IIITB COMET FOUNDATION

विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY

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COMET CONNECT

IIIT-BANGALORE COMET

Newsletter Vol: 02

Preface

Welcome to **Volume 2 of COMET Connect**, the flagship newsletter of IIIT-Bangalore's COMET Foundation your authoritative source for developments across our most consequential research and innovation initiatives. Each edition spotlights breakthrough advancements in our defining programs Massive MIMO ORAN and RIS technologies systematically reshaping telecommunications infrastructure through rigorous, impact-driven translational research. Readers will gain exclusive insight into our dynamic entrepreneurship ecosystem, encompassing high-potential startup success stories and targeted skill development programs purpose-built to cultivate the next generation of technology leaders. COMET Connect serves as the definitive briefing on the Foundation's strategic mission: seamlessly bridging world-class academic research with real-world industry application.

Message from the Project Director, IIIT-BANGALORE COMET

I am pleased to share that COMET's momentum across advanced communications technology development, entrepreneurship, and skill development continues to grow with meaningful outcomes this quarter.

On the technology front, our 5G-Advanced ORAN Massive MIMO Base Station is on track for an end-to-end call demonstration by June 2026, with Engineering Validation Test (EVT) and Design Validation Test (DVT) hardware completed and RU–DU integration well underway. Our Reconfigurable intelligent Surface (RIS) testbed has delivered measurable improvements in signal strength and throughput, and we are actively contributing to TSDSI standardization. The second version of the O-DU Accelerator Card is progressing towards fabrication, reflecting the depth of indigenous development we are achieving. A total of 19 patents have been filed so far in the areas of base station technologies and RIS, in addition to more than 60 peer-reviewed publications in reputed journals and conferences.

Our entrepreneurship ecosystem is thriving, with Startup Cohort 5.0 resulting in funding commitments for three promising startups. Portfolio companies such as Astrogate Labs and Mantiswave Networks are registering significant commercial and institutional milestones.

Our Future Wireless Communication (FWC) programme, launched from Bangalore in early 2025, is gaining strong traction. The curriculum has been formalised with CPE, and a collaborative workshop with Keysight Technologies on 5G–6G intelligence was successfully conducted. The skill development activities, through FWC and other technical workshops, have already reached **873** beneficiaries, and the funded projects and FWC have together supported the creation of **341** jobs till date.

Introduction:

Technology Vertical - Advanced Communication Systems (ACS)

IIIT-BANGALORE COMET is a Section 8 company established as a Technology Innovation Hub (TIH) by IIIT Bangalore. Operating under the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) of the Department of Science and Technology (DST), Government of India, the hub specializes in Advanced Communication Systems.

The hub's mission centers on generating valuable intellectual property through fundamental and applied research. Our work encompasses patents, publications, product development, entrepreneurship support, and advanced workforce training.

IIIT-BANGALORE COMET stands tall on 3 major pillars

- **Translational Research & Technology Development**
- **Entrepreneurship development**

- Skill Development

Translational Research & Technology Development

IIIT-BANGALORE COMET is working on 2 major technologies:

1. 5G-Advanced ORAN massive MIMO base station

5G Advanced O-RAN Massive MIMO Base Station

One of COMET's flagship initiatives under the DST NMICPS programme is the development of an indigenously built 5G-Advanced ORAN massive MIMO base station.

COMET's central contribution to this project is the **32TR Massive MIMO Radio Unit** developed and funded by COMET and built at IIT Hyderabad. This Radio Unit operates in the n78 band with 32 transmit-receive RF chains, compliant with both 3GPP Release 15 and O-RAN standards. Architecture design and Engineering Validation and Testing have been completed. Design Validation and Testing is currently ongoing, and a commercial version is targeted for 2026. The RU will be integrated with the Distributed Unit provided through the Bharat RAN project, forming a complete, indigenously developed base station stack.

Complementing the Radio Unit, COMET has also developed the **Open DU Accelerator Card** entirely in-house at IIIT Bangalore. Built on a 16-layer PCB, this custom hardware accelerates 5G NR physical layer processing with 100 Gbps optical front haul, PCIe Gen 3 at 64 Gbps, and support for up to 4-layer 5G transmission. Up to nine cards can be integrated per centralised server, meeting the most demanding signal integrity, power, and thermal requirements for high-performance 5G deployment.

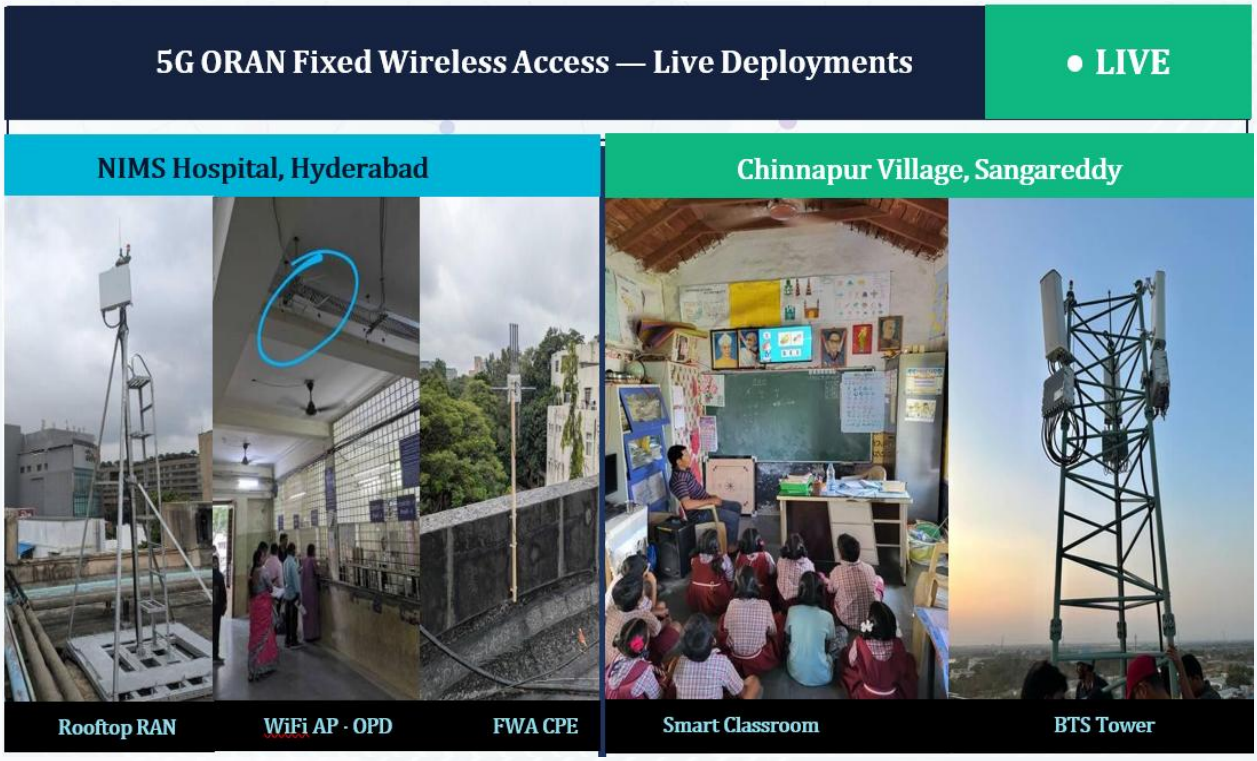
COMET's 32TR Radio in Action: Pre-6G Research at IIT Hyderabad

COMET's 32TR Radio Unit is not only at the heart of the base station project it is actively enabling cutting-edge Pre-6G research at IIT Hyderabad. Prof. Kiran Kuchi's team has deployed the COMET-funded 32TR Radio to validate India's first indigenously developed Pre-6G Physical Layer, the **OTFDM waveform**, over a live over-the-air link exceeding one kilometer on the IIT Hyderabad campus. This is a real FPGA modem transmitting in the 6.425–7.125 GHz band — 200 MHz instantaneous bandwidth, 1.2 Gbps peak rate per layer making it the widest-bandwidth indigenous physical layer demonstrated in India.

Beyond communications, COMET's 32TR Massive MIMO Radio carries a powerful dual-use advantage. The same hardware without any modification can perform radar-class sensing, providing 360-degree azimuth coverage with degree-level angular resolution for real-time drone detection, UAV tracking, and perimeter security. For India's rapidly expanding drone ecosystem and critical infrastructure requirements, a single COMET base station simultaneously functions as a broadband access point and a precision sensing platform.

Live Deployments: COMET Technology Serving Real Users

The COMET 32TR Radio has been deployed in live, real-world settings through WiSig Networks an IIT Hyderabad-incubated deep-tech startup and a MeitY-funded proof-of-concept partner. At **NIMS Hospital, Hyderabad**, the Radio Unit is mounted on the rooftop serving live patients and staff across multiple buildings, currently handling 50 gigabytes of data per day as an institutional-grade replacement for fiber. At **Chinnapur Village, Sangareddy**, the same technology delivered broadband to a government school for the very first time with no wire, no fiber enabling smart classrooms and sustaining home internet usage of over two gigabytes per day per user. These deployments are proof that COMET's indigenously developed technology works under real-world conditions, at scale, for India's most underserved communities.



O-DU Accelerator Card: Advancing Steadily Toward Fabrication

The O-DU Accelerator Card programme is progressing on schedule, with a series of significant design milestones completed and the second version of the card confirmed on track for fabrication by the end of May 2026. This brief outlines the key updates from our hardware engineering team.

Completed Milestones

PL RAM signals have been successfully connected to contiguous PL banks, ensuring reliable and high-integrity memory access across the programmable logic fabric. In parallel, the clock generator part number has been updated to incorporate GPS clocks as a reference source a critical enhancement for the precision timing demands of O-DU deployments.

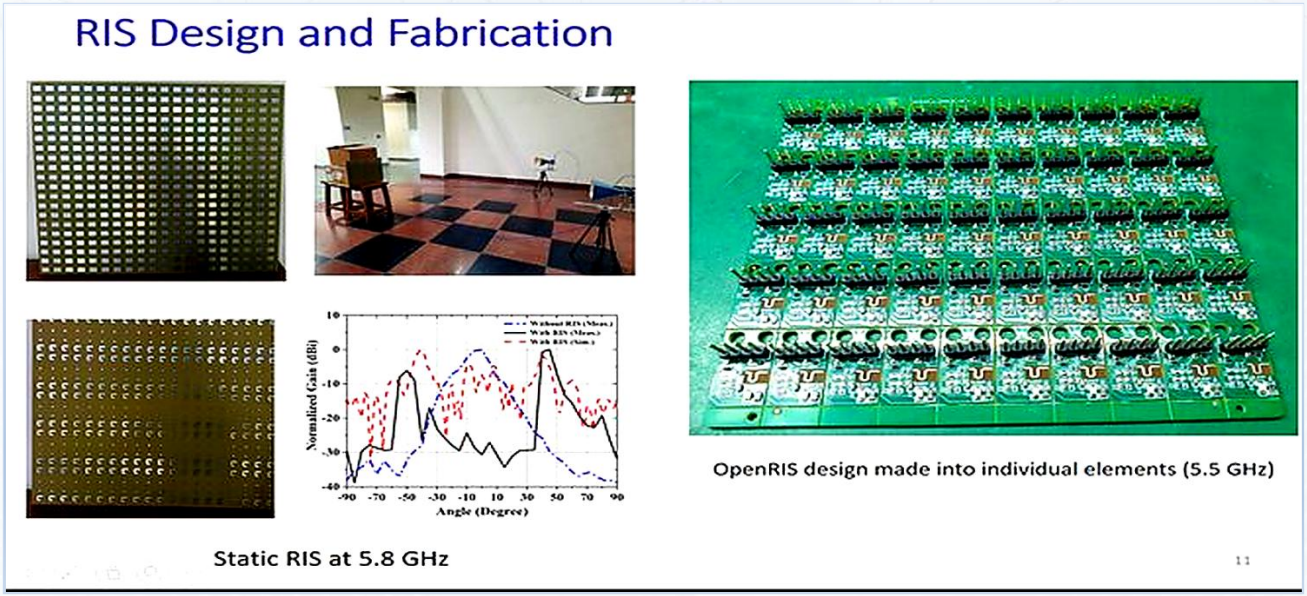
On the component side, select DNP parts have been populated with zero-ohm resistors to improve design flexibility and ease of assembly. Connector spacing between the two PMOD connectors has also been increased, providing improved clearance during the manufacturing process and reducing assembly risk.

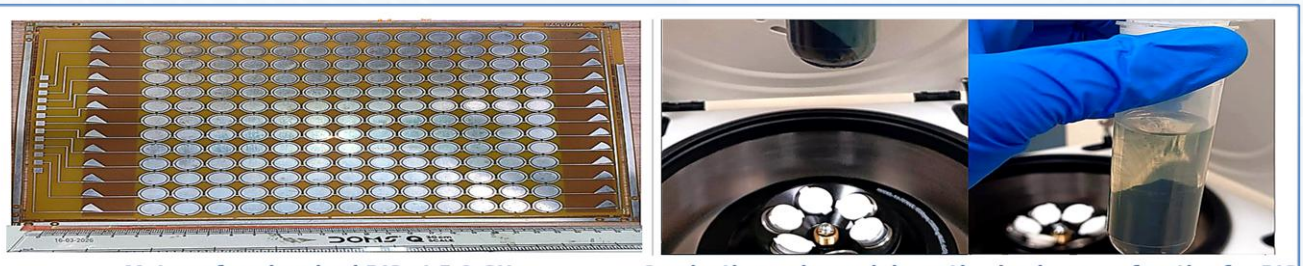
As part of our ongoing focus on power efficiency, supply lines to unused switchers in PMICs 1 and 3 have been removed. This targeted adjustment contributes to a meaningful reduction in the card's overall power consumption without any compromise to functional performance.

The O-DU Accelerator Card is a reflection of COMET Foundation's commitment to open, reliable, and power-conscious Radio Access Network infrastructure built to the highest engineering standards at every stage of development.

2. Reconfigurable Intelligent Surfaces (RIS)

Reconfigurable Intelligent Surfaces (RIS) stand as one of the most transformative and forward-looking technologies being advanced under IIITB COMET Foundation, poised to serve as a critical component of 6G wireless communication networks ecosystem and a decisive solution to the coverage and efficiency challenges that persist within the 5G-Advanced landscape. Under COMET's strategic leadership, a powerful national consortium has been forged, bringing together distinguished institutions IIT Bhilai, IIT Jodhpur, IIT Roorkee, IIT Patna, IIT Delhi, IIT Indore, IIT (ISM) Dhanbad, IIT (BHU) Varanasi, and IIIT Naya Raipur in a unified mission to develop, experimentally validate, and standardize this ground-breaking technology for India and the world. Unlike conventional approaches that demand the deployment of additional full-fledged base stations at enormous cost and energy expenditure, RIS intelligently extends network coverage by enabling programmable, adaptive signal reflection, delivering significant power savings and cost efficiencies that make next-generation connectivity not only technically superior but also economically viable and scalable across diverse deployment environments. The COMET-led RIS programme has achieved remarkable milestones during this reporting period, with the open, modular RIS testbed built on the Open Air Interface (OAI) framework and fully compliant with TSDSI STD 5003 specifications demonstrating throughput gains of up to 43% for video streaming and an exceptional 166% improvement for file transfer tasks over baseline scenarios, validating the real-world impact of RIS-assisted communication. This standardized, plug-and-play architecture, implemented through well-defined APIs, empowers researchers and industry partners alike to seamlessly integrate diverse RIS designs and customized channel estimation algorithms, accelerating the path from laboratory innovation to commercial deployment. The program's growing industry relevance has been affirmed through active partnerships with Tejas Networks and ongoing engagement with BSNL, while its academic and global standing has been demonstrated through high-profile demonstrations at the Indian Mobile Congress 2025 in New Delhi, IEEE COMSNETS 2026 in Bengaluru, and the IEEE National Conference on Communications 2026 at IIT Hyderabad a testament to COMET's enduring commitment to translating cutting-edge research into industry-ready solutions that will shape the future of India's wireless communication ecosystem.

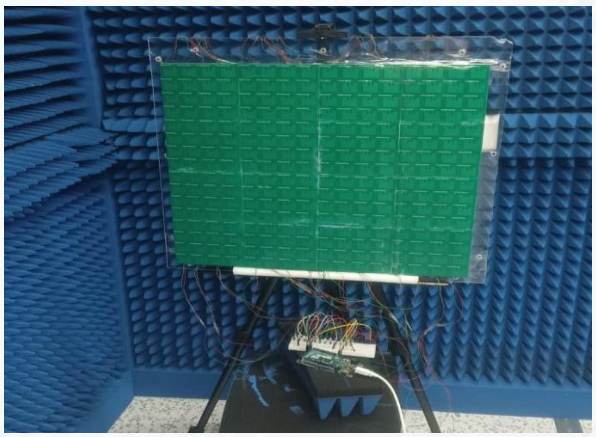



Metasurface inspired RIS at 5.2 GHz

Conducting polymer ink synthesized: a new frontier for RIS

Recent Updates on RIS collaboration with Tejas Networks

Following the landmark live demonstration of the n78 band Reconfigurable Intelligent Surfaces (RIS) proof of concept at the Indian Mobile Congress (IMC) 2025 in New Delhi, the COMET Foundation is now advancing a focused commercialization roadmap in close collaboration with Tejas Networks. This strategic partnership is centered on productizing the RIS solution for real-world deployment, encompassing the definition of rigorous performance benchmarks, the development of a next-generation four-layer PCB form factor for simplified field control, and the construction of a scalable testbed for systematic field trials with immediate application directed towards the Fixed Wireless Access scenario, underscoring COMET's commitment to translating indigenous research excellence into deployable, industry-ready wireless communication infrastructure.



Entrepreneurship development:

COMET 5G Spring board- Fostering Next-Gen Communication Technologies

COMET's 5G Springboard Program is a premier incubation initiative designed to accelerate entrepreneurial excellence in advanced communications technology. The program delivers an end-to-end pathway from ideation to market entry, fostering strategic collaboration between high-potential startups, established corporates, and key industry stakeholders, underpinned by expert mentorship in business development and commercialization. With a sharp focus on transformative problem-solving within the communications landscape, the program champions the development of scalable, high-impact solutions poised to redefine industry standards. We are proud to introduce our latest startup cohort, driving cutting-edge innovation across 5G-Advanced and 6G domains, spanning infrastructure, middleware, and implementation verticals.

Meet Our Incubates:

Mantiswave Networks	Benlycos	Cablesmith	Proyava Innovations
Astrogate Labs	Aditi Stonesoup	Cinque Networks	

IIIT-BANGALORE COMET's Workshop, Events & Trade Shows

1. Keysight Technologies & IIITB COMET Foundation Host Cutting-Edge 5G–6G Workshop

On February 13, 2026, Keysight Technologies and the IIITB COMET Foundation jointly hosted a full-day collaborative workshop titled *"Advancing 5G–6G Intelligence: From Open RAN to Intelligent Wireless Systems"* at Venue R309. The event brought together researchers and industry experts for an immersive exploration of the next frontier in wireless technology, spanning topics from 5G Core Architecture and Cloud-Native Virtualization to Open RAN innovations powered by AI. Attendees gained deep insights into Advanced RF Testing, Massive MIMO deployment challenges, and ground breaking concepts shaping 6G including Integrated Sensing and Communication (ISAC), Non-Terrestrial Networks (NTN), and Digital Twin-based test platforms. The workshop also covered practical tools such as SystemVue, Wireless Pro, and Automotive & IoT solutions including CV2X and Wavebee. Complementing the sessions were live hands-on demonstrations running throughout the day, featuring platforms like PROPSIM, EXata, Wavejudge, and NEMO, giving participants valuable real-world exposure to state-of-the-art testing and validation technologies driving the future of intelligent wireless networks.

2. COMSNETS FORUM

Empowering the Next Generation

Highlights from the COMSNET 2026 Graduate Forum

Graduate Forum participants at COMSNET 2026, Bengaluru, India — January 6–10, 2026 & Sponsor exhibitions and delegate networking

Forum Overview

The COMET Foundation co-organized the Graduate Forum at COMSNET 2026 an afternoon dedicated entirely to early-stage researchers, from undergraduate students to doctoral candidates. The session served as both a research showcase and a mentorship platform, with expert reviewers providing career-shaping feedback to all presenters.

Opening Masterclass

Prof. Ayon Chakraborty (Indian Institute of Technology, Madras) delivered an acclaimed masterclass titled *"Your First (Good) Paper: From Concept to Camera-Ready"* — offering researchers a candid, practical guide on producing top-tier publications from raw ideas.

Research Presented

Technical presentations spanned four thematic areas: Security & Resilience (vulnerabilities in multi-robot systems, federated graph learning for IoT); AI & Health (crop disease detection, cardiac arrest prediction); Next-Generation Networks (AI-native diagnostics, Kubernetes optimization, 5GC profiling); and Future Technologies (quantum simulation bottlenecks, evolutionary routing frameworks).

Forum Chairs

Pragma Kar, Tanya Shreedhar (Ph.D.), and Debasree Das chaired the Graduate Forum with exceptional dedication, ensuring a seamless and impactful experience for all participants.

Skill Development:

FWC Certificate Program

Launched at IIIT-Bangalore COMET • 5G & 6G Innovation

The FWC program bridges the gap between academic theory and industrial reality through a comprehensive, hands-on ecosystem for **5G and 6G innovation.** By integrating hardware and software expertise, it prepares engineers to lead the global transition toward ultra-fast, intelligent, and reliable communication networks.

Vision

Training engineers in advanced wireless technologies is critical to meeting India's rising demand for skilled talent in indigenous communication systems. This initiative builds deep expertise in next-generation domains driving innovation, enabling deployment, and advancing technological sovereignty while positioning India as a global leader in telecom.

Strategic Objectives

- **National R&D Leadership —** Leveraging IIITB COMET's specialized testbeds to foster homegrown expertise in 3GPP standards and cutting-edge system design.
- **Bridging the Skills Gap —** Transforming students into specialists through rigorous training in embedded systems design and advanced digital programming.
- **AI-Integrated Networks —** Pioneering AI/ML to optimize 5G and 6G performance, ensuring future networks are not just faster, but smarter and more adaptive.
- **Career Transformation —** Providing a direct pathway from education to industry through internships and full-time opportunities on cutting-edge wireless projects.

> *"Our mission is to cultivate a workforce capable of designing the entire wireless stack — from embedded protocols to the AI-driven architectures of the 6G future."*

Program Highlights

- **Industry-Grade Mastery —** Hands-on experience with 5G-NR wireless system design and 3GPP standardization protocols at IIIT-Bangalore's state-of-the-art testbed.
- **Expert Mentorship —** Learning directly from distinguished professors, industry leaders, and faculty from IIIT-Bangalore and the COMET Foundation.

Advancing India's Wireless Future

The IIITB COMET Foundation is driving India's transition to next-generation wireless communications through the **FWC Certificate Programme** and a nationwide Skill Development initiative bridging academic theory with industrial reality in 5G and 6G technologies, and strengthening India's self-reliant telecom talent pipeline.

FWC Programme showcase at IIITB COMET booth (left) • Collaborative engagement and MoU signing (right)

FWC Certificate Programme

Launched in February 2025 at IIIT-Bangalore with an approved curriculum developed in collaboration with the CPE committee, the programme combines hardware and software mastery across 5G-Advanced and 6G domains. Participants gain hands-on experience at COMET's state-of-the-art testbeds, receive mentorship from distinguished faculty and industry leaders, and meritorious students are supported by a **₹15,000 monthly stipend** to ensure talent is never held back by financial barriers. A collaborative workshop with Keysight Technologies on "Advancing 5G–6G Intelligence: From Open RAN to Intelligent Wireless Systems" further anchored industry integration.

Skill Development & National Outreach

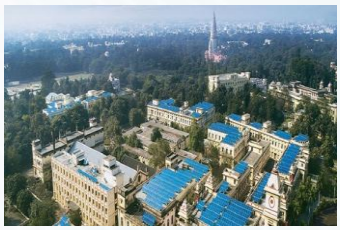
The Foundation's outreach spans final-year students across 500+ VTU-affiliated Tier 2/3 colleges. Active participation in the Bangalore Skill Summit (BSS) and an upcoming visit to Tumkur Startup College (April 2026) reflect strong regional momentum. In Andhra Pradesh, the Government has formally invited COMET to conduct skill programmes at IIIT Nuzvid, IIIT Ongole, IIIT RK Valley, and IIIT Srikakulam, with APSSDC collaboration discussions underway.

Institutional Partnerships & Collaborations


IIIT Naya Raipur


IIT Jodhpur


IIT (ISM) Dhanbad


IIT BHU Varanasi

IIT Indore


IIT Delhi


IIT Bhilai


IIT Patna


IIT Roorkee


IISc Bangalore


IIT Hyderabad


Amrita University

IIIT-BANGALORE COMET's Collaboration with Industries

1. IIIT-BANGALORE COMET signs Technology Transfer Agreement with WiSig Networks Pvt. Ltd.

IIIT-Bangalore COMET and WiSig Networks Pvt. Ltd. have formalized a landmark **Technology Transfer Agreement** for the pioneering **32TR ORAN Radio Unit** — an indigenous engineering breakthrough purpose-built for Advanced 5G Massive MIMO Base Stations.

Strategic National Significance

This indigenous innovation represents a decisive step toward reducing India's dependence on imported telecommunications equipment. By expanding the availability of network infrastructure from trusted domestic sources, it concurrently fortifies national security and establishes Indian enterprises as credible, competitive suppliers on the global stage.

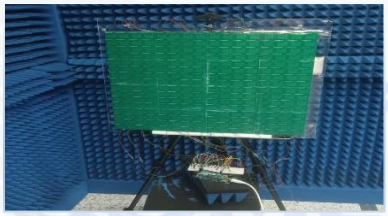
Aligned with Atmanirbhar Bharat & Digital India

Developed in full alignment with India's flagship ***Atmanirbhar Bharat*** and ***Digital India*** initiatives, the 32TR Radio Unit (n78 band) is engineered to deliver robust, long-range, and high-capacity 5G connectivity — seamlessly supporting both high-density urban deployments and last-mile rural coverage expansion.

Global Commercialisation by WiSig Networks

This agreement empowers WiSig Networks to manufacture, deploy, and commercially scale this state-of-the-art technology across international markets — positioning India at the forefront of next-generation wireless infrastructure and sovereign 5G innovation.

IIIT-BANGALORE COMET signs Technology Agreement with Tejas Networks Pvt. Ltd.



IIIT-BANGALORE COMET Enters Technology Agreement with Tejas Networks Pvt. Ltd.

IIIT-BANGALORE COMET has entered into a formal agreement with Tejas Networks Limited for the supply of prototype 1-bit controllable Reconfigurable Intelligent Surfaces (RIS) tailored for the N78 Band (3.6–3.8 GHz).

This partnership represents a pivotal milestone in the development of indigenous 5G Advanced and Beyond technologies. It builds upon the foundational intellectual property established through the Smart Radio Environment Project, carried out in collaboration with the International Institute of Information Technology Bangalore, the Indian Institute of Technology Bhilai, and the Indian Institute of Technology Jodhpur.

The developed prototypes will serve as proof-of-concept demonstrations, laying the groundwork for commercialization, scalable deployment of RIS-based solutions, and potential IP licensing engagements with Tejas Networks upon successful prototype evaluation.

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