{innovation}
comes
with b com

IRT B-COM
Presentation

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IRT b-com

- As a trusted research and innovation partner for businesses, b<>com is an IRT specializing in next-generation digital technologies for decarbonization.
- b<>com and its investors create research programs to develop innovative technologies that boost industrial performance.
- Its collaborative model fosters both technology and competitiveness while mitigating the risks associated with innovation.
- **Considered as a SME for European commission**
- **Located in Rennes, France**

- **2012** year of creation
- **4000** m² scientific campus
- **180** b<>comians
- **40** technologies & services
- **200** current patents
- **70** patent families
- **160** softwares
- **20** European projects
- **24** International Awards and distinctions
- **3** sites (Rennes, Brest, Lannion)
- **2** spin off

31/12/2025

Expertise and Europeans projects

Expertises

networks & Connectivity

Images & Vision

AI & Data

MLOps & Cloud

Engineering & embedded systemss

Digital & Society

Verticals

European projects

SUSTAIN 6G

Hexa-X

ARTWIN

EDINAF

5G EVE

5G-TOURS

XR 4ALL

NEpaas

5G-Transformer

DIGITAL INNOVATION HUB BRETAGNE

MonB5G

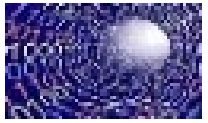
ONE5G

ARDITO

5GINFIRE

SENDATE

MEDIRAD



WORTECS

5G-Ensure

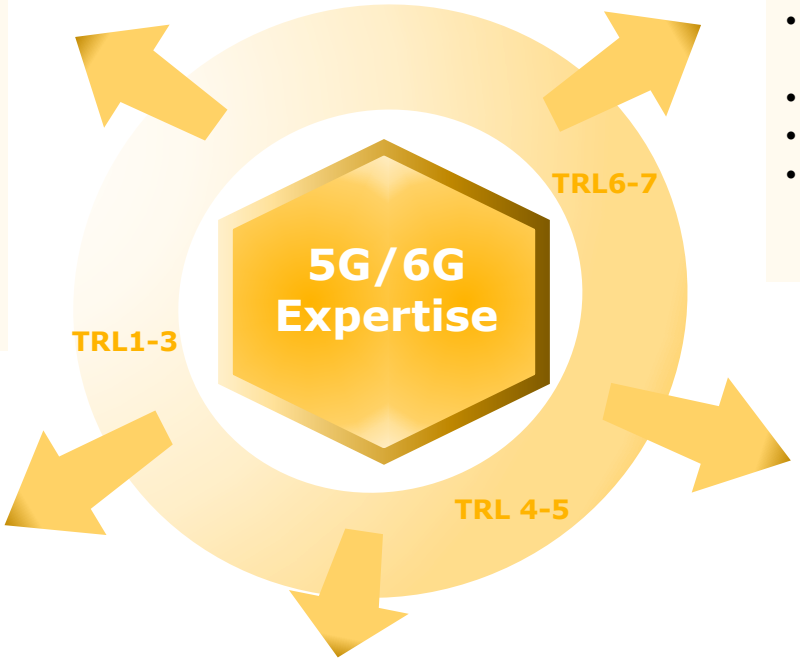
ORPHEUS Object-Based Audio Experience

Architecture & system engineering

- 3GPP roadmap & specifications study, support for contributions
- System level studies: Edge and central core Separation, public/private network integration, ...
- End-to-End architecture design
- Critical architectures: URLLC, NTN/LEO, TSN convergence, IAB/WAB
- System analysis & monitoring: Message tracing, system supervision

Research & innovation

- Signal processing: Synchronization, channel estimation, Massive MIMO, Full Duplex, beamforming
- Real-time AI: L1 receiver, MAC scheduling
- New frontiers: NTN/LEO, ISAC, PHY security, RIS, new waveforms…
- All Optical Networks



Modeling & Simulation

- 3D channel simulation: Sionna, GPU-accelerated Ray Tracing
- Network simulators: OMNeT++/OMNEST, ns-3, MATLAB

Integration & deployment

- E2E testing: UE, RAN, Core, Application
- RF measurements: EVM, sensitivity, environmental tests
- Field testing
- Critical KPIs measurement
- Vertical use cases and applications: Industry/Robotic, Healthcare, Agriculture, Defense/Public Safety, Drones

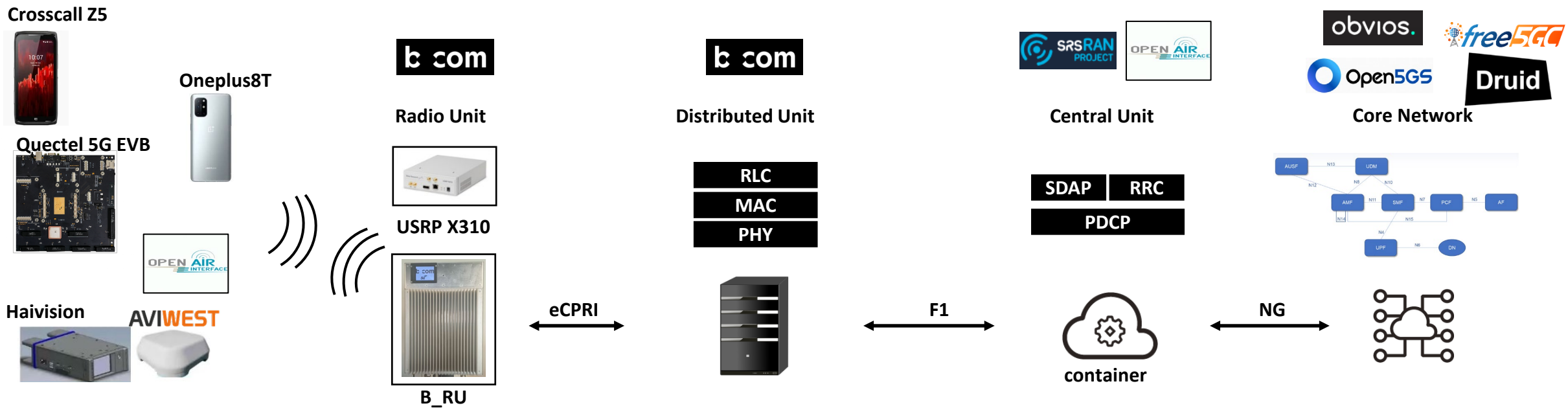
Platform development

- Software: 5G-NR RAN stack L1/L2, NB-IoT, Intel/ARM optimization
- Hardware: RU board design (FPGA/ARM SoC, eCPRI, RF transceiver, RF front-end, RFSoC)
- FPGA acceleration: High-throughput LDPC decoders, Low-PHY, …

6G topics of interest for b<>com

Technological Areas	Topics	Experience / assets	Next step
Sustainability	Power efficiency Use cases/KVIs : energy, agriculture, health	Participation to SUSTAIN-6G European project (2025-2027)	EuCNC 2026 Demos - gNB L1 power optimization - Wireless optical communications PoC design
MIMO signal processing techniques	PHY security / Discrete communications using cell-free massive MIMO	1 PhD thesis ongoing, research papers	Design prototype / PoC
	Full Duplex Self interference cancellation techniques	1 PhD thesis completed in April 2025 research papers	Design prototype / PoC
Non terrestrial networks	NTN IoT	- NTN IoT field tests with partner using an existing GEO constellation - 1 PhD thesis ongoing on MAC layer scheduling optimization - NB-IoT (3GPP Rel'13) eNB developed by b<>com (SDR platform)	b<>com RAN platform / Rel'17 NTN NB-IoT support
	LEO / 5G-NR broadband	Initial study of the rel'18 specifications	Leverage on bcom 5G-NR platform to demonstrate 5G NTN capabilities
URLLC	Low latency RAN adaptions short TTIs/mini-slots/grant-free allocation/…	Initial study ongoing	- Features implementation & TSN integration - 1 EU project setup / SNS-JU D01 call
	TSN integration PTP time sync, SIB9 broadcast to deliver absolute time information for UE alignment with TSN time, QoS-aware scheduling mapped directly to TSN traffic classes		

Technological Areas	Topics	Experience / assets	Next step
AI	Application to Layer 1 real time receiver processing : time & frequency synchronization, channel estimation, equalization…	Research papers on AI use for PRACH preamble detection, time and frequency offset estimation	- 1 project ongoing on AI application to L1 - Leverage on bcom 5G-NR platform to introduce IA based innovations
	QoS-aware MAC scheduling, slicing	1 PhD thesis completed in July 2025 on 5G resource allocation & scheduling in the context of 5G IAB, research papers	
New waveforms	**Study new waveforms in the context of integrated sensing and communication (ISAC)**	**Research papers on OCDM, AFDM**	**- Design prototype / PoC - 1 EU project setup / SNS-JU B02 call**
	Waveform analysis & detection through AI	**Initial study ongoing**	**Design prototype / PoC**



- Quectel 5G
- CrossCall
- Oneplus8T
- OAI UE

- n38 band (2.6GHz), n40 (2.3GHz) TDD, 2Tx / 2Rx
- 20/40/60/80/100 MHz bandwidth
- 2x37dBm output power, Digital Pre-distortion
- eCPRI Fronthaul, split 8
- GNSS, GPSDO, PTP
- USRP x310, b210, 205mini

- FR1 TDD duplexing, 2Tx 2Rx, 1 layer
- User friendly interface
- DU deployable in the field (cell range ~ 50 km)
- 20/40/50/60/80/100 MHz bandwidth
- Flexible TDD frame formats
- Full L1 Release 16
- MAC: QoS management, state of the art + customized scheduling algorithms

- CU OAI
- CU SRS RAN

- Druid
- Dome
- Free5GC
- Open5GS

<thanks>

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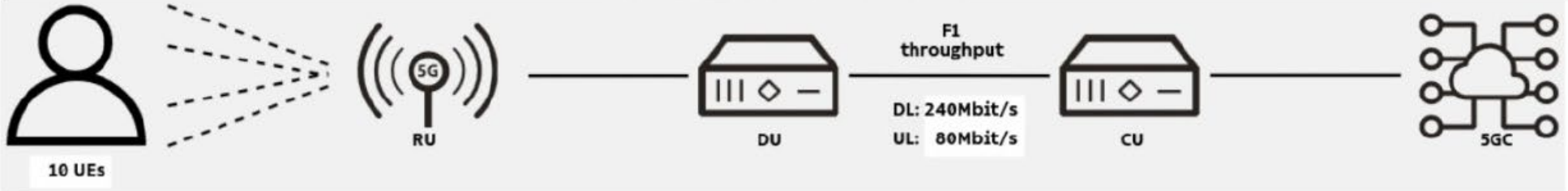
Overview

Host Info

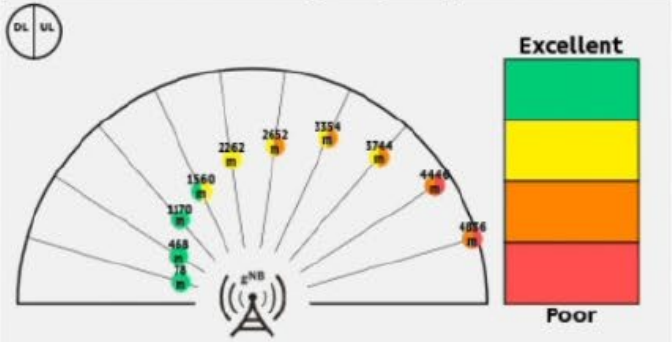
5G NR Cell Configuration

Transmission mode	TDD	Subcarrier spacing	30 khz	TX antenna number	2
Band number	n78	Cell id	222	RX antenna number	2
Bandwidth	100 Mhz	Frame format	d7s1u2	PRACH config index	89
Central frequency	3.473760 Ghz	MIMO layers	1	RU type	b_ru

Overview of 5G Network Architecture



Users Signal Quality



DU Dashboard

Radio Resource Usage

DL	Occupancy	UL
95%	Frequency (PRBs)	94%
95%	Time (Slots)	95%

Traffic Metrics

RLC DL:
ReTx_Pkts 264 Lost_Pkts 40

MAC DL:
ReTx_Pkts 994 Lost_Pkts 530 ReTx_Tput 0.80Mbits/s

DL: 240.80Mbit/s

UL: 81.60Mbit/s

MAC UL:
ReTx_Pkts 1979 Lost_Pkts 614 ReTx_Tput 1.60Mbits/s

System Status

DU Runtime: 4h05'30"

Alarms
packet drop
fronthaul

Log Level Control
log INF

Host CPU Load
max cpu: 100.0%
avg cpu: 39.9%

Track record

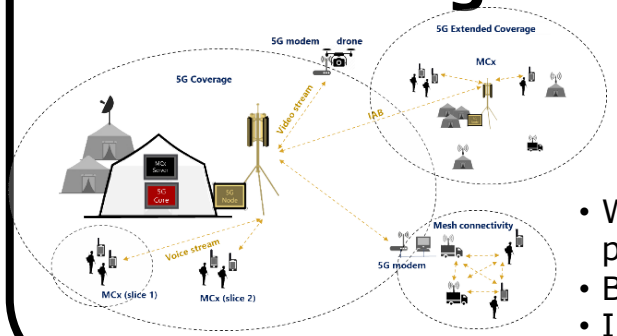
TRL 6

Industrial 5G deployment

- E2E deployment (UEs/RAN/Core/Applications)
- Remote assistance
- Digital model streaming
- Video surveillance

TRL5

Coverage extension



- Wireless Access & Backhaul prototyping (3GPP rel'19)
- Beamforming antenna
- Integration of RF repeaters

TRL6

5G flexible platform

flash me to discover b<>com *Open XG Hub*

- Multiple core networks options
- O-RAN SDR software
  - Multiple Central Units options
  - b<>com Distributed Unit
- b<>com Radio Unit prototype
  - 2x37dBm
  - Flexible frequency bands

TRL6

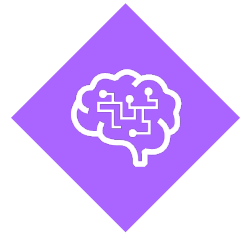
Airborne 5G bubble

- Embedded core/RAN/MCx app
- Delta suite & airbus applications
- <10kg, <100W
- Alimentation 18-75V, aluminum fanless case
- Drone embedded version under development

AI & Algorithmics expertises

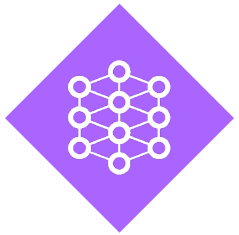
Data, Signals & Mathematical Foundations

- Radio, physiological & time-series signal processing
- Natural Language Processing (NLP)
- Statistics, stochastic modeling & optimization
- Data engineering & pipelines, Big Data architectures



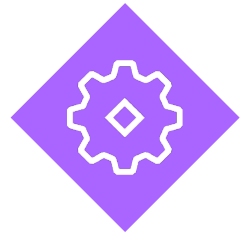
Generative & Advanced AI

- Large Language Models (LLM) & multimodal AI
- Retrieval-Augmented Generation (RAG), embeddings & vector databases
- Prompt engineering & AI agents/orchestration
- Trusted, Sovereign, Efficient & Edge-Ready AI Systems



Predictive AI & Machine Learning

- Classical ML: regression, classification, clustering, anomaly detection
- Time-series analysis, forecasting & flow prediction
- Predictive maintenance & failure-risk modeling
- Operational research, decision-support & planning optimization



Reliability, Deployment & Responsible AI

- MLOps, lifecycle management, monitoring & cloud/GPU architectures
- Model robustness, evaluation & benchmarking
- Governance, ethics, bias & regulatory compliance
- Privacy & data protection