



tsdsi NEWSLETTER

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New Leadership -

Mr. A K Mittal appointed **Director General**, TSDSI w.e.f. 1 April 2026

HIGHLIGHTS (October-December 2025)



TSDSI releases Technical Reports on

- Study of RIS empowered end-to-end application scenario with a focus on UE controlled and private deployments: Technical, cost-model and ownership aspects (TSDSI TR 6060 V1.0.0)
- Enablement of Common Edge Connectivity for Public Utility Purposes (TSDSI TR 6058 V1.0.0)
- AI Driven Massive Digital Twinning Framework for Networks (TSDSI TR 6057 V1.0.0)
- Dynamic Joint Deployment of SDN Controllers and Hypervisors for Softwarized 5G and Beyond (TSDSI TR 6056 V1.0.0)
- Study on Framework for AI/ML Operation Splitting in 6G Context (TSDSI TR 6055 V1.0.0)
- Study of 5G and 6G Beyond Network Security Architecture to support Multilevel End-to-End User Plane Security (TSDSI TR 6054 V1.0.0)
- Railway Communications using 5G: Use Cases & Reference Architecture (TSDSI TR 6053 V1.0.0)
- PQC in Embedded System to Secure the Connected Devices (TSDSI TR 6052 V1.0.0)

* Details Overleaf

INVITED ARTICLE



With the recent finalisation of the technical performance requirements (TPRs) for IMT2030 (aka 6G) by ITU-R WP 5D, standardization work is gaining traction in SDOs around the world. TSDSI is spearheading 6G standardization activities in India. It has created a thriving ecosystem with experts from research, academia, industry, startups and government bodies working together to deliberate on requirements and solutions. This edition carries an article on "Focus areas in 6G Research to align with IMT2030 requirements" by Dr T R Ramya (CEWiT) enumerating key considerations and the opportunity space for developing technologies where India can take a lead.

ANNOUNCEMENTS



Call for sponsorships - TTDD2026 is now open

Call for nominations for TSDSI OTC Awards - FY 2025-26 is now open till 21 May 2026

Whitepaper

A Whitepaper on *Automated Electric Road Transportation: Use Case-based Approach for Indian Context* has been released

Mr A K Mittal assumes office as Director General TSDSI w.e.f 1 April 2026



Mr A.K. Mittal has been appointed as Director General TSDSI with effect from 1st April 2026.

He was formerly Sr. DDG and Head of Telecommunication Engineering Centre, Department of Communications, Government of India. Mr Mittal was a government nominee and member of the first Governing Council of TSDSI. In this period, he chaired the Rules & Regulations (R&R) and IPR Committees of the TSDSI Governing Council, playing a pivotal role in formulating TSDSI's first IPR policy. He also recommended critical enhancements to the R&R framework for significantly improving the effectiveness and functioning of TSDSI and its Study Groups. He joined TSDSI in 2017 as Advisor – Networks, Systems, and Technologies, during which tenure, he streamlined operations of Study Group – Networks, through active engagement with members, fostering collaboration, and driving enhanced technical contributions. He has been effectively handling the ITU-R and 3GPP related activities of TSDSI. He also served on the Executive Administration Committee to the Chair TSDSI from June 2021 to Sep 2022. As convener of the TSDSI Roadmap committee since 2018, he has spearheaded development of TSDSI's Standardization Roadmaps through its versions 1.0 to 3.0.

Message from **Mr AK Mittal**, Director General, TSDSI

It is with a deep sense of responsibility and humility that I assume the office of the Director General of TSDSI on this day, 1st April 2026. I am honoured to take on this role where I will have the opportunity to serve alongside a distinguished community of TSDSI members, experts, and stakeholders committed to shaping the future of telecommunications through standards.

As we stand at the threshold of a new era defined by 6G, TSDSI has a unique opportunity to not only contribute to global standards but to proactively shape them—ensuring they reflect India's priorities, innovations, and diverse connectivity needs through collective endeavour.

I would like to place on record my sincere appreciation for the contributions of my predecessors, whose leadership has laid a strong foundation for TSDSI's growing stature in the global ecosystem. Building on this legacy, our vision will be to position TSDSI among the leaders in next-generation standards development, driving thought leadership and impactful contributions at

international fora with the help of the expertise of our members in diverse technology domains.

Going forward, focus will be on fostering deeper collaboration across industry, academia, and government. Emphasis will also be placed on interaction with stakeholders for identifying emerging use cases across sectors such as connected mobility, smart infrastructure and rural connectivity ensuring that TSDSI delivers standards, national and global, which become key enablers of inclusive digital transformation.

I firmly believe that through shared objectives, collaboration, and a commitment to excellence, we can elevate TSDSI's impact—both nationally and globally—and contribute meaningfully to shaping the telecommunications landscape of the next decade.





Standardization Activities

TSDSI has released the following new Technical Reports:

Networks Study Group:

- **Study of RIS-empowered end-to-end application scenario with a focus on UE-controlled and private deployments: Technical, cost-model and ownership aspects** (TSDSI TR 6060 V1.0.0)

This report studies the role of Reconfigurable Intelligent Surfaces (RIS) in enabling end-to-end application scenarios, with a specific focus on UE-controlled architectures and private network deployments. It examines a range of real-world use cases to demonstrate applicability of RIS in both rural and dense urban scenarios. Further, it recommends key topics for standardization, including unified control protocols, multi-UE resource management, and security frameworks, to support scalable and secure adoption of RIS in future 5G/6G ecosystems.

- **Dynamic Joint Deployment of SDN Controllers and Hypervisors for Softwarized 5G and Beyond** (TSDSI TR 6056 V1.0.0)

The report recommends development of a flexible and dynamic architecture for deploying SDN controllers and hypervisors that can balance latency and load requirements while enabling efficient service delivery in softwarized 5G and beyond networks. It further investigates the Joint Hypervisor and Controller Placement Problem (JHCPP) using optimization techniques on real-world topologies such as ERNET-India and extends the framework to include Load and Latency Aware Joint Hypervisor Controller, QoS-aware network virtualization at the hypervisor plane & VNF deployment and Service Function Chain (SFC) resource provisioning in SDN-enabled networks.

Services and Solutions Study Group:

- **Enablement of Common Edge Connectivity for Public Utility Purposes** (TSDSI TR 6058 V1.0.0)

The report studies enabling of common edge connectivity for public utility purposes across multiple Mobile Network Operators, where application data streams from one or more User Equipment associated with same or different MNOs processed at a common edge server. It analyses existing edge computing architectures, including ETSI MEC, 3GPP EDGEAPP, and GSMA Operator Platform (OP) interfaces and notably identifies gaps related to support for federation, interaction across multiple PLMNs and Edge Computing architectures of Service Providers (ECSPs), requirements for APIs, procedures, and architectural enhancements.

- **AI Driven Massive Digital Twinning Framework for Networks** (TSDSI TR 6057 V1.0.0)

The report studies AI-driven massive digital twinning for next-generation networks, where digital replicas of network elements including radio units, edge nodes, and IoT devices are dynamically synchronized with the physical network to provide real-time insights, predictive analytics, and autonomous control. It recommends standardization of AI-driven network digital twin architecture, unified data models, open APIs, scalable federation and multi-domain coordination, enhancement of security frameworks, aspects of Digital Twinning lifecycle and creation of validation and test standards. TSDSI has also taken up development of a standard on AI-Native Digital Twin Architecture for Massive Digital Twinning in 5G/6G (W11-NIP418).

- **Study on Framework for AI/ML Operation Splitting in 6G Context** (TSDSI TR 6055 V1.0.0)

The report studies AI/ML operation splitting in 6G networks for real-time applications such as tele-robotics, AR/VR, Industry 4.0, and mobile consumer applications, requiring delay-sensitive responsive AI operations from resource-constrained devices. It presents a Split AI Framework for distributed execution of AI inference across User Equipment, Multi-access Edge Computing, and Cloud and evaluates feasibility of operation splitting across different Artificial Neural Network models, including dynamic split-point decisions models such as YOLO. The report recommends standardization of protocols, frameworks, and mechanisms to enable efficient, scalable, and interoperable AI operation splitting in 6G systems.

- **Study of 5G and 6G Beyond Network Security Architecture to support Multilevel End-to-End User Plane Security** (TSDSI TR 6054 V1.0.0)

The report studies security mechanisms associated with user plane traffic and User Equipment (UE) in 5G and beyond networks, keeping in mind the need for secure end-to-end communication and proposals for mitigating emerging security risks if any besides other gaps. It focuses specifically on the user plane domain to examine the extent to which, end-to-end data traffic between the User Equipment (UE) and the Network is exposed to potential threats.

- **Railway Communications using 5G: Use Cases & Reference Architecture** (TSDSI TR 6053 V1.0.0)

The report provides in-depth analysis of various use cases and service requirements to modernize and advance railway infrastructure using 5G technology covering control, safety aspects, as well as enhanced connectivity services such as voice and broadband connectivity on-board and at railway stations. It presents analysis of 5G-based railway communications focusing on FRMCS and Vehicle Mounted Relays, with use cases such as multi-train communication, emergency communication, Automatic Train Protection, and real-time video/data communication.

- **PQC in Embedded System to Secure the Connected Devices** (TSDSI TR 6052 V1.0.0)

The report studies securing IoT/M2M and connected devices against quantum attacks using post-quantum cryptography (PQC), focusing on resource-constrained embedded systems. It highlights vulnerabilities of classical cryptographic algorithms such as RSA and ECC, risks to device identity, secure communication, and key management. It recommends requirements for quantum resistant security including enhanced support for Identity management and secure communication frameworks.



ACTIVITIES



Technical Activities:

TSDSI members are currently conducting technical studies and developing standards in the areas of 6G, 5G enhancements, broadcast offload, spectrum studies, wireless backhaul, VLC, quantum communications, security, application layer interfaces and related protocols and services architecture and frameworks. New proposals on topics in these areas and additionally from the TSDSI Standardization Roadmap 3.0 are being deliberated in the Networks, and Services & Solutions Study Groups.

Following new technical activities have been initiated in January-March 2026 period:

Networks Study Group:

Technical Studies:

- Study on IMT base station on HAPS for coverage extension and network resilience (SI169)
- AP-STA in Licensed mmWave Bands (SI170)
- Performance analysis of RIS assisted communication in 6G deployment scenarios (SI173)
- Study of Internetworking of Li-Fi & Wi-Fi Network (SI174)

Services and Solutions Study Group:

Development of Standards:

- Updation of TSDSI Standard on “Common data payload for adaptive traffic control system and other Intelligent Transportation system” based on TEC Consultative Committee Recommendations (WI1 - NIP 443)

Technical Studies:

- PQC Migration Strategies for 5G and 6G Mobile Networks (SI 166)
- Agentic AI framework for Autonomous Telco operations (SI 168)
- Smart Edge—Fog—Cloud Scheduling Framework for Digital Twin—Enabled Sustainable Agriculture Systems (SI172)
- A Zero-Trust Security Architecture for 5G beyond/6G - Enabled Intelligent Traffic Monitoring and Emergency Vehicle Prioritization (SI171)

Please visit [here](#) for a full list of ongoing technical activities.

Please reach out to vaishali.upperwal@tsdsi.in and Chandrakanta@tsdsi.in for details of our technical activities in the Networks and Services & Solutions Study groups respectively.

Liaisons

TSDSI has received the following liaison statements (LS)

- From TEC on “Referring the matter for Development of Technology Standards for using WiFi over mmWave in IMT spectrum (26 GHz band) allotted to TSPs in India-Regarding”
- From ITU-T/JCA-IMT2020/IMT2030 on “Invitation to update the information in the IMT-2020 and IMT-2030 roadmap”
- From ITU-R WP5D on “Further information on the invitation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2030 and invitation to participate in their subsequent evaluation”

TSDSI has sent following liaison statements (LS)

- To TEC on “AP-STA in Licensed mmWave Bands”
- To ITU-T JCA-IMT 2020 on “Response to JCA-IMT2020 LS18 date 29 October 2025 regarding update to the information in the IMT2020 and beyond Roadmap”

List of Liaisons received and sent by TSDSI can be viewed at <https://tsdsi.in/liaison-statements/>

Pre-standardization Activities

TSDSI Technology Roadmap Item Forums:

TSDSI has constituted Technology Roadmap Item Proposal (TRIP) Forums to carry out discussions with stakeholders in select areas of its Standardization Roadmap with the objective of recommending topics that can potentially be taken up for developing standards within TSDSI. The forums are open to participation by non-members.

Currently, the TRIP forum on IoT/M2M is active.

TSDSI released a whitepaper on *Automated Electric Road Transportation: Use Case-based Approach for Indian Context on 7th January 2026, its 13th Foundation Day*. The white paper presents a use-case-driven framework for addressing India’s transportation sector challenges like road safety, traffic congestion, environmental sustainability, and logistics efficiency through the deployment of automated electric vehicles (AEVs) in dedicated, well-separated lanes. It describes twelve use cases, broadly categorized under Platooning, ADAS-specific applications, and Satellite Communications and identifies gaps in current standards and infrastructure and recommends potential solution directions. It proposes a multi-layered technology stack integrating multi-GNSS systems (including NavIC), AI/ML-based perception, radar and LiDAR sensor fusion, and V2X communication to support precise navigation, efficient tolling, and dynamic traffic coordination.

GLOBAL STANDARDS ROUNDUP



ITU-R:

The ITU-R WP5D meeting #51 was held in Geneva from 3 - 12 February 2026. Delegates from 6 TSDSI member organizations registered for the meeting. The group has completed the draft new Report, “Minimum requirements related to technical performance for IMT-2030 radio interface(s) “and submitted the same to the parent ITU-R Study Group 5 for approval. Proposals for candidate technologies for IMT-2030 may be submitted until WP 5D meeting #59 (February 2029).

ITU-T:

CITS, 16 March 2026: Mr Vijay Madan, Advisor & Mentor, Services & Solutions, TSDSI presented a status report on TSDSI published standards, technical reports and ongoing activities in Intelligent Transport Systems (ITS) to the ITU-T CITS meeting held on 16 March 2026 [DOC 06R1].

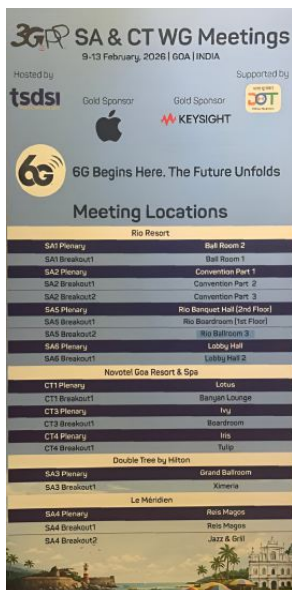
OUTREACH



3GPP:

TSDSI hosted meetings of the SA (Service and System Aspects) and CT (Core Network and Terminals) working groups of 3GPP (3rd Generation Partnership Project) in Goa from 09 to 13 February 2026. A total of 680 delegates from 50 countries attended these meetings, including 37 delegates from Indian IMs. The discussions focused on advancing ongoing work under 3GPP 5G-Advanced and initiated technical studies for 6G as a part of Release 20. 6G studies form a critical foundation for defining 6G specifications starting with Release 21. TSDSI thanks DoT for their continued support in hosting the meetings, by providing assistance to secure the necessary approvals for travel of the foreign delegates and financial grant for hosting the meetings. TSDSI also acknowledges support from the Ministry of External Affairs and its offices around the world for timely processing of visa requests from the delegates to these meetings.

A special thanks to Apple, Keysight and Tejas, who have supported the hosting of these meetings of 3GPP in India as sponsors.



oneM2M:

Representatives from TSDSI member organisations participated in the oneM2M Technical Plenary meetings held in January and March 2026. Keeping in view the growing interest in integrating AI and IoT, the group has taken up work on federated learning, Large Action Models (LAMs), and use of Coding Agents for Automated Interworking Proxy Entity Development.

Partnered Events:

Joint Webinar on Standardization Process Awareness: A Joint Webinar on “Standardization Process Awareness” was organized on 7 January 2026 by the Department of Telecommunications (DoT), Telecom Centres of Excellence (TCOE) India and TSDSI. It gave an overview of the standardization processes followed at TSDSI, 3GPP, ITU-T, ITU-R, and oneM2M, along with experience sharing by a startup actively contributing to standards for the target audience comprising DCIS and TTDF beneficiaries.

Telecom Shakti: Policy, Practice & Research in Convergence: TSDSI joined the Workshop on Telecom Shakti: Policy, Practice & Research in Convergence, organised by IIT Delhi from 5-8 March 2026 as a technical partner. Mr Pranav Jha, IIT Bombay (TSDSI Member) delivered talk on “Telecom Standardization Landscape: An Overview of TSDSI, Current Technical Activities, and Standardization Process and 3GPP: Structure, TSGs & WGs, Standardization Procedure” on 5 March 2026.

Speaking opportunities:

IEEE SA-CDAC Agriculture Workshop: Mr Satish Jamadagni, Chair TSDSI and Senior VP & Head of Global Standards, Reliance Jio delivered a talk on “Developing an India AgriStack to Enable Smart Farming in India” on 9 January 2026 at Bengaluru, India.

18th International Conference on Communication Systems & Networks, COMSNETS 2026: Mr Suresh Kumar Karthikeyan, Susan Future Technologies (TSDSI Member) joined a panel on “Bringing all Networks Together/ Ubiquitous Connectivity” under the Standards-driven Research Workshop on 10 January 2026 at Bengaluru.

80th Raising Day of DCPW: Mr Vijay Madan, Advisor & Mentor, Services & Solutions, TSDSI joined the panel in the Session on “Broadband – Public Protection & Disaster Relief Communication Network” on 19 February 2026 at Delhi.

National Conference on Communications (NCC 2026): Dr Garima Mishra, TCS (TSDSI Member) joined a Panel discussion on “From Research to Silicon and Beyond: Closing the Gap” on 1 March 2026 at IIT Hyderabad to promote the concept of Standards Driven Research.

Webinar on ongoing 6G Standardization Activities at the ITU and the 3GPP: Dr Sonali Garg, TSDSI SGN-Vice Chair, HFCL, (TSDSI Member) delivered a talk on “6G Standardization Work at TSDSI” in the Webinar on “Ongoing 6G Standardization Activities at the ITU and the 3GPP” organized by TCOE on 6 March 2026.

33rd Convergence India Expo: Mr A K Mittal, Director General TSDSI joined a panel on “6G by 2030: India’s Leap into the Next-Gen Connectivity” in the conference on 23 March 2026 and Prof. Brijesh Lall, IIT Delhi (TSDSI Member) joined a panel on “The Future is Connected: IoT Across Industries” in the same Conference.

Capacity Building:

NCA-T Induction training of ITS 2023 batch: Mr P K Jaswal, Consultant, Process, Quality, IT & Membership Development delivered a lecture on “TSDSI – Organizational Setup, Functions and Working & TSDSI Technical Contributions” on 17 February 2026.

NCA-T Common Induction Training of 2024 batch of Group A services in DoT: Mr A K Mittal, Director General, TSDSI delivered a lecture on Telecom Standardisation and Opportunities/Standardisation Landscape: TSDSI and Global Forums.



Focus areas in 6G Research to align with IMT 2030 requirements

- Dr T.R. Ramya, Senior Principal Research Engineer, CEWiT

The world has recently witnessed the rollout of 5G, which promises higher data rates, improved QoS and better coverage. The lessons learnt from 5G deployment are providing useful inputs for scoping of 6G. Standardization of 5G-Advanced (5G-A) is happening on a parallel track in 3GPP. ITU released the recommendation on framework and objectives for IMT2030 (6G) in 2023 namely ITU-R M.2160 [1]. The wheel diagram (Fig. 1) and the palette diagram (Fig. 2) provide the 6G usage scenarios and the key 6G capabilities respectively. Out of the six usage scenarios of the wheel diagram, three are extensions of IMT2020 (5G). The capabilities in the palette diagram have been specified in order to achieve the desired performance indices for the usage scenarios.

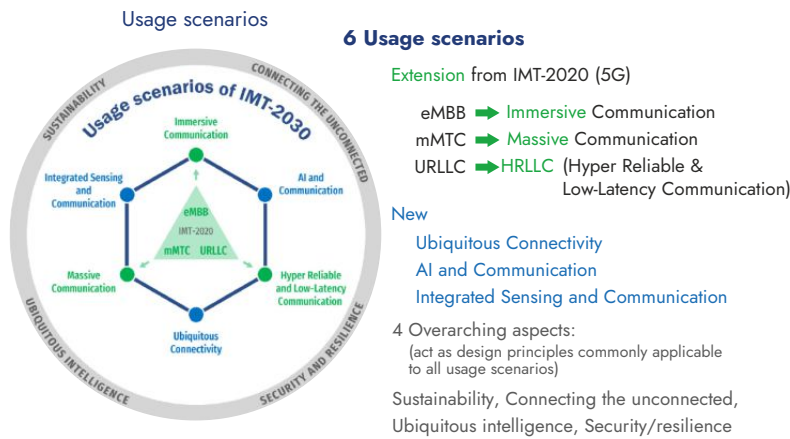


Fig. 1 Wheel Diagram showcasing Usage Scenarios [1]

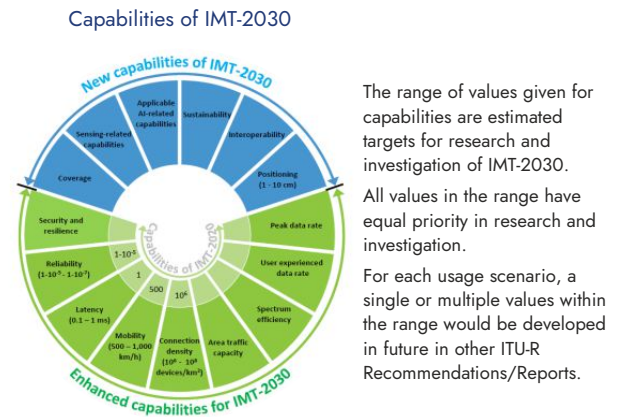


Fig. 2 Palette Diagram showcasing Capabilities [1]

TSDSI contributed to the development of the M.2160 document. India also played a pivotal role in the inclusion of the usage scenario “Ubiquitous Connectivity” in the document. It is an important scenario for addressing the digital divide and coverage holes. Earlier, the Low Mobility Large Cell (LMLC) scenario was proposed and included in the IMT2020 recommendations through India’s efforts. LMLC is a much-needed aspect to remove the digital divide in the rural and remote areas, where the Base Station (BS) deployments tend to be far apart owing to the sparse population. The efforts to include “Ubiquitous Connectivity” is a step further in this process. This is also a critical requirement in other countries with rural and remote (hilly terrain, islands etc.) regions.

ITU-R conducted a detailed study of the above use cases.

The ITU-R WP 5D has finalised a report on the technical performance requirements (TPRs), namely, M. [IMT-2030.TECH PERF REQ] [2]. This document describes the technical performance requirements as well as test requirements that need to be met for various usage scenarios. These were discussed over a long period of time, with India and TSDSI actively contributing to their development of the requirements.

3GPP has begun 6G studies in Release 20, taking into account the TPRs finalised by WP 5D. This opens up several options for research and contributing to the standardization work. TSDSI, is spearheading 6G standardization activities in India. It had earlier contributed to the ITU-R Framework document [1] and Future Technology Trends document [3] in 2021-23. It is now prioritising study of Indian requirements to enable their inclusion in the global standards. TSDSI has created a thriving ecosystem where experts from research, academia, industry, startups and government bodies work together to deliberate on the requirements and solutions. Topics in the following areas are potentially promising candidates for India to take the lead in 6G: Coverage Enhancement, RAN & Core Architecture and Interface Design, ISAC and Positioning, HAP based networks, AI/ML, FWA systems and RIS.

Key considerations for developing technologies that can effectively serve the IMT2030 usage scenarios are described below.

1. Immersive Communications:

Immersive communication encompasses eXtended Reality (XR) related use cases that improve user experience. The primary requirement is huge data rates. Some use cases may pose latency constraints as well. Higher data rates can be achieved with higher bandwidth, higher modulation order and massive multi antenna systems. The lower FR3 spectrum (7.125 – 10 GHz) is appealing in terms of availability of higher bandwidth and also moderate propagation characteristics compared to FR2 band (> 24.25 GHz). FR3 being a higher frequency range, the antenna size becomes much lesser. This enables multi fold increase in number of beams in FR3 band, leading to better signal reception at the desired user. This necessitates clever beam management strategies and prompt beam switching methods. Large Multiple Input Multiple Output (MIMO) systems are envisioned to provide huge data rates in an urban environment. However, the propagation characteristics are quite different for large MIMO that requires relook into precoder design and beam management. Therefore, efficient beam management and optimal Precoder design are important research focus points from the aspect of immersive communications.

Fixed Wireless Access (FWA) systems are seen as a potential to improve indoor coverage and offload indoor devices. FWA systems can handle huge data rates, since it can support massive MIMO owing to the stationary nature of the device. This is also a promising means to handle immersive communications. TSDSI is considering study and specification development of FWA.

2. Ubiquitous Connectivity:

Ubiquitous connectivity can be achieved by various mechanisms, a few of which are elaborated here. Non Terrestrial Networks (NTN) was brought in 5G-A with the intention to cover sparsely populated areas and shadow regions. However, having been introduced later in 5G, the basic system design was not optimized for NTN. 6G will consider a harmonized design suitable for both TN and NTN. In order to achieve a harmonised design, it is important to understand the challenges in the satellite link, owing to the large distance. In addition to satellites, HAPS can also augment the connectivity for areas where huge data rates are required for a limited duration, for example, stadiums. A study on this is also being carried out in TSDSI.

Side Link (SL), developed to support vehicular communications has not been deployed yet owing to issues in revenue model. 6G architecture must be designed to overcome these issues and leverage benefits from SL.

Reconfigurable Intelligent Surfaces (RIS) is a promising technology, also used for coverage extension. TSDSI has been spearheading standardization work related to RIS among SDOs. The first TSDSI standard on RIS - "Methods and Interface Design for RIS-assisted Communication Systems" has been published. Further work related to extending this standard and developing open interface standards is currently in progress. Studies related to RIS enabled use cases, performance evaluation, autonomous reconfiguration for reduced control overhead are also going on.

A harmonized design across NTN, SL, RIS is essential to achieve ubiquitous connectivity.

3. Massive Communications:

Massive Communication relates to smart homes, smart cities, enhanced hospitals and smart inventory management. It deals with deployment of numerous sensors/tags that transmit either some simple environmental measurement data or just an identity information. It is characterised by very small bursts of occasional data transmission from low end devices. This is a much sought after use case for India. Popular use cases include smart agriculture applications, where sensors are installed to eradicate pests, ensure proper irrigation, monitor weather and soil conditions etc.

This usage scenario would require support of high connection density, low power consumption, mobility, extended coverage, and high security & reliability and, depending on use cases, diverse data rates. However, the primary requirement is the Connection Density, which is the measure of total number of connected and/or accessible devices per unit area. For use cases envisioned in 6G, target of connection density could be $10^6 - 10^8$ devices/km².

The wide range of use cases envisioned for 6G means there would be devices of varying capabilities, starting from FWA devices that support huge data rates to smaller sensors that transmit few bytes of data occasionally. A harmonised design for handshaking, latching, paging, monitoring methods need to be developed to support the range of such devices.

4. Hyper Reliable Low Latency Communications:

Hyper Reliable Low Latency Communication (HRLLC) is for mission critical services, where latency requirement is very stringent and reliability requirement is critical. This requires concepts like mini slots to reduce latency and complicated error control schemes for improved reliability.

In addition to improved data rates, coverage and connectivity, role of 6G is to ensure inclusion of verticals such as localization and sensing. Localization was dealt in 5G but limited to connected devices alone. Enhancements in localization are envisioned to extend it to IDLE mode and INACTIVE mode devices. RAT based positioning to reduce latency, which also enables the base station to use the device location to perform intelligent beam management and handover schemes, is an area of interest for standardization.

5. ISAC:

Integrated Sensing and Communication (ISAC) aims at applications such as intruder detection, drone detection/ tracking, detecting human-animal conflicts etc., with the intention to improve safety and security. Advanced

methods to handle sensing measurement and reporting from multiple base stations and user equipment, handle interference, effective signal flow across various network entities need to be developed for effective working of ISAC. A technical study on Joint Sensing and Communications for defining KPIs for sensing, requirements on frame structure, pilot design is being carried out in TSDSI.

6. Integrated AI and Communications:

Introduction of Artificial Intelligence / Machine Learning (AI/ML) is foreseen to provide better performance in various aspects mentioned above, be it energy efficiency, sensing, positioning or improved data rates. An AI native air interface, where all signaling overheads, reference signals are alleviated is the ultimate goal. AI is expected to transform the network. At the same time, the cellular network must be designed to be suitable for AI. Therefore, AI for Network and Network for AI should go hand in hand. Artificial intelligence (AI) will be a game changer and various aspects of the 6G CORE network, and the Radio Access Network (RAN) are expected to be designed to accommodate as well as benefit from AI.

Apart from the above, sustainability is a key overarching requirement for 6G. Energy efficiency both at the network side and device side is an essential factor. Design of various network entities is performed with this notion. Design of initial access procedure (that enables the device to get latched to the base station), resource allocation, antenna configurations are all done with the notion of energy efficiency. The main aim is to configure the working at network, base station and device side so that certain activities (that are always performed currently) are either minimised or suspended in low load scenarios, thereby ensuring that almost zero energy is spent when there is NO load.

Significant work is required at the higher layers and the network to implement the usage scenarios efficiently. Security is a prime concern owing to the different varieties of devices and huge number of devices that are expected to be connected to the network. Services such as positioning, sensing, mission critical use cases etc. require very low end to end latency. This motivates development of Edge computing, where much of the data processing is handled closer to the source, rather than taking the whole chunk of information to the cloud. The inclusion of positioning/sensing necessities that the privacy of the user is not compromised. A slice-based architecture to ensure different QoS for different services is a fundamental concept that was already studied in detail in 5G and will be advanced in 6G.

TSDSI is developing standards and conducting technical studies in topics related to these aspects.

In general, 6G is seen as a game changer that brings in numerous applications, multiple device types and verticals to enhance user experience, remove digital divide and improve quality of life. While 3GPP has started studies towards 6G, TSDSI is gearing up to promote India specific use cases and requirements in global forums and be a forerunner in 6G standards.

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T. R. Ramya

About the Author

T. R. Ramya is a Senior Principal Research Engineer at the Center for Excellence in Wireless Communication, actively engaged in 3GPP proceedings and standards-based research. She participates in TSDSI and has contributed to the Annual Tech Deep Dive Conferences (2023–2024), while also delivering lectures on 5G Advanced and 6G systems. With over 16 years of experience across academia, industry, and standards research, she has been associated with Hewlett Packard, Tata Elxsi, and has briefly served as an Assistant Professor at IIITDM Kancheepuram.

ANNOUNCEMENTS



Operational Matters

Dr Sonali Garg (HFCL) was elected as the Vice Chair of the Networks Study Group unopposed w.e.f February 2026. This position, earlier held by Mr Pradeep Hirisave, had fallen vacant as a consequence of his transitioning out from Reliance Jio.

TSDSI Tech Deep Dive Conference 2026



The 9th edition of the TSDSI Tech Deep Dive (TTDD) Conference will be held from 7 to 10 July 2026. Its theme is **"Shaping the Next Decade of Telecommunications: 6G Standards, Systems, and Cross-Sector Synergies."** Visit here for latest information on the conference.

TSDSI invites its members, partners and collaborators to support in organising this event by way of sponsoring financially as per the details given in the link here.

Call for Nominations - TSDSI Outstanding Technical Contributions Awards:

TSDSI invites nominations for the TSDSI Outstanding Technical Contributions Awards for financial year 2025-26. The nomination window is open from **9 April 2026 till 21 May 2026 End of Day**. Members are invited to submit nominations in accordance with the prescribed guidelines available at the link provided here.



About TSDSI

Telecommunications Standards Development Society, India (TSDSI), aims at developing and promoting India-specific requirements, standardizing solutions for meeting these requirements and contributing these to international standards, contributing to global standardization in the field of telecommunications, maintaining the technical standards and other deliverables of the organization, safe-guarding the related IPR, helping create manufacturing expertise in the country, providing leadership to the developing countries (such as in South Asia, South East Asia, Africa, Middle East, etc.) in terms of their telecommunications-related standardization needs.

TSDSI is recognised by the Department of Telecommunications as India's Telecom Standards Development Organisation (SDO).

TSDSI is registered as a Society under the Societies Registration Act (Act XXI of 1860).

EVENTS



Upcoming Events

Meetings/Workshops/Conferences/Webinars	Date	Venue
ITU-T FG-AINN	5-7 May 2026	Online
ITU-T FG-EAI	6-7 May 2026	Online
3GPP PCG#56/OP#55	12-13 May 2026	Sophia Antipolis, France
ITU-T SG20	12-21 May 2026	Geneva, Switzerland
3GPP CT/RAN/SA WG Meetings	18-22 May 2026	Dalian, China
Bharat 6G 2026 International Conference & Exhibition	22 May 2026	Le Meridien, New Delhi
ITU-R WP5D#52	27 May-5 June 2026	Geneva, Switzerland
oneM2M TP#75	1-5 June 2026	British Columbia, Vancouver
3GPP SA/CT/RAN #112	8-9 June 2026	Singapore
ITU-T SG12	9-17 June 2026	Geneva, Switzerland
ITU-T SG5	9-18 June 2026	Sophia Antipolis, France
ITU-T SG 13 Future Networks	23 June-2 July 2026	Geneva, Switzerland
ITU-R RRB-26.2	29 June-3 July 2026	Geneva, Switzerland

Visit here for the Upcoming Calendar of Events.

MEMBERSHIP UPDATES



TSDSI welcomes following organisations that joined us as members in January-March 2026:

New Corporate Members: Advaya Networks Private Limited

New Associate Members: DTS Licensing Limited

New Guest Members: Skye Air Mobility Private Limited, PERT Telecom Solutions Private Limited

The full member list can be viewed here https://tsdsi.in/present_members/.

To apply for TSDSI membership, please visit <https://tsdsi.in/membership/>.