

ANNUAL REPORT  
FY 2022-23



## STANDARDS FOR SUSTAINABLE DEVELOPMENT

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# ABOUT tsdsi

## WHO ARE WE

TSDSI is an autonomous, membership based, standards development organisation (SDO) for Telecom/ICT products and services in India. We develop standards for access, core, back-haul and infrastructure systems, solutions and 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 encouraging generation of Indian IPRs in this technology intensive field and get them incorporated into international standards. This in turn promotes indigenous research, product development & manufacturing. Department of Telecommunications & Ministry of Electronics and Information Technology, Govt. of India are jointly supporting TSDSI as India's Telecom/ICT SDO.



TSDSI has a sound Intellectual Property Rights (IPR) policy in place. Scan the QR code to view it.

TSDSI is registered as a not-for-profit society, under the Indian Societies Registration Act XXI of 1860.

## OUR VISION

Our vision is 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. We aim to do this by creating a leadership position through India's participation and contribution to emerging Digital Communication Standards in global SDOs.

## OUR PHILOSOPHY

Follow a consensus-based approach, enforcing a methodical and transparent, open-to-all-members (Industry, Government and Academia) process while generating standards.

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.

Represent the views of our members to DoT and other Government bodies on matters concerning policy, regulatory and standardisation issues in the field of Telecom.

## OUR OBJECTIVES

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

Maintain technology neutrality and provide a uniform playing field for our members

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

Providing guidance and leadership to developing countries

## EFFECTIVE STANDARDS FACILITATE

INCLUSION ACROSS ECOSYSTEM

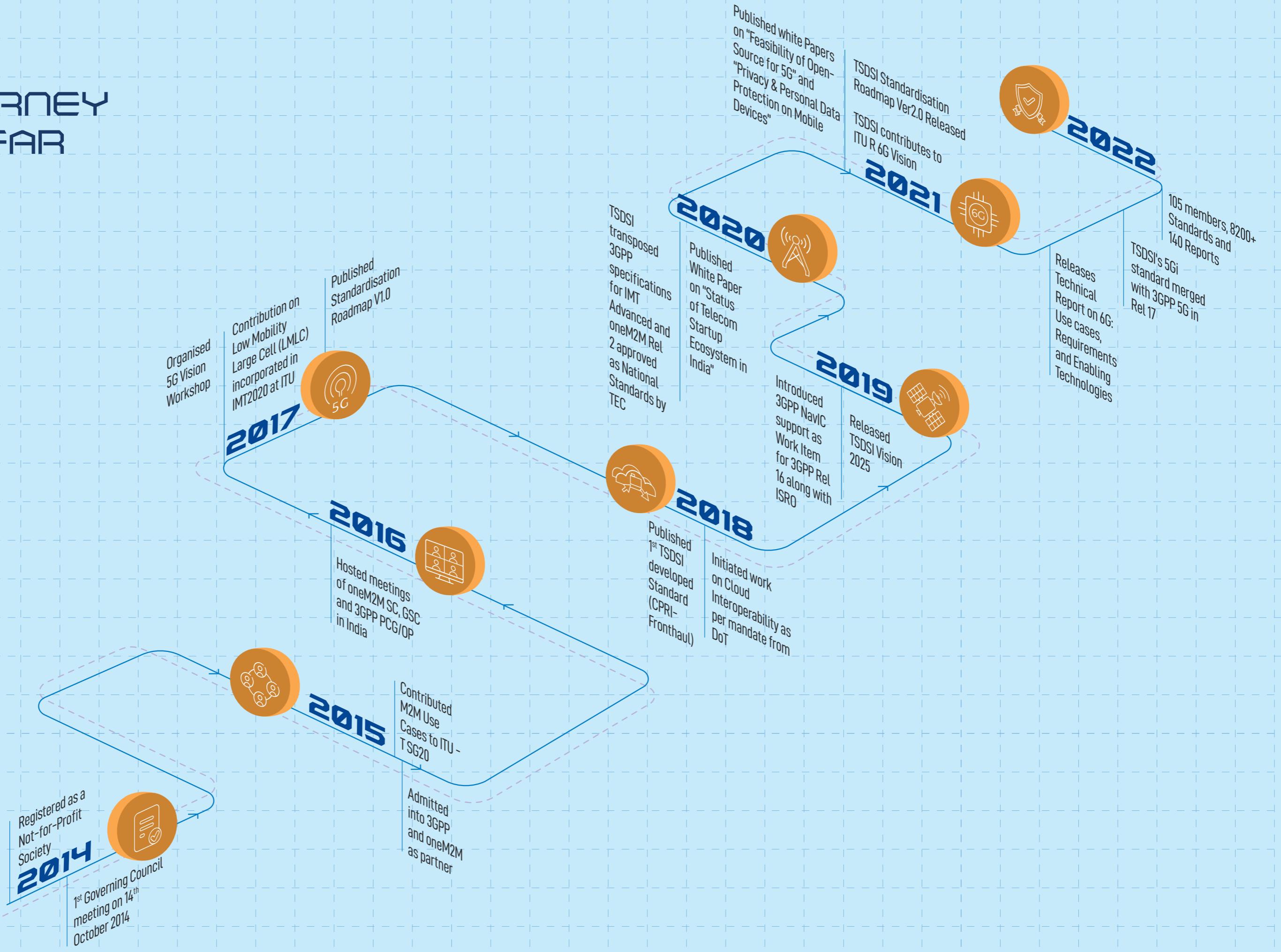
INTEGRATION OF SERVICES

INNOVATION THAT MATTERS

GROWTH

ACCELERATED DEPLOYMENT

# JOURNEY SO FAR



# KEY METRICS

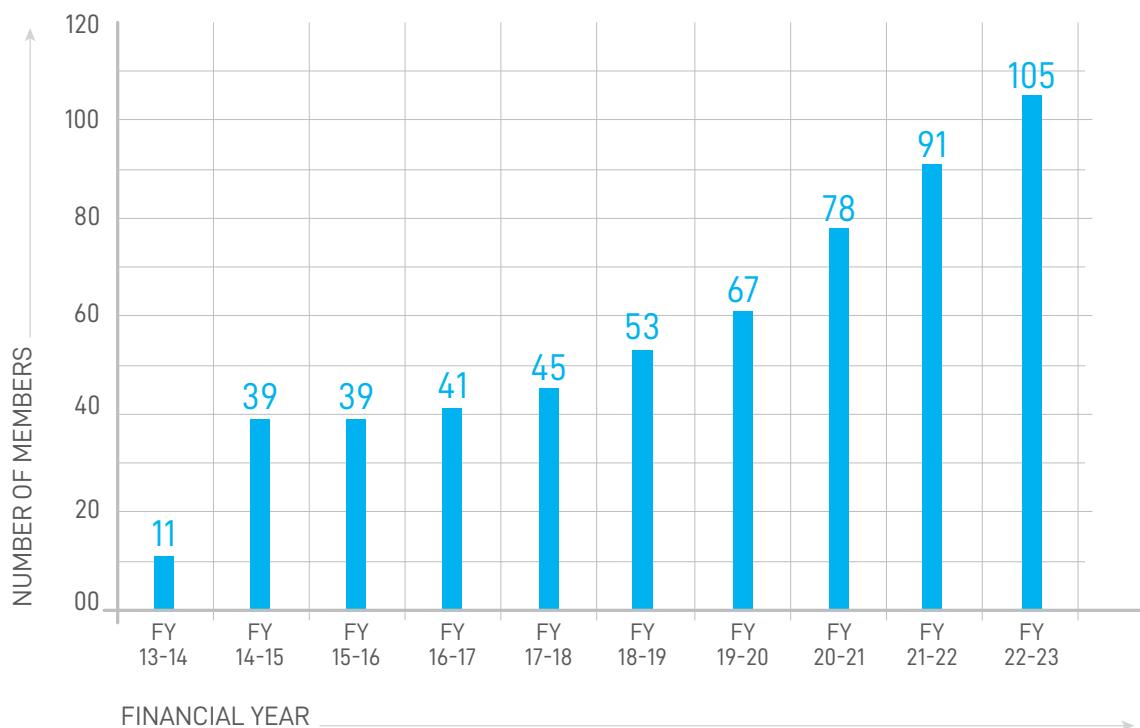
1	5659564
2	5645646
3	5956564
	6564548
	1265489
	4565456
	9894465
	3125646
	5678987
	7643547



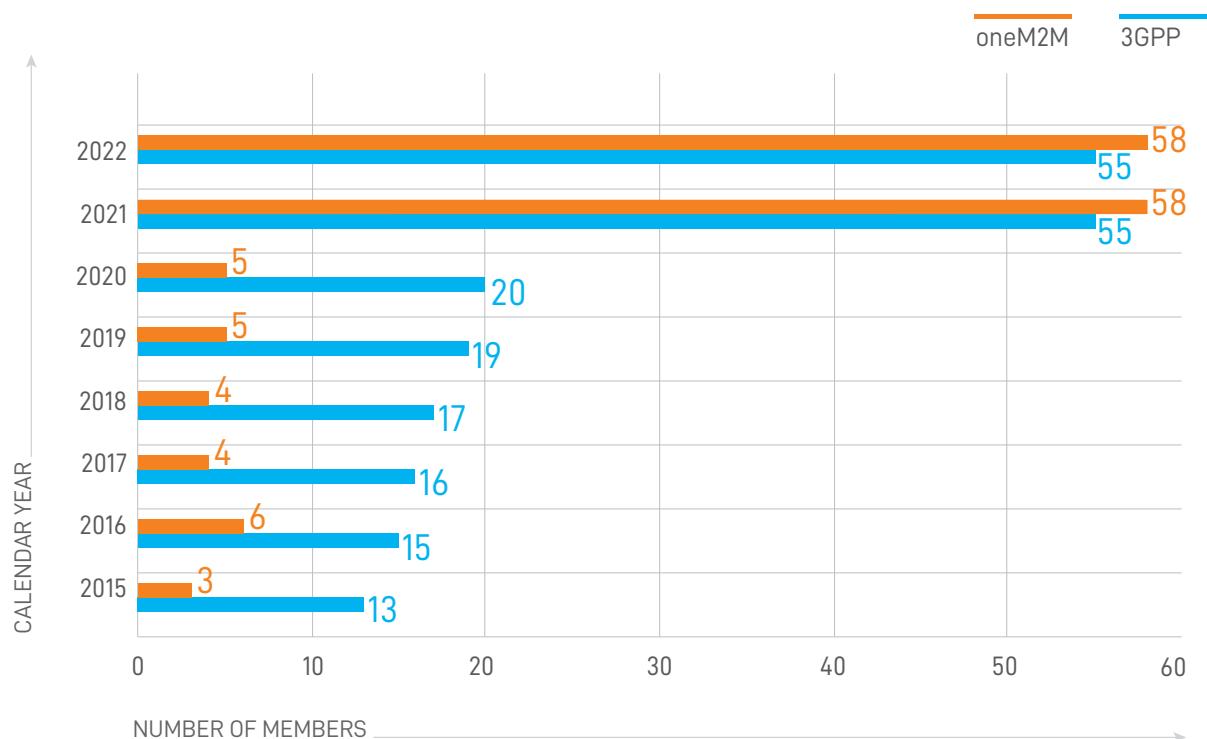
## PUBLISHED STANDARDS AND REPORTS

GROUP	STUDY GROUP – NETWORKS	STUDY GROUP – SERVICES & SOLUTIONS
NUMBER OF TECHNICAL REPORTS PUBLISHED	09	131
NUMBER OF TECHNICAL STANDARDS PUBLISHED	7985	222

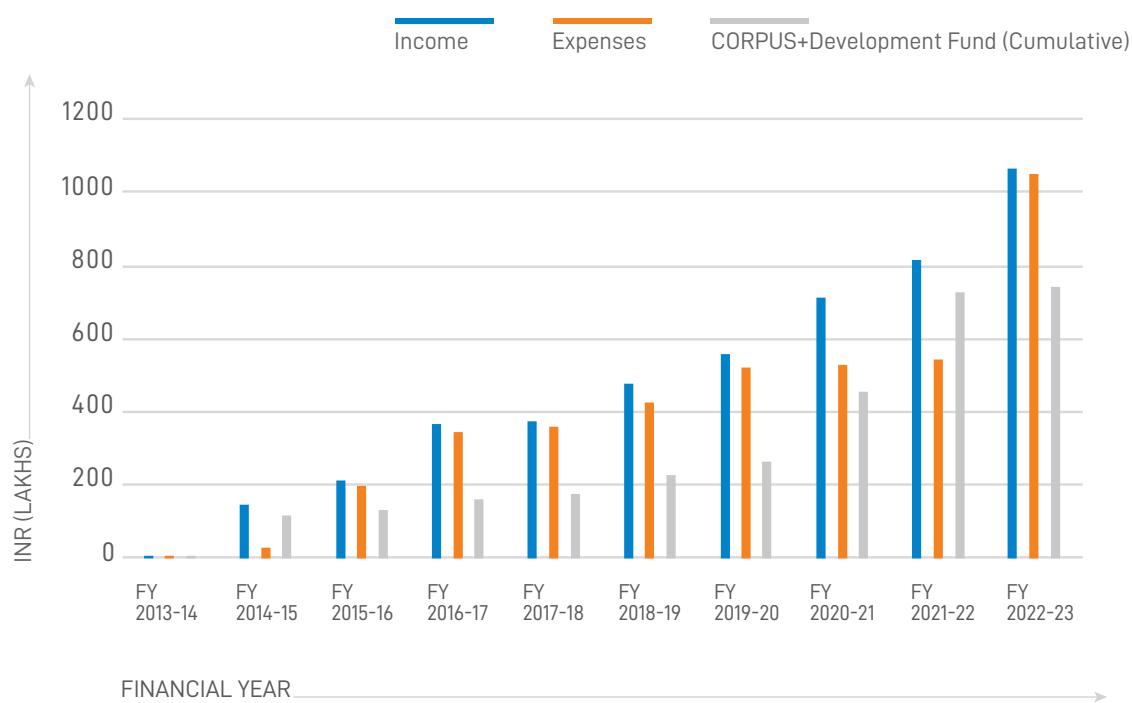
## MEMBERSHIP



## GLOBAL FORUMS PARTICIPATION



## FINANCIALS



# PARTNERSHIPS AND ALLIANCES

## ALLIANCES



Organisational Partner of 3GPP  
[www.3gpp.org](http://www.3gpp.org)



Partner Type 1 of oneM2M  
[www.oneM2M.org](http://www.oneM2M.org)



Member of Global Standards Collaboration

## PARTNERSHIPS

### Adoption Agreements

- The Institute of Electrical and Electronics Engineers Standards Association (IEEE-SA)
- Advanced Television Systems Committee (ATSC)

### Co-operation Agreements

- European Telecommunications Standards Institute (ETSI)
- Open Connectivity Foundation (OCF)

### Letter of Intent to Co-operate

- Association of Radio Industries and Businesses (ARIB), Japan
- Telecommunication Technology Committe (TTC), Japan
- Alliance for Telecommunications Industry Solutions (ATIS), USA
- China Communications Standards Association (CCSA)

### MoUs

• 5G Brasil	• Malaysian Technical Standards Forum Bhd (MTSFB), Malaysia	• Standards (TAICS), Taiwan
• 6G Infrastructure Association (6G IA)	• ORAN Alliance	• Telecommunications Technology Association (TTA), Korea
• Advanced Television Systems Committee (ATSC)	• Satcom Industry Association India	• Telecommunications Industry Association (TIA), US
• Broadband India Forum (BIF)	• The Institute of Electrical and Electronics Engineers Standards Association (IEEE-SA)	• Wireless World Research Forum (WWRF)
• Cloud Computing Innovation Council of India (CCICI)	• Taiwan Association of Information and Communication	
• Global Certification Forum (GCF)		

## REGIONAL CO-OPERATION

### 5G Multilateral MoU

Between 5G Americans, IMT2020 PG (China), 5GIA (Europe), 5G Forum (Korea), 5GMF (Japan), 5G Brasil, and TSDSI for organising '5G Global Event'

# ORGANISATION STRUCTURE

## GENERAL BODY

Chair	N G Subramaniam (TCS)
Vice Chair	Suresh Chitturi (Samsung Research)
Treasurer	Rajeev Sharma (BIS)

## GOVERNING COUNCIL (21 ELECTED MEMBERS + 8 GOVERNMENT NOMINEES)

Chair	N G Subramaniam (TCS)
Vice Chair	Suresh Chitturi (Samsung Research)
Treasurer	Rajeev Sharma (BIS)
Standing Committees (Co-Chairs)	Budget & Finance – KN Jha, DoT; Rajeev Sharma, BIS Rules & Regulations – RK Pathak, DoT; Suresh Chitturi, Samsung Research; Klutto Milleth, CEWiT Legal & IPR – N G Subramaniam, TCS; Sendil Devar, Ericsson Outreach – Vijaya Kamath, Sensorise; Anuradha Agarwal, Prasar Bharati Transposition & Standardisation – Bhaskar Ramamurthi, IIT Madras; Manikantan Srinivasan, NEC Roadmap – Samar Shailendra, Intel; Dindayal Tosniwal, DoT

## TECHNICAL GROUPS

Study Group – Networks	Chair – Prakash R, C-DOT Vice Chair – Samar Shailendra, Intel
Study Group – Services and Solutions	Chair – Mahesh Nayaka Mysore Annaiah, Reliance Jio Vice Chair – VACANT

## SECRETARIAT

Director General	Pamela Kumar
Advisors	Networks: A K Mittal Services & Solutions: Vijay Madan
Technical Activities Support	SGN: Guna Bala Shekar, Akansha Arora, Raunak Mishra SGSS: Vishnu Ram OV, Rajesh Kapoor, Akash Malik, Chandrakanta Rathore
Operations, Membership Development, IT & Information Management	P K Jaswal, Harsh Arora, Asif Iqbal, Niwedita Pathak, Rajesh Vasudev Karbele, Kuljit Singh, Anupam Sinha, Akash Patel, Sushil Kumar Paswan
MARCOM & Partner Relations	Bindoo Srivastava, Shefali Sinha, Sonia Sachdeva Sharma, Jaskirat Singh
Strategic Initiatives	Research & Academia: Uday B Desai Membership Development & Start-ups: Amit Gupta Global Partnerships & Alliance: Jean Pierre Bienaimé IT Strategy Consultant: Udayan Banerjee Strategy Consultant - Government Sector: B M Baveja

# TSDSI MANAGEMENT

As on 31<sup>st</sup> March 2023



**N G Subramaniam**

Chair  
Chief Operating Officer,  
Tata Consultancy Services  
Pvt. Ltd.v & Additional  
Director and Chairman of  
Tata Elxsi Limited



**Suresh Chitturi**

Vice Chair  
Senior Director,  
Head of Technology  
Standards at Samsung  
Research (Bangalore)



**Rajeev Sharma**

Treasurer  
DDG Standardisation-I at  
Bureau of Indian Standards

## GOVERNING COUNCIL MEMBERS as on 31<sup>st</sup> March 2023

Telecom Network  
Equipment  
Manufacturers with  
Indian product related  
IPR



**Sreenath Ramanath**

Lekha Wireless Solutions Pvt.  
Ltd.



**Kumar N Sivarajan**

Tejas Networks Ltd.

Domestic Telecom  
Network Equipment  
Manufacturers



**Sendil Kumar Devar**  
Ericsson India Pvt. Ltd.



**Manikantan Srinivasan**  
NEC Corporation India  
Pvt. Ltd.W

Telecom Service  
Provider



**Rahul Vatts**  
Bharti Airtel Limited



**Mukesh Ghuriani**  
Tata Teleservices Limited  
(TTSIL)

**Any other Service Providers**



**Vijaya Kamath**  
Sensorise Digital Services P  
Limited



**Neeraj Dindore**  
Tata Communications Ltd.

**Applications/ Solutions  
Developers/ Application  
Software / Service Platform  
Developers/ Digital  
communication Software  
Developers**



**N G Subramaniam**  
Tata Consultancy Services  
Limited



**Kiran P.V.N.N**  
Wipro Limited

**Semiconductor components  
designer/manufacturing**



**SaiDhiraj Amuru**  
WiSig Networks Pvt. Ltd.



**Samar Shailendra**  
Intel Technology India Pvt.  
Ltd.

**Terminal Equipment  
Manufacturers**



**Ganesh Shivalingaiah**  
Apple India Private Limited



**Suresh Chitturi**  
Samsung R&D Institute India  
– Bangalore (SRI-B)

**R&D Organisations****J Klutto Milleth**

Centre of Excellence in  
Wireless Technology (CEWiT)

**Rajkumar Upadhyay**

Centre for Development of  
Telematics (C-DOT)

**Academic Institutions****Prasanna Chaporkar**

Indian Institute of Technology  
Bombay

**Bhaskar Ramamurthi**

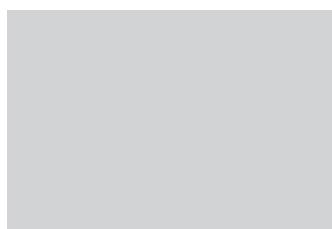
Indian Institute of Technology,  
Madras

**Government Department/  
Statutory or Autonomous  
bodies/ organisations set  
up by the Government or  
Statutory or autonomous  
bodies****Satheesh G**

Centre for Development of  
Advanced Computing (CDAC)

**Anuradha Agarwal**

Prasar Bharati

**Any other entity in  
ICT enabled product  
manufacturing/service/  
solution provider domain****VACANT**

## Nominated Members



**R K Pathak**

Department of  
Telecommunications,  
Govt. of India



**R R Mittar**

TEC - Department of  
Telecommunications,  
Govt. of India



**V J Christopher**

Department of  
Telecommunications,  
Govt. of India



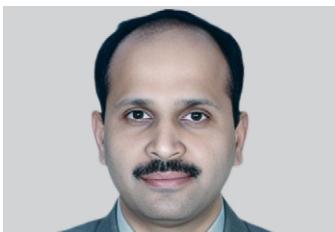
**Pushpendra Kumar Singh**

Department of  
Telecommunications,  
Govt. of India



**Dindayal Tosniwal**

Department of  
Telecommunications,  
Govt. of India



**Kishore Babu**

Department of  
Telecommunications,  
Govt. of India



**S.K. Marwaha**

MeitY



**Rajeev Sharma**

Bureau of Indian Standards  
(BIS)

## Special Invitee



**K N Jha**

Department of  
Telecommunications,  
Govt. of India

## CHAIR'S MESSAGE



**N Ganapathy Subramaniam**

Dear Members,

It's a privilege to be your Chair and pleasure connecting with you through this Annual Report of TSDSI for FY 2022-23. Thank you for the opportunity.

At the outset, I would like to thank the outgoing Vice Chair, Satish Jamadagni, and members of the 4<sup>th</sup> Governing Council for their support and welcome Suresh Chitturi as the incoming Vice Chair and the members of the 5<sup>th</sup> Governing Council. With all your active participation and support, TSDSI can further build on the momentum gained thus far and accelerate our journey of Telecom Standards.

India has seen one of the fastest rollouts of 5G services, after its launch on 1<sup>st</sup> October 2022. The Digital India Stack and our 4G/5G solutions that are based on globally accepted standards, have captured the world's imagination.

TSDSI is leading the country's efforts in the development of globally harmonised telecom standards. We actively contribute and ensure timely transposition of such globally harmonised standards to make it available for the industry in India. Our members actively participate and contribute in TSDSI's technical activities and, ITU and 3GPP forums in a timely manner and have been instrumental in putting forward India's requirements meaningfully. But, this is not enough!

Standards development is a massively collaborative, detailed engineering effort, that requires consistent participation over a long-time horizon. Leading "standards" (for adoption and contributing to its roadmap and evolution) in an enterprise is a full-time job like R&D. Indian Enterprises should recognise the same and set-up "Standards" as a strategic organisational unit led by Head of Standards like many leading international firms do. I am urging TSDSI to establish a "standards community" as a virtual forum to network, exchange views and collaborate on requirements and specifications that are important for India and our region. We should also consider measuring our capabilities on standards development & contribution on a defined maturity framework. This will be an important first step to align ourselves to the goal our Hon'ble MoC has set that India should make about 30% of all contributions to the 6G standards and at least 10% of all patents.

Further, this needs pooling of resources and alignment of efforts between industry, academia and the government, to foster an environment of collaborative research, prototyping and co-creation; and focus on key areas of importance for India on the global standards arena. TSDSI's Standards driven Research initiative, is a step in this direction and am happy to report that our members have actively contributed to Bharat 6G Vision document and to IMT2030 requirements.

The innovative spirit and 'can do' attitude inherent in many of us make it possible to be frugal and agile to deliver outcomes within the constraints. It is important to recognise our creativity and innovation by patenting it appropriately. Sometimes, we tend to trivialize our efforts by looking at the 'simplicity of the solution' (because of the ingenuity) rather than the 'complexity of the problem' solved. It is critical to understand that all innovations are worth patenting and can rightfully be brought-in as contribution to standards, however trivial one may feel about it. Let the community be the jury! I encourage you to share your innovations in the digital technology space in standards forums such as TSDSI.

TSDSI has, in the reporting period, grown from strength to strength, producing technical reports and developing/adopting standards from relevant SDOs; enhancing participation and contributions to global standards bodies through enabling membership and concerted mentoring/handholding of its members; built alliances with peer SDOs forums within and outside the country; and is expanding its membership base. It has been awarded the A.5 certification by ITU-T.

Congratulations to the TSDSI Hall of Fame 2022 awardees- Anindya Saha and Satish Jamadagni, for their respective contributions to TSDSI's Technical activities and Institution Building. I would also like to commend the Outstanding Technical Contribu-

tion Awardees for FY 21-22, Abhishek Thakur and Srinivasan Radhakrishnan.

Last but not the least, I would like to place on record, the contributions made by Ms Pamela Kumar, who has served as TSDSI's Director General since early 2017. Her efforts in steering TSDSI from a nascent institution to a well-recognised SDO on the global stage is well regarded. I look forward to TSDSI building on this legacy and growing even more under N Mohanram, who takes over from her as Director General in early April 2023.

Yours Sincerely,  
N Ganapathy Subramaniam

## VICE CHAIR'S MESSAGE



**Suresh Chitturi**

It is with great pleasure I write this message as the first-term Vice-Chair of TSDSI, connecting to all the members and the larger community of standards enthusiasts.

TSDSI continues to enhance its stature as the India's Telecom SDO with expanding its reach to both local and global forums, and representing India's interests on the global stage. The membership has steadily increased over the years with a strong desire to engage in standardisation activities. TSDSI has clearly established itself as the go-to organisation where technical standards are developed within India, and acting as the gateway to the world of standards both from inside-out and outside-in. This has been possible only with the commitment and strong engagement of its members, the leadership of the Governing Council, strong secretariat, and the unwavering support of DoT.

The technical activities with the Study Groups are on the rise, with increased participation, touching on diverse aspects of ICT technologies including, but not limited to 5G enhancements, Edge Computing, AI/ML, IoT/M2M, PQC, Application-Layer architectures and pre-6G studies. TSDSI has also taken the initiative to engage early in 6G standardisation process with key contributions to IMT-2030 framework, and I believe TSDSI will play a significant role in shaping 6G in the years to come.

While we are still a relatively young organisation, we have come a long way since inception, and I can confidently say that we are on track to become a leading SDO (both technically and operationally) by the end of this decade. I encourage everyone to take this opportunity to leverage this great platform, consistently contribute to the standards-making activities and help take TSDSI to the next level.

Yours Sincerely,  
Suresh Chitturi

# DIRECTOR GENERAL'S MESSAGE



**N Mohanram**

As we conclude the fiscal year 2022-23, I am pleased to share with you the comprehensive highlights of our activities and accomplishments during this reporting period.

Our dedication to technical excellence was underscored in March 2023 when the Study Group approved the draft specifications on Cloud Interoperability and Portability (WI1-NIP197). This significant milestone paved the way for the progression of these specifications to the GBM for approval as TSDSI Standard.

In October 2022, we released a white paper on "6G Use Cases and Enabling Technologies," providing a glimpse into the future of telecommunications and based on the TSDSI Technical Study Report "6G: Use cases, Requirements and Enabling Technologies". Furthermore, our collaboration with the Department of Telecommunications (DoT) culminated in the organisation of the International Conference on "Towards 5G Advanced and 6G" during the India Mobile Congress (IMC) in October 2022, showcasing our proactive approach towards shaping the next generation of mobile technology.

TEC has embraced TSDSI transposed specifications, aligning with cutting-edge telecommunications technology. This includes 3GPP Release 15 and 16 (5G), IMT Advanced (4G), and security-focused standards from Release 15-16, extending to Release 17 and oneM2M Release 3.

The establishment of new TRIP Forums on Automated Electric Road Transportation, Quantum Communications, and IoT/M2M reflects our forward-thinking approach towards identifying emerging technological trends and addressing industry challenges. Additionally, our joint micro-workshop series on "Advancing 5G Towards 6G" with DoT aims to mobilise the Indian ecosystem and contribute to ongoing studies in Release 19, fostering collaboration and innovation within the industry. A Test & Certification Task Force has been formed to study the current status of test and certification infrastructure in the country, project future requirements as we gear up for 5G and beyond technologies and recommend role of TSDSI in enabling the same, with a special focus on IoT testing.

I am pleased to announce the successful transition in leadership, with N G Subramaniam continuing as Chair TSDSI of the

5<sup>th</sup> Governing Council and Suresh Chitturi being elected as Vice Chair after two successful terms by Satish. Mahesh Nayaka was elected unopposed as the SGSS Chair. I extend my congratulations to Aurindam, Saurabh Khare, Arzad Kherani, Vireshwar, Niranth, and Roopa on their election to the Chair and Vice Chair positions for the Working Groups in SGSS. Furthermore, the issuance of our Software Copyrights Policy and Trademark Usage Guidelines underscores our commitment to upholding intellectual property rights and promoting fair use practices within the organisation.

With our membership base currently standing at 105 members, I am delighted to see our community continue to grow, reflecting the trust and confidence placed in TSDSI by stakeholders across the telecommunications industry.

Our efforts in global standards leadership were recognised with the attainment of A.5 certification from ITU-T. Furthermore, N G Subramaniam's tenure as the 3GPP Chair for the calendar year 2022 highlights our active involvement in shaping global telecommunications standards. TSDSI has initiated the continuous transposition of 3GPP specifications, marking a significant step forward in our commitment to staying at the forefront of industry standards. In February 2023, TSDSI facilitated the oneM2M TP meetings in New Delhi, with backing from the India EU Cooperation on ICT Related Standardisation, Policy, and Legislation project. Following the TP meetings, TSDSI organised a one-day oneM2M Stakeholders' Day workshop on 24<sup>th</sup> February 2023, also in New Delhi, with support from the India EU Partnership Project.

In this reporting period, we forged strategic partnerships with SIA-India, 5G Brasil, and MTSFB, enhancing our collaborative efforts and expanding our network of alliances for mutual benefit and growth.

The India EU Partnership Project on ICT Standardisation, Policy and Legislation with TSDSI as the India Anchor, concluded in February 2023. It led to the creation of permanent resources such as MOOCs on oneM2M and VLC, technical reports on LPWAN systems and technologies for specially abled people. Contributions were made to ITU-T Focus Groups on AI/ML challenges for 5G and AI & IoT for Digital Agriculture. Additionally, 32 webinars were conducted for capacity building.

Our outreach efforts in organising a myriad of events, webinars, and workshops have been commendable. Special mention goes to TTDD, which attracted over 420 attendees, and the successful conclusion of the 6 Part TSDSI-ITU Webinar Series on Digital Technology Innovations, engaging participants from 30 countries. Furthermore, Standards Driven Research Workshops were successfully held at prestigious conferences such as IEEE-ANTS, COMSNETS, and NCC.

In closing, I extend my heartfelt congratulations to the Hall of Fame 2022 Awardees: Mr. Anindya Saha, recognised as a TSDSI Hall of Fame 2022 Fellow for Technical Excellence, and Mr. Satish Jamadagni, honoured as a TSDSI Hall of Fame 2022 Fellow for Organisation Building. Additionally, I applaud the recipients of the Outstanding Technical Contribution (OTC) Awards for FY 2021-22, Mr. Abhishek Thakur and Mr. Srinivasan Radhakrishnan.

I wish to express my deepest condolences on the loss of Retd. Major General (Dr) Pritam Bishnoi. His unwavering dedication and meticulous approach will be sorely missed within our Secretariat.

As we look ahead, let us continue to collaborate, innovate, and drive positive change within the telecommunications industry, reaffirming TSDSI's position as a leader in standards development and innovation.

## ENHANCING TECHNICAL ACTIVITIES

### HIGHLIGHTS

**STUDY GROUP KPIs (AVG/MEETING)** 10 NIPs/SWICs (Goal 10) | 31 Members (Target 30) | 60 Attendees

#### OUTCOMES:

- 8 TR's Published (Service Delivery using 5G Broadcast, VLC/Li-Fi, 6G Use Cases, PPDR, Co-existence in 6 GHz Spectrum, Edge Intelligence, Digital Process for KYMC, PQC)
- Transpositions: 3GPP Rel 10 to 17 for IMT Advanced Revision 5 & oneM2M Rel. 3
- Adoption of TSDSI standards as National Standard (adopted by TEC/ submitted to TEC)
  - oneM2M Rel. 3
  - 3GPP Release-15 & Release-16
  - 3GPP specifications (Rel 10-16) related to LTE-Advanced for ITU-R Recommendation (M.2012 Rev. 5)
  - 3GPP Release-17
  - 3GPP Releases 15-17 (submitted to TEC)
  - 3GPP Releases 13-17 (submitted to TEC)

### FOCUS TOPICS/INITIATIVES

- 6G, 5G enhancements, Broadcast Convergence, Spectrum studies, Open Systems
- Security-Trust-Privacy-Data Protection Standards; Applications and Service Layer Standards, AI/ML; Smart Infra, Critical Communications, Cloud & IoT
- Conducted workshop to mobilise members for contributions to ongoing Roadmap items as well as identify new items for Rel. 19
- New Technology Roadmap Item Proposal (TRIP) FORUMS formed – Quantum Communications, IoT/M2M, Automated Transport
- Work to update the Roadmap V2.0 initiated

## HIGHER IMPACT IN GLOBAL FORUMS

### HIGHLIGHTS

GLOBAL SDO OUTCOMES	GLOBAL SDO KPIs	LEADERSHIP ROLES	SUPPORT TO GLOBAL SDOs	AFFILIATIONS
<ul style="list-style-type: none"> <li>• 1 contribution on Framework for IMT-2030 and Beyond in ITU-R WP5D</li> <li>• oneM2M: 450+ cumulative contributions</li> <li>• 19 specifications of ATSC standards approved by TSDSI SGs for adoption as TSDSI Standards</li> </ul>	<ul style="list-style-type: none"> <li>• Avg. Delegates/mtg: 10@ITU-R, 10@3GPP, 17@oneM2M</li> <li>• Avg. Contributions/mtg: 15@3GPP; 1@ITU-R, 3@ITU-T, 36@oneM2M (goal 10/SDO)</li> <li>• # of IMs: 55 @3GPP; 58 @oneM2M</li> </ul>	<ul style="list-style-type: none"> <li>• <b>3GPP:</b> PCG Chair (CY'22), PCG Vice Chair (CY'23)</li> <li>• <b>oneM2M:</b> SC Vice Chair, MARCOM Chair &amp; Vice Chair, SDS Vice Chair (Term just got over)</li> <li>• <b>ITU-T:</b> SG9 Vice Chair</li> </ul>	<ul style="list-style-type: none"> <li>• <b>3GPP:</b> 3-Yr deputation at MCC completion in EOF CY25</li> <li>• <b>oneM2M:</b> Secretariat support to oneM2M of 278.6 person-days (PD) in CY 22 and 260.6 PDs in CY 23</li> </ul>	<ul style="list-style-type: none"> <li>• TSDSI signed MoU with 5G Brasil, MTSFB (Malaysia) and SIA India</li> <li>• 5 Events with 4 Global Partners (Goal 10)</li> <li>• 24 International Speakers @ TTDD 2022</li> </ul>

### KEY FOCUS AREAS

- Global SDO Strategy: Focus on streamlining processes to enhance contributions
- Sector membership at ITU : Enhanced participation at ITU-T / WTSAs
- Process for Managing Affiliations being updated
- IEEE Standards Adoptions to be initiated

## ESTABLISHING TSDSI AS A WORLD CLASS SDO

### HIGHLIGHTS

#### MEMBERSHIP DEVELOPMENT 105 Members

#### MARCOM: AVG. 1 EVENT PER WEEK

- TSDSI Tech Deep Dive 2022: 4 days-10 sessions, 105 Speakers & 420+ Attendees
- 6 Part TSDSI-ITU Webinar Series on Digital Technology Innovations concluded with 2 webinars in FY 2022-23 engaging 30 countries
- "Standards driven Research" Outreach workshops@ NCC 2022, IEEE ANTS 2022, COMSNET 2023, NCC 2023
- Total 32 events organised in FY 2022-23 and 22 speaking opportunities

#### ORGANISATIONAL

- IT Support for world Class Virtual working / events/ hybrid
- Legal & IPR Matters:
  - Obtained A.5 Certification from ITU
  - Released TSDSI Software Copyrights Policy and Trademark Usage Guidelines

#### STRATEGIC TASK FORCES

- Start-up Strategy- Implementation of recommendations
- Application/Services Layer Strategy- WG formed
- Open-Source Strategy- White paper & NIPs
- Global SDO Strategy- Draft Report submitted to GC
- Standards Driven Research- Engaging with COMSNETS, NCC, IEEE-ANTS
- Industry Strategy- TF formed

### KEY FOCUS AREAS

#### MEMBERSHIP DEVELOPMENT

- Induction of new members
- Bharat Digicom
- GC Connect; GC members engagement in MARCOM, MEMDEV & Technical Activities to be improved further

#### ORGANISATIONAL

- Process & Quality: SoPs - 11
- Making the Secretariat more effective
- Synergy with TEC and BIS

Yours Sincerely,

N Mohanram



# THE YEAR GONE BY

# TECHNICAL ACTIVITIES

## STANDARDISATION

TSDSI members took up technical activities in the following areas:

Study Group – Networks	6G	5G Enhancements	Broadcast Offload
	Spectrum Studies	Open Systems	Wireless Backhaul
Study Group – Services & Solutions	Security - Machine KYC, Post Quantum Cryptography, security aspect of AI/ML model transfer in 5GS	Application layer - Automotive, Health, and Finance, Indian Language Support for Financial Transactions, Metaverse, UAV Drone	Services Architecture and Framework - Defining Architecture and Protocol Requirements, Development of Service Framework, Rural Broadband, Common Edge Connectivity, Cloud Interoperability, IoT/M2M, Public Safety/Critical Communications

The study groups approved adoption of specifications from ATSC 3.0 standards related to Services [NIP 298]. TSDSI has an agreement with ATSC (<https://www.atsc.org/>) for adoption of their standards. ATSC 3.0 Standards relate to TV broadcasting. A New Item Proposal (NIP) was introduced in SGN TP held in September 2022 for adoption of these standards which was further revised by dividing the set of specifications into Network and Services categories. NIP 298 was formally submitted in SGSS TP in December 2022 for approval for adoption of specifications related to Services.

## NETWORKS STUDY GROUP

SGN published following Technical Reports in the reporting period:

### Technical Report on Visible Light Communications/Li-Fi (TSDSI TR 6016 V1.0.0)

<https://bit.ly/3BlzPOa>

The report gives a snapshot of current status of global standards, and has identified gap areas that require further study, notably use-cases in the areas of Smart Villages, Building Infrastructure, Telecom Infrastructure, Defence and V2X.

### Technical Report on 6G: Use Cases, Requirements and Enabling Technologies (TSDSI TR 6017 V1.0.0)

<https://bit.ly/3lwblzy>

This report lists key use-cases and requirements that are expected to drive 6G, establish KPIs for the

same, identify candidate technologies to address these KPIs, corresponding spectrum requirements, and its related aspects. It also covers network evolution and the respective performance parameters with recommended areas of study and research towards the 6G objective.

### Technical Report on Study of 6 GHz spectrum for IMT services in India (TSDSI TR 6020 V1.0.0)

<https://bit.ly/3ZQi6ay>

The report gives findings of simulated studies for different cases relevant to India, including existing FSS deployments with assumption of IMT deployments within 3 dB footprint of satellites. It also addresses issues such as current spectrum allocations in 6 GHz and usage in India, 6 GHz Indoor/Outdoor usage feasibility, sharing and compatibility between IMT and other primary services in 6 GHz band etc.

The group initiated/continued technical activities on the following topics during the year:

Area	Study Items	Work Items
6G	Defining qualitative metrics for 6G KPI definitions [SI97])	New Architecture for 6G Communication Systems [WI1-NIP290] Methods and Interface Design for RIS-assisted Communications [WI1-NIP284]
5G Enhancements	Study of waveforms for B5G communication systems [SI96] Futuristic architecture of 5G Backbone and Slicing [SI95] Dynamic Joint Deployment of SDN Controllers and Hypervisors for Frugal 5G and Beyond [SI80] Improving Data Capacity & Experience as per NDCP Vision (SI 72)	Functional Split and Fronthaul Interface in FBS Driven C-RAN for 5G and Beyond [WI1-NIP 270] Enabler Private Networks [WI1-NIP210]
Broadcast Offload		Extension of Broadcast offload [WI1-NIP226]
Spectrum Studies	A Case Study for Sub-THz Channel Modeling [SI100] Study of 6 GHz spectrum for license-exempt wireless applications in India [SI74]	

Area	Study Items	Work Items
Open Systems		Open Radio initiative: Towards a Open, Disaggregated RAN (WI1-NIP271)
Wireless Backhaul		Characterisation of E-band for 4G/5G Backhaul & Rural Broadband [WI1-NIP 258] Evaluation of the existing IAB architecture in 5G Networks [WI1-NIP 248]

### SERVICES & SOLUTIONS GROUP

SGSS published following Technical Reports in the reporting period:

**Technical Report on Need of Post Quantum Cryptography in 5G Networks (TSDSI TR 6021 V1.0.0)**

<https://bit.ly/45nB0bY>

The report presents an analysis of the existing security algorithms in 5G Networks based on the released 3GPP standards and evaluates the potential threats of Quantum Computing to the Security Algorithms employed in 5G Networks.

**Technical Report on Study on Edge Intelligence standards for haptics related IIoT use cases (TSDSI TR 6018 V1.0.0)**

<https://bit.ly/45CmKMG>

The report lists critical technical issues with new requirements and recommendations for standardisation to enable haptics-related applications of critical nature in the edge computing system based on gap analysis of existing standards and requirements.

**Technical Report on Digital Process for Know Your Machine Custodian (TSDSI TR 6013 V2.0.0)**

<https://bit.ly/42YHCvV>

This report establishes a trust and compliance framework for M2M device and custodian verification including unique characteristics of M2M connections and its ownership and requirements for the

verification of these connections. First version of this report was published in September 2021.

**Technical Report on Minimum Technical Requirements for PPDR system deployment in India (TSDSI TR 6019 V1.0.0)**

<https://bit.ly/3My8Sds>

This report provides the detailed minimum requirements for services and architecture aspects for PPDR based TRAI's recommendation on setting up of a pan-India integrated, hybrid Broadband (BB) – PPDR network in India.

**Technical Report on Service Delivery using 5G Broadcast for TV, Radio, IPTV and File-casting (TSDSI TR 6015 V1.0.0)**

<https://bit.ly/3Wtm5sy>

An instantiation of a 5G Broadcast System is presented in this technical report, referred to as LTE- based 5G Broadcast. It also provides the description of 3GPP solutions that may be utilised to deploy linear television, radio services, IPTV and file-casting.

**Standards Development:**

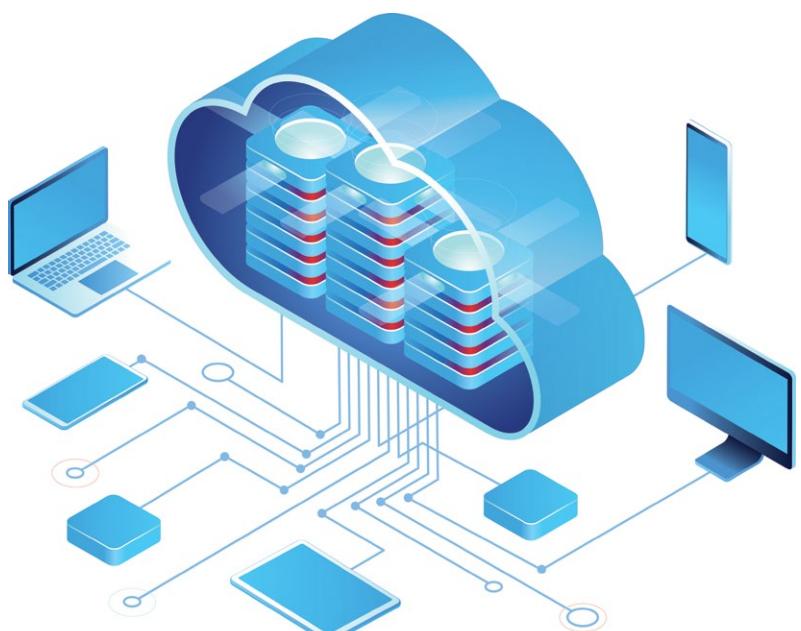
**Draft specifications on Cloud Interoperability and Portability (WI1-NIP197)** were approved by Study Group- Services & Solutions in the TP meeting held on 16<sup>th</sup> - 17<sup>th</sup> March 2023. The draft specifications were progressed to the GBM for approval as TSDSI Standard, after due updates as per comments received in the TP.

The group initiated/continued technical activities on the following topics during the year:

Work Group	Study Item	Work Item
Security	IoT Identifier (SI 75 NIP 243)  Security aspect of AI/ML model transfer in 5GS (SI103 NIP 303)	
Application Layer	Communications Requirement for the Energy Sector (SI 87 NIP262)  Study UAV/Drone 3GPP-5G standards applicability to India use cases (SI 93 NIP 274)  System requirements related to Metaverse use cases in mobile network [SI 98 NIP 296]  Enablement of common ontology for adaptive traffic control system and other Intelligent transportation system products (SI 102 NIP 299)	Use Cases and 5G Trials for Automotive [WI1-NIP260]  A local language repository as an enabler for financial workflows [WI1-NIP 279]
Services Architecture & Framework	Common user profile to promote accessibility in audio visual media (SI 76 NIP239)  Rural Broadband Services & architecture (SI 85 NIP255)  Enablement of common edge connectivity for public utility purposes (SI 101)	Architecture to support tactile applications with edge intelligence over 5GS [WI1-NIP 282]

The group took up discussions on proposals for following technical activities:

- Suggested recommendations in Smart Metering Standards for greater efficiency from Telco perspective (NIP 304)
- Open APIs to use Smart-Ambulance Services (NIP 293)
- Use Cases and Deployment Options (5G and Beyond) for BFS Vertical



## Technical Group Meetings:

Technical groups held meetings as per details below:

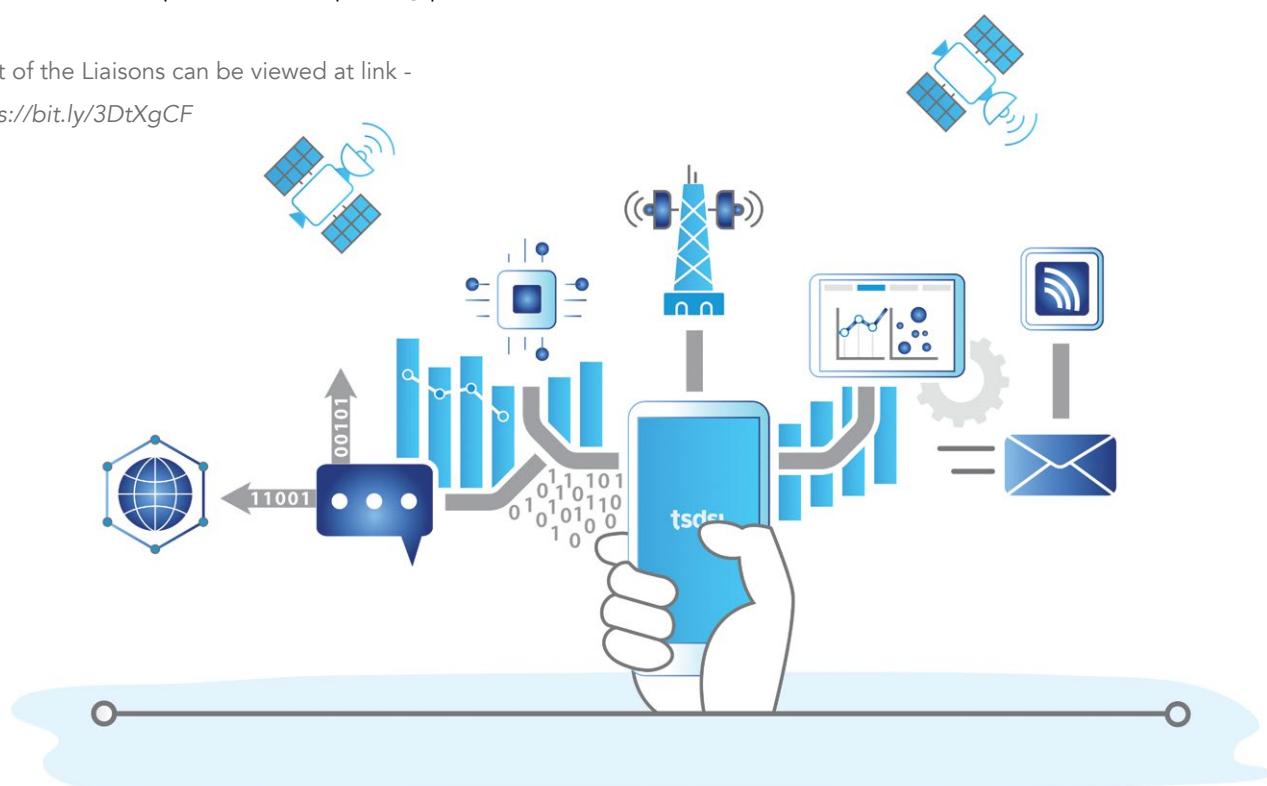
Date	Meeting	Venue	Participation (Member Organisations)
2 <sup>nd</sup> - 3 <sup>rd</sup> June 2022	SG – Networks	Online	24
15 <sup>th</sup> - 16 <sup>th</sup> June 2022	SG – Services & Solutions	Online	29 +1 observer
1 <sup>st</sup> - 2 <sup>nd</sup> September 2022	SG – Networks	Online	37
6 <sup>th</sup> - 7 <sup>th</sup> September 2022	SG – Services & Solutions	Online	30 +1 observer
6 <sup>th</sup> - 7 <sup>th</sup> December 2022	SG – Networks	Online	30
20 <sup>th</sup> - 21 <sup>st</sup> December 2022	SG – Services & Solutions	Online	30
14 <sup>th</sup> - 15 <sup>th</sup> March 2023	SG – Networks	Online	28
16 <sup>th</sup> - 17 <sup>th</sup> March 2023	SG – Services & Solutions	Online	31

## Liaison Statements

TSDSI received 6 Liaison Requests/Statements and sent 6 Liaison Requests in the reporting period.

A list of the Liaisons can be viewed at link -

<https://bit.ly/3DtXgCF>



## PRE-STANDARDISATION

A white paper on "6G Use Cases and Enabling Technologies", giving a summary of the TSDSI Vision for 6G based on the TSDSI Technical Report on 6G: Use cases, Requirements and Enabling Technologies (TSDSI TR 6017 V1.0.0) was released in October 2022.

Please visit <https://bit.ly/3jNJnds> to read the white paper.



## DoT-TEC-TSDSI Joint workshop on "5G Advanced and Beyond (6G)

### Including for IMT for 2030:

A joint workshop on "5G Advanced and Beyond (6G) including for IMT for 2030" was organised by TSDSI in partnership with DoT and TEC on 25<sup>th</sup> April 2022. The objective of the workshop was to formulate a strategy for participation in 3GPP's Release 18 and beyond, and other relevant ITU and global forums. This would facilitate inclusion of TSDSI contributions in 5G Advanced and Beyond (6G), including for IMT 2030. It deliberated on potential areas of interest for contributions for 5G Advanced and beyond (6G) with participation from TSDSI members/3GPP IMs and other stakeholders. 3GPP TSG Chairs gave an overview of Release 18 topics and shared their views. Other speakers included experts from TEC, DoT and TSDSI membership. Nine (9) contributions were received from TSDSI- 3GPP IMs. The workshop had 160 participants.

## Towards 5G Advanced and 6G – An International Conference@IMC 2022:

TSDSI, in partnership with DoT, organised an International Conference on "Towards 5G Advanced and 6G" as part of India Mobile Congress (IMC 2022) from 1<sup>st</sup> - 3<sup>rd</sup> October 2022. It featured keynotes by globally eminent 6G experts and presentations by researchers that were shortlisted by a program committee based on an open call for abstracts. The topics covered areas in PHY Layer Techniques, RF Design and Applications, IRS and Massive MIMO Techniques, Positioning, Imaging, and Security, AI/ML, Network Architecture, Simulation and Testing for 5G+/6G Wireless systems.



## POST-STANDARDISATION

TEC has adopted the following TSDSI transposed standards as National Standards:

### TSDSI Standards transposed from 3GPP

Standards available at link: <https://tsdsi.in/3gpp/>

**3GPP Rel 15 & 16**  
Specs corresponding  
to ITU-R M.2150 i.e.  
5G (356 Documents)

**3GPP Rel 10-16**  
Specs related to  
IMT Advanced  
corresponding  
to ITU-R M.2012  
Rev 5 i.e., 4G  
(589 Documents)

**3GPP Rel 15-16**  
Security  
Specifications  
for ITSAR  
Requirements  
(124 Documents)

**3GPP Release -**  
**17 Standards**  
(1,227 Documents)

### TSDSI Standards transposed from oneM2M

Standards available at link: <https://tsdsi.in/oneM2M/>

**oneM2M Rel 3**  
(27 Documents)



## ROADMAP

Technology Roadmap Item Proposal (TRIP) Forums: Based on the recommendations from the Roadmap committee, the Governing Council, in its 38<sup>th</sup> Meeting (held on 26<sup>th</sup> July 2022) has approved creation of three TRIP Forums with their Terms of Reference.

The same are described below:

1. **Automated Electric Roadmap Transportation (AERT):** This TRIP forum will study and develop potential requirements for a standardisable reference architecture for the operation of automated electric vehicles in separate lanes; enable the adoption of electric and automated road transport to solve safety and traffic congestion problems and high-speed intercity road transport; improve utilisation and efficiency of the roads through the involvement of market forces; develop use cases; study technology aspects and gaps in current standards.

*It is co-chaired by Surya Satyavolu (Sirab Technologies) and Niranth Amogh (Huawei).*

2. **Quantum Communications (QC):** The TRIP Forum will develop use cases and identify new components required to support the emerging use cases and identify gaps/opportunities with existing standards and develop potential requirements to enable standardisation.

*It is chaired by Manjunath Ramachandra (Wipro).*

3. **IoT/M2M:** This TRIP Forum will engage IoT stakeholders representing different verticals; release a white paper on IoT/M2M global deployments; study the IoT/M2M standards landscape, including oneM2M; recommend suitable roadmap for India; conduct a study on Fintech, Agritech, and other verticals to assess the readiness of existing digital infrastructure and the enhancements required to support Advanced LTE and 5G use cases and create a strategy for oneM2M inter-ops and pilots to enable deployments and the define role of TSDSI.

*It is co-chaired by Suresh V (C-DAC) and Abhishek Thakur (IDRBT).*

## STANDARDISATION

**Global SDO Strategy:** Recommendations made by the Global SDO Strategy Implementation Oversight Committee on process for forming TSDSI Delegations for 3GPP PCG, ITU-R, ITU-T and oneM2M meetings was approved by the Council in its 40<sup>th</sup> Meeting (held on 4<sup>th</sup> November 2022).

**Startup Strategy:** The Startup Strategy Implementation Oversight Committee contributed to development of a Startup Corner (<https://www.bharatdigicom.in/>). The committee is working closely with the TSDSI membership development team to onboard startups as members of TSDSI and to further handhold them for participating and contributing in standards development activities.

**Standards Driven Research (SdDR) Strategy:** Recommendations of the Standards driven Research Task force for enhancing continued contributions by Academia into standards were submitted to the 38<sup>th</sup> meeting of the Governing Council (held on 26<sup>th</sup> July 2022). The same were approved by the Governing Council's 40<sup>th</sup> meeting (held on 4<sup>th</sup> November 2022). Subsequently, the Governing Council, in its 41<sup>st</sup> meeting (held on 23<sup>rd</sup> January 2023) approved formation of an Implementation Oversight Committee to supervise the execution of the recommended actions, for a duration of 2 years.

**Industry Task Force:** The Industry Task Force, formed to come out with recommendations for active engagement/ value creation and strategic expectations of the industry, wrt TSDSI, submitted its report to the Governing Council in its 40<sup>th</sup> Meeting (held on 4<sup>th</sup> November 2022). The same was approved by circulation. The Governing Council, in its 41<sup>st</sup> meeting (held on 23<sup>rd</sup> January 2023) approved the formation of an Implementation Oversight Committee to supervise the execution of the recommended actions, for a duration of 2 years.

**Test & Certification Task Force:** Based on the recommendations of the Standardisation Committee, Governing Council, in its 41<sup>st</sup> Meeting (held on 23<sup>rd</sup> January 2023) approved formation of a Test & Certification Task Force. Its purpose is to study the current status of test and certification infrastructure in the country, project future requirements as we gear up for 5G and beyond technologies and recommend role of TSDSI in enabling the same, with a special focus on IoT testing.



## STRATEGIC EVENTS

### TSDSI-ITU Webinar Series on "Digital Technology Innovations - Case Studies from India and the Asia-Pacific Region":

TSDSI in collaboration with ITU is conducting a joint webinar series on "Digital Technology Innovations - Case Studies from India and the Asia-Pacific Region" (<https://bit.ly/3IZZvzJ>), with support from the Department of Telecommunications, select Ministries of Govt of India and other partners from the Asia-Pacific region.

Following webinars were organised under this series in the reporting period:

Date	Name	Speakers	Attendees
18 <sup>th</sup> April 2022	Terrestrial/NTN Technologies for Rural and Remote Areas	Ms Atsuko Okuda, ITU   Prof Uday Desai   Mr Supree Tientamnoon, Division Director, NBTC Thailand   Dr Walid Mathlouthi, Head, Future Networks & Spectrum Management Division, ITU   Prof Radhakrishna Ganti, IIT Madras   Dr Mohammad Danesh, Transcelestial Technologies   Mr Gaurav Kharod, Intelsat   Ms Neha Satak, Astrome   Mr Pankaj Dalela, C-DOT   Ms Charumati P, C-DOT	86 from India 33 Global
12 <sup>th</sup> May 2022	Data Protection and Privacy	Ms Atsuko Okuda, ITU   Mr Narendra Nath, Jt Secy, NSCS   Mr Vijay Madan, Advisor & Mentor SGSS, TSDSI   Mr Sharad Arora, Ex Founder Director- Sensorise   Ms Pamela Kumar, DG TSDSI   Ms Sofie Maddens, ITU   Mr R Shakya, DDG (IR), DoT	42 from India 50 Global

**DoT-TSDSI Webinar Series on “IoT/M2M Applications for Verticals”:**

A webinar series on “IoT/M2M applications for Verticals” (<https://bit.ly/IOTM2MAApps>) has been initiated by DoT & TSDSI in order to strengthen the M2M Ecosystem in the country and facilitate wider proliferation and innovation in the sector.

Following webinars were organised under this series in the reporting period:

<b>Date</b>	<b>Name</b>	<b>Speakers</b>	<b>Attendees</b>
<b>7<sup>th</sup> April 2022</b>	Webinar on Transportation	Shri Dindayal Tosniwal, DDG (NT), DoT   Mr Sharad Arora, Chair SGSS, TSDSI   Shri A K Tiwari, Member (T), DoT   Mr Alok Sethi, General Manager, DIMTS Ltd.   Ms Reena Malhotra, Director (NT), DoT   Mr Sunil Kaul, CEO, Airlinq   Mr Benoy Gopal EB, Associate Director, C-DAC   Mr Mallesh B, Director, Zero-Sum ITS Solutions India Pvt Ltd   Mr Amrit Singha, Vice President-Operations, IHMCL   Mr Yatin Mankame, Product Head – Digital Transit and Electronic Toll Collection, IDFC FIRST Bank	170
<b>4<sup>th</sup> May 2022</b>	Webinar on Utilities	Shri Dindayal Tosniwal, DDG (NT), DoT   Mr Rajesh Kapoor, Technical Consultant SGSS (TSDSI)   Shri A K Tiwari, Member (T), DoT   Ms Reena Malhotra, Director (NT), DoT   Ms Kumud Wadhwa, Sr. General Manager, NSGM   Mr Manender Mohour, Rural Infrastructure Consultant, NPMU, NJJM   Mr Phil Beecher, President & CEO, WiSUN Alliance   Mr Koustubh Patil, Lead Technical Architect, Secure Meters Limited   Mr Deven Patel, Head – Energy Analytics, L&T Smart World & Communication   Mr Dharmendra Tomar, DGM New Ventures – IoT Business, Tata Communications Limited   Ms Anuradha Vattem, Lead Architect, IIIT Hyderabad	135
<b>25<sup>th</sup> August 2022</b>	Webinar on Health	Shri Dindayal Tosniwal, DDG (NT), DoT   Prof Arzad Alam Kherani, Chair-SGSS WG2, TSDSI (IIT Bhilai)   Shri A K Tiwari, Member (T), DoT   Mr Manish Saxena, Director (NT), DoT   Mr Manish Khare, Chief Operating Officer, Sensorise Digital Services Pvt Ltd   Dr Sanjay Gupta, Associate Professor, NIHFW   Prof Harish Kumar, UIET-Panjab University, Chandigarh   Dr Zainul Charbiwala, Co-Founder and CTO, Tricog Health   Mr Vishnu Madhuri Sugathan, Co-Founder and CEO, Evelabs Technologies Private Limited   Dr Tavpritesh Sethi, Associate Professor (CB), IIITD	135

### DoT-TSDSI Micro Workshop Series on "Advancing 5G Towards 6G":

A joint micro-workshop series on 'Advancing 5G towards 6G' has been initiated by DoT and TSDSI. Its purpose is to disseminate information about 3GPP technology areas and timelines related to Release 19, mobilise Indian Ecosystem to contribute to Release 19 ongoing studies and identify and propose any new study to be undertaken as Release 19. Each workshop, being held online, walks through select 3GPP study items, provides timelines and describes how to contribute.

Following webinars were organised under this series in the reporting period:

Date	Name	Speakers	Attendees
13 <sup>th</sup> January 2023	#1: Studies related to 'Mobile Network Services'	V J Christopher, WPC   Samar Shailendra, Intel   Vinay Shrivastava, Reliance Jio   Jishnu Aravindakshan, Tejas Networks   Mahesh Nayaka Mysore Annaiah, Reliance Jio   Dindayal Tosniwal, DoT	269
20 <sup>th</sup> January 2023	#2: Studies related to 'Technology and Systems'	R. R. Mittar, TEC, DoT   Samar Shailendra, Intel   Ki-Dong Lee, LGE   Francesco Pica, Qualcomm   Xu Yang, Oppo   Srinivasan Selvaganapathy, Nokia   Dindayal Tosniwal, DoT	250
27 <sup>th</sup> January 2023	#3: Studies related to 'Vertical Applications and Services'	Y.G.S.C Kishore Babu, DoT   Samar Shailendra, Intel   Pallab Gupta, Nokia   Niranth Amogh, Huawei   Prakash R, C-DoT   Eric Guttman, Samsung	148
17 <sup>th</sup> February 2023	#4: Studies related to 'Physical Layer Technologies' (in partnership with IIT Kanpur)	Guna B Shekar, TSDSI   Ajit K Chaturvedi, IIT Kanpur   Rohit Buddhiraja, IIT Kanpur   Shyam Vijay Gadhia, IIT Kanpur   Jyotirmay Saini, IIT Kanpur   Ashna Kumari Banka, IIT Kanpur   Abhishek Kumar Singh, IIT Kanpur   Samar Shailendra, Intel	248

### Women in Standards - TSDSI Roundtable Meeting:

A Closed Door Roundtable meeting of select women experts was organised online by TSDSI on 10<sup>th</sup> March 2023 on "Increasing participation of Women experts in Standardisation activities from India". The objective was to discuss how to engage more women in standards bodies. Information on initiatives being taken by ITU for women to contribute meaningfully in standards meetings was shared with the group.

The Round table resulted in the following Key Recommendations:

- Enable remote online participation and host Global meetings in India to facilitate in-person interactions
- Organise debriefing meetings after every global SDO Meeting
- Provide encouragement and support to women within parent organisations by way of
- Recognitions of contributions of women in standards development activities
- Support from other officers within the team
- Assign mentors & arrange talks by role models
- Leverage Capacity building programs of ITU

# AWARDS & RECOGNITIONS

## TSDSI HALL OF FAME

TSDSI Hall of Fame was instituted from year 2019 onwards to felicitate individuals who have contributed to the cause of TSDSI by providing outstanding leadership, making outstanding contributions of technical nature, for institution building and raising reputation of TSDSI in the community.

The awardees were felicitated in an Awards Ceremony held on 3<sup>rd</sup> March 2023 at India Habitat Centre, New Delhi.

(<https://tsdsi.in/hall-of-fame/>)

## Awardees of the Hall of Fame 2022

Mr. Anindya Saha, Chief Technology Officer, Saankhya Labs Pvt. Ltd. was recognised as **TSDSI Hall of Fame 2022 FELLOW for Technical Excellence** for "pioneering the Standards development for Broadcast-Broadband Convergence, at TSDSI, ITU and 3GPP, establishing India as a global leader; and for shaping the TSDSI Standardisation Roadmap 2.0".



Mr. Satish Jamadagni, Sr Vice President – Global Standards, Technology Development, Reliance Jio was recognised as **TSDSI Hall of Fame 2022 FELLOW for Organisation Building** for "establishing strong Industry-Academia collaboration and rallying global support for TSDSI driven contributions (for 5G and 6G) at 3GPP & ITU and committed leadership to streamline the technical and governance processes within TSDSI".



## TSDSI OUTSTANDING TECHNICAL CONTRIBUTIONS AWARDS FY21-22

TSDSI Outstanding Technical Contributions Award has been instituted to recognise the efforts of individuals towards contributing to and/or championing a technical activity within TSDSI during the year (April through March). The efforts may either have given desired results or have the potential of yielding significant results.

The awardees for the financial Year 2021-22 were felicitated in the TSDSI General Body e-Meeting #19<sup>th</sup> held on 24<sup>th</sup> January 2023 by Shri Ritu Ranjan Mittar, Sr DDG & Head TEC-DoT, Govt. of India.

(<https://bit.ly/41O5dP9>)

Awardees of the Outstanding Technical Contributions for FY 2021-22:

Dr. Abhishek Thakur, (IDRBT) was presented the **TSDSI Outstanding Technical Contributions Award for FY 2021-22**



Mr. Srinivasan Radhakrishnan, Sooktha Consulting Pvt. Ltd., was presented the **TSDSI Outstanding Technical Contributions Award for FY 2021-22**



# ORGANISATIONAL MATTERS

## 5<sup>th</sup> GOVERNING COUNCIL

The Two-Year term of the 4<sup>th</sup> Governing Council came to an end in September 2022. Elections for the 5<sup>th</sup> Governing Council of TSDSI were conducted on 29<sup>th</sup> July 2022. Thereafter, elections for the TSDSI Chair and Vice Chair positions were held on 12<sup>th</sup> August 2022.

Mr N G Subramaniam, Chief Operating Officer and Executive Director, TCS and Mr Suresh Chitturi, Senior Director Standards Research Group Samsung R&D Institute were elected as Chair and Vice Chair respectively.

As per the Rules and Regulations of TSDSI, the Governing Council has 21<sup>st</sup> elected representatives from various segments of Digital Communications ecosystem and 8 nominated members from DoT, MeitY and BIS. The new Governing Council has one additional special invitee from DoT. The GC seat in the Category 11 segment (any other entity in ICT enabled product manufacturing/service/solution provider domain) could not be filled.

The new council took over from the previous slate in the 39<sup>th</sup> GC Meeting held online on 23<sup>rd</sup> September 2022. First full meeting of the new GC (GC#40) was held online on 04<sup>th</sup> November 2022.

Subsequent to taking over of the 5<sup>th</sup> Governing Council in September 2022, Committees of the Governing Council were reconstituted. The transposition committee and standardisation committee were merged from this GC onwards. Composition of the Committees as of 31<sup>st</sup> March 2023 is given at Annexure 4.

## TECHNICAL LEADERS: SGSS Chair and SGSS WG Chairs & WG Vice Chairs

Elections to the positions of - Chair - SGSS (that had fallen vacant due to transition of Mr Sharad Arora, to a non-member organisation) and Working Group Chairs and Vice Chairs of this study group, were held along with the GC Elections.

Mr Mahesh Nayaka Mysore Annaiah, Reliance Jio Infocomm Ltd, the current Vice Chair for SGSS, was elected unopposed to this post. With this the Vice Chair position for this Study Group falls vacant.

The following experts were elected unopposed to the positions given below.

Working Group	Chair	Vice Chair
WG1: Security	Mr. Aurindam Bhattacharya (C-DOT)	Mr. Saurabh Khare (Nokia)
WG2: Application Layer	Prof. Arzad Alam Kherani (IIT Bhilai)	Prof. Vireshwar Kumar (IIT Delhi)
WG3: Services Architecture & Framework	Mr. Niranth Amogh (Huawei, India)	Ms. Roopa C (C-DOT)

## OPERATIONS

Six meetings of the Governing Council and two General Body Meetings were held in online mode, in the reporting period, as per following details:

Meeting	Date
37 <sup>th</sup> GC	5 <sup>th</sup> May 2022
38 <sup>th</sup> GC	26 <sup>th</sup> July 2022
39 <sup>th</sup> GC	23 <sup>rd</sup> September 2022
40 <sup>th</sup> GC	4 <sup>th</sup> November 2022
41 <sup>st</sup> GC	23 <sup>rd</sup> January 2023
42 <sup>nd</sup> GC (Extra ordinary GC)	31 <sup>st</sup> March 2023
18 <sup>th</sup> GBM	20 <sup>th</sup> May 2022
19 <sup>th</sup> GBM (AGM)	24 <sup>th</sup> January 2023

Important decisions taken in these meetings are as follows:

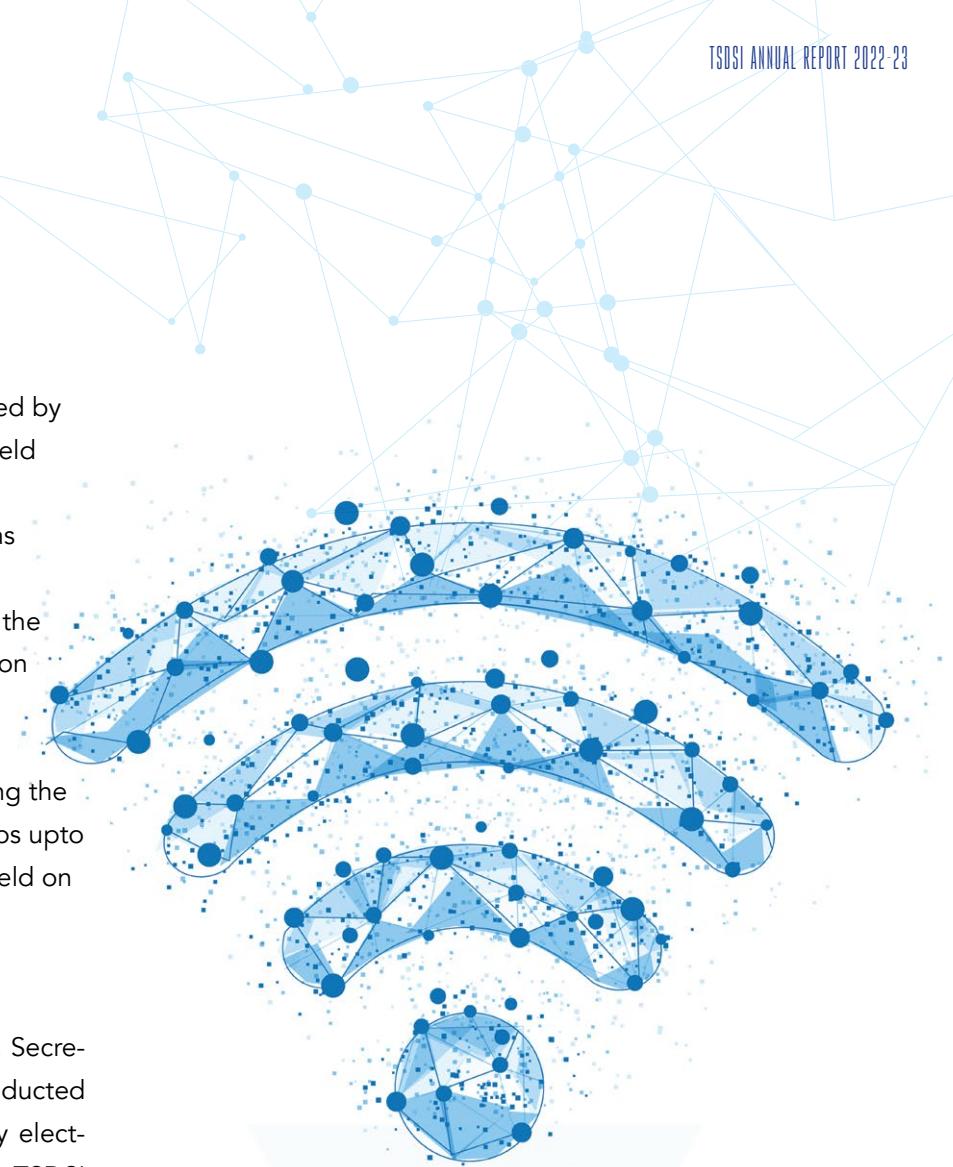
- Budget for FY 22-23 was approved by the 18<sup>th</sup> General Body meeting held online on 20<sup>th</sup> May 2022.
- Annual Report for FY 2021-22 was approved by the 38<sup>th</sup> Governing Council meeting and released in the 19<sup>th</sup> General Body meeting held on 24<sup>th</sup> January 2023.
- The Governing Council gave an in-principle approval for extending the 3GPP IM fees subsidy for Start-ups upto MSME level in its 42<sup>nd</sup> meeting held on 31<sup>st</sup> March 2023.

#### GC Connect:

As part of the GC Connect initiative, Secretariat led by Director General, conducted one-on-one meetings with the newly elected GC members to orient them on TSDSI activities and solicit their suggestions.

#### TSDSI Software Copyrights Policy and Trademark Usage Guidelines:

- TSDSI issued its Software Copyrights Policy (<https://bit.ly/3X3imAV>) and
- Trademark Usage Guidelines (<https://bit.ly/3YaA1rk>) in August 2022.





**Retd. Major General (Dr) Pritam Bishnoi**

**TSDSI mourns the loss of  
Retd. Major General (Dr) Pritam Bishnoi**

Retd. Major General (Dr) Pritam Bishnoi, who had joined TSDSI as Consultant in the Networks Study Group, passed away on 8<sup>th</sup> March 2023 after a brief illness.

Gen Bishnoi joined TSDSI in August 2021 after a distinguished career spanning 37 years in the Indian Army. During his short stint at TSDSI, he made an indelible mark in the activities of TSDSI- notably, broadcast-broadband convergence, mobilising participation and contributions in 3GPP, interfacing with NCCS, BIS and Satellite communities.

He will be remembered for his laser sharp focus and military precision in all activities that he undertook at TSDSI.

The Secretariat Team was enhanced as follows:

- Cdr Anurag Vibhuti, Executive Director- Operations at TSDSI Secretariat has moved on to TCOE India. Mr Kuljit Singh has taken over his responsibilities w.e.f. 11<sup>th</sup> July 2022. The Governing Council, in its 38<sup>th</sup> meeting, thanked Cdr Vibhuti for his contributions to TSDSI.
- Ms Anupam Sinha, Mr Akash Patel and Mr Jaskirat Singh have joined the Operations, IT and MARCOM teams respectively. Mr Sarat Sahoo has moved on from TSDSI.
- Composition of the Secretariat team as on 31<sup>st</sup> March 2023 is given at Annexure 3.

# MEMBERSHIP

14 new members joined TSDSI in the reporting period [7 Corporate and 7 Observers]. 4 members upgraded from observer to corporate membership.

Total member strength as on 31<sup>st</sup> March 2023 stood at 105. List of Members is provided in Annexure.

The membership fee structure for FY 22-23 is as follows.

## CORPORATE

INR 10 Crore > Annual Turnover <= INR 100

FEE CATEGORY 1A

Admission Fee	Annual Subscription Fee
INR 2,00,000	INR 2,80,000

INR 100 Crore > Annual Turnover <= INR 1000 Crore

FEE CATEGORY 1B

Admission Fee	Annual Subscription Fee
INR 2,00,000	INR 4,50,000

Annual Turnover > Rs. 1000 Crore

FEE CATEGORY 1C

Admission Fee	Annual Subscription Fee
INR 2,00,000	INR 9,25,000

R&D organisations, Test labs

FEE CATEGORY 1D

Admission Fee	Annual Subscription Fee
INR 2,00,000	INR 2,80,000

Annual Turnover <= INR 10 Crore

FEE CATEGORY 1E

Admission Fee	Annual Subscription Fee
INR 1,00,000	INR 1,40,000

Academic Institutions, Not-for-Profit R&D organisations  
Govt, Public Sector Undertaking (PSU)

FEE CATEGORY 2

Admission Fee	Annual Subscription Fee
INR 1,00,000	INR 1,40,000

## ASSOCIATE (INDIAN ENTITIES)

INR 10 Crore > Annual Turnover <= INR 100

FEE CATEGORY 3

Admission Fee	Annual Subscription Fee
INR 1,00,000	INR 1,40,000

## ASSOCIATE (FOREIGN ENTITIES)

INR 10 Crore > Annual Turnover <= INR 100

FEE CATEGORY 4

Admission Fee	Annual Subscription Fee
USD 1600	USD 2800

\* 18% GST is applicable on all the membership categories.

# GLOBAL STANDARDS ACTIVITIES

## ITU

ITU opened its India Area Office and Innovation Center in New Delhi, C-DOT Campus in March 2023.

- A Co-creation demonstration session focusing on the current landscape of Digital Health in India was conducted as part of the inauguration activities by the newly opened office. Dr Varinder Garg, Principal Investigator – ICMR-CIBioD, Chandigarh (Officer on Special Duty (OSD) to the hon'ble Union Health Minister and President PGIMER, Govt. of India) represented TSDSI in this session.
- This Area office hosted the ITU Regional Innovation Forum for Asia and the Pacific and Co-Creation Demonstration Session on 23<sup>rd</sup> March 2023. Ms Bindoo Srivastava, Director - MARCOM and Partner Relations (TSDSI) moderated a Panel Discussion on "Open Technology Innovation for SDGs" as part of a Power session entitled "Open Technology Innovation" in the Regional Innovation Forum.

## ITU-R

TSDSI delegation attended 3 meetings of ITU-R WP5D during the reporting period:

Meeting # & Participation #	Key Contribution(s) & Outcomes if any
<b>WP5D#41:</b> 13 <sup>th</sup> - 24 <sup>th</sup> June 2022 14 TSDSI Delegates attended the meeting	TSDSI contributed towards working document towards preliminary draft new Recommendation ITU-R M. [IMT.VISION 2030 AND BEYOND] TSDSI members made presentations on following topics in the workshop on "IMT for 2030 and Beyond" held on 14 <sup>th</sup> June as part of the meeting: <ul style="list-style-type: none"><li>• 6G Vision by TSDSI</li><li>• Network architecture for IMT-2030</li></ul>
<b>WP5D#42:</b> 10 <sup>th</sup> - 21 <sup>st</sup> October 2022 20 TSDSI Delegates registered for the meeting	TSDSI Contribution on "Proposal for update to the draft working document towards a preliminary draft new report ITU-R M. [IMT. Above 100 GHz]" was accepted and made part of the draft working document. The meeting finalised the Draft Report on M. [IMT. Terrestrial broadband remote coverage] for submission to ITU-R SG5.
<b>WP5D#43:</b> 31 <sup>st</sup> January - 9 <sup>th</sup> February 2023 18 TSDSI Delegates registered for the meeting	Discussions on the IMT 2030 Framework (a.k.a IMT 2030 Vision) took place.

## ITU-T

### ITU-T IMT2020 Roadmap:

TSDSI submitted an SGN approved contribution towards the update of ITU-T IMT-2020 Roadmap to the Joint Coordination Activity (JCA-IMT2020) of ITU-T in June 2022.

### ITU-T SG-20 (Internet of things (IoT) and smart cities and communities (SC&C):

ITU-T SG20, in its meeting held in Geneva from 18<sup>th</sup> - 28<sup>th</sup> July 2022 conducted adhoc sessions on collaboration between ITU-T SG20 and oneM2M. SG20 plenary approved the qualification of TSDSI for ITU-T A.5 certification. This certification enables normatively referencing TSDSI documents in ITU-T Recommendations. The Study Group in its meeting

held on 30<sup>th</sup> January 2023, noted that TSDSI's Software Copyright Policy and Trademarks Guidelines are fully compatible with ITU-T's current policies and guidelines on the same.

A new ITU-T SG20 Regional Group for Asia Pacific (SG20RG-AP) was approved in the SG20 plenary meeting that took place on 08<sup>th</sup> February 2023. This was based on the contribution from the Ministry of Communication (India), which was supported by TSDSI.

#### **ITU-T Focus Group on AI and IoT for Digital Agriculture (FG AI4A):**

A contribution titled "Internet of Things (IoT) and deep learning based multi-model system for detection and management of Active Fire Locations (AFL) in Agricultural activities" was presented by TSDSI member - UIET Chandigarh during the 17<sup>th</sup> -19<sup>th</sup> October 2022 meeting of the ITU Focus Group on AI and IoT for Digital Agriculture. This contribution was developed under the Indo-EU Partnership Project, hosted by UIET and supported by TSDSI.

#### **ITU-T SG-13 (SG13 - Future networks and emerging network technologies)**

ITU-T SG13, in its meeting held in Geneva from 4<sup>th</sup> - 15<sup>th</sup> July 2022 approved a contribution from IDRBT, Member TSDSI, on enabling microfinance and rural financial inclusion via Autonomous Networks and the corresponding requirements as part of ITU-T Supplement 71 to ITU-T Y.3000 series on use cases for autonomous networks. The contribution is based on TSDSI's NIP 267 (Inter-domain service automation (IDSA) (motivation microfinance).

A demonstration from IIT Delhi and IIT Bhilai was presented remotely to ITU-T SG13 during the workshop on "Advances in Evolutionary Autonomous Networks: Use Cases, Architecture and PoC" organised in collaboration with Rakuten Mobile on 15<sup>th</sup> November 2022. This demo was based on SI 90 (Creation of Edge Intelligence standards for latency and privacy management) and WI1-NIP 282 (Enhancement of application enablement architecture EDGEAPP (3GPP SA6 WG) with the support of 5GS (5G System) to enable tactile applications with edge intelligence in an Indian deployment scenario).

This demo was developed under the Build-a-thon India round, hosted by IIT Delhi and supported by TSDSI, Indo-EU Partnership Project and ITU.

#### **ITU-T AI/ML Challenge:**

ITU-T Focus Group on Autonomous Networks launched the 2022 edition of its proof-of-concept initiative called "Build-a-thon 2022" (<https://bit.ly/39AjPvb>) in collaboration with ITU AI/ML Challenge. Build-a-thon 2022 hosted a problem statement named "Build your own closed loops". Teams from IIT Delhi, IIT Bhilai, JKSBOTE (Jammu and Kashmir Board of Technical Education), University of Kashmir and TCS developed three contributions for the above initiative, under the Build-a-thon India round, that was hosted by IIT Delhi with support from TSDSI, Indo-EU Partnership Project and ITU. The solution and demo developed by the IIT-Delhi and IIT-Bhilai team was ranked among the top 3 submissions in this Build-a-thon, from among various submissions from 6 countries around the world. Subsequently, the team made a presentation on "AI/ML Driven Low Latency Closed Loop Control" in the 2022 ITU AI/ML in 5G Challenge Play-offs (Final Presentations and Evaluation) on 1<sup>st</sup> December 2022. The presentation is based on TSDSI Study Item SI 90 (Creation of Edge Intelligence standards for latency and privacy management) and WI1-NIP 282 (Enhancement of application enablement architecture EDGEAPP [3GPP SA6 WG] with the support of 5G System to enable tactile applications with edge intelligence in an Indian deployment scenario). The ITU Focus group will include the contributions made by TSDSI members (NOKIA, TCS, IIT Bhilai) and University of Kashmir, in its report to the ITU-T SG13.

### Collaboration on ITS Communication Standards

#### (ITU-T CITS e-meetings):

Two meetings of the group were held in the reporting period - 23<sup>rd</sup> September 2022 and 17<sup>th</sup> March 2023. Mr Hemant Magadum, Principal Engineer, C-DAC (TSDSI Member) represented TSDSI and presented the Status of the TSDSI activities in communication technologies for Intelligent Transport systems.

### Vehicular Multimedia Implementation Aspects:

ITU-T organised a workshop on "Vehicular Multimedia Implementation Aspects" <https://bit.ly/3M2X-3KI> on 27<sup>th</sup> April 2022 in online mode. Dr Pradipita Biswas, IISc Bangalore (Member, TSDSI) gave a presentation in the workshop on "Eye gaze tracking for Automotive HMI".

### ITU-T Regional Standardisation Forum (RSF):

ITU-T organised a Regional Standardisation Forum (RSF) on "Regulatory and Policy aspects of Telecommunications/ICTs" as a physical event on 8<sup>th</sup> August 2022 in New Delhi. This was followed by the meeting of the ITU-T Study Group 3 Regional Group for Asia and Oceania (SG3RG-AO) from 9<sup>th</sup> to 12<sup>th</sup> August 2022. A Bridging the Standardisation Gap (BSG) Interactive training Workshop was conducted as part of the activities. Several TSDSI members participated in the meeting and the training program.

### 3GPP

As per decision taken by Governing Council in its 36<sup>th</sup> meeting (held on 7<sup>th</sup> and 30<sup>th</sup> March 2022), TSDSI has taken up continuous transposition of 3GPP specifications.

Telecom Engineering Centre (TEC, DoT) adopted a total of 124 TSDSI Security Standards transposed from 3GPP Release 15 & 16 as National Standard. These are available at link <https://tsdsi.in/3gpp/>

55 TSDSI members enrolled in 3GPP as Individual Members in the Calendar year 2022.

Participation and contributions by representatives from TSDSI member organisations in 3GPP technical meetings in the reporting period is as follows:

#### 3GPP Participation and Contribution Data (April'22 – March'23)

Groups	No. of Meetings	No. of Participants	No. of Contributions
RAN	31	644	608
SA	51	504	359
CT	34	364	472

Mr N G Subramaniam, Chair TSDSI was the 3GPP Chair for the calendar year 2022. 3GPP PCG-OP Meetings were held online on 26<sup>th</sup> - 27<sup>th</sup> April 2022 and 27<sup>th</sup> - 28<sup>th</sup> September 2022.

An article on Non-IAB Based Mobile Base Station Relays by Dr Rashmi Kamran Bhatia, IIT Bombay (Member TSDSI), has been published in the 3GPP Newsletter, November 2022 Edition (<https://bit.ly/3hxG1dJ>).

TSDSI has deputed Ms Akansha Arora from the Secretariat team to the 3GPP project where she is supporting the CT1 workgroup activities as a Technical Officer w.e.f January 2023 for a period of three 3 years.

## oneM2M

58 TSDSI members joined oneM2M as IMs from TSDSI for CY'22.

Five Technical Plenary meetings of oneM2M were held in the reporting period. Status of participation and contributions to oneM2M by TSDSI members in the reporting period is as follows:

TP Meeting	Venue	No. of TSDSI Participants	No. of Contributions (No. of IMs)
TP 54 (9 <sup>th</sup> - 13 <sup>th</sup> May 2022)	ETSI Premises, Sophia Antipolis, France (with remote participation)	20 (10)	1
TP 55 (11 <sup>th</sup> - 15 <sup>th</sup> July 2022)	Online mode	32 (20)	2
TP 56 (26 <sup>th</sup> - 30 <sup>th</sup> September 2022)	ETSI Premises, Sophia Antipolis, France (with remote participation)	19 (14)	7+5 in interim calls
TP 57 (28 <sup>th</sup> November - 2 <sup>nd</sup> December 2022)	TTA Premises, South Korea (with remote participation)	31 (15)	6+5 in interim calls
TP 58 (20 <sup>th</sup> - 23 <sup>rd</sup> February 2023)	New Delhi, India (with remote participation)	46 (24)	5+2 in interim calls

## Center for Innovation for IoT/M2M:

TSDSI member C-DOT launched a Center for Innovation for IoT/M2M (<https://coi.cdot.in/home>) on 17<sup>th</sup> May 2022 to guide Indian Entities in development, integration and testing of innovative Smart Solutions based on oneM2M standards.

## oneM2M White Paper on Sustainability:

The 2<sup>nd</sup> edition of oneM2M white paper on "How oneM2M is Enabling More Sustainable IoT Deployments" was released in September 2022. It describes techniques for reducing energy consumption, increasing system longevity, and minimising the amount of e-waste in IoT deployments based on oneM2M. To read the white paper, please click <https://bit.ly/3YbHIOa>

## oneM2M 10<sup>th</sup> Anniversary Celebrations:

- oneM2M completed 10 Years of its existence on 24<sup>th</sup> July 2022. Messages from the project partners and an article released to mark the occasion can be viewed at link <https://bit.ly/3KBdSwH>.
- A revisiting TP#1 event was held on 26<sup>th</sup> September 2022, wherein long serving experts and leaders were felicitated. Souvenirs, provided by M/s Sensorise, TSDSI Member, were distributed to the members to mark the 10<sup>th</sup> anniversary

## oneM2M International Hackathon:

The 2<sup>nd</sup> oneM2M International Hackathon was organised online by Korean Electronics Technology Institute (KETI) in association with Telecommunications Technology Association (TTA), European Telecommunications Standards Institute (ETSI), with support from the Ministry of Science and ICT, S. Korea from 4<sup>th</sup> October to 28<sup>th</sup> November 2022. 6 teams from India participated in the hackathon. Team "Athena", from IIIT Hyderabad Smart City Living Lab won the Best Technology Award in the Telecommunications category.

A webinar on "Progress and Prospects for global IoT Standardisation" was organised on 8<sup>th</sup> September 2022 where Mr Aurindam Bhattacharya, MARCOM Vice Chair (C-DOT, India) conducted a freewheeling conversation with oneM2M leaders. For details click: <https://bit.ly/3RgXSmM>.

An international conference on "The Journey to Massive IoT through interoperable and open standards" was organised in hybrid mode with support from TTA Korea in Seoul.

### oneM2M TP 58 hosted by TSDSI:

TSDSI hosted the oneM2M TP meetings from 20 to 23 February, 2023 in New Delhi, with support from the India EU Cooperation on ICT Related Standardisation, Policy and Legislation project. The TP was attended by 60 member participants and observers (in person and remote). It included sessions on "oneM2M engagement with Universities" and an orientation for newbies.

**oneM2M Stakeholders' Day:** oneM2M Stakeholders' Day workshop was organised by TSDSI at the end of the oneM2M TP meetings, on 24 February 2023 in New Delhi, with support from the India EU Partnership Project. The workshop was attended by 48 participants in person and 78 participants in online mode from India and abroad. Participants from India, representing the market, verticals, policymakers, regulatory agencies, startups, interacted closely with the visiting global oneM2M

technical experts, and deliberated on India specific requirements, local innovations and solutions. It also had demonstrations by those who have adopted oneM2M for their vertical application / use cases in various sectors.

TSDSI Secretariat is contributing to running the oneM2M project by supporting the project activities related to technical working groups and plenaries, conformance Testing Support, MARCOM, Membership development, Methods and Processes, Industry Liaison etc.

### Asia Pacific Telecommunity (APT)

Mr Satish Jamadagni, Vice Chair TSDSI (Reliance Jio), made a presentation on behalf of TSDSI, in the Standardisation Workshop on "Guidelines on setting up National ICT Standardisation Regime" during ASTAP-34 held on 18 April 2022.



oneM2M Stakeholders' Day

# PARTNERSHIPS & ALLIANCES

## New Partnerships

TSDSI signed 3 New MoUs in the reporting period, as detailed below:

- SIA-India on 18<sup>th</sup> April 2022 for co-operation in development of standards in India and International Standard Development Organisations that address the common interests.
- 5G Brasil on 17<sup>th</sup> May 2022, World Telecommunication and Information Society Day, to encourage and develop collaborative activities in various ways, including the exchange of ideas and expertise in the field of wireless communications.
- MTSFB on 17<sup>th</sup> May 2022, World Telecommunication and Information Society Day, to co-operate in the fields of Communications and Multimedia Industry (CMI) developments in a broad range of areas as appropriate.

## Partner Activities

### MTSFB

The following activities / events have been organised with MTSFB, Malaysia in the reporting period:

- TSDSI participated remotely in a Round Table on "Digital Technologies for Everyone" during the MoU signing ceremony with MTSFB on 17<sup>th</sup> May (WTISD).
- **oneM2M Tech Talk (Hybrid):** TSDSI and Malaysian Technical Standards Forum Bhd (MTSFB) partnered to conduct an awareness session on oneM2M "oneM2M Tech Talk" to celebrate the World Standards Day on 14<sup>th</sup> October 2022 from 9:30 - 10:30 AM IST. For more details, click: <https://bit.ly/3HD5rQv>
- **Workshop on Introduction to "ITU-R and 3GPP meetings":** An introductory session on ITU-R WP5D & 3GPP for members of MTSFB was held on 20<sup>th</sup> January 2023. Dr Sendil Kumar (Ericsson), Mr Jitendra Singh (Qualcomm) and Mr AK Mittal (TSDSI) gave presentations in the workshop on "Introduction to ITU-R and 3GPP meetings".

TSDSI participated in the 7<sup>th</sup> meeting of the Indo-Japan Joint Working Group on "Collaboration among Standards Development Organisations" on 13<sup>th</sup> May 2022.

## 9<sup>th</sup> Global 5G Event

TSDSI, as a co-signatory of the Multilateral MoU for 5G Global Events (along with 5G Americas, 5G Brasil, IMT2020 PG China, 5GIA Europe, 5G Forum Korea and 5GMF Japan), participated in the 9<sup>th</sup> Global 5G Event, in Tokyo on 20<sup>th</sup> - 21<sup>st</sup> September 2021. This event was organised by 5<sup>th</sup> Generation Mobile Communications Promotion Forum (5GMF) in partnership with the Japanese Ministry of Internal Affairs and Communications. Mr S N Rama Gopal (DoT), Mr Sunil Kumar Singh (DoT), Ms Shikha Srivastava (C-DOT), Mr Balaji Rangaswamy (Sooktha Consulting Private Limited), Mr Sanjeev Dhallam (Bharti Airtel) and Mr Satish Jamadagni (Reliance Jio) represented TSDSI in the various discussion sessions in the event, joining remotely. Mr Jean-Pierre Bienaime, Senior Advisor International Relations TSDSI, attended the conference on-site.

## IEEE Standards Association Workshop on Next Generation Connectivity

TSDSI partnered with IEEE and DoT to conduct a "Workshop on Next Generation Connectivity" on 7<sup>th</sup> February 2023 in New Delhi. Apart from other activities, a key topic of discussion was the recently published IEEE Standard 1930.1 (SDN based middleware for control and management of wireless networks) which has been spearheaded by TSDSI Member Expert – Mr Pranav Jha.

# PROGRAMMES

## TSDSI Tech Deep Dive 2022 (TTDD 2022)

TSDSI organised the 5<sup>th</sup> Edition of its Annual flagship TSDSI Tech Deep Dive (TTDD) Conference 2022 from 7<sup>th</sup> - 10<sup>th</sup> November 2022. The theme of the conference was "Standards for Sustainable Development".

Shri K Rajaraman, Chairman DCC and Secretary (Telecom), Department of Telecommunications, delivered the inaugural speech in the conference. He encouraged TSDSI to work with policy makers to make changes in policies or introduce new ones that will enable wider participation in standards. The conference kicked off with a mega theme session (held in hybrid mode - at India Habitat Centre, New Delhi and online) comprising four panel discussions on the topics listed below:

- Leading the 6G Standards to a sustainable future
- Integrating Regional use cases and innovation in Global Standards

- Harmonisation of Standards - Lessons from 5G and Way Ahead
- Role of Standards in achieving Sustainable Development Goals (SDGs)

This was followed by nine fully online Technical Sessions spread over 3 days - each day dwelling on select topics around 6G, applications and horizontals. 100+ globally renowned experts delivered keynotes and participated in panel discussions. The conference saw participation of 400+ unique participants including 54 global ones. The individual online session participation ranged from 46 to 151 with onsite participation of 39 for the hybrid session. Representatives from 18 partners and affiliates of TSDSI delivered keynotes and participated in panel discussions during the conference.



The presentations made in the conference may be viewed on the event website at link: <https://ttdd.tsdsi.in/archive/2022/sessions/>

### Promoting Standards Driven Research:

TSDSI has been engaging with research and academia on various platforms to promote research work that can contribute to development of standards. TSDSI partnered with NCC, IEEE ANTS and COMSNETS to conduct SDR workshops during the reporting period.

These are described below:

**SDR@NCC 2022:** The 28<sup>th</sup> edition of the National Communications Conference (NCC 2022) was jointly organised by IIT Bombay, IIT Dharwad, IIT Gandhinagar, IIT Goa, and IIT Indore during 23<sup>rd</sup> - 27<sup>th</sup> May 2022. TSDSI organised a Standards Driven Research workshop (<https://bit.ly/SDRatNCC>) on 24<sup>th</sup> May 2022 in this conference. The workshop helped disseminate information to the participants on topics that can be candidates for contributing to standards, discussed challenges faced by academia in carrying out standards driven research, and came out with suggestions to address the same.

### SDR@NCC 2023:

The 29<sup>th</sup> edition of NCC 2023 was jointly organised by IIT Guwahati, IIT Patna and IIT Ropar, in IIT Guwahati campus from 23<sup>rd</sup> to 26<sup>th</sup> February 2023. TSDSI organised a Standards Driven Research Workshop on 23<sup>rd</sup> February 2023 in this conference. It had four technical sessions - Cyber-physical system; Sustainability, Trust, Security, and Resilience; Defeat Digital Divide and Ubiquitous Intelligent Mobile Connected Society.

### SDR@IEEE ANTS 2022:

A Panel discussion on "Standards Driven Research in Indian Academia: Achievements, Challenges and the Way Forward" was conducted in the IEEE ANTS 2022 conference <https://bit.ly/3YQkM6v> at IIT Gandhinagar on 21<sup>st</sup> December 2022. The panel, moderated by Prof Vimal Bhatia (IIT Indore) and Dr Sainath Bitragunta (BITS Pilani), had TSDSI Member experts- Prof Brejesh Lal, Dr Vireshwar Kumar, Mr Debasis Mitra from IIT Delhi (Member TSDSI); Mr Pranav Jha, IIT Bombay; Prof Sachin Chaudhari, IIIT Hyderabad; Dr Pradipta Biswas, IISc Bangalore; and Prof Ruchir Gupta, IIT BHU as panelists. The panel concluded that the introduction of credit courses on standards development discipline in the course curriculum will be helpful in motivating academia to take up standards development activities.

### SDR@COMSNETS 2023:

TSDSI partnered with COMSNETS to conduct a Standards Driven workshop on 8<sup>th</sup> January 2023. Dr Marco Di Renzo delivered a keynote on Reconfigurable Intelligent Surfaces and standardisation workplan at 3GPP and ETSI. Shri K Rajaraman, Hon'ble Secretary- Telecom, in his inaugural address to the conference, acknowledged the role played by the Indian Research Community through TSDSI in the development of 5Gi and its integration into 3GPP global 5G standard. The workshop had 5 invited talks and 6 research presentations that were shortlisted based on a call for papers.



SDR@NCC 2023

### India-EU Partnership Project (PP) on Cooperation for ICT related Standardisation, Policy and Regulations

The project supported following "collaboration projects" of TSDSI members in the reporting period:

- IIT Delhi in partnership with Delft University, Netherlands, conducted a "2022 Build-A-Thon India AI/ML Challenge Low Latency Closed Loop" to solve the problem statement "Network Resource Allocation for emergency management based on closed loop analysis" using 5G technologies and previous work done in IIT Delhi in the area. As part of this activity, a webinar was conducted on 26<sup>th</sup> August 2022 followed by 2 online round table sessions. The activity concluded with an Experts' workshop on AIML on 14<sup>th</sup> October 2022.
- A team from IISc Bangalore, led by Prof Pradipita Biswas, partnered with Universitat Autònoma de Barcelona, Spain on development of Common User Profile Personalisation and Standards, including for those in remote areas, specially abled persons, those using regional languages, those requiring emergency assistance etc. The team organised a hackathon on eye gaze controlled cyber physical systems for Students and young adults with severe motor impairment, paraplegic and quadriplegic individuals ranked at levels 4 or 5 according to Gross Motor Function Classification system in IIT Madras Research Park on 17<sup>th</sup> - 18<sup>th</sup> October 2022. This was followed by an Experts' Workshop on Inclusive Design and Standardisation on the topic conducted in IISc Bangalore on 28<sup>th</sup> - 29<sup>th</sup> November 2022 to discuss recent developments in assistive technology, standardisation and rehabilitation. Prof Marukku Turunnen from Tampere University, Finland and Prof Pilar from Universitat Autònoma de Barcelona, Spain joined the workshop with Prof Biswas.
- IIIT Delhi developed a LiFi MOOC covering concepts, technologies, architecture, research, industrial applications for Optical Wireless Communication (OWC) in context of 5G and

beyond standards to facilitate and build a road map for next 5 years.

- IIT Bhilai workshop on Regulatory and Standardisation Aspects for Long-life Public Utility LPWANs. A workshop on upgrading efficacy of LPWAN systems, and due diligence on network performance was conducted on 7<sup>th</sup> November 2022 led by Prof Arzad Alam Kherani, IIT Bhilai and Prof Balakrishna Prabhu, LAAS CNRS University, France. A technical report is being finalised.
- UIET Chandigarh presented a contribution on "Internet of Things (IoT) and deep learning based multi-model system for detection and management of Active Fire Locations (AFL) of 5 in Agricultural activities" to the 17<sup>th</sup> - 19<sup>th</sup> October meeting of ITU Focus Group on AI and IoT for Digital Agriculture based on their work under the partnership project.

The project also supported:

- An IoT/M2M Capacity Building workshop by IIITH CoE on oneM2M on 13<sup>th</sup> - 14<sup>th</sup> May 2022 for students and faculty of 6 colleges on IoT, Smart Cities and oneM2M, encouraging them to deploy standard - based solutions in their campuses and to promote standards in their course curriculum. 115 students & 18 faculty attended the workshop.
- Hosting of the 58<sup>th</sup> Technical Plenary meeting of oneM2M and Stakeholders' Day in New Delhi from 20<sup>th</sup> to 24<sup>th</sup> February 2023.

The project came to an end in February 2023. A concluding ceremony was held on 24<sup>th</sup> February 2023 in New Delhi, where the project stakeholders and beneficiaries shared their experiences.

## ARTICLES

TSDSI Experts published the following articles in the reporting period:

**Interview with Mr N G Subramaniam, Chair TSDSI and current 3GPP PCG Chair, in 3GPP Newsletter May 2022 Edition.**

Click here to read the interview:  
<https://bit.ly/3WGVrg3>

**“Broadcast Broadband Convergence”, by Maj Gen (Dr) Pritam Bishnoi, Technical Consultant, Study Group-Networks, TSDSI in TVBEurope April/May 2022 Edition.**

Click here to read the article:  
<https://bit.ly/42fu8ec>

**“Sustainable Smart Cities: Using a national standards-based horizontal framework”, by Mr Aurindam Bhattacharya, Group Leader, C-DOT in tele.net April 2022 issue.**

Click here to read the article:  
<https://bit.ly/3HrUUlm>

**“Non-IAB Based Mobile Base Station Relays” by Dr Rashmi Kamran Bhatia, IIT Bombay, in 3GPP Newsletter November 2022 Edition.**

Click here to read the article:  
<https://bit.ly/3pPNMzK>

**“Taking the Lead: Scripting India’s global journey towards 6G standards” by Ms. Pamela Kumar, Director General, TSDSI, in tele.net Magazine January 2023 Edition.**

Click here to read the article:  
<https://bit.ly/3MwNKpg>

The following articles were published in the TSDSI Newsletter in the ‘Invited Article’ section

**June 2022 Issue: Service Function Chaining an Opportunity for Edge Computing by Dr Samar Shailendra, Intel.**

Click here to read the article:  
<https://bit.ly/TSDSINewsletterJune22>

**December 2022 Issue: Haptics in Future Networks by Dr Pimmy Gandotra and Mr Muneeb Ahmed, IIT Delhi**

Click here to read the article:  
<https://bit.ly/TSDSINewsletterDec22>

## Global Partner Events

### WWRF Connected Vehicles Workshop:

Mr Vishnu Ram OV, Consultant to TSDSI, delivered a presentation on the topic "**Architecture of Autonomous Systems**" at the WWRF Connected Vehicles workshop themed 'Impact of 5G and Beyond on Connected and Autonomous Vehicles', on 12<sup>th</sup> May 2022 in hybrid format at University of Ottawa-Kanata, Ontario, Canada.

### 47<sup>th</sup> WWRF Meeting:

Dr Samar Shailendra, Vice Chair SGN, TSDSI (Intel) made an online presentation on "**TSDSI Views on The Road to the Next G**" at the 47<sup>th</sup> WWRF Meeting themed "The Roadmap to the Next G", on 21<sup>st</sup> June 2022 in Bristol, UK, remotely.

### First ACM/IEEE Next G Summit:

Mr Vinay Srivastava, Member Expert TSDSI (Reliance Jio) delivered a talk, online, on "**6<sup>th</sup> Generation: At what cost**" at the "First ACM/IEEE Next G Summit (Hybrid, in-person and remote)", on 14<sup>th</sup> June 2022 at Laurel, Maryland, USA.

The IEEE Future Networks World Forum 2022 was held in hybrid mode in Montreal, Canada from 12<sup>th</sup> - 14<sup>th</sup> October 2022. Ms Pamela Kumar, Director General, TSDSI delivered a plenary keynote on "**5G and Beyond – Update from India**" in the conference online on 14<sup>th</sup> October 2022.

Mr Prakash R, Chair- Networks Study Group (C-DOT), delivered a talk on "**Strengthening of the collaboration to lead 6G**" in a session on "SDO activities on B5G/6G" in the B5G/6G Standardisation Workshop organised by TTA's Mobile Communication Technical Committee (TC11) on 10<sup>th</sup> November 2022.

## Member Partner Events

### Conclave on "Direct-to-Mobile (D2M) Broadcast & 5G Broadband Convergence Roadmap for India":

TSDSI along with Prasar Bharati supported the Conclave on "Direct-to-Mobile (D2M) Broadcast &

"5G Broadband Convergence Roadmap for India" which was organised by IIT Kanpur on 1<sup>st</sup> June 2022 in New Delhi. The event participation was strictly by invitation. It enumerated benefits of DTM for users, broadcasters, Telecom Service Providers and Government. Need for India to get involved in developing globally harmonised standards in this area, for ensuring faster deployment and sustained success of convergence was emphasised.

### Open-Source Conference 2022:

TSDSI supported the Open-Source Conference 2022 with the theme "Proliferation of Open Source for Emerging Technologies" organised by IEEE ComSoc Bangalore and Samsung R&D Institute India, held on 7<sup>th</sup> July 2022. TSDSI Member Experts from CISCO, IISc, IIT Jodhpur, Niral Networks, Samsung R&D Institute India spoke at the event.

**Workshop on Next Generation Optical Networks:**  
TSDSI supported the Workshop on Next Generation Optical Networks organised by IIIT Delhi as Knowledge Partner. The workshop was held in Hybrid Mode on 9<sup>th</sup> August 2022. Mr Satish Jamadagni, Vice President & Head of Standards, Reliance Jio (Vice Chair TSDSI) spoke on "**Moving from 5G to 6G: Architectural needs and optical technologies for access and backhaul**" in this workshop.

## Partner Events

### 2<sup>nd</sup> Open RAN India 2022 International Conference:

TSDSI was the Standards Partner at the 2<sup>nd</sup> Open RAN India 2022 International Conference (<https://bit.ly/ORAN2022>) held at Shangri-La, New Delhi on 16<sup>th</sup> June 2022. Mr Rajesh Gangadhar, Member Outreach Committee, TSDSI (Sterlite) moderated a Panel Discussion on "Role in Open Source and Open Ecosystem for Accelerating the Edge", where Dr. R K Upadhyay, Chair Outreach Committee TSDSI (C-DOT) and Mr Krishna Sirohi, Member TSDSI (IIT Delhi) shared their views along with other Industry Experts.

### 5G India 2022:

TSDSI supported the 5G India 2022 Conference organised by Bharat Exhibitions on 7<sup>th</sup> - 8<sup>th</sup> September 2022 as a Standards Partner. The Plenary Panel Discussion on "5G – The Indian Journey on Standards & Innovation", chaired by Shri Kishore Babu, Member Governing Council, TSDSI (DDG SRI, DoT) had Dr RK Upadhyay (Member Governing Council, TSDSI) and Mr Satish Jamadagni (Former Vice Chair, TSDSI) as expert speaker panelists.

### Global Conference on "Growth of the IoT/M2M Ecosystem through Standardised Implementations":

TSDSI along with C-DOT and Department of Telecommunications, Ministry of Communications, Government of India organised a Global Conference of the IoT/M2M Ecosystem through Standardised Implementations on 14<sup>th</sup> - 15<sup>th</sup> December 2022 at C-DOT Campus, New Delhi. TSDSI anchored a Technical Session on IoT/M2M Applications for Agriculture featuring invited talks by experts from the Agriculture domain and Agritech from within and outside India.

### Session on "Smart Communication Solutions for Smart Utilities and Smart Cities" @ India Smart Utility Week (ISUW) 2023

(<https://bit.ly/3VhoqGI>) - The 9<sup>th</sup> edition of India Smart Utility Week (ISUW) 2023 was scheduled from 28<sup>th</sup> February – 04<sup>th</sup> March 2023 at Hotel Lalit, New Delhi, India. TSDSI, along with DoT and TEC, organised a session on "Smart Communications for Smart Utilities and Smart Cities" on 1<sup>st</sup> March 2023.

### First International Quantum Communication Conclave

TSDSI, TEC, C-DOT and IEEE Communications Society – Delhi chapter jointly organised the First International Quantum Communication Conclave on 27<sup>th</sup> - 28<sup>th</sup> March 2023, bringing together the international experts in the domain, practitioners, start-ups, researchers and the scientific community.

### Invited Talks

Mr Akhilesh Srivastava, Former Chair SGSS (TCS), conducted a session on 'Support Policies of TSDSI for IPR and facilitation for Start-Up' at the NTIPRIT Workshop on "Protecting your IDEA - IPR for Start-Ups" on 13<sup>th</sup> April 2022.

### Digital India Week:

Mr Ravi Lakhota, Governing Council Member TSDSI (Vodafone Idea Ltd.), spoke on "Role of TSDSI in 5G Standards and Approach to 6G" in the Panel Discussion on "5G and the future of internet in India's Techade" on 6<sup>th</sup> July 2022 in The Digital India Week (DIW) 2022 in Gandhinagar, Gujarat.

### Virtual International Conference on Standard Essential Patents and FRAND:

Mr AK Mittal, Advisor Networks, TSDSI participated in a Panel Discussion on "Global Jurisprudence on SEP" in the Virtual International Conference on Standard Essential Patents and FRAND Licensing organised by IPETHICON Educational Academy on 28<sup>th</sup> July 2022.

### Catalyst 2022:

Prof Abhay Karandikar (Former Chair, TSDSI), Mr Satish Jamadagni (Former Vice Chair, TSDSI), along with Mr G. Narendra Nath (JS, NSCS) and Mr Ganesh Lakshminarayana (CEO & Head Enterprises Business, Airtel) shared their views in a Panel Discussion on "Telecom & 5G – Possibilities & Challenges" in Catalyst 2022, an event organised by StratNews Global on 21<sup>st</sup> September 2022 in New Delhi.

### ET Telecom The 5G Congress 2023:

A Panel Discussion on "India's 6G Ambition: Role of Academia & Industry in Global Standards" was conducted on 24<sup>th</sup> March 2023 as part of the ET Telecom The 5G Congress 2023. TSDSI Experts - Prof Abhay Karandikar (Director, IIT Kanpur), Dr Rajkumar Upadhyay (Chairman, C-DOT), Dr Kumar N Sivarajan (CTO, Tejas Networks) and Ms Pamela Kumar (DG, TSDSI) participated in this panel discussion.

# CAPACITY BUILDING

## Induction Sessions on TSDSI:

TSDSI conducted two Induction Sessions in the reporting period:

- An online session on 22<sup>nd</sup> July 2022 <https://bit.ly/3ACANmx>
- A Hybrid Session (India Habitat Centre, New Delhi) on 14<sup>th</sup> October 2022 (<https://bit.ly/3WRxK2W>) on the occasion of World Standards Day.

These covered the overview of TSDSI, Standardisation life cycle, Technical focus areas and resources, Engagement with Global SDOs (3GPP, ITU, oneM2M). There was a special session on IPR/SEP in the July 2022 program.

Training Sessions with National Telecommunications Institute for Policy Research, Innovation and Training NTIPRIT, DoT: TSDSI regularly conducts training sessions at NTIPRIT, DoT. Details of the trainings conducted in the reporting period are as follows:

PROGRAM	DATE	SPEAKER/S
NTIPRIT Technical Component of Mid-Career Training Programme (Phase III) for ITS officers (with 26 to 28 years of service seniority)	6 <sup>th</sup> April 2022	Mr AK Mittal, Advisor – Networks on Role of TSDSI
NTIPRIT Mid-career Training Programme (MCTP) Phase 1 in respect of ITS Group "A" officers	28 <sup>th</sup> June 2022	Ms Bindoo Srivastava, Director – MARCOM and Partner Relations on Role of TSDSI
NTIPRIT Induction Training for ITS 2019 Batch International Organisations in ICT Domain	12 <sup>th</sup> -15 <sup>th</sup> July 2022	TSDSI: Organisational Setup, Functions and Secretariat working (Shefali Sinha, MARCOM Consultant, TSDSI Secretariat); TSDSI Contributions – SGN (Dr Samar Shailendra, Vice Chair SGN, TSDSI) and SGSS (Mr Niranth Amogh, Member Expert, TSDSI) and 3GPP: Organisational Setup, Functions and Secretariat working (Mr Basavaraj Pattan, Member Expert, TSDSI).
Mid-Career Training Program for ITS officers with 25 years+ service in the NTIPRIT ALT Campus, Ghaziabad	9 <sup>th</sup> February 2023	Maj Gen (Dr.) Pritam Bishnoi (Technical Consultant – Study Group Network, TSDSI) and Ms Shefali Sinha (MARCOM Consultant, TSDSI) on Role of TSDSI

TSDSI partnered with NTIPRIT for organising following webinars to create awareness of 5G in key verticals:

Date	Webinar Topic	Webinar Link
27 <sup>th</sup> April 2022	5G Use cases in Power Sector	<a href="https://bit.ly/3kKdyzu">https://bit.ly/3kKdyzu</a>
25 <sup>th</sup> May 2022	5G Use cases in Manufacturing and Logistics	<a href="https://bit.ly/5Gusecasesmfg">https://bit.ly/5Gusecasesmfg</a>

**NICF Training on "Specialised Module" for Grade A Officer Trainees (OTs) of IP&TAFS (Batch-2019 & 2020):**  
Major Gen (Retd.) Pritam Bishnoi, Technical Consultant - SGN, TSDSI conducted a session on "Standardisation in Global Sector and Telecom Practices" in the NICF Training on "Specialised Module" for Grade A Officer Trainees (OTs) of IP&TAFS (Batch-2019 & 2020) on 15<sup>th</sup> July 2022.

An ITU TSB online self-paced training course on "Recommendation ITU-T A.1 on Working Methods of ITU-T Study Groups", based on WTSA 2020 was open till 31<sup>st</sup> December 2022. 3 members from the TSDSI Secretariat - Chandrakanta Rathore, Jaskirat Singh and Sonia Sachdeva Sharma secured this certification.

# LOOKING AHEAD

TSDSI has helped place India on the global standards landscape, with our contributions to the development of 5G standards at 3GPP and ITU. Even as 5G gets rolled out, the Government has stated its ambitions to take up a leadership role in the next generation of standards. TSDSI's thrust activities are being planned to help achieve this goal.

Key Focus Areas for TSDSI for the FY 22-23 are:

## TECHNICAL ACTIVITIES

- Focus technologies - 6G, 5G Enhancements, Broadcast, Spectrum Studies / WRC-23, Open Systems, Security, Quantum, Applications and Service Layer Standards, Services Architecture and Frameworks, AI/ML, Cloud, Backhaul, Rural Broadband, Critical Communications,
- Mobilise and align contributions to 3GPP and ITU timelines
- Liaise with relevant entities and forums in India to exchange outcomes of technical activities, and align efforts for development of standards.
- Engage with the community through Pre-standards Technology Roadmap Item Proposal (TRIP) forums to crystallise scopes for technical activities within TSDSI
- Update the Standardisation Roadmap 2.0

## GLOBAL IMPACT

- Enhance membership, participation and contributions to Global SDO Forums
- Leverage the TSDSI partnerships to co-create standards and progress TSDSI's priority areas
- Establish Coordination groups for engaging strategically with Global SDOs
- Collaborate with Regional entities to align viewpoints and build a support base for contributions in global platforms
- Work with peer entities in other countries for bilateral cooperation in development of standards

## ORGANISATIONAL

- Implement recommendations of the Startup, Standards Driven Research, Industry Engagement Task Forces
- Increase Membership
- Enhance Member Engagement in TSDSI's activities
- Institutionalise Process & Quality framework with SOPs, Audits and Performance Dashboards

## ECOSYSTEM

- Strengthen Interfaces with Industry forums, policy agencies (TEC, BIS etc.)
- Capacity Building wrt standards development skills
- Nurture identified verticals to contribute to global standards

# FINANCES

**BHATIA & BHATIA**  
CHARTERED ACCOUNTANTS



81, Hemkunt Colony, Levels-I & II,  
Opp. Nehru Place,  
New Delhi - 110 048  
TEL : (011) 4163-5599, 4183-5599  
FAX : (011) 4580-5599  
e-mail : taxauditor@bnbindia.co  
Website : www.bnbindia.co

### Independent Auditor's Report

To the Members of

**TELECOMMUNICATIONS STANDARDS DEVELOPMENT SOCIETY, INDIA**

#### Report on Financial Statements

We have audited the accompanying financial statements of **M/STELECOMMUNICATIONS STANDARDS DEVELOPMENT SOCIETY, INDIA** ("SOCIETY") which comprises the Balance Sheet as at 31<sup>st</sup> March, 2023 and also the Income and Expenditure Account for the year ended on that date annexed thereto.

#### Managements' Responsibility for Financial Statements

The Society's Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position, financial performance in accordance with the Accounting Standards and the accounting principles generally accepted in India. This responsibility also includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

#### Auditor's Responsibility

Our responsibility is to express opinion on these financial statements based on our audit. We conducted our audit in accordance with Accounting Standards on Auditing issued by The Institute of Chartered Accountants of India. These Standards require that we plan and perform the audit to obtain the reasonable assurance about whether the financial statements are free of material misstatements.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal financial control relevant to the Society's preparation and fair presentation of the financial statements in order to design audit procedure that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of Society's internal control. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

We believe that our audit provides a reasonable basis for our opinion.



**BHATIA & BHATIA**  
CHARTERED ACCOUNTANTS



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TEL : (011) 4163-5599, 4183-5599  
FAX : (011) 4580-5599  
e-mail : taxauditor@bnbindia.co  
Website : www.bnbindia.co

### Opinion

In our opinion and to the best of our information and according to the explanations given to us, aforesaid financial statements give the information required by the Act in the manner so required and gives a true and fair view in conformity with the accounting principles generally accepted in India:

- a) In the case of the Balance Sheet, of the state of affairs of the Society as at March 31, 2023; and
- b) In the case of the Income and Expenditure Account, of the Surplus of Society for the year ended on that date.

Place: New Delhi  
Date: 21-08-2023



For **BHATIA & BHATIA**  
**Chartered Accountants**

FRN: 003202N of ICAI

  
(R. Bhatia), FCA

(Partner)

Membership No.:017572

UDIN: 2301757286SXBN8008

## **TELECOMMUNICATIONS STANDARDS DEVELOPMENT SOCIETY, INDIA**

### **SIGNIFICANT ACCOUNTING POLICIES & NOTES TO THE FINANCIAL STATEMENT FOR THE YEAR ENDED 31<sup>ST</sup> MARCH, 2023**

#### **16. BACKGROUND**

Telecommunications Standards Development Society, is an autonomous, membership based, standards development organization (SDO) for Telecom/ICT products and services in India. It aims at developing and promoting standards for access, back-haul, and infrastructure systems, solutions and services that best meet India-specific requirements based on research and innovation in India. They are also working closely in 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 Registered as Not for Profit Society, under Indian Societies Registration Act of 1860.

#### **17. SIGNIFICANT ACCOUNTING POLICIES**

##### **17.1 Basis of Accounting**

Financial statements have been prepared under Historical Cost convention, on accrual basis of accounting except for membership fee receipts which are being accounted as income in the year of receipt.

##### **17.2 Revenue Recognition**

The membership fees are recognized in the books of accounts in the year of receipts. Interest on Fixed Deposits of the Society is taken into account on an accrual basis during the Current Year.

##### **17.3 Fixed Assets**

The value of Fixed Assets is stated at cost of acquisition or construction, including any cost attributable to bringing the assets to their working condition for their intended use. Assets having their useful one year or less are expensed off in the year they are acquired.



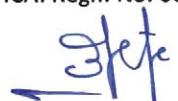
#### **17.4 Depreciation on Fixed Assets**

Depreciation on fixed assets has been provided under “written down value method” at the rates and in the manner as provided in the Income Tax Act, 1961.

#### **18. NOTES ON ACCOUNTS**

- a) Previous Years figures have been regrouped /rearranged wherever necessary to make them comparable with current year figures.
- b) Admission Fees received during the year has been transferred to Corpus Fund.
- c) Employees Provident Fund & Miscellaneous Provision Act, 1952 and Payment of Gratuity Act, 1972 are not applicable to the Society because the number of employees is below the statutory limits required under the Acts.
- d) During the year, a sum of INR 2,16,40,881 has been utilised and INR 62,74,875 has been transferred to the Development Fund as per the provisions of Income Tax Act, 1961 for future development programmes of TSDSI.
- e) During the year, a sum of INR 1,57,81,427 has been transferred to the Corpus Fund which does not exceed 15% of the total revenue as per the provisions of the Income Tax Act, 1961.

For BHATIA & BHATIA  
Chartered Accountants  
ICAI Regn. No. 003202N

  
(R. BHATIA), FCA  
Partner  
M. No. 017572  
Place: New Delhi  
Date: 21-08-2023

UDIN: 23017572 BGSXBN8008



  
(MR. N GANPATHY SUBRAMANIAM)

CHAIRPERSON

  
(MR. SURESH CHITTURI)

VICE CHAIRMAN

  
(MR. RAJEEV SHARMA)

TREASURER

  
(MR. KULIT SINGH)

EXECUTIVE DIRECTOR

TELECOMMUNICATIONS STANDARDS DEVELOPMENT SOCIETY, INDIA  
Balance Sheet as at 31st March 2023

Particulars		Note No.	As at 31st March 2023	As at 31st March 2022 (in Rupees)
1	2	3	4	
<b>I. ASSETS</b>				
<b>Non-current assets</b>				
(a) Fixed assets				
(i) Tangible assets	1	13,32,588	9,30,114	
<b>Current assets</b>				
(a) Cash and cash equivalents	2	7,00,08,226	7,67,69,967	
(b) Short Term Loans and Advances	3	81,292	2,19,637	
(c) Trade Receivables	4	6,68,642	17,96,031	
(d) Other current assets	5	98,28,364	50,91,697	
	TOTAL		8,19,19,112	8,48,07,446
<b>II. LIABILITIES</b>				
<b>1 Corpus Fund</b>	6	6,76,95,121	5,09,13,694	
<b>2 Development Fund</b>	7	62,74,875	2,16,40,881	
<b>3 Non-current liabilities</b>			-	-
<b>4 Current liabilities</b>				
(a) Other current liabilities	8	65,56,762	1,19,06,138	
(b) Trade Payables	9	11,71,855	3,24,233	
(c) Advance Received From Debtors	10	2,20,500	22,500	
	TOTAL		8,19,19,112	8,48,07,446

Significant Accounting Policies and Notes to Accounts

(1-18)

## AUDITORS' REPORT

As per our separate report of even date attached  
For BHATIA & BHATIA  
Chartered Accountants  
ICAI Regn. No. 003202N

(R. BHATIA), FCA  
Partner  
M. No. 017572



Place : New Delhi  
Date: 21-08-2023  
UDIN: 23017572BGSXBNG008

(MR. N GANPATHY SUBRAMANIAM)  
CHAIR

(MR. SURESH CHITTURI)  
VICE CHAIR

(MR. RAJEEV SHARMA)  
TREASURER

(MR. KULIT SINGH)  
EXECUTIVE DIRECTOR

**TELECOMMUNICATIONS STANDARDS DEVELOPMENT SOCIETY, INDIA**  
**INCOME AND EXPENDITURE ACCOUNT FOR YEAR ENDED 31st March, 2023**

( in Rupees)

Particulars	Refer Note No.	For the year Ended 31st March 2023	For the year Ended 31st March 2022
I. Membership Fees	11	4,49,92,482	3,91,82,648
II. Grants		2,59,11,688	1,65,00,000
III. Sponsorship Fees		2,99,660	17,04,000
IV. Other income	12	3,40,05,685	2,31,63,729
<b>V. Total Revenue (I + II + III + IV)</b>		<b>10,52,09,515</b>	<b>8,05,50,377</b>
VI. Expenses:			
Subscription & Membership	13	6,16,50,134	2,79,70,110
Other Office & Administration Expense	14	2,90,31,133	1,53,33,681
Salary to Staff	15	1,01,60,347	55,43,887
Deputation Cost		33,65,493	49,82,208
Depreciation and amortization expense	1	5,86,987	4,95,862
Total expenses		<b>10,47,94,094</b>	<b>5,43,25,747</b>
<b>VII. Surplus Being excess of Income over Expenditure</b>		<b>4,15,421</b>	<b>2,62,24,629</b>

Significant Accounting Policies and Notes to Accounts

(1-18)

**AUDITORS' REPORT**

As per our separate report of even date attached  
 For BHATIA & BHATIA  
 Chartered Accountants  
 ICAI Regn. No. 003202N

  
 (R. BHATIA), FCA  
 Partner  
 M. No. 017572



Place : New Delhi  
 Date: 21-08-2023  
 UDIN: 23017572 BG5XBN 8008

  
 (MR. N GANPATHY SUBRAMANIAM)  
 CHAIR

  
 (MR. SURESH CHITTURI)  
 VICE CHAIR

  
 (MR. RAJEEV SHARMA)  
 TREASURER

  
 (MR. KULJEET SINGH)  
 EXECUTIVE DIRECTOR

Notes to the Financial Statements  
For the year ended 31st March, 2023

1. FIXED ASSETS AS AT 31st MARCH 2023

S.NO.	PARTICULARS	DEP RATE	OPENING BALANCE AS ON 01-04-2022	ADDITIONS DURING THE YEAR		TOTAL AS ON 31-03-2022	ASSETS WRITTEN OFF	DEPRECIATION FOR THE YEAR	WRITTEN DOWN VALUE AS ON 31-03-2023
				FOR MORE THAN 180 DAYS	FOR LESS THAN 180 DAYS				
<b>1. COMPUTERS &amp; PRINTERS :-</b>									
1.1	LAPTOP	40%	6,19,430		3,91,460	10,10,890	-	3,26,064	6,84,826
1.2	PRINTER	40%	-		-	-	-	-	-
1.3	UPS (600VA)	40%	-		-	-	-	-	-
1.4	COMPUTER	40%	-		-	-	-	-	-
1.5	TABLET	40%	15,589		15,589			6,236	9,353
1.6	HEADPHONE SONY WH500	40%	9,717		9,717			3,887	5,830
1.7	SOFTWARE	40%	69,761		54,9,565			2,10,265	3,39,300
1.8	EXTERNAL HARD DISK	40%	8,199		8,199			3,280	4,919
	<b>TOTAL (A)</b>		<b>7,22,696</b>	<b>4,31,998</b>	<b>4,39,266</b>	<b>15,93,960</b>	<b>-</b>	<b>5,49,732</b>	<b>10,44,228</b>
<b>2. ELECTRONIC EQUIPMENT :-</b>									
2	SAMSUNG LED	15%	26,388		26,388			3,958	22,430
3	TCL LCD	15%	26,401		26,401			3,960	22,441
4	MICROWAVE OVEN	15%	8,661		8,661			1,299	7,362
5	PORTABLE PROJECTOR	15%	11,509		11,509			1,726	9,783
6	POLYCOM	15%	12,506		1,05,506			8,851	96,655
7	MOBILE PHONE	15%	23,989		23,989			3,598	20,391
8	LG AIR CONDITIONER	15%	56,119		56,119			8,418	47,701
	<b>TOTAL (B)</b>		<b>1,65,573</b>	<b>-</b>	<b>93,000</b>	<b>2,58,573</b>	<b>-</b>	<b>31,810</b>	<b>2,26,763</b>
<b>9. OTHERS :-</b>									
9	SAFE	10%	9,040	-	9,040			904	8,136
10	OFFICE CHAIR	10%	32,805		32,805			3,281	29,524
11	Room Heater	10%	-		25,197	25,197		1,260	23,937
	<b>TOTAL (C)</b>		<b>41,845</b>	<b>-</b>	<b>25,197</b>	<b>67,042</b>	<b>-</b>	<b>5,445</b>	<b>61,597</b>
	<b>GRAND TOTAL (A+B+C)</b>		<b>9,30,114</b>	<b>4,31,998</b>	<b>5,57,463</b>	<b>19,19,575</b>	<b>-</b>	<b>5,86,987</b>	<b>13,32,588</b>



**Notes to the Financial Statements**  
**For the year ended 31st March, 2023**

**2. Cash and cash equivalents**

Particular	As at 31st March 2023	As at 31st March 2022
<b>Savings Bank Accounts</b>		
Canara Bank	25,595	25,000
Cash in Hand	6,337	-
<b>Fixed Deposit</b>		
Fixed Deposits- A/c No-8657413000121	41,13,459	39,59,689
Fixed Deposits- A/c No 8657401001345	48,00,958	38,62,170
Fixed Deposits- A/c No-8657307000089	28,25,838	26,87,668
Fixed Deposits-A/c No-8657307000087	21,93,562	20,77,026
AUTO SWEEP FDs	5,60,42,477	6,41,58,414
<b>Total</b>	<b>7,00,08,226</b>	<b>7,67,69,967</b>

**3. Short Term Loans & Advances**

Particular	As at 31st March 2023	As at 31st March 2022
Interest with staff	3,000	6,000
Other Advances	78,292	2,13,638
Security Deposit	-	-
<b>Total</b>	<b>81,292</b>	<b>2,19,638</b>

**4. Trade Receivables**

Particular	As at 31st March 2023	As at 31st March 2022
Indian Institute of Technology Mandi	2,675	2,675
Bharti Airtel Ltd	16,500	-
Indian Institute of Science, Bangalore	5,999	
Indian Space Research Organisation	23,500	23,500
Indian Institute of Technology Bombay	7,000	7,000
India Cellular & Electronics Association(ICEA)	12,516	12,516
Intel Technology India Pvt Ltd	4,86,000	-
Telecommunications Consultants India Ltd	73,348	48,148
Worxpace Consulting Private Limited	137	137
ERNET INDIA	37,800	-
Ericsson India Pvt Ltd	-	16,99,380
Fraunhofer Institute for Integrated Circuits IIS	492	-
Sensorise Digital Services Pvt Ltd	2,675	2,675
<b>Total</b>	<b>6,68,642</b>	<b>17,96,031</b>



**5. Other Current Assets**

Particular	As at 31st March 2023	As at 31st March 2022
Interest Accrued on FDR	3,69,052	9,16,167
GST Receivable	20,02,680	10,59,848
TDS on GST	1,63,800	1,63,800
TDS on Contractor	-	931
TDS on Profession	-	1,834
TDS on sweep deposit	558	558
Tax Deducted at Source	15,17,462	29,48,559
Advance to Suppliers ( <b>Annexure - '6'</b> )	57,74,812	-
<b>Total</b>	<b>98,28,364</b>	<b>50,91,697</b>

**6. Corpus Fund**

Particulars	As at 31st March 2023	As at 31st March 2022
Opening Balance	5,09,13,694	3,80,15,794
Add: Admission Fees Received During the year	10,00,000	8,15,344
Add: Income transferred to Corpus Fund	1,57,81,427	1,20,82,556
<b>Total</b>	<b>6,76,95,121</b>	<b>5,09,13,694</b>



**Notes to the Financial Statements**  
**For the year ended 31st March, 2023**

**7. Development Fund**

Particulars	As at 31st March 2023	As at 31st March 2022
Opening Balance	2,16,40,881	74,98,808
Less: Utilisation during the year	(2,16,40,881)	(74,98,808)
Add: Accumulation of Surplus Income in Development Fund	62,74,875	2,16,40,881
<b>Total</b>	<b>62,74,875</b>	<b>2,16,40,881</b>

**8. Other Current Liabilities**

Particular	As at 31st March 2023	As at 31st March 2022
Duties & Taxes Payables	26,17,298	28,43,511
Provision for Performance incentive	19,21,238	-
Expense Payable	20,18,226	90,62,627
<b>Total</b>	<b>65,56,762</b>	<b>1,19,06,138</b>

**9. Trade Payables**

Particular	As at 31st March 2023	As at 31st March 2022
Ms. Bindoo Srivastava	-	90,000
All Unique Creation	266	266
Bhatia & Bhatia	625	25,535
Aircruise Travels Pvt Ltd	23,069	-
Akansha Arora	44,930	-
Akash Malik	50,064	-
Akash Patel	1,710	-
Animatiny Univeres	1,92,227	-
Anupam Sinha	28,584	-
Best Digital Prints Pvt Ltd	14,291	-
Anurag Vibhuti	-	2,500
Shivam Print Solutions	130	130
Chandrakanta Rathore	51,000	-
Credit Card	81,650	-
HolidayINN New Delhi INT Airport	6,000	-
Aditi Das	35,216	-
Jaskirat Singh	17,244	-
Kuljit Singh	3,794	-
Transcending Horizons Pvt Ltd	33,150	33,150
Kalinga Car Rental Private Ltd.	-	4,032
Md Asif Iqbal	49,527	-
M Jean Pierre Bienaime	-	1,68,220
Network Tours Pvt Ltd	11,290	-
Niwedita Pathak	53,260	-
Print Orbit	70,992	-
Rajesh Vasudev Karbele	53,108	-
SHYAM SPECTRA PRIVATE LIMITED	59,000	-
SISL Infotech Pvt Ltd	1,03,840	-
SONIA SACHDEVA SHARMA	48,288	-
Syed Zeeshan Hasan	1,26,000	-
Webtel Electrosoft Pvt. Ltd.	12,200	-
Visual Information System Pvt.Ltd	400	400
<b>Total</b>	<b>11,71,855</b>	<b>3,24,233</b>



**Notes to the Financial Statements**  
**For the year ended 31st March, 2023**

**10. Advance Received from Debtors**

Particular	As at 31st March 2023	As at 31st March 2022
Ericssion India Pvt Ltd	1,70,000	-
NEC India Pvt Ltd	28,000	-
UNLIMIT IOT PRIVATE LIMITED	22,500	22,500
<b>Total</b>	<b>2,20,500</b>	<b>22,500</b>

**11. Membership Fees**

Particular	For the year ended at 31st March 2023	For the year ended at 31st March 2022
Membership Fees	2,73,47,536	2,26,82,648
3GPP-IM Fees	1,76,44,946	1,65,00,000
One M2M-IM Fees	-	-
<b>Total</b>	<b>4,49,92,482</b>	<b>3,91,82,648</b>

**12. Other Incomes**

Particular	For the year ended at 31st March 2023	For the year ended at 31st March 2022
Interest on Fixed Deposits From Banks	36,52,403	28,61,867
Interest on Savings Banks Accounts	22,670	7,196
Interest on Swipe In	14,564	54,175
Compensation for deputation @3GPP	1,19,85,600	1,18,82,088
Credit Note From ETSI	38,55,400	-
Manhours at One M2M	1,42,72,000	23,72,175
2020 Credit Note From ETSI	-	58,03,118
Interest on Income tax Refund	2,03,048	1,27,860
Miscellaneous income	-	55,250
<b>Total</b>	<b>3,40,05,685</b>	<b>2,31,63,729</b>

**13. Subscription & Membership**

Particular	For the year ended at 31st March 2023	For the year ended at 31st March 2022
Membership Fees- ETSI 3GPP	4,38,54,698	2,55,97,935
Membership Fees- TTC One M2M	1,42,72,000	23,72,175
Membership Fees- International Telecommunication Union	35,23,436	-
<b>Total</b>	<b>6,16,50,134</b>	<b>2,79,70,110</b>





## 14. Other Office &amp; Administration Expense

Particular	For the year ended at 31st March 2023	For the year ended at 31st March 2022
Legal Expenses	4,15,000	1,29,150
Honorarium	1,13,44,000	1,04,39,040
Internet Charges	2,52,357	1,02,361
Bank Charges	77,020	74,337
IT Expenses	29,539	2,300
Internet Reimbursement	1,24,154	1,28,587
Design and Art Work Expense	4,88,800	3,63,350
Diwali Expense	1,21,838	47,500
Printing & Stationery	5,37,859	25,299
Office Rent	1,40,000	1,69,609
Office Cleaning Charges	14,240	1,000
Conferencing Expenses	7,96,334	-
Office Chair and Table (WFH)	-	18,000
Travelling Expense	-	21,204
Hotel Accomodation Expenses	19,28,767	67,462
Flight Ticket Expenses	25,24,489	36,956
Employer Share PF	2,65,815	1,03,125
Pantry Expense	30,328	525
Professional Charges	6,58,761	96,815
Taxi/Cab Hire Charges	6,86,487	32,772
Visa Fees	1,42,080	27,930
Interest Paid on Grant Reced	15,947	-
Mobile Reimbursement Exp	1,68,720	85,972
Auditor Remuneration	50,000	59,000
Computer Repair & Maintenance	98,130	54,969
Office Repairs & Maintenance	80,180	-
Conveyance	-	97,400
Administration charges -PF	10,575	4,125
Meeting & Conference Expense	16,17,098	6,88,847
Web Hosting Charges	1,48,751	1,19,285
Postage & Courier Expense	38,976	2,150
Group Medical Insurance Policy	3,44,458	6,28,339
GoToMeeting	64,572	30,297
G-Suite	1,96,812	1,08,741
FCRA Registration Fee	10,006	-
Transportation Expense	14,10,833	12,86,630
Transposition Expenses	11,59,700	57,098
TTCN-Work Load Exp	12,83,334	-
Rates & Taxes	-	24,320
Foreign Remittance Charges	615	-
Skill Enhance Expense	8,200	49,800
OneM2M Support	5,39,375	1,29,996
Per Diem	9,17,919	-
Fixed Assets written off	-	8,923
Leave Encashment	1,37,378	-
Local Conveyance	1,65,190	-
GST on Audit fees Reversed	(13,500)	-
Short & Excess	(3)	10,466
<b>Total</b>	<b>2,90,31,133</b>	<b>1,53,33,681</b>

**15. Salary to Staff**

Particular	For the year ended at 31st March 2023	For the year ended at 31st March 2022
Basic pay	32,26,118	25,06,900
Conveyance Allowance	6,38,666	2,23,878
Education Allowance	-	10,500
House Rent Allowance	8,39,713	12,27,334
Medical Allowance	-	55,000
Other Allowance	-	4,35,760
DA on TA	2,17,113	-
Dearness Allowance	10,57,435	-
Performance Incentive	38,60,781	9,55,000
Salary Arrear	32,690	-
Staff Welfare Expense	2,87,831	1,29,515
<b>Total</b>	<b>1,01,60,347</b>	<b>55,43,887</b>



## ANNEXURE TO BALANCE SHEET

1. Imprest with Staff

Particular	As at 31st March 2023	As at 31st March 2022
Lalit Bhandari	3,000	3,000
Rajesh Vasudev Karbele	-	3,000
<b>Total</b>	<b>3,000</b>	<b>6,000</b>

2. Other Advances

Particular	As at 31st March 2023	As at 31st March 2022
<b>Advance Receivables from Employees-</b>		
Salary Advance Rajesh Vasudev	40,000	20,000
Harsh Kumar	24,654	1,80,000
<b>Advance Receivables from Vendors-</b>		
M/s India International Centre	13,638	13,638
<b>Total</b>	<b>78,292</b>	<b>2,13,638</b>

3. Security Deposits

Particular	As at 31st March 2023	As at 31st March 2022
M/s. Preserve Faciliteez Pvt Ltd - A/c Tech Park	-	-
Spaze Tower Pvt. Ltd.	-	-
<b>Total</b>	<b>-</b>	<b>-</b>

4. Duties & Taxes Payable

Particular	As at 31st March 2023	As at 31st March 2022
TDS - Contractors	6,635	-
TDS - Profession	1,67,760	-
GST Payable	24,42,903	28,43,511
<b>Total</b>	<b>26,17,298</b>	<b>28,43,511</b>



**5. Expenses Payable**

Particular	As at 31st March 2023	As at 31st March 2022
Audit Fees Payable	50,000	63,500
Salary Payable	26,051	783
Provision for Leave Encashment	1,53,425	1,53,425
Advance Membership Fee 2023-24	17,40,000	53,47,536
Advance 3GPP 2022	-	28,50,000
Salary Advance - Jayeeta EURO	-	6,06,133
Employee Provident Fund	48,750	41,250
<b>Total</b>	<b>20,18,226</b>	<b>90,62,627</b>

**6. Advance to Suppliers or staff**

Particular	As at 31st March 2023	As at 31st March 2022
Anupam Sinha(Imprest A/c)	24,808	-
International Telecommunication Union	57,36,084	-
Raunak Kumar Mishra	1,800	-
Sushil Kumar Paswan	12,120	-
<b>Total</b>	<b>57,74,812</b>	<b>-</b>



# ANNEXURES

# ANNEXURES

## ANNEXURE 1: LIST OF TSDSI TECHNICAL GROUP LEADERS

Study Group -  
Networks



Prakash R  
Chair (C-DOT)

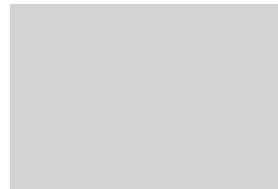


Samar Shailendra  
Vice Chair (Intel)

Study Group -  
Services & Solutions



Mahesh Nayaka Mysore  
Annaiah  
Chair (Reliance Jio)



Vacant

## ANNEXURE 2: SECRETARIAT TEAM

Director General



Pamela Kumar

Advisors



Vijay Madan



A K Mittal

Operations & Strategy to  
Operations, Membership  
Development, IT  
and Information  
Management



Anupam Sinha



Akash Patel



Asif Iqbal



Harsh Arora



Kuljit Singh



Niwedita Pathak



P K Jaswal



Rajesh Vasudev Karbele



Sushil Kumar Paswan

MARCOM and Partner  
Relations



Bindoo Srivastava



Jaskirat Singh



Shefali Sinha



Sonia Sachdeva Sharma

Technical Activities  
Support



Akansha Arora



Akash Malik



Raunak Mishra



Chandrakanta Rathore



Guna Bala Shekar



Rajesh Kapoor



Vishnu Ram OV

Strategic Initiatives



Amit Gupta



B M Baveja



Jean Pierre Bienaimé



Udayan Banerjee



Uday B Desai

**ANNEXURE 3: LIST OF TSDSI MEMBERS AS ON 31<sup>ST</sup> MARCH 2023****Corporate Members**

S.NO.	Name	Membership ID
1	Apple India Private Limited	TSDSIC029
2	Astrome Technologies Private Limited	TSDSIC117
3	Bharat Electronics Limited	TSDSIC087A
4	Bharat Sanchar Nigam Limited	TSDSIC020
5	Bharti Airtel Limited	TSDSIC019
6	Central Electronics Engineering Research Institute (CSIR)	TSDSIC099
7	Centre for Development of Advanced Computing (C- DAC)	TSDSIC018
8	Centre for Development of Telematics (C-DOT)	TSDSIC002
9	Centre of Excellence in Wireless Technology (CEWiT)	TSDSIC017
10	Cisco Systems India Pvt. Ltd.	TSDSIC031
11	Cyient DLM Pvt. Ltd.	TSDSIC102
12	Department of Telecommunications, Govt. of India	TSDSIC010
13	DOLBY Technology India Private Limited	TSDSIC112
14	Engineering Research Center TATA Motors Ltd. v	TSDSIC095
15	Enhanced Communications & Technologies Pvt. Ltd. (ECTL)	TSDSIC131
16	Ericsson India Pvt. Ltd.	TSDSIC006
17	ERNET India	TSDSIC086
18	Facebook India Online Services Pvt. Ltd.	TSDSIC096
19	Ganpat University	TSDSIC121
20	Himachal Futuristic Communications Ltd. (HFCL)	TSDSIC124
21	Huawei Telecommunications (India) Co. Pvt. Ltd.	TSDSIC032
22	IIT Jodhpur	TSDSIC126
23	IIT PATNA	TSDSIC127
24	Indian Institute of Science, Bangalore	TSDSIC065
25	Indian Institute of Technology Bhilai	TSDSIC075
26	Indian Institute of Technology Bombay	TSDSIC001
27	Indian Institute of Technology Delhi	TSDSIC068
28	Indian Institute of Technology Hyderabad	TSDSIC016
29	Indian Institute of Technology Kanpur	TSDSIC026
30	Indian Institute of Technology Madras	TSDSIC012
31	Indian Institute of Technology Mandi	TSDSIC038
32	Indian Institute of Technology, Kharagpur	TSDSIC093
33	Indian Institute of Technology, Roorkee	TSDSIC122
34	Indian Space Research Organisation (Department of Space)	TSDSIC109
35	Indraprastha Institute of Information Technology, Delhi (IIIT Delhi)	TSDSIC119
36	Institute for Development and Research in Banking Technology (IDRBT)	TSDSIC113
37	Intel Technology India Pvt. Ltd.	TSDSIC013
38	International Institute of Information Technology, Blr (IIIT Blr)	TSDSIC120
39	International Institute of Information Technology, Hyderabad	TSDSIC087

### Corporate Members

S.NO.	Name	Membership ID
40	INVAS Technologies Pvt. Ltd.	TSDSIC125
41	ITI Limited, Corporate Office	TSDSIC098
42	Keysight Technologies India Pvt. Ltd.	TSDSIC118
43	Lekha Wireless Solutions Pvt. Ltd.	TSDSIC108
44	MediaTek India Technology Pvt. Ltd.	TSDSIC101
45	Ministry of Electronics & Information Technology (MeitY), Govt. of India	TSDSIC066
46	National Smart Grid Mission	TSDSIC107
47	NEC Corporation India Pvt. Ltd.	TSDSIC009
48	Niral Networks Private Limited/Etrance Networks	TSDSIC115
49	Nokia Solutions and Networks India Pvt. Ltd.	TSDSIC025
50	OptM Media Solutions Private Limited	TSDSIC130
51	Philips India Ltd.	TSDSIC128
52	Prasar Bharati	TSDSIC114
53	Qualcomm India Private Limited	TSDSIC005
54	Railtel Corporations of India Ltd.	TSDSIC023
55	Reliance Jio Infocomm Limited	TSDSIC028
56	Rohde & Schwarz India Pvt. Ltd.	TSDSIC035
57	Saankhya Labs Pvt. Ltd.	TSDSIC039
58	Samsung R&D Institute India - Bangalore (SRI-B)	TSDSIC044
59	Sensorise Digital Services P Limited	TSDSIC104
60	Signalchip Innovations Pvt. Ltd.	TSDSIC105
61	Society for Applied Microwave Electronics Engineering and Research (SAMEER)	TSDSIC094
62	Sooktha Consulting Pvt. Ltd.	TSDSIC088
63	Sterlite Technologies Ltd.	TSDSIC042
64	Symbiosis Institute of Telecom Management	TSDSIC011
65	Syniverse Technologies Services (India) Pvt. Ltd.	TSDSIC091
66	Tata Communications Limited (TCTSL)/TCL	TSDSIC111
67	Tata Consultancy Services Ltd.	TSDSIC014
68	TATA Teleservices Limited (TTSL)	TSDSIC123
69	Tech Mahindra Ltd.	TSDSIC074
70	Tejas Networks Ltd.	TSDSIC003
71	Telecommunications Consultants India Limited (TCIL)	TSDSIC027
72	TUV Rheinland (India) Private Limited	TSDSIC097
73	University Institute of Engineering and Technology, Punjab University	TSDSIC100
74	VASBEAM Pvt. Ltd.	TSDSIC132
75	Vodafone Idea Limited	TSDSIC033
76	Wipro Limited	TSDSIC090
77	WiSig Networks Pvt. Ltd.	TSDSIC089

**Associate Members**

S.NO.	Name	Membership ID
78	Fraunhofer Institute for Integrated Circuits IIS	TSDSIA008
79	India Cellular & Electronics Association (ICEA)	TSDSIC116
80	InterDigital, Inc	TSDSIA009
81	ONE Media 3.0 LLC	TSDSIC092

**Observer Members**

S.NO.	Name	Membership ID
82	Aeris Communications India Pvt. Ltd.	Observer
83	Amantya Technologies Private Limited	Observer
84	Apazuc (OPC) Pvt. Ltd.	Observer
85	Coherent Logix	Observer
86	COS Grid Systems Private Limited	Observer
87	Densho Technoplus Private Limited	Observer
88	DSPWorks Automation and Wireless Network Solutions Pvt. Ltd	Observer
89	ELCOM Innovations Private Limited	Observer
90	ESDS Software Solution Ltd.	Observer
91	Elena Geo Systems Private Limited	Observer
92	Gigayasa Wireless Private Limited	Observer
93	Innogle Technologies Pvt. Ltd.	Observer
94	Internet and Mobile Association of India (IAMAI)	Observer
95	Kirat Communications (OPC) Private Limited	Observer
96	Mavenir Systems Pvt. Ltd.	Observer
97	MCLabs Private Limited	Observer
98	NIT Jalandhar	Observer
99	QuNu Labs Private Limited (QNu Labs)	Observer
100	Sirab Technologies Transportation Pvt. Ltd.	Observer
101	Simulanis Solutions Private Limited (SSPL)	Observer
102	Spiktel Technologies Pvt. Ltd.	Observer
103	TekUncorked AlloT Pvt. Ltd.	Observer
104	Viavi Solutions India Pvt. Ltd.	Observer
105	VVDN Technologies Private Limited	Observer

**ANNEXURE 4: COMPOSITION OF TSDSI COMMITTEES AS ON 31<sup>ST</sup> MARCH 2023**

<b>Name of the Committee</b>	<b>Co-Chairs</b>	<b>Members</b>
GC Standing Committee on Standardization & Transposition	Bhaskar Ramamurthy, IITM Manikantan Srinivasan, NEC	Neeraj Dindore, TCL V J Christopher, DoT Rahul Vats, Airtel R K Upadhyay, C-DOT Prakash R, C-DOT - SGN, Chair Mahesh Nayaka Mysore Annaiah, Reliance Jio - SGSS, Chair Samar Shailendra, SGN, Vice Chair Pamela Kumar, TSDSI
GC Standing Committee on Roadmap	Samar Shailendra, Intel Dindayal Toshniwal, DoT	Prasanta Sarkar, Tata Motors Ltd. Alex Vikas, DoT Balaji Rangaswamy, Sooktha Niranth Amogh, Huawei Jishnu A, Tejas Networks Puneet Jain, Intel Tejas Shah, Lekha Wireless Satish Jamadagni, R-Jio Anindya Saha, Saankhya Labs P K Singh, DoT Kiran Pasumarthy, WIPRO Prakash R, C-DOT Mahesh Nayaka Mysore Annaiah, Reliance Jio - SGSS, Chair Pamela Kumar, TSDSI A K Mittal, TSDSI Vijay Madan, TSDSI
GC Standing Committee on Rules and Regulations	R K Pathak, DoT Suresh Chitturi, Samsung Klutto Milleth, CEWiT	S K Marwaha, MeitY Prasanna Chaporkar, IIT Bombay P K Jaswal, TSDSI
GC Standing Committee on Legal & IPR Matters	N G Subramaniam, TCS Sendil Devar, Ericsson	Kumar N Sivarajan, Tejas Networks Ganesh Shivalingaiah, Apple Pushpendra Kumar Singh, DoT Shefali Sinha, TSDSI
GC Standing Committee on Budget and Finance	K N Jha, DoT Rajeev Sharma, BIS-Treasurer	Sreenath Ramanath, Lekha Wireless SaiDhiraj, WiSig Networks Kuljit Singh, TSDSI
GC Standing Committee on Outreach	Vijaya Kamath, Sensorise Anuradha Agarwal, Prasar Bharati	Rajeev Shorey, IIT Delhi Gagandeep Bajaj, Vodafone Idea Satheesh G, C-DAC Subhash Chand, BSNL Avinash Agarwal, TEC Bindoo Srivastava, TSDSI Shefali Sinha, TSDSI

# JOIN US

An organisation can join TSDSI as a Corporate member/ Associate member/ Guest member

## CORPORATE MEMBER

### DESCRIPTION

Entities registered in India and engaged in telecom related activities e.g.: Telecom Equipment Manufacturers, Mobile Phone/CPE Manufacturers, Service Providers, R&D, Academic Institutions, Value Added Service Providers/Software Developers, Govt., Societies of Govt., PSUs, Regulatory Bodies etc.

### PRIVILEGES

Contribute to Technical Activities  
Participate in Decision making and voting  
Hold office bearer positions

## ASSOCIATE MEMBER

### DESCRIPTION

Industry Associations, Foreign Entities, Foreign Industry Associations

### PRIVILEGES

Contribute to Technical Activities

## GUEST MEMBER/ OBSERVER

### DESCRIPTION

Professional experts, researchers in their individual capacity as Guests. Companies wishing to explore before becoming full members are granted Observer Membership for six months

### PRIVILEGES

Participate in Technical Activities and contribute on invitation

**REGISTERED OFFICE**

2<sup>nd</sup> Floor, CDOT Campus,  
Mandi Road, Mehrauli,  
New Delhi 110030,  
INDIA

**ADDRESS FOR COMMUNICATION**

304, Bharti School of Telecommunications  
Technology & Management, IT Campus,  
Hauz Khas, New Delhi 110016  
INDIA

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[Company/tsdsi](https://www.linkedin.com/company/tsdsi)

[@TSDSI\\_India](https://twitter.com/TSDSI_India)