot, there were great discussions, and topics on Interoperability between mobile and wireless communications, including cybersecurity/privacy aspects and Wireless Power Transfer and RF energy harvesting (Reuse/Reduce/Combine, a concept introduced by Guillaume), use cases/scenarios and characterization of applications, PHY aspects/RRM/spectrum management/ MAC sub-layers protocols, and system level performance (from sub-6 GHz to millimetre and sub-THz bands). A paper is being prepared and dates for its production are being shared with VT4 members.

HA1

In the COST INTERACT meeting held in Barcelona, I have briefly announced the upcoming INTERACT ML challenge, which is one of the core activities of HA1. The upcoming challenge will be split into two sub-challenges, one focused on PHY layer, the other on NET layer. No further details were announced, since at the time being, everything was still to be decided.

Liaisons Feedback

1. Report from TeamUp5G MSCA ITN/ETN:

LIAISONS (Fernando J. Velez and Ana Garcia Armada) – TeamUp5G is an MSCA ETN/ITN that will finish mid-2023, and includes research from 15 Early Stage Researchers (ESRs) performing research on topics like massive MIMO, cell-free communications, visible light communications, radio resource management (RRM) for ultra-dense networks, functional splitting in the context of Open RAN, ISAC, XR and AR applied to UAVs, spectrum and RRM applied to networks with UAVs, network slicing and carrier aggregation applied to 5G New Radio, to multi-link operation in IEEE 802.11be networks, full-duplex communications. The first Ph.D. student already defended her Ph.D., in the Aarhus University, in February 2023, and the other ones either already delivered or are now delivering their thesis.

2. Carles Anton-Haro 6G-IA:

- Second call for project proposals of the JU-SNS:
    - Now open for submissions. Indicative budget: 132 Meuro (2023 call). Closing date: April 25, 2023.
    - Further information:
        - https://smart-networks.europa.eu/europe-launches-the-second-phase-of-its-6g-research-and-innovation-programme/
        - https://smart-networks.europa.eu/wp-content/uploads/2022/12/sns_ri_wp_2023-24.pdf
- Info day on JU-SNS Call 2:
    - Held on Jan 23, 2023.
    - Presentations available from here:
        - https://smart-networks.europa.eu/event/sns-call-for-proposals-2023-information-day/
- ETSI Research Conference: Maximizing the Impact of European 6G Research through Standardization
    - Upcoming event co-organized with ETSI.
    - Date and place: Feb 6-8, 2023. ETSI-HQ at Sophia-Antipolis (FR)
    - Registration open
    - Further information:
        - https://www.etsi.org/events/2130-etsi-research-conference

3. Fredrik Tufvesson

H2020 Reindeer (https://reindeer-project.eu/ including e.g. INTERACT partners Lund University, Ericsson, KU Leuven, TU Graz), investigating the Radioweave concept, an extreme form of distributed massive MIMO, where we equip the environment with many active distributed antennas and coherently process the signals from selected dynamic groups of radio elements. Supports communication, sensing positioning and wireless power transfer. We recently finished one deliverable on distributed large-scale arrays that we aim to report from in the next meetings.

H2020 ITN MINTS, https://b5g-mints.eu/, including e.g. INTERACT partners KU Leuven, Lund University, University Carlos III of Madrid, and Nokia, is now entering its final year. It is a training network with 15 PhD students in the wider area of millimeter wave communication, systems, applications and sensing.

5th Scientific & Technical Meeting

Barcelona, Spain, 23-25 May 2023

cost
EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY

Funded by
the European Union

Chiara BURATTI
University of Bologna

cnit
consorzio nazionale
interuniversitario
per le telecomunicazioni

Laurent CLAVIER
IMT Nord Europe

IMT Nord Europe
École Mines-Télécom
IMT-Université de Lille

COST INTERACT

Intelligence-Enabling Radio Communications for Seamless Inclusive Interactions

5th MC and Technical Meeting

May 23, 24 and 25, 2023

Castelldefels, Spain

WELCOME !

Tuesday Morning Session 1

1. Welcome words
2. Adoption of the Agenda
3. Status of the Action and of the current meeting
4. Report from the Grant Holder
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6. STSM & more
7. Dissemination
8. Data sets
9. Next meetings and this meeting

Tuesday Session 2

14. Plenary talks
    11:00 - Richard Rudd, TD 57
    11:30 - Angel Lozano

Tuesday afternoon till Thursday 10:30am

15. Sessions

Thursday (11am)

16. Plenary Talk: Carles Anton
17. Feedbacks from Working Group Chairs
18. Feedbacks from Liaisons

Welcome words.

Carles Anton

Welcome words.

Carles Anton

Agenda (1/1)

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Adoption of the Agenda and first points

Any change to the agenda ?

Approval of the minutes from Dubrovnik's meeting

ATTENDANCE LISTS (for people on site)

Please sign the attendance list for **the day(s) you are present**

No reimbursement of travel expenses (for those entitled to) if attendance lists are not duly signed

Tuesday Morning Session 1

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Number of signatory countries

46 (36 out of 40 COST full members, including 21 ITC)

Number of WG members registered on the website

536

Young Researchers 54%
Gender balance 19% / 80%

COST full members: 36 (ITC: 21)
COST Cooperating Member: 1
COST Partner: 1
International: 5
NNC: 3

Number of MC Members

- 66
- 34 (+7 substitutes) attending the meeting (33 on site)

One new MC for Ireland Dr. Avishek Nag

People attending the meeting

- 104 on site
- 25+ remote

Number of TDs

- 69

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Budget Y2

Work and Budget Plan	Budget
A. COST Networking Tools EUR	
(1) Meetings	129.000,00
(2) Training Schools	14.500,00
(3) Mobility of Researchers and Innovators	7.200,00
(4) Presentation at Conferences organised by Third Parties **(WIRS)**	1.350,00
(5) Dissemination and Communication Products	0,00
(6) Other Expenses Related to Scientific Activities (OERSA)	993,00
B. Total Science Expenditure (sum of (1) to (6))	153.043,00
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)	22.956,45
Total Grant (B+C)	**175.999,45**

Budget Y2

Work and Budget Plan	Budget	Top-up	New Budget
A. COST Networking Tools EUR			
(1) Meetings	129.000,00	45.709,35	**174.709,35**
(2) Training Schools	14.500,00	3.598,00€	**18.098,00**
(3) Mobility of Researchers and Innovators	7.200,00	8.890,00€	**16.090,00**
(4) Presentation at Conferences organised by Third Parties **(WIRS)**	1.350,00	7.500,00€	**8.850,00**
(5) Dissemination and Communication Products	0,00	1.500,00€	**1.500,00**
(6) Other Expenses Related to Scientific Activities (OERSA)	993,00		**993,00**
B. Total Science Expenditure (sum of (1) to (6))	153.043,00	67.197,35	**220.240,35**
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)	22.956,45	10.079,60	33.036,05
Total Grant (B+C)	**175.999,45**	**77.276,95**	**253.276,40**

Dubrovnik Meeting

Work and Budget Plan	Spent	Remaining budget
A. COST Networking Tools EUR		
(1) Meetings	**47.649,76**	127.059,59
(2) Training Schools		18.098,00
(3) Mobility of Researchers and Innovators		16.090,00
(4) Presentation at Conferences organised by Third Parties **(WIRS)**		8.850,00
(5) Dissemination and Communication Products		1.500,00
(6) Other Expenses Related to Scientific Activities (OERSA)		993,00
B. Total Science Expenditure (sum of (1) to (6))		172.590,59
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)		

4.400 €
LOS

43.250 €
Reimbursement MCM and WGC

STSM

Work and Budget Plan	Spent	Remaining budget
A. COST Networking Tools EUR		
(1) Meetings	47.649,76	127.059,59
(2) Training Schools		18.098,00
(3) Mobility of Researchers and Innovators	**4.800,00**	11.290,00
(4) Presentation at Conferences organised by Third Parties **(WIRS)**		8.850,00
(5) Dissemination and Communication Products		1.500,00
(6) Other Expenses Related to Scientific Activities (OERSA)		993,00
B. Total Science Expenditure (sum of (1) to (6))		167.790,59
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)		

4 x 1.200 € STSM

Expected Expenses

Work and Budget Plan	Expected Expenses	Remaining budget
A. COST Networking Tools EUR		
(1) Meetings	58.300,00	68.759,59
(2) Training Schools	18.000,00	98,00
(3) Mobility of Researchers and Innovators	3.600,00	7.690,00
(4) Presentation at Conferences organised by Third Parties **(WIRS)**	850,00	8.000,00
(5) Dissemination and Communication Products	2.520,00	-1.020,00
(6) Other Expenses Related to Scientific Activities (OERSA)		993,00
B. Total Science Expenditure (sum of (1) to (6))	83.270,00	84.520,59
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)		

Barcelona Meeting

Work and Budget Plan	Expected Expenses	Remaining budget
A. COST Networking Tools EUR		
(1) Meetings	**58.300,00**	68.759,59
(2) Training Schools		98,00
(3) Mobility of Researchers and Innovators		7.690,00
(4) Presentation at Conferences organised by Third Parties **(WIRS)**		8.000,00
(5) Dissemination and Communication Products		-1.020,00
(6) Other Expenses Related to Scientific Activities (OERSA)		993,00
B. Total Science Expenditure (sum of (1) to (6))		84.520,59
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)		

2.200 €
LOS

56.100 €
Reimbursement MCM and WGC

Training Schools

Work and Budget Plan	Expected Expenses	Remaining budget
A. COST Networking Tools EUR		
(1) Meetings	58.300,00	68.759,59
(2) Training Schools	**18.000,00**	98,00
(3) Mobility of Researchers and Innovators		7.690,00
(4) Presentation at Conferences organised by Third Parties **(WIRS)**		8.000,00
(5) Dissemination and Communication Products		-1.020,00
(6) Other Expenses Related to Scientific Activities (OERSA)		993,00
B. Total Science Expenditure (sum of (1) to (6))		84.520,59
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)		

12.000 €
DolCom

6.000 €
ESoA

STSM

Work and Budget Plan	Expected Expenses	Remaining budget
A. COST Networking Tools EUR		
(1) Meetings	58.300,00	68.759,59
(2) Training Schools	18.000,00	98,00
(3) Mobility of Researchers and Innovators	**3.600,00**	7.690,00
(4) Presentation at Conferences organised by Third Parties **(WIRS)**		8.000,00
(5) Dissemination and Communication Products		-1.020,00
(6) Other Expenses Related to Scientific Activities (OERSA)		993,00
B. Total Science Expenditure (sum of (1) to (6))		84.520,59
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)		

3 x 1.200 € STSM

ITC Grants

Work and Budget Plan	Expected Expenses	Remaining budget
A. COST Networking Tools EUR		
(1) Meetings	58.300,00	68.759,59
(2) Training Schools	18.000,00	98,00
(3) Mobility of Researchers and Innovators	3,600,00	7.690,00
(4) Presentation at Conferences organised by Third Parties **(WIRS)**	**850,00**	~~8.000,00~~
(5) Dissemination and Communication Products		-1.020,00
(6) Other Expenses Related to Scientific Activities (OERSA)		993,00
B. Total Science Expenditure (sum of (1) to (6))		84.520,59
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)		

850 € ITCG

ITC Grants

Work and Budget Plan	Expected Expenses	Remaining budget
A. COST Networking Tools EUR		
(1) Meetings	58.300,00	68.759,59
(2) Training Schools	18.000,00	98,00
(3) Mobility of Researchers and Innovators	3,600,00	7.690,00
(4) Presentation at Conferences organised by Third Parties **(WIRS)**	850,00	8.000,00
(5) Dissemination and Communication Products	**2.520,00**	~~1.020,00~~
(6) Other Expenses Related to Scientific Activities (OERSA)		993,00
B. Total Science Expenditure (sum of (1) to (6))		84.520,59
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)		

Video

Reallocated Budget

Work and Budget Plan	Remaining budget	Reallocated budget	
A. COST Networking Tools EUR			
(1) Meetings	68.759,59	**60.739,59**	
(2) Training Schools	98,00	**7.098,00**	**+ 7.000**
(3) Mobility of Researchers and Innovators	7.690,00	7.690,00	
(4) Presentation at Conferences organised by Third Parties **(WIRS)**	8.000,00	8.000,00	
(5) Dissemination and Communication Products	-1.020,00	**0,00**	**+ 1.020**
(6) Other Expenses Related to Scientific Activities (OERSA)	993,00	993,00	
B. Total Science Expenditure (sum of (1) to (6))	84.520,59	84.520,59	
C. Financial and Scientific Administration and Coordination (FSAC) (max. of 15% of B)			

Formal approval from the MC Members

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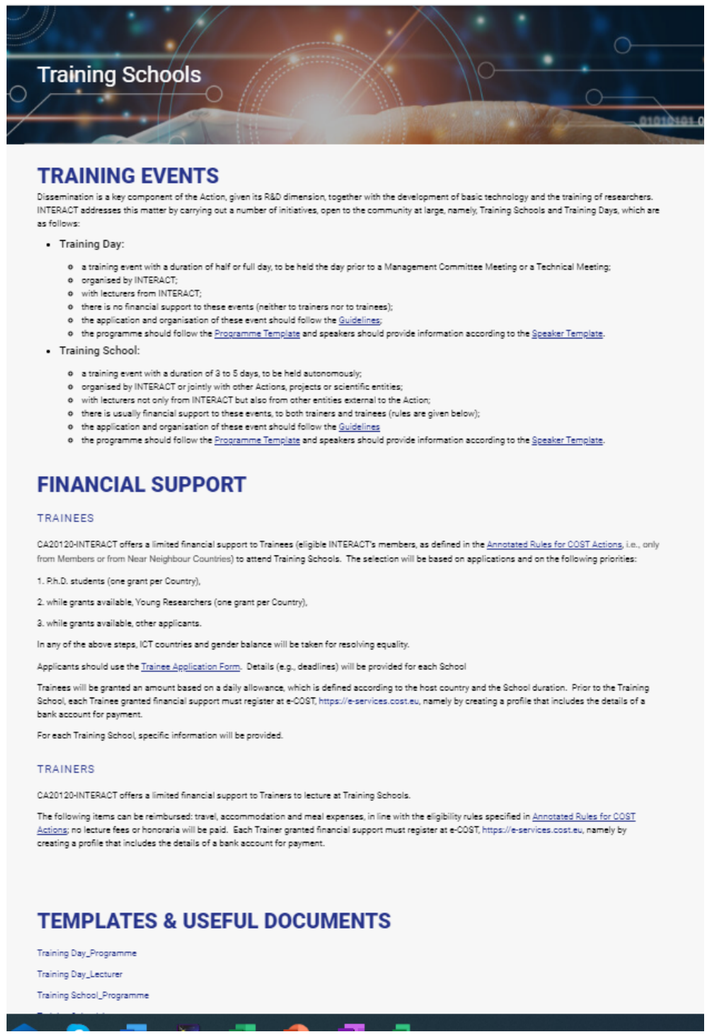
Training Days - General:

- the Call will be launched 3 months prior to the meeting;
- the deadline for proposals is 2 months prior to the meeting;
- meetings will start on Tuesday or Wednesday, so that Training Days can be held on a weekday.

Training School - General:

- the Call has been launched by the beginning of January;
- the deadline for proposals was by mid February;
- the evaluation result was announced by early March.



https://interactca20120.org/meetings-events/training-schools

Training Days in 2023:

- Barcelona:
  - *Recent Advances in Data Engineering for Networking*, Engin Zeydan and Josep Mangues, (CTTC).
- Poznan:
  - Call open (email to be sent next week).
  - Deadline for proposals on June 30th.

Training Schools in 2023:

- 26-29 June 2023
  - *DolCom 2023 - Summer School & Workshop on Radio Communications in the Dolomites.*
  - Application to travel grants by May 26th
  - Registration by May 31st
  - Information is available at the website.
- 4-8 Sep. 2023
  - *Short-Range Radio Propagation: Theory, Models and Applications.*
  - Information will be available soon at the website.

And what else?

- 2023 May 26th: apply to a travel grant to attend the DolCom Training School
- 2023 May 31st: register to the DolCom Training School
- 2023 June 30th: submit a proposal for the Training Day prior to the Sep. meeting.

But still:

- Let us know what topics you would be interested in having in a Training Event.

Agenda (1/1)

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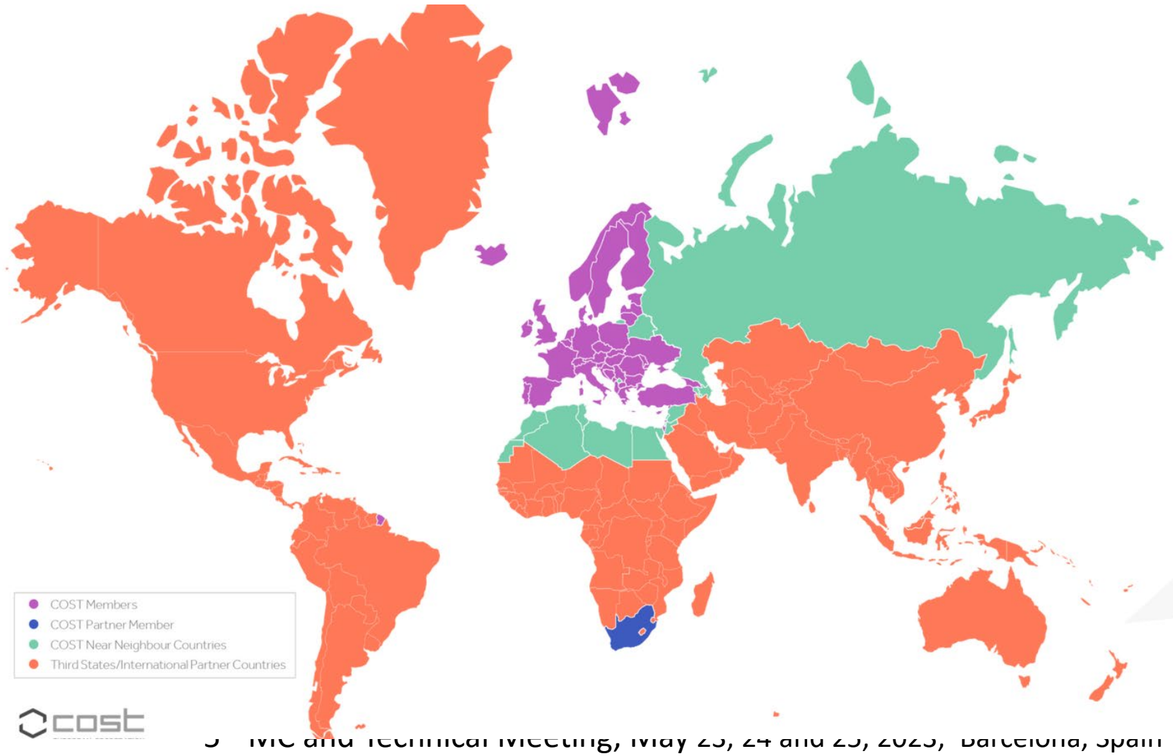
SHORT TERM SCIENTIFIC MISSIONS (STSMs)

STSMs are **exchange visits** aimed at supporting **individual mobility, strengthening existing networks** and **fostering collaboration** between researchers. The aim […] is to **contribute to the scientific objectives** of a COST Action […] by allowing scientists to go to an **institution or lab in another COST country** to foster collaboration, to learn a **new technique** or to **take measurements** using instruments and/ or **methods not available** in their own institution/ lab.

- BOTH the home and host institutions MUST be INTERACT partners (easy fix)
- Home: COST full members, cooperating member, or Near Neighbouring Countries (NNC).
- Details: https://interactca20120.org/grants/stsm/



THE STORY SO FAR: GRANT PERIOD 1 & 2 STSMs

François Rottenberg (KU Leuven, Belgium)

Title: Smart precoder design to minimize energy consumption in 5G and beyond communication systems

Dates: 9/06/2022 to 24/06/2022

Host: Centre Tecnològic de Telecomunicacions de Catalunya (Spain)

WG2

WG1

Monika Drozdowska (Technical University of Valencia, Spain)

Title: Measurements in Gdańsk University of Technology

Dates: 26/09/2022 to 30/09/2022

Host: Gdańsk University of Technology (Poland)

Mohammed Mallik (U Lille, France)

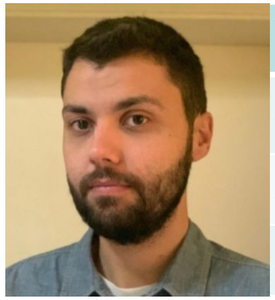
Title: Evaluation of the Electromagnetic Field Exposure Map using the VENERIS simulation tool

Dates: 17/01/2023 to 28/01/2023

Host: Universidad Politécnica de Cartagena (Spain)

VT1- SWG EMF

WG2



Vukan Ninkovic (University of Novi Sad, Serbia)

Title: Design and Implementation of autoencoder-based codes for Beyond 5G Communication Systems

Dates: 29/01/2023 to 10/02/2023

Host: Centre Tecnològic de Telecomunicacions de Catalunya (Spain)

THE STORY SO FAR: GRANT PERIOD 1 & 2 STSMs

Adam Samorzewski (Poznan U, Poland)

Title: Sustainable use of resources in wireless systems powered by Renewable Energy Sources

Dates: 13/02/2023 to 15/03/2023

Host: Ghent University (Belgium)

WG3

WG3/VT2

Valentina Timcenko (Pupin I., Serbia)

Title: Attack identification and classification in V2X scenarios

Dates: 08/03/2023 to 31/03/2023

Host: Centre Tecnològic de Telecomunicacions de Catalunya (Spain)

Jesús Argote (INSA Lyon, France)

Title: RF harvester realization for powering ultra-low power wake-up radios in the context of the IoT

Dates: 03/04/2023 to 08/05/2023

Host: RWTH (Germany)

VT3/VT4

WG3 (VT2, WG1)

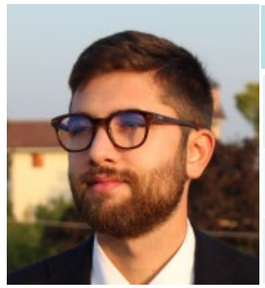
Salim Janji (Poznan U., Poland)

Title: Resource Allocation for UAV-Enabled Networks with Beamforming Capabilities

Dates: 30/04/2023 to 30/05/2023

Host: U. Bologna (Italy)

THE STORY SO FAR: GRANT PERIOD 1 & 2 STSMs



Emanuele Peschiera (Katholiek Universiteit Leuven, Belgium)
Title: Space-Domain Lean Transmissions for Cell-Free Massive Multiple-Input Multiple-Output
Dates: 15/05/2023 to 28/07/2023
Host: Centre Tecnològic de Telecomunicacions de Cataluinya (Spain)

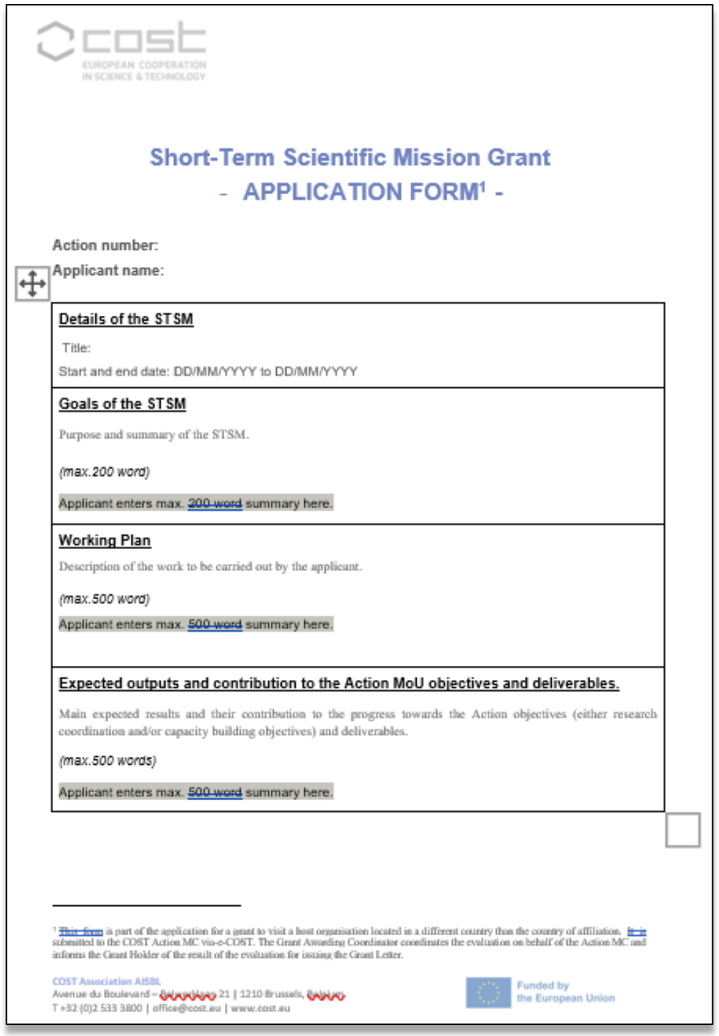
WG2

WG?

?	YOU (YOUR INSTITUTION)
	Title: Your topic
	Dates: Your dates
	Host: Your host

SHORT TERM SCIENTIFIC MISSIONS (STSMs)

- STSM request handled via the e-COST platform:
  http://www.cost.eu/STSM
- You only need:
  - Grant application (what)
  - Invitation Letter (host)
  - Letter of Support (home)
  - Motivation Letter (why)
  - Applicant's CV (who)
- Applications: submit at least 1 month before mission starts.
- Activities: entirety within a single Grant Period (up to Oct 31).
- Grants:
  - Up to 1.200 euro / grant, according to duration & budget availability.
  - Extra budget allocated: 12 STSM grants planned for Grant Period 2
  - 7 awarded so far -> at least **5 STSMs available until October 2023**



cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Short-Term Scientific Mission Grant
- APPLICATION FORM[1] -

Action number:
Applicant name:

Details of the STSM
Title:
Start and end date: DD/MM/YYYY to DD/MM/YYYY

Goals of the STSM
Purpose and summary of the STSM.
(max.200 word)
Applicant enters max. ~~200 word~~ summary here.

Working Plan
Description of the work to be carried out by the applicant.
(max.500 word)
Applicant enters max. ~~500 word~~ summary here.

Expected outputs and contribution to the Action MoU objectives and deliverables.
Main expected results and their contribution to the progress towards the Action objectives (either research coordination and/or capacity building objectives) and deliverables.
(max.500 words)
Applicant enters max. ~~500 word~~ summary here.

[1] ~~This form~~ is part of the application for a grant to visit a host organisation located in a different country than the country of affiliation. It is submitted to the COST Action MC via e-COST. The Grant Awarding Coordinator coordinates the evaluation on behalf of the Action MC and informs the Grant Holder of the result of the evaluation for issuing the Grant Letter.

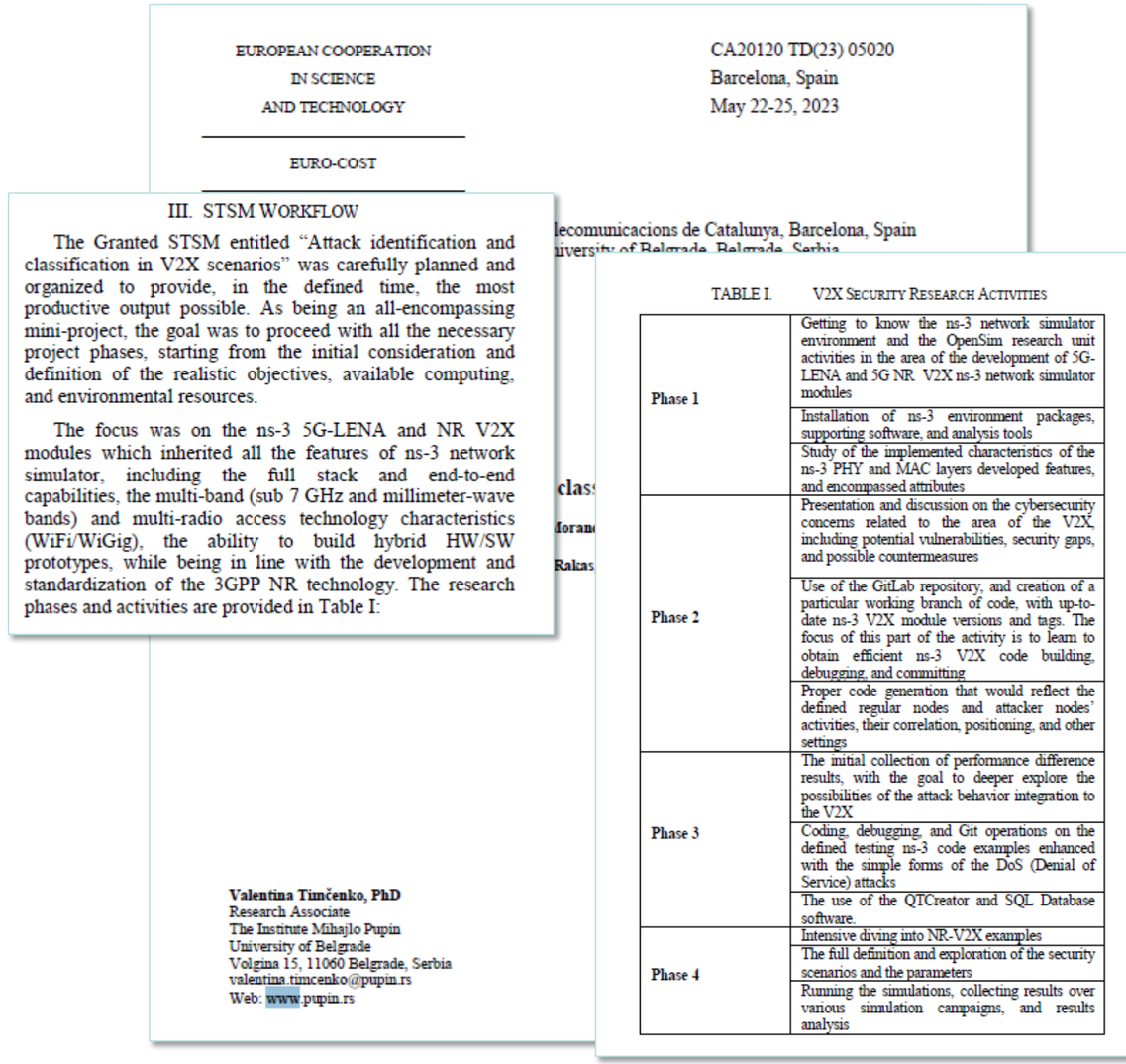
COST Association AISBL
Avenue du Boulevard – ~~Brussels~~ 21 | 1210 Brussels, ~~Belgium~~
T +32 (0)2 533 3800 | office@cost.eu | www.cost.eu

Funded by the European Union

INTERACT

SHORT TERM SCIENTIFIC MISSIONS – BEST PRACTICES

- Read the evaluation criteria – STSM webpage.
- All STSMS must have tangible outcomes: publications, code, datasets,…
  - TD(s) in upcoming INTERACT meetings: a MUST
  - Submission of joint conference papers: very RECOMMENDED
  - Submission of joint journal articles: GREAT !
- Make sure your workplan is well defined and realistic.
- Cleary identify alignment with overall scientific objective(s) of INTERACT and with WGs/VTs/HAs
- Identify support offered by the host institution:
  - e.g., labs, equipment, know-how, simulators, technician support, workplace,..
- Emphasize synergies host-home institutions .
- Justify need for researcher mobility
- Likely to trigger new collaborations home - host Institutions?



EUROPEAN COOPERATION
IN SCIENCE
AND TECHNOLOGY

EURO-COST

CA20120 TD(23) 05020
Barcelona, Spain
May 22-25, 2023

III. STSM WORKFLOW

The Granted STSM entitled "Attack identification and classification in V2X scenarios" was carefully planned and organized to provide, in the defined time, the most productive output possible. As being an all-encompassing mini-project, the goal was to proceed with all the necessary project phases, starting from the initial consideration and definition of the realistic objectives, available computing, and environmental resources.

The focus was on the ns-3 5G-LENA and NR V2X modules which inherited all the features of ns-3 network simulator, including the full stack and end-to-end capabilities, the multi-band (sub 7 GHz and millimeter-wave bands) and multi-radio access technology characteristics (WiFi/WiGig), the ability to build hybrid HW/SW prototypes, while being in line with the development and standardization of the 3GPP NR technology. The research phases and activities are provided in Table I:

TABLE I. V2X SECURITY RESEARCH ACTIVITIES

Phase 1	Getting to know the ns-3 network simulator environment and the OpenSim research unit activities in the area of the development of 5G-LENA and 5G NR V2X ns-3 network simulator modules
	Installation of ns-3 environment packages, supporting software, and analysis tools
	Study of the implemented characteristics of the ns-3 PHY and MAC layers developed features, and encompassed attributes
Phase 2	Presentation and discussion on the cybersecurity concerns related to the area of the V2X, including potential vulnerabilities, security gaps, and possible countermeasures
	Use of the GitLab repository, and creation of a particular working branch of code, with up-to-date ns-3 V2X module versions and tags. The focus of this part of the activity is to learn to obtain efficient ns-3 V2X code building, debugging, and committing
	Proper code generation that would reflect the defined regular nodes and attacker nodes' activities, their correlation, positioning, and other settings
Phase 3	The initial collection of performance difference results, with the goal to deeper explore the possibilities of the attack behavior integration to the V2X
	Coding, debugging, and Git operations on the defined testing ns-3 code examples enhanced with the simple forms of the DoS (Denial of Service) attacks
	The use of the QTCreator and SQL Database software.
Phase 4	Intensive diving into NR-V2X examples
	The full definition and exploration of the security scenarios and the parameters
	Running the simulations, collecting results over various simulation campaigns, and results analysis

Valentina Timčenko, PhD
Research Associate
The Institute Mihajlo Pupin
University of Belgrade
Volgina 15, 11060 Belgrade, Serbia
valentina.timcenko@pupin.rs
Web: www.pupin.rs

GRANTS FOR ATTENDING CONFERENCES FOR INSTITUTIONS FROM INCLUSIVE TARGET COUNTRIES (ITC grants)

The aim of ITC **Conference** Grants is to **support PhD students** and **Early Career Investigators** (ECI) from **INTERACT institutions** located in **Inclusive Target Countries** (ITC) to attend **international science and technology-related conferences** not specifically organized by the COST Action.

- Inclusive Target Countries (as of March'22):

  Albania, Bosnia and Herzegovina, Bulgaria, Cyprus, Czech Republic, Estonia, Croatia, Greece, Hungary, Lithuania, Latvia, Malta, Moldova, Montenegro, Poland, Portugal, Romania, Slovenia, Slovakia, Republic of North Macedonia, Republic of Serbia and Turkey.

- Virtual or physical attendance (annotated rules).

- Grants:
  - Up to **1000 euro** (increased)/ grant to partly cover travel expenses
  - Extra budget allocated: 5 ITC grants planned for Grant Period 2
  - 2 awarded so far -> at least **3 ITC grants available until October 2023**

- Details: https://interactca20120.org/grants/itc-conference-grants

NEW

VISIBILITY BOOSTER GRANTS (VBG)

To support activities leading to a **strong** visibility of the INTERACT COST action.

To support initiatives aimed to **significantly** increase the visibility/raise the profile of female researchers in the research community and beyond.

- In conference/events organized by THIRD parties:
  - MC/Technical meetings, training days/schools, other events organized by INTERACT excluded.
- Physical attendance only
- Open to all researchers enrolled in INTERACT (must be)
  - Priority to *young*, female researchers, and regular participants to INTERACT meetings (*ceteris paribus*).
- Evaluated in monthly batches: within first week
- Grants:
  - **Indicatively 1000 euro** / grant (partly cover travel expenses)
  - 5 VBG grants planned for Grant Period 2: 5 batches to go (June…October)
- Details: https://interactca20120.org/grants/xxxx

Looking forward to receiving your STSM / ITCG/ VBG applications !!!

~6 STSM grants

3 ITC grants

5 VBG grants

await your activities until October 31, 2023

If interested, apply soon !!

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Tuesday Morning Session 1

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9. Next meetings and this meeting

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14. Plenary talks
    - 11:00 - Richard Rudd, TD 57
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Tuesday afternoon till Thursday 10:30am

15. Sessions

Thursday (11am)

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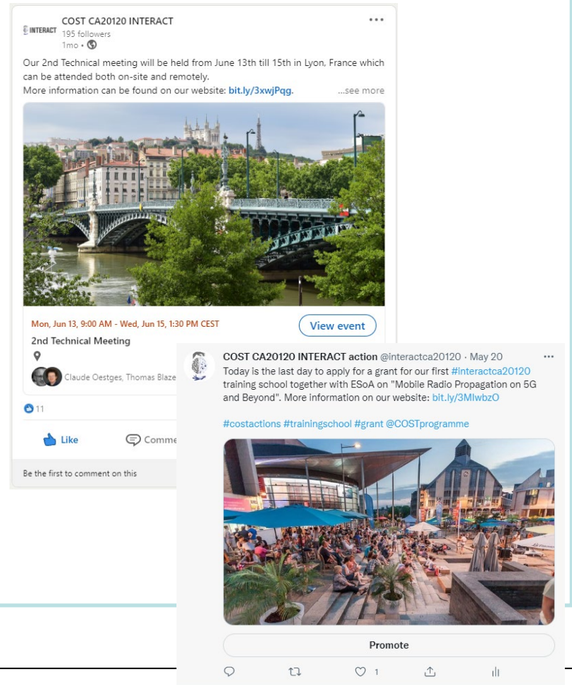
PLEASE FOLLOW AND SHARE!!!
#interactca20120

- Linkedin (https://www.linkedin.com/company/interactca20120): 387 followers

EVENT-BASED

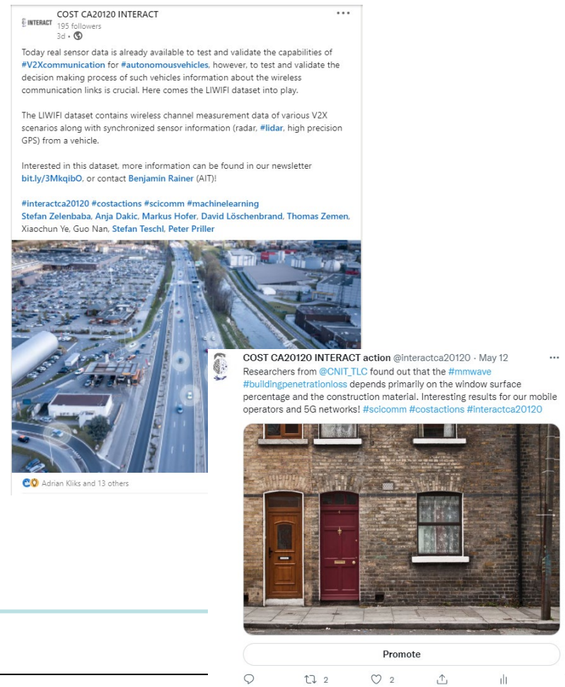
- Announcements/reminder meetings, TTSs, etc.
- Call for STSMs, TTSs, grants, etc.
- Newsletters, leaflet



SCIENCE COMM

WEEKLY

- Selected TDs from WGs
- White papers
- Joint papers



DATASETS

WEEKLY

- Short description of dataset, link to paper, contacting author
- Starting week 27/28

TESTIMONIALS

- STSMs
- TTSs: participants w/ grant

- Available on various platforms (YT, anchor, spotify)

- Host: Prof. Adrian Kliks (Poznan University of Technology)

- Episodes
  1. Laurent Clavier
  2. Conchi Pardo
  3. Thomas Zemen
  4. Ana Garcia Armada

Newsletter

4th issue

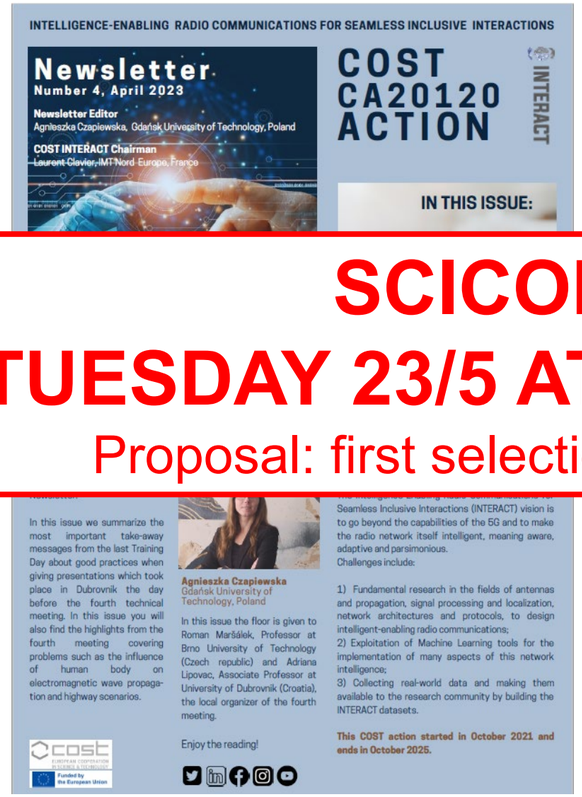
Editor: Agnieszka Czapiewska

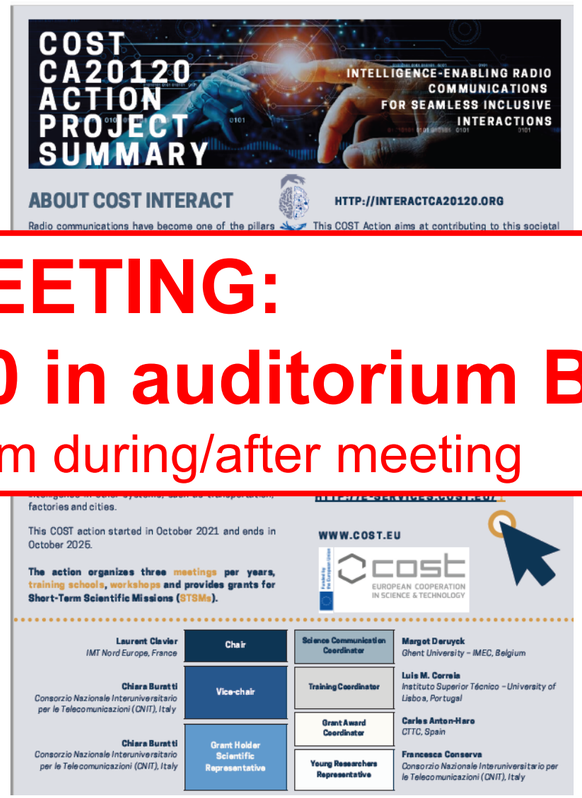
Leaflet

Update available

Also in print-friendly version

https://bit.ly/3DQgzHb





SCICOMM MEETING:

TUESDAY 23/5 AT 17:30 in auditorium B6

Proposal: first selection, confirm during/after meeting

Promo video

- Today a promo video will be shot
- 5 min video
  - Short introduction on our action (Alister Burr)
  - Three interviews
    - WG Chair (Yang Miao)
    - STSM (Mohammed Mallik)
    - WIRS initiative (Sana Salous)
  - Recorded during coffee breaks or right before/after lunch
- Some general footages will be shot during the day

Call for input

- Liaisons
- Organized special sessions/workshops
  → SINCE START OF THE ACTION!

→ Email to: margot.deruyck@ugent.be

- 40th Anniversary of COST actions in telecommunications
  - Lisbon (PT) – January 2024 – Organised by Prof. Luis M. Correia
  - COST Actions: 207, 231, 259, 273, 2100, IC1004, CA15104, CA20120
  - Dedicated pages on our current website
    - Testimonials: https://interactca20120.org/anniversary-testimonials/
    - Memories: https://interactca20120.org/anniversary-memories/

  - Quest for input: https://interactca20120.org/anniversary-quest/
  - Looking for
    - Testimony of your view about these action series (video/sentence/text)
    - Photos or videos of meetings you attend (proper credit will be given)

→ Email contributions to vera.almeida@inov.pt

→ For testimony: add a photo of yourself (with name and affiliation)

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Tuesday afternoon till Thursday 10:30am

15. Sessions

Thursday (11am)

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Main updates:

- ML-based competition (call for interest)
- Dataset session in Castelldefels

ML-based competition

- Student competition on a ML-task to be executed on one of the COST dataset
- Call for interest – look for emails at the end of the meeting
- Dataset TBD
- Further details TBD

Dataset session in Castelldefels

- During coffee breaks
- Chance to learn about dataset from authors and discuss collaborations

Dataset session in Castelldefels

Schedule

	Booth 1 (poster + tv)	Booth 2 (poster)
Tue 23 morning	Konstantin M. (Oulu)	Faruk P. (TU Wien)
Tue 23 afternoon	Paolo D. + Marco M. (CTTC)	*Free slot*
Wed 24 morning	Mate B. (Huawei) + Marco S. (Bologna)	Ana M. (CTTC)
Wed 24 afternoon	*Free slot*	Free slot

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Core group meeting 02/06 – 14:00 CET.

Upcoming Meetings

Sixth MC meeting and technical meeting

Sep. 11-14, 2023 – Poznan

Seventh MC meeting and technical meeting

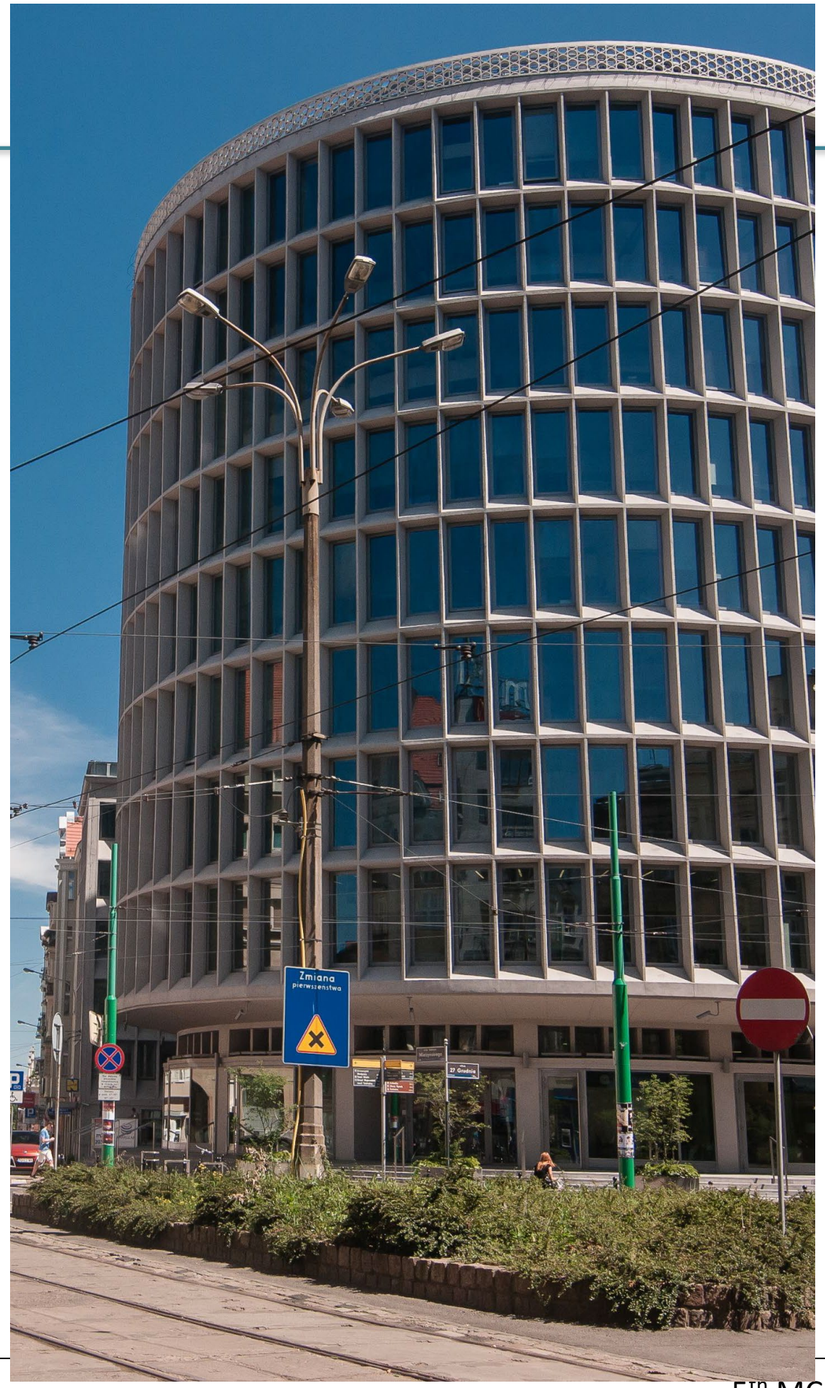
Jan. 22-25, 2024 (special one) – Lisbon

Eighth (and following) MC meeting and technical meeting

Open to proposals

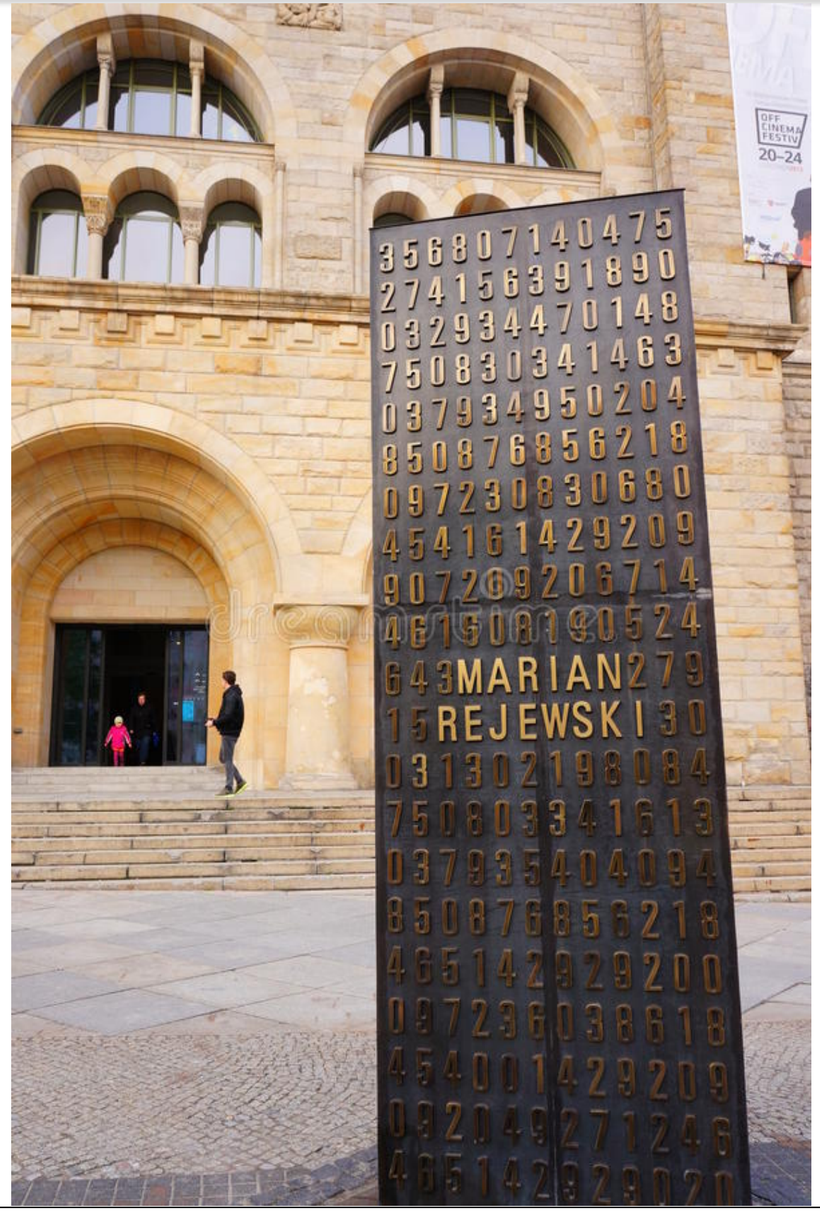
Some information about Poznan


WARKA
FCB
potify


Zmiana
pierwszeństwa


Amica


IEEE MILESTONE IN ELECTRICAL ENGINEERING AND COMPUTING
First Breaking of Enigma Code
by the Team of the Polish Cipher Bureau, 1932-1939
Polish Cipher Bureau mathematicians Marian Rejewski, Jerzy Różycki and Henryk Zygalski broke the German Enigma cipher machine codes. Working with engineers from the AVA Radio Manufacturing Company, they built the 'bomba' – the first cryptanalytic machine to break Enigma codes. Their work was a foundation of British code breaking efforts which, with later American assistance, helped to end World War II.
August 2014
IEEE


MARIAN
REJEWSKI

City of greenness

6th MC Meeting and 6th Technical Meeting
Poznan, 11-15 September

Back to this meeting

BARCELONA MEETING / 22-25 May 2023

Monday 22/05

13:30 Welcome

14:00

Auditorium B6
Training
Session

15:30 Coffee break

16:00

Auditorium B6
Training
Session

17:30

18:00

G7
SC meeting

Tuesday 23/05

08:30 Welcome

09:00

PLENARY	Auditorium B6+B4 Online
Management Comittee meeting	
General Information	

10:30 Coffee break

11:00

PLENARY	Auditorium B6+B4 Online
Kegnotes	**Richard Rudd (TD 57)**
	Angel Lozano

12:30 Lunch

13:30

	Video Recording	VIRS

14:00

Auditorium B6	HUB	E2
WG1 - Mes.	WG2 Coding - IA	WG3 - Res. Man.
6	27	47
63	10	33
77	53	51
16	59	65

15:30 Coffee break

16:00

Auditorium B6	HUB	E2
VT2-WG1 -	ISAC-WG2	WG3-VT2
31	44	72
8	22	74
38	42	20
32	70	Disc WG3

17:30

Newsletter		VIRS
Auditorium B6	HUB	E2

18:30 **Performance**

Wednesday 24/05

08:30 Welcome

09:00

Auditorium B6	HUB	E2	E3
WG1-WG2 Perf	WG1 - RT	VT4-WG3 Alloc.	VT1
43	30	7	4
5	62	48	9
46	18	23	41
76		78	54

10:30 Coffee break

11:00

Auditorium B6	HUB	E2	E3
VT2-WG1	WG2 - Mat. Acc.	WG3	EMF-WG1
29	40	3	14
2	73	37	15
12	68	Disc WG3 (ctd)	52
39	25		Disc EMF

12:30 Lunch

14:00

Auditorium B6	HUB	E2	E3
WG1 - Models	WG2-ISAC - Loc	VT3	
34	19	55	DISC VT4
11	69	84	
28	61	60	
36	83		

15:30 Coffee break

16:00

Auditorium B6	HUB	E2	E3
Disc WG1	Disc WG2	Disc VT1	Disc VT3
Disc THz Disc RIS	Disc ISAC	Disc EMF (Ctd)	

17:30

18:00 **Departure to social event and dinner**

Thursday 25/05

08:30 Welcome

09:00

Auditorium B6	HUB	E2
ISAC-WG1	WG1 - RIS	
1	26	Disc VT2
66	75	
45	17	
	Disc RIS (Ctd)	

10:30 Coffee break

11:00

PLENARY	Auditorium B6+B4 Online
Kegnote	**Carles Anton**
MC meeting	Summary of WG activities

12:30 Lunch

Tuesday 23/05

08:30 Welcome

09:00	PLENARY	Auditorium B6+B4 Online
	Management Comittee meeting	
	General Information	

10:30 Coffee break

11:00	PLENARY	Auditorium B6+B4 Online
	Keynotes	Richard Rudd (TD 57)
		Angel Lozano

12:30 Lunch

Keynotes after the break

And in the last plenary

Don't miss it!

Thursday 25/05

08:30 Welcome

09:00	Auditorium B6	HUB	E2
	ISAC-WG1 Model	SWG1 - RIS	
	66	26	Disc VT2
	45	75	
	1	17	
		Disc RIS	

10:30 Coffee break

11:00	PLENARY	Auditorium B6+B4 Online
	Keynote	Carles Anton
	MC meeting	Summary of WG activities

12:30 Lunch

At 11:00… Keynotes

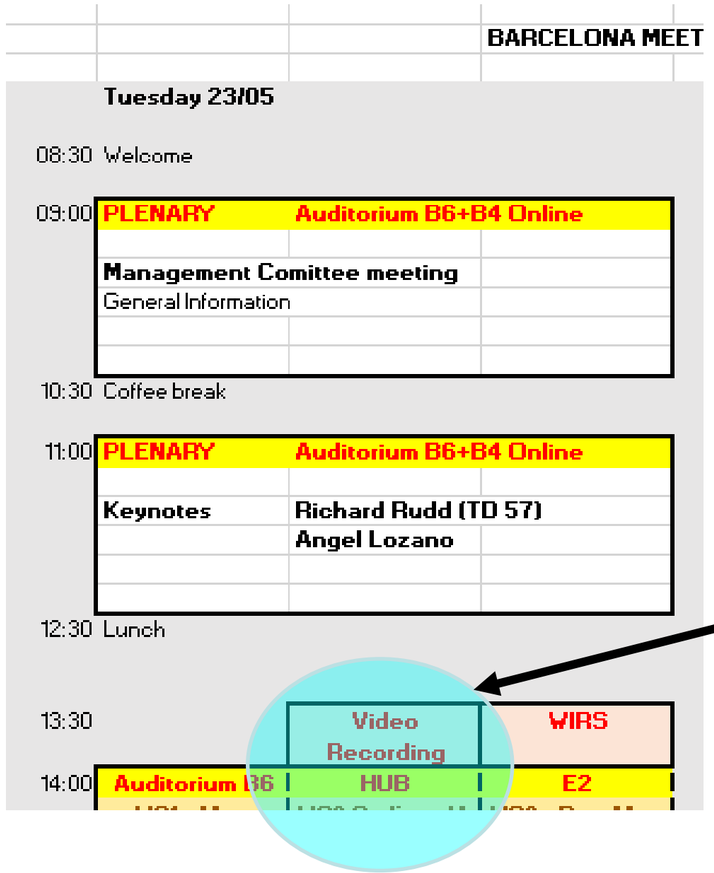
11:00 – 11:30 Richard Rudd, Plum Consulting.
Propagation modelling in the ITU-R: challenges and evolution

11:30 – 12:30 Angel Lozano, UPF Barcelona.
Near-Field MIMO: An Old Theory Up to New Tricks

And an extra keynote Thursday at 11:00…

Thursday, 11:00 – 11:30 Carles Anton

"Key Strategies for 6G Networks and Services: the 6G SNS Industry Association’s Vision"



Video recording - Today

You could meet them sometimes today, SMILE!

Margot will tell you more.

Tuesday 23/05

08:30 Welcome

09:00	PLENARY	Auditorium B6+B4 Online	
	Management Comittee meeting		
	General Information		

10:30 Coffee break

11:00	PLENARY	Auditorium B6+B4 Online	
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		Angel Lozano	

12:30 Lunch

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16:00	Auditorium B6	HUB	E2
	VT2-VG1 - Space	ISAC-VG2	VG3-VT2
	31	44	72
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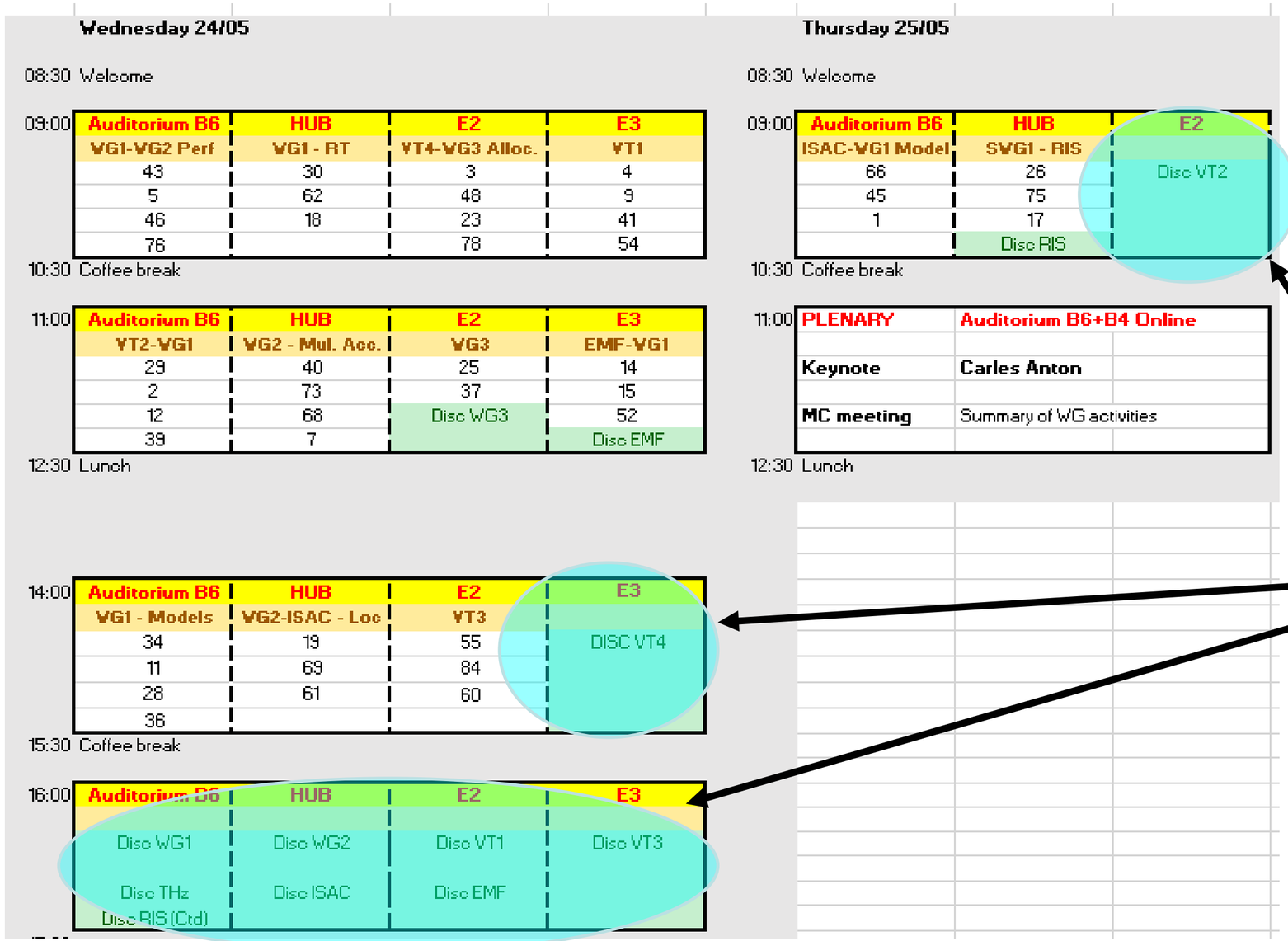
	38	42	20
	32	71	
17:30	Newsletter		VIRS
	Auditorium B6	HUB	E2
18:30	Performance		

Women in Radio Science meeting

Today 1:30pm – possible extension at 5:30 if needed

What is expected:
Tell us the objectives and the means.
Make a short paragraph for dissemination

Carles has told you about financial support



Wednesday 24/05

08:30 Welcome

09:00

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36			

15:30 Coffee break

16:00

Auditorium B6	HUB	E2	E3
Disc WG1	Disc WG2	Disc VT1	Disc VT3
Disc THz	Disc ISAC	Disc EMF	
Disc RIS (Ctd)			

Thursday 25/05

08:30 Welcome

09:00

Auditorium B6	HUB	E2
ISAC-VG1 Model	SVG1 - RIS	
66	26	Disc VT2
45	75	
1	17	
	Disc RIS	

10:30 Coffee break

11:00

PLENARY	Auditorium B6+B4 Online
Keynote	Carles Anton
MC meeting	Summary of WG activities

12:30 Lunch

Discussion Sessions

Longer this time…

I offer some ideas for discussion, but of course, feel free to share anything you think is relevant to the people gathered.

In addition to traditional points (training school, training day, STSMs…), I suggest the following discussions

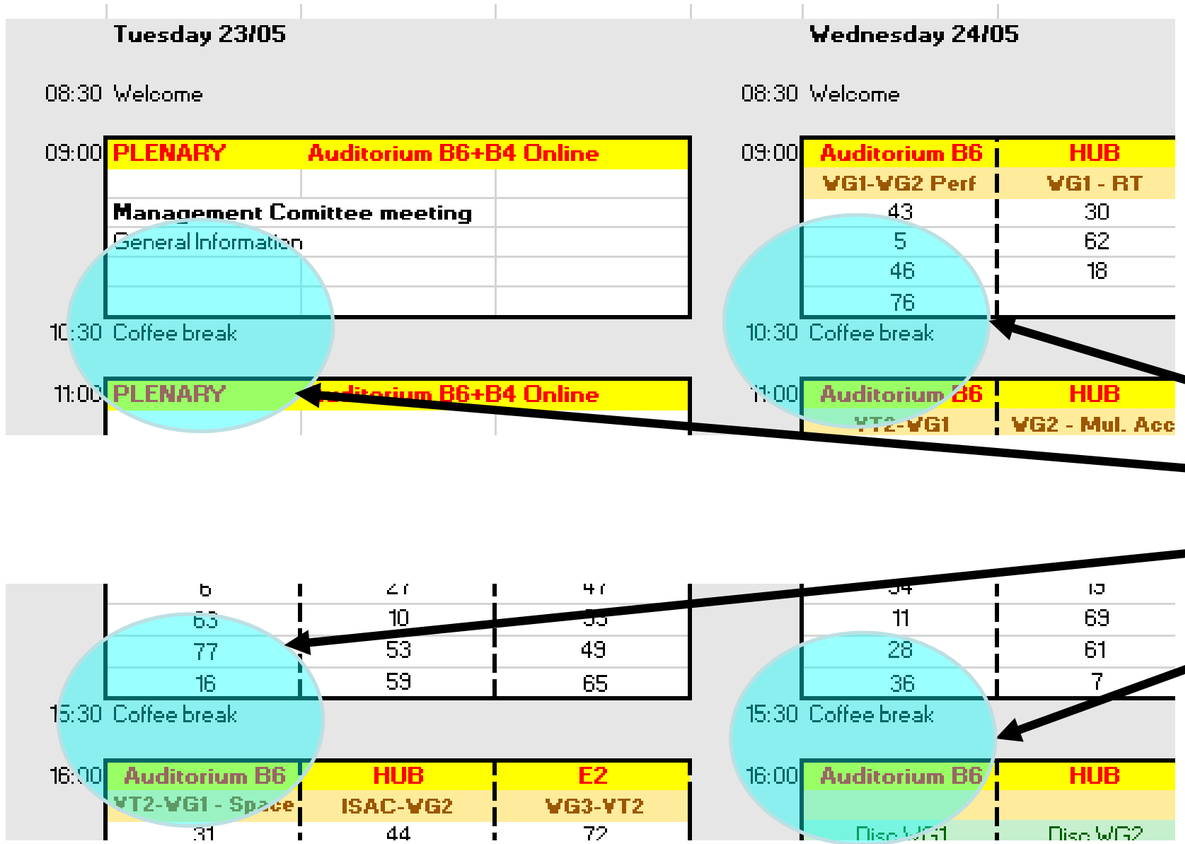
- **WG1** - a white paper is under preparation. What contribution will INTERACT make to channel modelling?
    - And what with sWG THz
    - And what with sWG RIS

- **WG2** - Start thinking about White paper on *novel physical layer technologies and localization algorithms for future wireless networks* (planned Mid June 2024). The scope can be adjusted. Perhaps it could be a good time to think about it and about the editorial committee.

- **WG3** - the White paper on novel network architectures and protocols for future wireless networks is planned in October 2025 so we have time (so only half a session) but time as come to put the seeds in the heads.

- **All** WGs and verticals - in **Mid October 2024** we planned a deliverable "*disciplinary solutions to the research challenges (preliminary draft of the final report)*" I encourage you to already think about how we should build this deliverable.

- **VTs**: I would like VTs take time to discuss what could be done in their specific verticals, if we can support a few actions to encourage some STSMs for instance on pluri-disciplinary topics related to VTs... And even if no white paper is planned, how they would like to structure their contribution in the "final report".



And don’t forget the **Database Sessions**

During coffe breaks!

Plenary resumes on

Thursday at 11:00 am after the *early morning session*

Agenda (1/1)

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Enjoy the sessions.

Enjoyed the sessions?

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Keynote Thursday at 11:00…

Thursday, 11:00 – 11:30 Carles Anton

"Key Strategies for 6G Networks and Services: the 6G SNS Industry Association’s Vision"

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18. Feedbacks from Liaisons

10. Feedbacks from Working Group Chairs

WG1 Vittorio Degli-Esposti, Mate Boban
SWG mmW and THz channel sounding Wei Fan, Diego Dupleich
SWG RIS Di Renzo, Joonas Kokkoniemi
WG2 Ana Garcia Amada, Alister Burr
SWG ISAC Yang Miao, Carsten Smeenk
WG3 Hamed Hamadi, Konstantin Mikhaylov

VT1 Kamran Sayrafian, Slawomir Ambroziak
SVT1 EMF exposure Conchi Garcia Pardo, Wout Joseph
VT2 Thomas Blazek, Adrian Kliks
VT3 Golsa Ghiaasi, Raheeb Muzaffar
VT4 Periklis Chatzimisios, Fernando Velez

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- H2020 Reindeer – Fredrik Tufvesson
- EU-ITN MINTS – Fredrik Tufvesson
- 5G DU-Volution – Alister Burr
- 5G… – Alister Burr
- 6G-IA (SNS) – Carles Anton
- TeamUp5G (MSCA ETN/ITN) – Fernando J. Velez and Ana Garcia Armada
- ETSI ISG for Terahertz Communications (THZ) – Mate Boban, Thomas Kuerner
- DETERMINISTIC6G (SNS) – Raheeb Muzaffar
- PEPR 5G (France Plan de relance) – Laurent Clavier

Any other Business?

TBD. Action Points

AP	WHAT	WHO	WHOM	WHEN
1	Submit **reimbursement** forms	Those entitled to	**e-cost**	Before 09/06
2	Send Minutes of Group Meetings	Group Chairs	Chair + Secretary	Before 09/06
3	Apply to Travel Grants for **DolCom**	Those interested	INTERACT Website	Before 26/05
4	Register to DolCom	Those interested	INTERACT Website	Before 09/06
5	Send **Training Day** proposals	Those interested	Training Chair (K. Cichon)	Before 30/06
6	Publications (Joint)	Authors	Secretary	When accepted
7	Liaisons, special sessions/workshops	Organizers	Dissemination chair (M. Deruyck)	When done with short summary
8	Call for interest **DataBase Competition**	Competitors		
9	Send STSM / ITCG / VBG applications	Those interested	e-cost +Grant Chair (C. Anton)	Open call
10	CORE Group meeting	SC members + WG chairs	Remote meeting	02/06, 2pm CET

Thank you !

See you in Poznan