International Workshop on "DIGITIZATION : BRIDGING THE PRESENT AND FUTURE"

EU & India Partnership: Role of Standards in building Digital Infrastructure

Agenda

- **About Project SESEI**
- **Importance of Standards**
- **EU-India - latest updates (Policies and standardization)**
  - 5G/5GA and 6G
  - AI and
  - Quantum technologies
- **EU-INDIA Partnership Instruments**

EU Project SESEI

Project is a local presence in India

SESEI (**S**econded **E**uropean **S**tandardization **E**xpert in **I**ndia) ***is a local face for the European standardization community in India: Dinesh Chand Sharma***

Why SESEI: India is a major trade partners for EU/EFTA, Increasing role of standards to gain market access, evolving & complex nature of regulatory and standardization landscapes, sharing best practices, and work together as partners

Priority Sectors/topics: Aligned with EU-INDIA TTC, Connectivity Partnership

- **Digitization: Strategic technologies, digital governance, and digital connectivity** - Smart Cities/Urban Development, ITS, Quantum Technologies, Smart Grid/Meter, **Artificial Intelligence**, 5G/6G, Open RAN, M2M/IoT (Cyber-Physical Systems), DECT, Data Privacy, Satellite Communication, Blockchain, Digital Signature, Smart Manufacturing, e-Accessibility, cybersecurity, digital skills, digital platforms including Research and Innovation etc.
- **Green & Clean technologies :** Clean Energy, Energy Efficiency (Green ICT), Environment, Circular Economy including Resource Efficiency, Waste Management, Energy storage technologies, Electric mobility, Green Hydrogen, Advanced biofuels including R&I etc.
- **Other topics** of mutual interests such as Rail, Ropeways, Machinery Safety etc.

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Importance of standards

Why standards are important?

It is widely accepted that standards play a vital and often invisible role in supporting economic growth:

- ✓ by promoting productivity and efficiency in companies
- ✓ through their role in supporting international trade
- ✓ by acting as a catalyst for innovation within companies and sectors.
- ✓ Enhance **safety of products**
- ✓ Promote **common understanding**
- ✓ **Facilitate trade** by reducing TBs
- ✓ Promote **interoperability of products and services**
- ✓ Benefits of **economies of scale**
- ✓ Support **environmental sustainability**
- ✓ Facilitate the **uptake of innovation &** reflect the outcome of **research and Development**

World of Standardization

Objective - Avoid duplication of work at Indian, European and International levels with an aim for a identical worldwide standards

"Vienna Agreement" with

Chemistry, Material, Energy, Environment, Transport, Construction, Services, eMobility etc

"Frankfurt Agreement" with

Electricity, Electro-technical

MoU for telecommunications sector (ITU-T), Agreement on radio-communication sector (ITU-R)

Information & Communication Technologies (ICT)

Founding Partner to 3GPP & oneM2M

Founding member of ISO and working with IEC since 1911

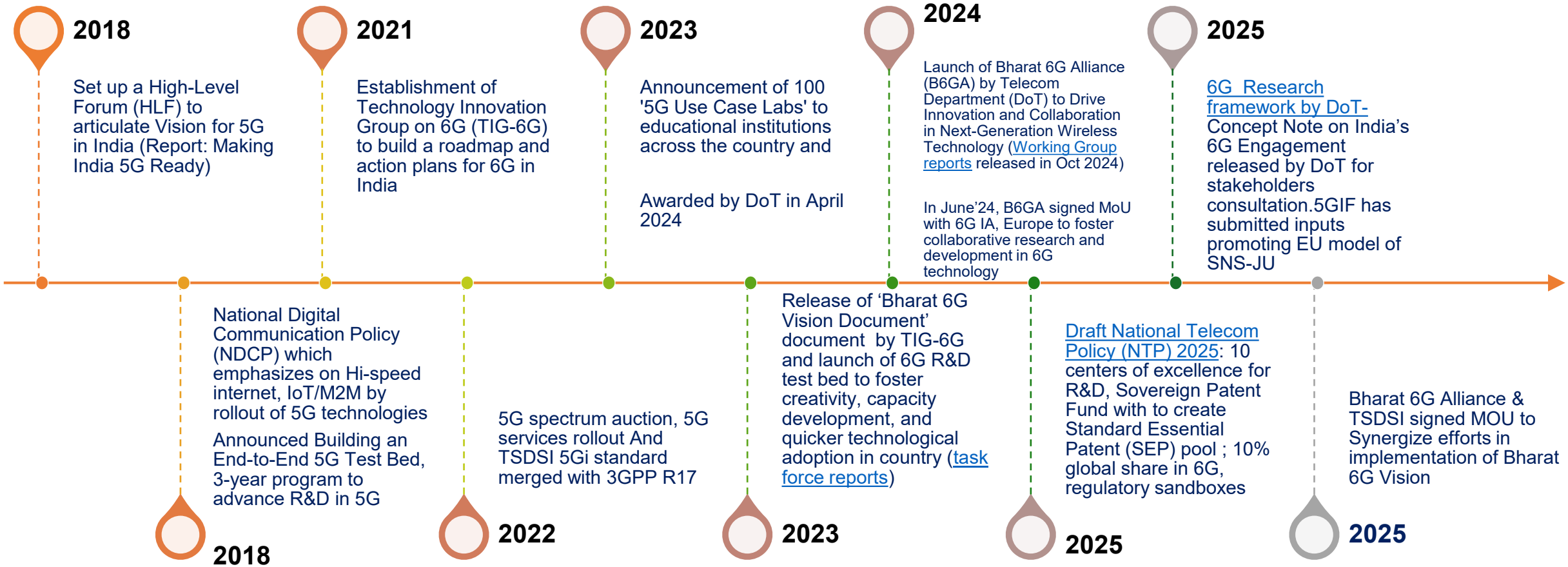
DoT/TEC are member of ITU-T and WPC for ITU-R

Organisational Partner of 3GPP and Partner Type 1 of oneM2M

SESEI | Seconded European Standardisation Expert in India

Enabling Europe-India Cooperation on Standards

India: 5G => 6G



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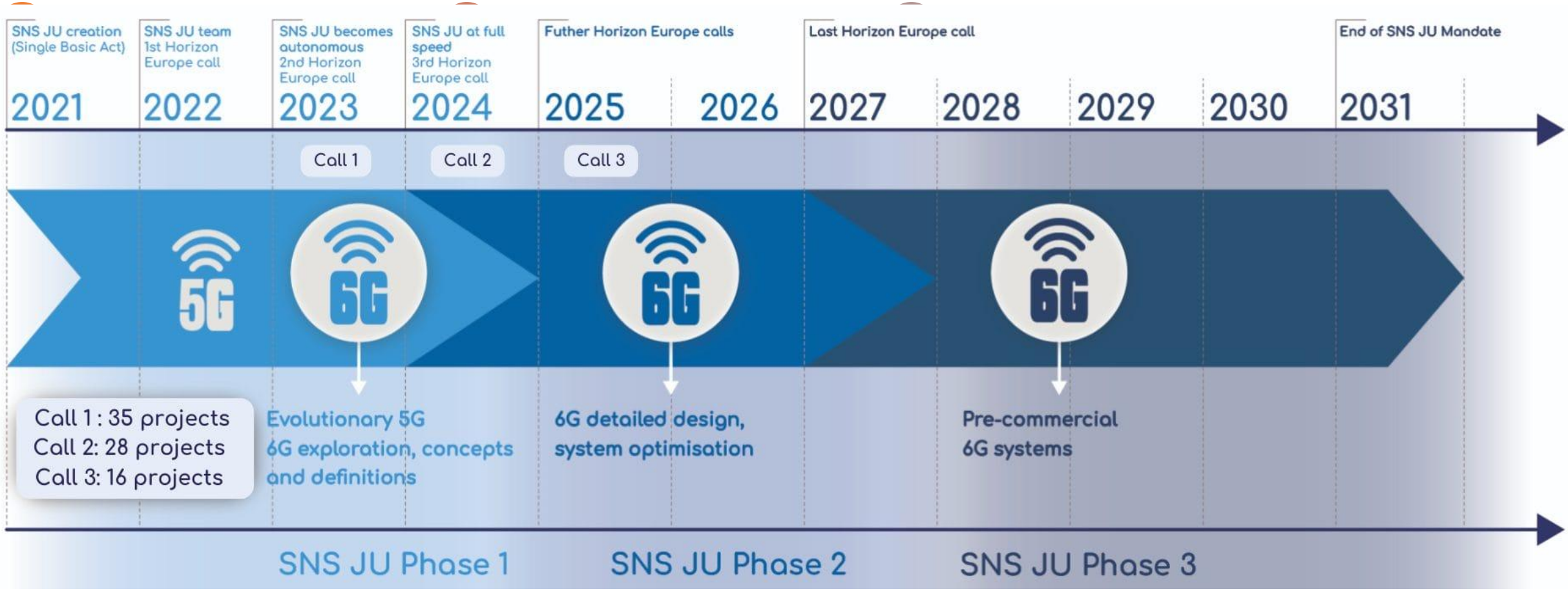
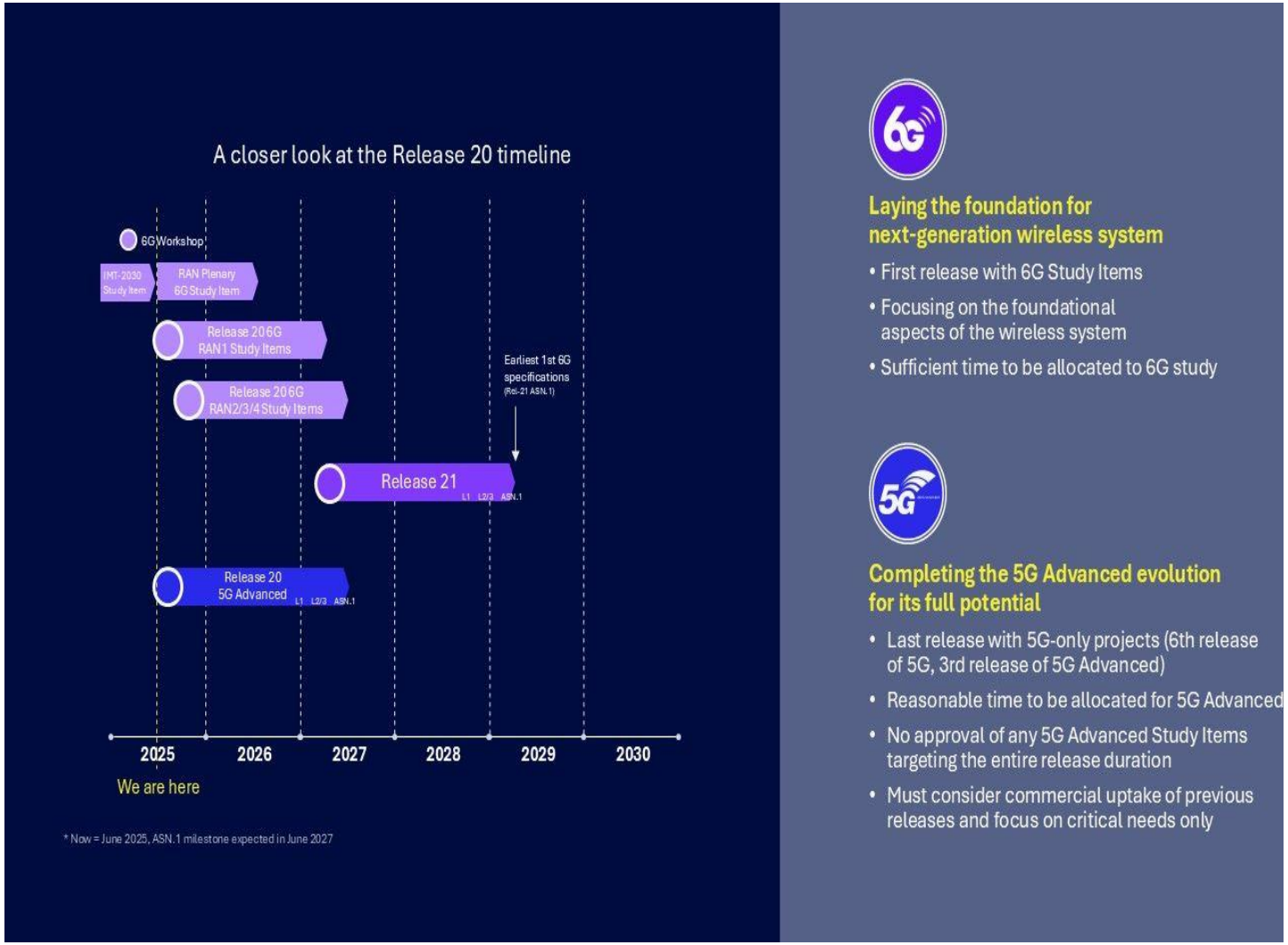
Journey of 5G/6G in Europe till now



B5G/6G Research & Standards

- Operators are currently deploying 5G networks across the globe.
- It is important to use with caution when using the term 6G to avoid diluting the impact of present day 5G rollouts.
- Current assumption is that the first 6G services may be deployed as of 2030 or may be later…but of course expectations can and often do change due to global/market pressure.
- 3GPP is starting detailed studies on 6G that are expected to lead to the first release of 6G standards as part of Release 21.
- Additionally, Release 20 will continue to enhance 5G in the third release of 5G Advanced.



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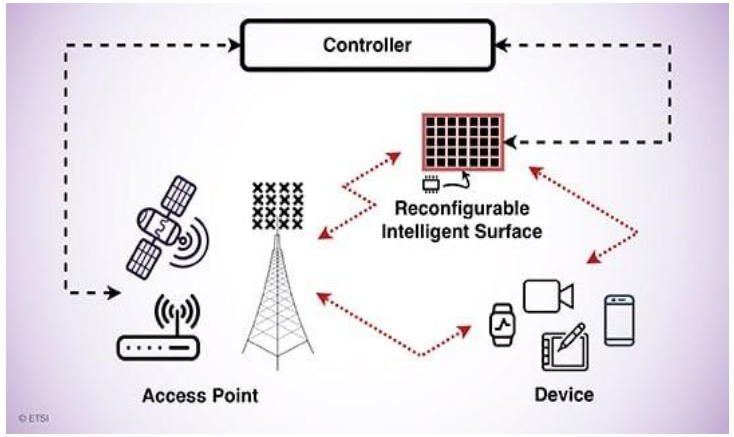
ETSI ISGs, recent pre-standards Groups for B5G / 6G

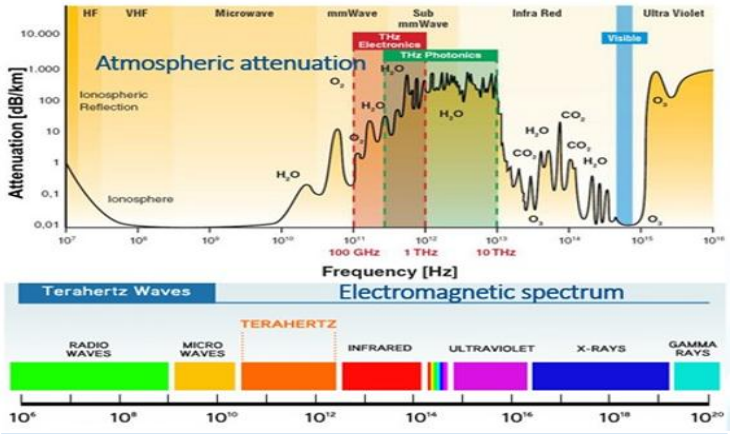
ISG RIS (Sept. 2021)



ETSI ISG RIS Mission:

Pre-standards activities based on outcome of research on RIS (Reconfigurable Intelligent Surfaces) from EU/UK collaborative projects, extended with relevant global initiatives, towards paving the way for future standardization of the RIS tech.

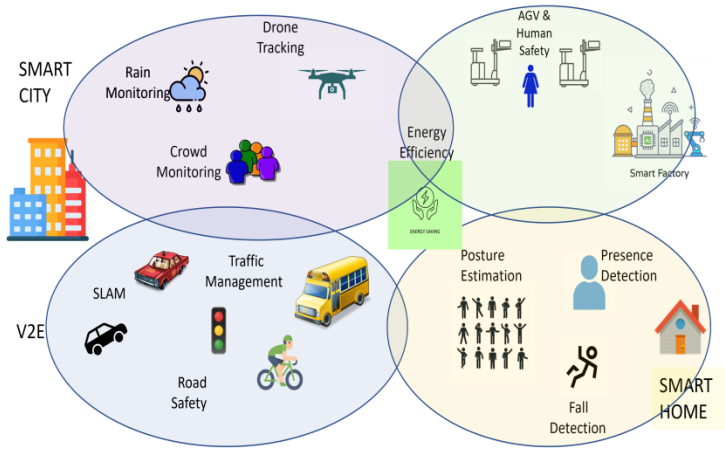
ISG THz (Sept. 2022)



ETSI ISG THz Mission:

Establish technical foundations for sub-THz (100 GHz -> 10 THz). Place for ETSI members *(and non-members)* to progress their pre-standardization activities resulting from EU/National research efforts in the domain of sub / full THz technologies.

ISG ISAC (Oct. 2023)



ETSI ISG ISAC Mission:

Provide an opportunity for members to coordinate their pre-standards 6G research efforts on integrated sensing and communication (ISAC) technology across various European/National funded collaborative projects, extended with relevant global initiatives.

India: key policy initiatives (AI)

2017: Task Force on Artificial Intelligence (AI):

On 24th August 2017, Ministry of Commerce and Industry had constituted a Task Force on Artificial Intelligence (AI) for India's Economic Transformation.

- ✓ In its report on 19th January 2018, recommended setting up an Inter-Ministerial National Artificial Intelligence Mission to act as a nodal agency for coordinating AI related activities in India. The recommendations of the Task Force were shared with various Ministries and Departments of the Government of India.

2018: National Strategy for Artificial Intelligence (AI):

- ✓ Released by Govt. think tank - NITI Aayog in June 2018 with an aim to guide research and development. Identified five sectors — healthcare, agriculture, education, smart cities and infrastructure and transportation — to focus its efforts on implementation of AI.
- ✓ As a follow up to its National Strategy for AI, NITI Aayog also published various discussion papers on Responsible Artificial Intelligence (RAI)

Ministry of Electronics and Information Technology (MEITY) had created four committees to create a policy framework and to develop the ecosystem for Artificial Intelligence:

- ✓ Committees released four reports covering all the aspects of AI.

2024: India AI Mission: National Program on Artificial Intelligence

- ✓ In March 2024, Government of India approved an allocation of over Rs 10,300 crore (approx. €1.03 billion) for the IndiaAI Program, marking a significant step towards bolstering India's AI ecosystem.
- ✓ Program aims to build a comprehensive ecosystem that fosters AI innovation by democratizing computing access, enhancing data quality, developing indigenous AI capabilities, attracting top AI talent, enabling industry collaboration, providing startup risk capital, ensuring socially impactful AI projects, and promoting ethical AI.
- ✓ Mission drives responsible and inclusive growth of India's AI ecosystem through seven pillars: **IndiaAI Innovation Centre, IndiaAI Application Development Initiative, AIKosh Platform, IndiaAI Compute Capacity, IndiaAI Startup Financing, IndiaAI FutureSkills, Safe & Trusted AI**

Europe: key policy initiatives (AI)

- **EU strategy on AI** was published on 25th April 2018
  - ✓ aims at making the EU a world-class hub for AI and ensuring that AI is human-centric and trustworthy.
- In December 2018, Commission presented a **Coordinated Plan on AI**
  - ✓ to maximize the impact of investments at EU and national levels, to encourage synergies and cooperation across the EU, and to foster the exchange of best practices.
- In April 2021, Commission presented its **AI package**, covering:
  - ✓ Communication on fostering an European approach to AI;
  - ✓ a review of the Coordinated Plan on AI (with EU Member States);
  - ✓ Regulatory framework proposal on AI and relevant Impact assessment.
- In January 2024, Commission launched **AI innovation package to support AI startups and SMEs.**
- **European AI Office** was inaugurated in February 2024 as part of the Commission.
  - It plays a key role on the enforcement and implementation of the AI Act in collaboration with the member states.
- **EU AI Act** came into force on 1 August 2024.
  - ✓ aims to foster responsible AI development and deployment in EU.

✓ AI Continent Action Plan and Apply AI Strategy

- ✓ **AI Continent Action Plan 2025** focuses on developing trustworthy AI technologies to enhance Europe's competitiveness while safeguarding and advancing our democratic values.
- ✓ Launched in October 2025, the **Apply AI Strategy** complements the AI Continent Action Plan. It aims to harness AI's transformative potential by increasing AI adoption and integration across key industrial and public sectors, especially among SMEs, and support their specific needs.

AI: Standardization

India

Bureau of Indian Standards (BIS) LITD TC 30: Artificial Intelligence Sectional Committee:

- ✓ Responsible for AI and Big Data standardization and National Mirror Committee for ISO/IEC JTC1/SC42.
- ✓ Adopted following Standards:
  - IS/ISO/IEC/TR 24028: 2020: Information technology AI Overview of trustworthiness in artificial intelligence.
  - IS/ISO/IEC/TR 24029-1: 2021: AI Assessment of the robustness of neural networks Part 1: Overview
  - IS/ISO/IEC/TR 24030: 2021: AI Use cases.
  - IS/ISO/IEC/TR 24368: 2022: AI Overview of Ethical and Societal Concerns
  - IS/ISO/IEC 24668: 2022: AI Process management framework for big data analytics
  - IS/ISO/IEC 38507: 2022: Information technology Governance of IT Governance implications of the use of artificial intelligence by organizations.

Telecommunication Engineering Centre (TEC), Department of Telecom (DoT), Ministry of Communications:

- ✓ DoT formed a committee for "Standardisation in AI technologies".
  - Committee released its Indian AI Stack discussion paper on September 2, 2020, with the intention of mitigating impediments in AI deployment and essentially make AI uniform for application across sectors.
  - The AI Stack paper highlighted five major horizontal pillars and one main vertical pillar covering some of the most crucial aspects in AI deployment including security, data storage, privacy, customer experience and computing.
- ✓ In July 2023, Telecommunication Engineering Centre (TEC), DoT has unveiled a Standard (No. TEC 57050:2023) for "Fairness Assessment and Rating of Artificial Intelligence Systems".
  - This Standard enumerates detailed procedures for accessing and rating artificial intelligence systems for fairness.

Europe

CEN/CLC/JTC 21 - Artificial Intelligence is responsible for producing standardization deliverables for AI and related use of data.

- EN ISO/IEC 22989:2023- Artificial intelligence concepts and terminology
- CEN/CLC ISO/IEC/TR 24027:2023- Bias in AI systems and AI aided decision making
- CEN/CLC ISO/IEC/TR 24029-1:2023- AI - Assessment of the robustness of neural networks - Part 1: Overview
- EN ISO/IEC 8183:2024- AI - Data life cycle framework
- EN ISO/IEC 25059:2024 - Software engineering - Systems and software Quality Requirements and Evaluation (SQuaRE) - Quality model for AI systems
- EN ISO/IEC 23894:2024 - AI - Guidance on risk management
- EN ISO/IEC 23053:2023- Framework for AI Systems Using ML

ETSI Technical Committee on Securing AI (ISG AI) : responsible for developing technical specifications to mitigate threats arising from deployment of AI throughout multiple ICT-related industries

- ETSI TR 104 225 V1.1.1 (2024-04); Privacy aspects of AI/ML systems
- ETSI TR 104 067 V1.1.1 (2024-04); Proofs of Concepts Framework
- ETSI TR 104 066 V1.1.1 (2024-07); Security Testing of AI

ETSI ISG ENI (Experiential Networked Intelligence): aims to help operators facilitate their network deployment by using AI techniques

- ETSI GR ENI 009 V1.2.1 (2023-05); Definition of data processing mechanisms
- ETSI GS ENI 002 V3.2.1 (2023-04); ENI requirements
- ETSI GS ENI 001 V3.2.1 (2023-05); ENI Use Cases
- ETSI GR ENI 010 V1.2.1 (2024-06); Evaluation of categories for AI application to Networks

India: Quantum Technologies Ecosystem

National Quantum Mission (NQM) 2023:

- ✓ At a total cost of Rs.6003.65 crore (approx. €680 Million) from 2023-24 to 2030-31 approved by Govt. of India, aiming to seed, nurture and scale up scientific and industrial R&D and create a vibrant & innovative ecosystem in Quantum Technology (QT).
- ✓ Four Thematic Hubs (T-Hubs) will be set up in top academic and National R&D institutes on the domains – Quantum Computing, Quantum Communication, Quantum Sensing & Metrology and Quantum Materials & Devices.

National Supercomputing Mission (NSM) 2015:

- ✓ It envisages empowering the academic and R&D institutions spread over the country by installing high-performance computing facilities.
- ✓ **Application areas:** Climate Modelling, Weather Prediction, Disaster Simulations and Management, Big Data Analytics, Computational Chemistry, Computational Material Science and Nanomaterials, Large Complex Systems Simulations and Cyber Physical Systems, Information repositories/ Government Information Systems, among others.
- ✓ As of March 2025, a total of 34 supercomputers with a combined compute capacity of 35 Petaflops have been deployed

Quantum-Enabled Science & Technology (QuEST) program:

- ✓ In 2018, Department of Science & Technology set up QuEST program to develop quantum technology
- ✓ India established a national quantum hub — the I-HUB Quantum Foundation or I-HUB QTF in Pune in 2020 under National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) dedicated to the development of QT.

Quantum Computing Applications Lab (QCAL):

- ✓ Launched by MeitY in collaboration with AWS with aims to accelerate the adoption of quantum computing by providing access to quantum computers, tools, and resources to researchers and developers.

QSim- Quantum Computer Simulator Toolkit:

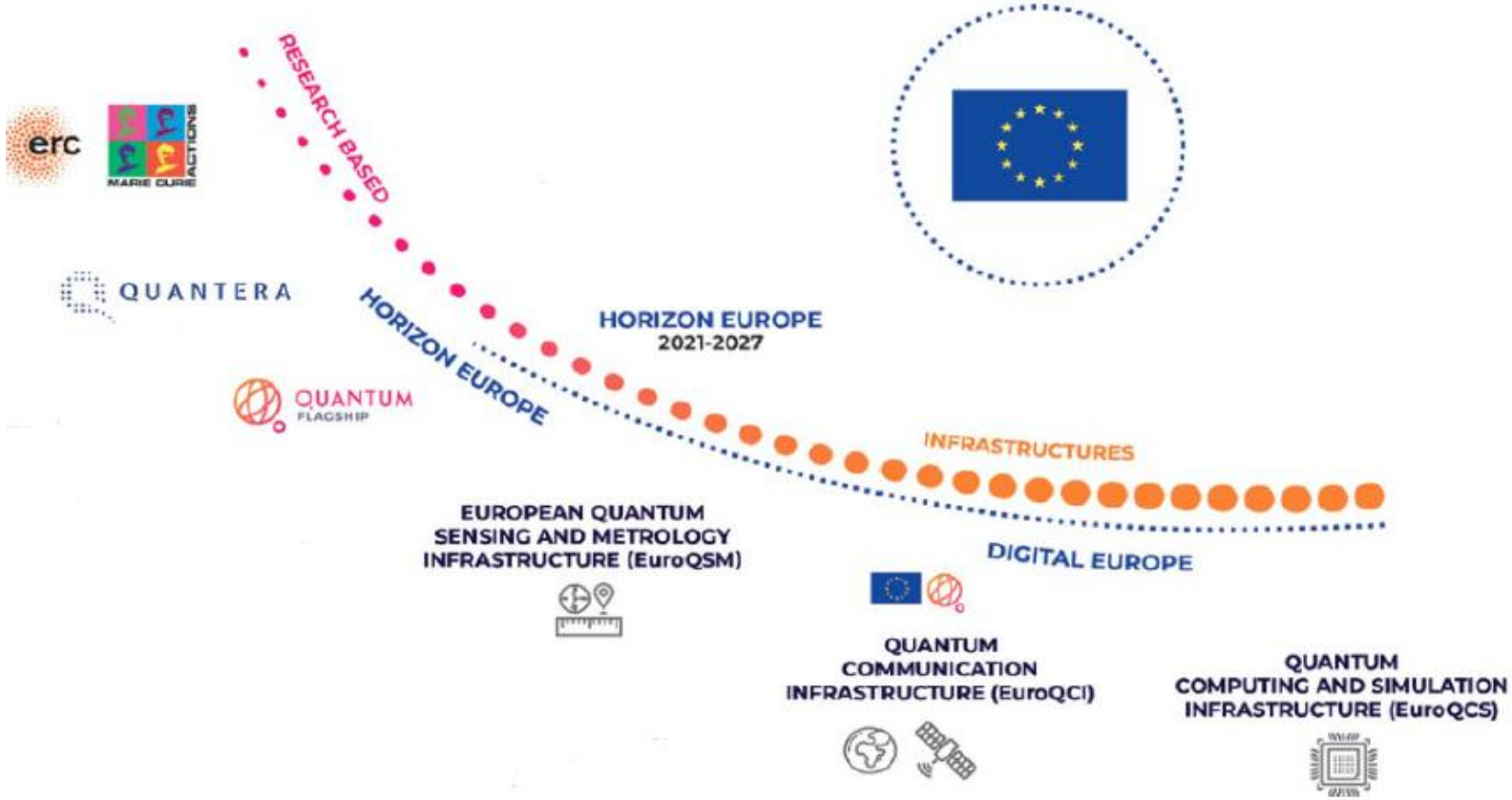
- ✓ Launched by MEITY to allow researchers and students to write and debug Quantum Code for developing Quantum Algorithms

Centre of Excellence (CoE) in Quantum Technology

- ✓ MEITY has established a Centre of Excellence (CoE) in Quantum Technology and has also deployed the Metro Area Quantum Access Network (MAQAN) in Chennai, establishing a secure quantum communication testbed.

Europe: Quantum Technologies Ecosystem

- European Quantum Technologies Ecosystem
  = Quantum Flagship + Quantera + EuroQSM + EuroQCI + EuroQCS
  + ERC/Marie Skłodowska Curie actions



Quantum Technologies: Standardization

India

Bureau of Indian Standards (BIS):

- ✓ Recently BIS established a new technical committee **LITD-38 on Quantum Technologies and Applications** which is responsible Standardization in the field of quantum technologies, including quantum information technologies (quantum computing and quantum simulation), quantum metrology, quantum sources, quantum detectors, quantum communications, and fundamental quantum technologies.
- ✓ This technical committee is a national mirror committee of ISO/IEC JTC3 - Quantum technologies.

Telecom Engineering Centre (TEC), DoT has released following standards in the field of quantum technologies.

- ✓ **TEC 91020:2024:** Quantum Random Number Generator
  - ✓ This document describes the generic requirements and specifications for Quantum Random Number Generator.
- ✓ **TEC 91010:2023: Standard for Generic Requirements- Quantum-Safe and Classical Cryptographic Systems:**
  - The standards for Post Quantum Cryptography system provide the specifications for a cryptographic mechanism to ensure secured communication against vulnerabilities posed with the advent of Quantum computing.
- ✓ **TEC 91000:2022: Standard for Generic Requirements- Quantum Key Distribution System:**
  - This document describes the generic requirements and specifications for Quantum Key Distribution (QKD) systems as per, ITU-T Y.3801-3804 Recommendations for use in Indian telecom network.

Europe

- **CEN-CENELEC / JTC 22 'Quantum Technologies'** is dedicated to the development of standards for quantum technologies. The scope of CEN-CLC/JTC 22 covers but not limited to the following areas:
  - Coordination of European Quantum-Technologies Standardization Strategy
  - Quantum Enabling Technologies
  - Quantum Metrology, Sensing, and Enhanced Imaging
  - Quantum Computing and Simulation
  - Quantum Communication and Quantum Cryptography
- **ETSI Industry Specification Group (ISG) QKD** is working on various specifications:
  - Protection Profile for QKD systems
  - Protection against Trojan horse attacks in one-way QKD systems
  - Characterization of the optical output of QKD transmitter modules
  - A control interface for SDN (Software Defined Networks)
  - A review of network architecture
  - Application Interface (API) in response to new network developments
- **ETSI Technical Committee on Quantum technology**: Recently established ETSI TC QT is responsible for developing specifications that address quantum communications and quantum networks across multiple sectors, deploying quantum-based solutions to lay the foundations for secure global communications networks.
- Key Areas of Activity:
  - Quantum Communications: Secure data transmission using quantum principles like superposition and entanglement.
  - Quantum Networking: Connecting quantum systems for distributed computing and cryptography.
  - Quantum Sensing: Enabling ultra-precise measurements for quantum communication networks.
  - Satellite Quantum Communications: Standardising beacon signals, interfaces, and security for space-based quantum systems.
  - Quantum Random Number Generators (QRNGs): Generating true randomness for secure applications.
  - Quantum Security: Establishing methodologies to assess hardware vulnerabilities and side-channel attack risks.

Digitization: EU–India Partnership Instruments

EU-India TTC – What's in it

WG1: Strategic technologies, digital governance and digital connectivity

Areas to be explored:

- Digital connectivity
- Artificial Intelligence
- 5G/6G (MoU b/w B6GA and 6G-IA)
- High performance and Quantum computing
- Semiconductors (EU-Ind signed MoU in Nov'23)
- Cloud systems
- Cybersecurity
- Digital skills
- Digital platforms

WG 2: Green & clean technologies

The group focuses on **standards**, emphasis on research and innovation.

Areas to be explored :

- Research and Innovation
- Wastewater treatment
- Recyclable Plastics
- Waste to Energy
- E-mobility and battery performance and recycling
- Green hydrogen and green ammonia
- Liquid fertilizers

WG 3: Trade, investment and resilient value chains

- The resilience of supply chains and access to critical components, energy, and raw materials.
- To resolve identified trade barriers and global trade challenges by promoting cooperation in multilateral fora.
- Towards **promotion of international standards** and cooperation on addressing global geopolitical challenges.

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EU-India: New Strategic Agenda

- **On September 17, 2025, European Union (EU) unveiled a new "Strategic EU-India Agenda" to significantly deepen and broaden cooperation with India across multiple sectors.**
  - This builds on Strategic Partnership established in 2004 and is underpinned by shared interests and complementary strengths.

Five Pillars

PROSPERITY AND SUSTAINABILITY	TECHNOLOGY AND INNOVATION	SECURITY AND DEFENCE	CONNECTIVITY AND GLOBAL ISSUES	ENABLERS ACROSS PILLARS
• Boosting trade and investment; strengthening supply chains and economic security; and advancing the clean transition and resilience.	• Supporting critical emerging technologies; advancing a conducive digital environment; and promoting research cooperation.	• Deepening engagement on regional security; countering traditional and hybrid threats; and boosting defence industrial cooperation.	• Strengthening regional connectivity; promoting cooperation in third countries; and shaping effective global governance.	• Expanding skills mobility; promoting mutual understanding; involving business communities; and reinforcing institutional architecture.

Other Partnership Projects/instruments

EU–India Global Gateway

- Strategic partnership under **EU's Digital & Connectivity Strategy with** Priorities around **Emerging tech, Cybersecurity, DPI, Trusted digital infra, Online platforms**
- Initiatives:
  - **EU-India Global Gateway Conference for Connectivity Investments in North-Eastern India (Shillong Conference-2023)** – Digital, Energy & Transport sectors
  - **Trilateral cooperation** in Africa, Indo-Pacific, Central Asia
  - **India–Middle East–Europe Economic Corridor (IMEC)** → Transport, energy & **digital connectivity**

SESEI Project (Phase VI: 2024–2027)

- Managed by **CEN, CENELEC, ETSI, EC-DG INTPA, EFTA**
- Enhances visibility of **European Standardization System (ESS)** in India
- Supports EU–India alignment in **standards, regulations, policies**
- Priority Areas are aligned with EU-India TTC topics:
  - **Digitization**: AI, 5G/6G, IoT, Quantum, Smart Manufacturing, e-Signature, e-accessibility etc.
  - **Green & Clean Tech**: Clean Energy, EVs, Green Hydrogen, Circular Economy etc.

InDiCo-Global (2024–2027)

- Consortium: ETSI, CEN, CENELEC, Trust-IT, Martel, COMMpla
- Promotes EU **digital policies & ICT standards** globally
- Focus: **AI, 5G/6G, IoT, Cybersecurity, Quantum, Smart Cities, Circular Economy etc.**
- Outreach: **India, China, South-eat Asia, African Union, Western Balkans, Eastern Partnership and Latin America and Caribbean (LAC).**

Conclusion

- Early 6G expected “around 2030” alongside an evolved 5G (5G-A).
  - ✓ Now is the time to share 6G vision, carry out research and pre-standardisation and roadmaps: Study Period
- 6G will usher in a new era in which humans and connected vehicles, robots and drones will generate Zettabytes of information.
  - ✓ It will bring pervasive and seamless connectivity and expand integrated sensing and communication (ISAC) as well as possible extensive use of artificial intelligence (AI).
- We believe 6G shall be designed to make sustainable breakthroughs on all fronts:
  - ✓ from improved network footprint to societal, economic and environmental benefits such as macro-economic gains, a narrower digital divide, and improvements to education, healthcare and other key sectors.
- As more and more of us access the digital world, generating more and more data, a supportive digital infrastructure will be needed.
  - AI & Quantum Technologies (QKD, PQC) will play a key role.
- Global Industry Alliances & Standards Bodies should work together capitalizing global SDOs (3GPP, ISO/IEC/JTC, ITU) to develop and promote standards for emerging technologies

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