

tsds
India's Telecom SDO

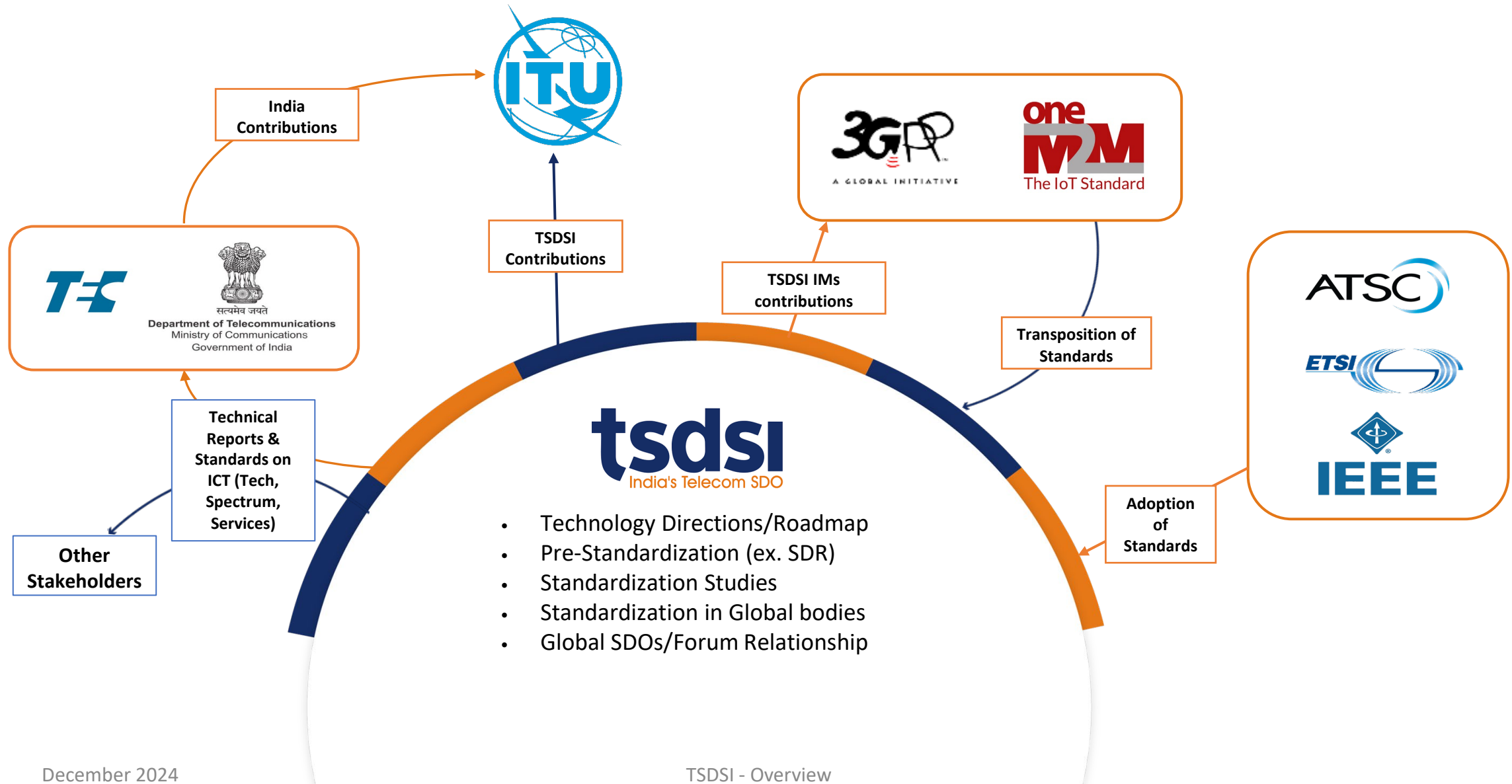
Telecommunications
Standards Development
Society, India



TSDSI – an Overview

Years of developing **ICT Standards**

Shaping the future of telecom and ICT standards



Our Vision



“To ensure that Digital Communication Standards increasingly drive domestic, economic and policy activities and enhance India’s competitiveness for ICT goods and services in global markets. It aims to do this by creating a leadership position through India’s participation and contribution to emerging Digital Communication Standards in global SDOs”

About Us

We are an autonomous, membership based, standards development organization (SDO) for Telecom/ICT products and services in India.

We develop standards for access, core, back-haul, core telecom networks, ICT solutions & services that best meet India specific Telecom/ICT needs, based on research and innovation in India.

We work closely with global standards’ bodies to reflect Indian requirements into International Telecom/ICT standards.

We play an important role in incorporation of Indian IP into Global Telecom standards.

We are recognised by DoT as India’s Telecom SDO

We are registered as a not for profit Society, under the Indian Societies Registration Act XXI of 1860

Our Objectives

Developing, promoting and standardizing India-specific Telecom/ICT requirements and solutions

Taking Indian requirements to Global Standards organizations

Adhere to the principles of Openness, Transparency, Fairness, Consensus and due Process in conducting its activities

Maintain technology neutrality and provide a uniform playing field for its members.

Partnerships & Alliances



TSDSI is the Organizational Partner of 3GPP. This entitles TSDSI members to become Individual Members of 3GPP through TSDSI and contribute to 3GPP Specifications, taking their IPR into the global arena.



TSDSI is Partner Type I of oneM2M project a leading forum driving M2M service layer standards. It entitles TSDSI member organizations to become Individual Members of oneM2M and contribute to standards development in M2M space.



TSDSI is a constituent SDO of Global Standards Collaboration (GSC) – a voluntary forum of the world's leading information and communication technologies standards organizations (SDOs).



TSDSI is a member of the Multilateral MoU for conducting Global 5G Events (other members being 6G-IA, XGMF, 6G Forum, 5G Americas, IMT-2020 (5G) PG, 6G Brasil)

Organizational Structure



General Body

Chair

Satish Jamadagni

Vice Chair

Suresh Chitturi

Treasurer

Rajeev Sharma

Technical Groups

Study Group - Network

Chair

Prakash R

Vice Chair

Abhijeet Masal

Study Group - Services & Solutions

Chair

Mahesh Nayaka Mysore Annaiah

Vice Chair

Niranth Amogh

Governing Council (21 Elected Members + 8 Govt. Nominees)

COMMITTEES

Budget & Finance

Rules & Regulations

Legal & IPR

Outreach

Roadmap

Standardization & Transposition

Secretariat

Director General

N Mohanram

Technical Activities

AK Mittal, Vijay Madan

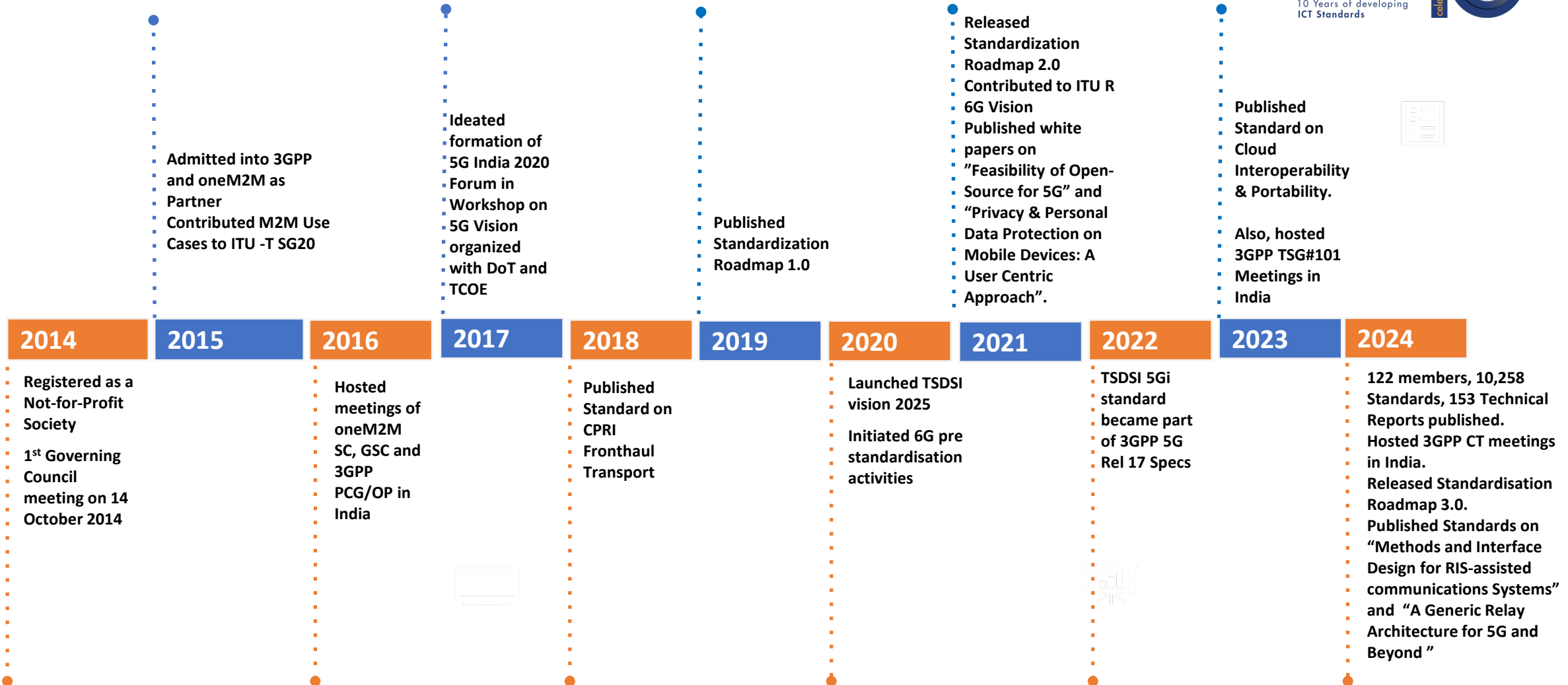
Operations

Kuljit Singh

MARCOM & Partner Relations

Bindoo Srivastava

Journey so Far



Our Activities

Technical Groups

Study Group - Networks

- 6G
- 5G Enhancements
- Broadcast offload
- Spectrum Studies
- Open Systems
- Wireless Backhaul
- Visible Light Communications
- Quantum communications

Study Group- Services & Solutions

- Security - Security and Privacy aspects in the end-to-end Telecom/IoT networks & related standards, Multilayer user plane security, Post Quantum Cryptography, AI/ML model and delivery of services, enablers for 6G.
- Application layer - Localization, Metaverse, UAV Drones, Telerobotics, Sustainable 6G networks, V2X applications in 6G Networks, integrated sensing at application level, common payload.
- Services Architecture and Framework – Edge solutions, Critical Communications, Tactile Applications, RAN Slice Services, Cloud Interoperability, Rural Broadband services and marketplace, cost modelling data services, Smart Agriculture, Split AI in 6G context.

Strategic Initiatives

- Technology Roadmap Item Proposal Forums
- Global Standards Coordination, Engagement with Startups & Industry, Standards Driven Research, Test & Certification

- ITU Sector Member
- Contributions to 3GPP, oneM2M and ITU
- Agreements with ATSC, ETSI and IEEE-SA for adopting their standards

- TSDSI Tech Deep Dive Conference
- Workshops to promote SDR, and contributions to 3GPP, ITU (including WTSA)

ROADMAP 3.0

6G/5G ENHANCEMENTS	APPLICATIONS/ VERTICALS	QUANTUM COMMUNICATIONS	VISIBLE LIGHT COMMUNICATION	SPECTRUM STUDIES			
<p>Use cases and services, KPIs, Key Technologies and network architecture and evolution for 6G, Rural Coverage and Capacity Enhancement, Waveform Design for THz Communication, Network Energy Saving in 5G and its Evolution towards 6G Sustainability Requirements, Channel Models for Integrated Sensing and Communication in Beyond 5G Systems, Non GNSS/NTN Positioning, Ambient IoT – A New Paradigm for Resource-Efficient IoT Deployments, Unified Global Communication Infrastructure Reference Architecture, Network Capabilities Exposure, Sustainable Development with Minimal Energy Consumption in 6G</p>	<p>5G use cases for Verticals, Study on System Requirements for NR based Future Railways Mobile Communication System (FRMCS), Collation of Satellite Imagery for agriculture using 5G network, Requirement for a Reference Architecture for Solar-powered Unmanned Aerial Vehicle</p>	<p>Next generation secure, adaptable and cost effective solutions for Quantum security, Quantum communication, security and modelling, Trusted node testing, Underwater QKD, PQC in embedded systems and Device Biometrics</p>	<p>Standards for Visible Light Communication, Standardization of FSO systems for broadband communication</p>	<p>Spectrum Coexistence studies towards 6G, Flexible Dynamic Spectrum Access architecture</p>			
NON-TERRESTRIAL NETWORKS	INTELLIGENT TRANSPORT SYSTEMS	CLOUD	WIRELESS BACKHAUL	SECURITY	AI/ML	OPEN SYSTEMS	RURAL BROADBAND
<p>Positioning in 6G Communication networks using Multi GNSS including NavIC, Multi-dimensional multihop non terrestrial networks with BS functionality onboard</p>	<p>Standard and regulations for Autonomous driving System, Reference Architecture for Automated Electric Road Transportation, Connected Multi-Modal Transportation</p>	<p>Cloud Resource Management in Future Networks</p>	<p>UAV based backhaul, 4G/5G Fronthaul & Backhaul, Wireless-to-Building (WTTB)</p>	<p>Security standards for IoT and Machine-to-Machine, Quantum Security</p>	<p>AI/ML in & for Future Networks, AI/ML based Mobility Enhancements</p>	<p>Open Disaggregated Networks</p>	<p>Architectures for Rural Broadband</p>

Our Accomplishments

Group	Technical Reports Published	Technical Standards Transposed
Study Group- Networks	13	10,032
Study Group- Services & Solutions	140	226

Technical Standards Developed and Published

- Cloud Interoperability & Portability Standard (Stage I, II and III)
- 5Gi (merged with 3GPP Rel 17 in 2022)
- CPRI Fronthaul Transport
- A Generic Relay Architecture for 5G and Beyond
- Methods and Interface Design for RIS-assisted Communication Systems
- Standardization of common data payload for adaptive traffic control system and other Intelligent Transportation system

Standards Adopted

- Adoption of ETSI IoT and NFV Standards as TSDSI Standards
- 19 Specifications of ATSC 3.0 Standards
- Transposed 3GPP and oneM2M Specifications into TSDSI Standards

TSDSI transposed standards mandated as National Standards by TEC

- 3GPP Specifications for 3G, 4G and 5G
- 3GPP Specifications for Indian Telecom Security Assurance Requirements
- oneM2M Rel 2 & Rel 3 Standards

Technical Reports Published



6G / 5G Enhancements

- 5G Extensions for Broadcast Offload
- Slice Identification in 5G RAN for End-to-End Secure Services
- 6G: Use Cases, Requirements and Enabling Technologies
- Visible Light Communication/Li-Fi
- Enhancements of flexible UL/DL Resource Utilization
- Functional Split and Fronthaul Interface in FBS Driven C-RAN for 5G and Beyond

Spectrum Studies

- Characterization of E-band for 4G/5G Backhaul & Rural Broadband
- 6 GHz spectrum for IMT services in India

Broadcast Convergence

- Broadcast Offload
- 5G Broadcast based Service Delivery for TV, Radio, IPTV and File-casting
- 5G Extensions for Broadcast Offload

Open Systems

- Open Disaggregated RAN

Wireless Backhaul

- Channel Characteristics of 60GHz for 4G/5G Backhaul
- Evaluation of the existing IAB architecture in 5G Networks



<https://tsdsi.in/tr/>

December 2024

Applications / Verticals

- Study on the Usage of oneM2M for Smart Agriculture end-to-end Monitoring Use Case in Indian Context
- System requirements in Metaverse use cases in mobile network
- Communication Requirements & Recommendations for Energy Sector
- Enablement of Common Ontology for Adaptive traffic control system and other Intelligent transportation system products
- Slice Identification in 5G RAN and Core for End-to-End Secure and Resilient Slice Services
- Study of UAV/Drone 3GPP Standard Applicability to India Use Cases
- Drone Communication Services
- Public Protection Disaster Recovery (PPDR)
- Indian Languages in Mobile Transactions
- Information Centric Networking
- Data Pruning in Smart IoT Applications
- M2M Use Cases in Various Verticals - India Context
- NB IoT capabilities for Energy Metering

Services Architecture

- Edge Intelligence for haptics IoT use cases
- Network Security
- Performance Measurements for Dual SIM Devices
- Cloud Interoperability and Portability Standards
- Rural Broadband Services and Architecture
- Service Delivery using 5G Broadcast for TV, Radio, IPTV and File-casting

Security

- Network Security Encryption Mechanism
- Enhancement of Privacy in Future Networks
- Usage of oneM2M for Smart Agriculture End-to-End Monitoring Use Case in the Indian Context
- Study of Post-Quantum Cryptography for Future 5G Networks and Application
- Enhancement of the Privacy of User Subscription Identity in Future Networks
- Digital Process for Know Your Machine Custodian
- Smartphone User Data & Privacy Protection
- Reducing Threats to the National Critical Infrastructure using DNS

TSDSI - Overview

Published White Papers



[Status of Telecom Startup Ecosystem in India](#)



[6G Use Cases and Enabling Technologies](#)



[Privacy & Personal Data Protection on Mobile Devices](#)



[Feasibility of Open Source for 5G](#)

Engagement with Global Forums

TSDSI@ITU

Contributed to IMT2030 Framework

5Gi standard (recognized as one of the ITU-R Recommendation M.2150, and now merged into 3GPP 5G)

LMLC requirement to address requirements of Rural & Remote areas mandatory in IMT.2020

TSDSI obtained A.5 Certification from ITU-T

Contributed to ITU-T WTSR Resolutions, GSS

TSDSI mentored Members contributed to AI activities and Hackathon, NoW, Kaleidoscope

@ 3GPP

Hosted 3GPP SA WG, CT WG Meetings in Hyderabad (Oct and May, '24) and TSG#101 meetings in Bengaluru (Sep'23)

Hosting RAN WG meetings in Aug 2025

58 TSDSI Members to 3GPP as Individual Members

New 5G Release 19 work item on LCS_NAVIC_L1_SPS_NR_LTE approved at 3GPP TSG RAN#105 Plenary. Earlier support for NavIC was advanced to Rel 16 in 2017.

Conducted Workshops on 3GPP Releases

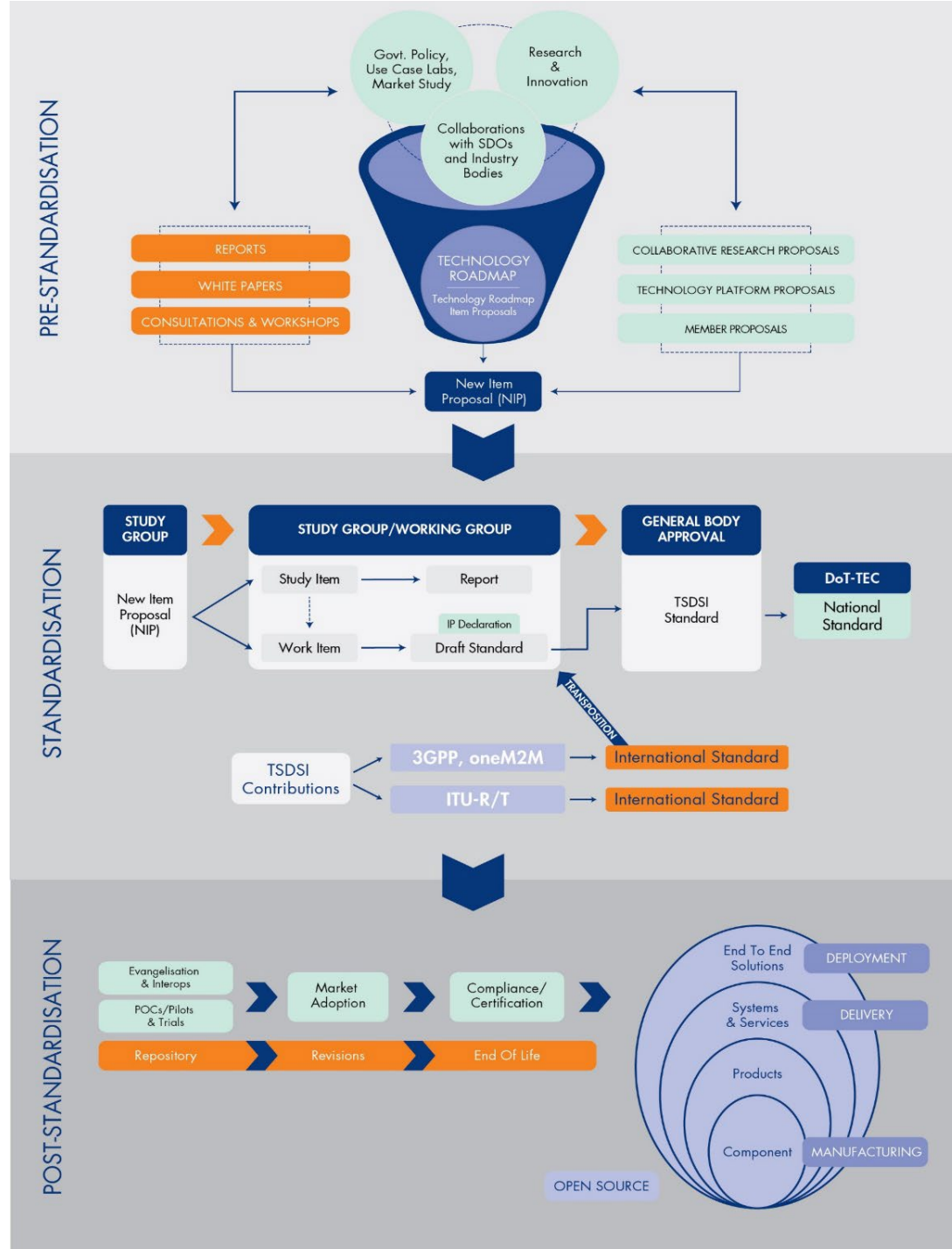
@ oneM2M

58 TSDSI Members to oneM2M as Individual Members

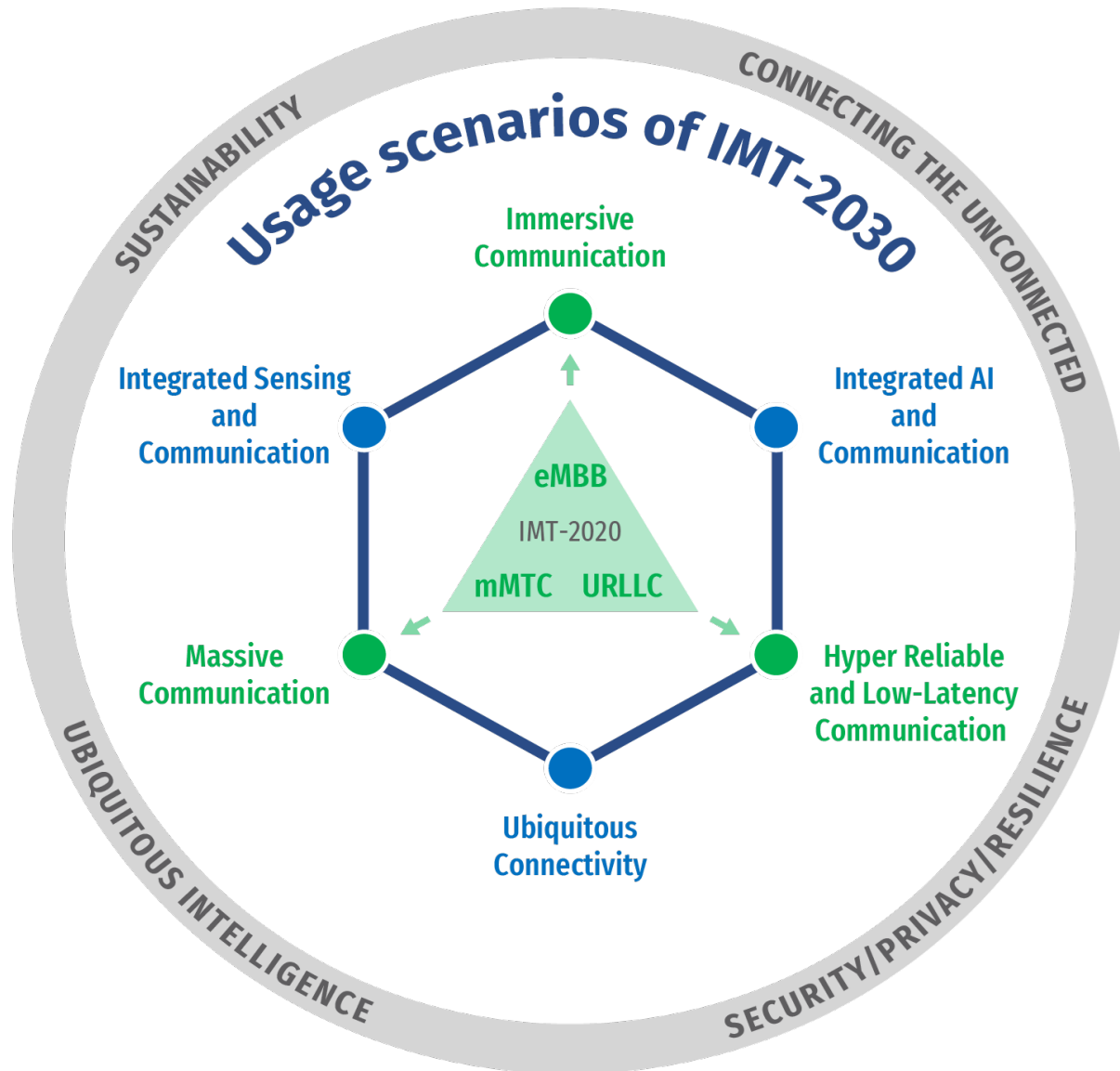
oneM2M Centres of Excellence @ IIIT Hyderabad and UIET Chandigarh

Hosting oneM2M TP68 meeting with a Stakeholders' Day workshop in New Delhi in February 2024

STANDARDISATION PROCESS @ TSDSI



ITU-R FRAMEWORK for IMT-2030 & TSDSI Role



TSDSI contributed to ITU-R Framework document and Future Technology Trends document in 2021-22 and 2022-23

Current Standards Development Activities



6G / 5G Enhancements

- Architecture for 6G Communication Systems
- Coreless RAN
- AI Architecture for RAN (SON / RRM)
- Functional Split and Fronthaul Interface in FBS Driven C-RAN for 5G and Beyond
- Update to TS on Methods and interface design for RIS- assisted communication System

Broadcast Offload

- Extension of Broadcast Offload (TR Published)

Services Architecture

- Rural Broadband Services Architecture
- Cloud Interoperability & Portability
- Architecture to support tactile applications with edge intelligence over 5GS

Wireless Backhaul

- Characterization of E-band for 4G/5G Backhaul & Rural Broadband (TR Published)

Applications / Verticals

- Integrated Communication and Sensing
- Local language repository as an enabler for financial workflows
- Standardization of common data payload for adaptive traffic control system and ITS interoperability

Others

- Profile for Smart Meters

Current Technical Studies: SGN



6G / 5G Enhancements

- Handling of Diverse Services in Future Mobile Networks
- System Requirements for NR based Future Railways Mobile Communication System (FRMCS)
- Minimum Performance Spec for Mobile Devices
- Role of Edge Intelligence in a 6G Communication Network
- Network Energy Saving functionality of the 5G-Advanced system and its Evolution
- Study of Multiple Access for 6G communication
- Joint communication & sensing in 5G networks & beyond
- Study on channel modeling and physical layer requirements for near-field communication in 6G networks
- Defining qualitative metrics for 6G KPI definitions
- Study of waveforms for B5G communication systems
- Functional Split Selection & Transition for FBS-assisted C-RAN Operation in 5G and Beyond
- Dynamic joint deployment of SDN Controllers and Hypervisors

Wireless Backhaul

- Characterization of E-band for point-to-multipoint backhaul

Spectrum Studies

- Sub-THz Channel Modeling
- Study of the channel model for integrated sensing and communication network in FR3 and THz band

Quantum Communication

- Trusted node mapping for diverse Quantum channels
- Underwater QKD

VLC

- Solar Panel Based Optical Wireless Communication
- Enhancement to media access control (MAC) protocols for visible light communication (VLC) in indoor scenarios

Others

- Unified network slicing model

Current Technical Studies: SGSS



Security

- Security aspects of Artificial Intelligence (AI)/Machine Learning (ML) models for 5G applications
- A location privacy-preserving scheme to mitigate the authentication relay attack under False Base Station in 5G
- Security Enablers for 6G
- 5G and Beyond Network Security Architecture to support Multilevel End-to-End User Plane Security
- Network Security
- AI/ML-based Security Implementation in Wireless Communication Systems
- Interoperability of Multi-vendor QKD Hardware using SDN

Applications / Verticals

- Easing Operations using ML/AI solution for 6G and beyond
- Public Safety Use Cases for 6G Networks
- Research directions and Collaboration on Intelligent Transport Systems Communication Standards
- Enablement of common payload for Agricultural Automation Solutions
- Semi-autonomous collaborative telerobotics
- Slice Identification in 5G RAN and Core for End-to-End Secure and Resilient Slice Service
- Suggested recommendations for sustainable 6G networks
- Recommendations for use of Dynamic AI/ML models for self-sustainable V2X applications in 6G Networks

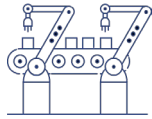
Services Architecture

- Service requirements and reference architecture for Railways Communications using 5G
- Network Capabilities Exposure
- Enablement of common edge connectivity for public utility purposes
- Framework for AI/ML operation splitting in 6G context
- Usage of oneM2M for Smart Agriculture end-to-end monitoring use case in Indian context
- Cost model considering network assets and utilization
- Further enhancements on RBSA
- Use cases for rural connectivity
- Carrier Grade Linux Specification

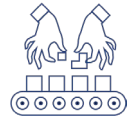
TSDSI Membership



TSDSI attracts members from all sections of Telecom/ICT Ecosystem



Manufacturers with Indian IP



Domestic Manufacturers



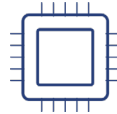
Telecom Service Providers



Other Services



R&D Organisations



Semiconductor components designers/manufacturers



Manufacturers of Mobile Device/CPE End User Devices



Government Departments/Autonomous Bodies



Developers of Application solution/Service Platform



Academic Institutions

An organization can join TSDSI as a Corporate/Associate/Guest member. Corporate Members can join 3GPP and oneM2M.

Membership Type

Corporate

Associate

Guest

Description

Entities registered in India and engaged in Telecom related activities

Industry Associations, Foreign Entities, Foreign Industry Associations

Organizations who wish to explore the need for becoming a member before taking up Corporate or Associate Membership, can be granted, on request Guest Membership for a period of 6 months.

Privileges

- Participate in and Contribute to Technical Activities
- Participate in Decision making and voting
- Eligible to hold office bearer positions

Participate in & Contribute to Technical Activities

Participate in Technical Activities and contribute on invitation



Join Us



Member List



THANK YOU

 secretariat@tsdsi.in