From the CHAIR'S DESK

Focus on Experience & Outcome

Dear Readers,

The critical role that telecom Infrastructure plays in ensuring not just the resilience but being the backbone of all economic activities need not be over emphasised and in that context, mobile penetration has become a key economic indicator and of digital maturity across the globe. 5G has been rolled out in thousands of cities across 60+ countries and needless to state it will become the main digital infrastructure for citizens, enterprises, and the state alike soon. In India, the TSPs with necessary support from the government and nodal agencies have worked hand in hand in order to ensure its affordability, reach and competitiveness with which the India digital stack juggernaut is marching on.

The advancements of digital technologies - specifically cloud, artificial intelligence and edge computing - have opened many possibilities for the network to be even more converging, reliable, scaling, secured and trustworthy. It is increasingly becoming clear that more and more of the network will be software driven with embedded cognitive capabilities. These are enabling the reimagining of the art of possible across industry verticals and consequently use cases that improve the quality of life for people and businesses.

The future of network and standards will have to consider the need to leverage & support rapidly maturing digital technologies to deliver the desired ‘Experience’ and ‘Outcome’ for the powerful use cases businesses will embrace - the fundamental tenet for ROI on 5G/6G networks.

In this context, the role of TSDSI is well cut out. We are in the thick of things on 5G Advanced and 6G as they are rapidly evolving. We are in a position - individually and collectively - to influence the way business is done in the future across industries by brainstorming the art of possible and demonstrate use cases that will drive experience and outcome. We need to have structured engagements with the industry, academia, intensify deliberations in the study groups and make noteworthy contributions to the global standards at 3GPP and oneM2M.

Let us deliberate on the future, have open and transparent discussions, respect the disagreements we may have at times, but build consensus with a view to accelerate our relevance to the community that we serve. We will also work towards making our contributions and deliverables complete, correct, factual, unambiguous and include as much data and results as possible. The only way we can do this is by actively participating in our forums, have a collaborative mindset and build buy-in to our needs and contributions regionally and globally.

I take this opportunity to sincerely appreciate your support, contribution, and commitment to the world of standards and to the cause of TSDSI.

I wish you and your loved ones all the very best and much success in 2022.

Regards
N G Subramaniam

TSDSI Standardization Roadmap Ver2.0 released

White Papers on “Feasibility of Open-Source for 5G” and “Privacy & Personal Data Protection on Mobile Devices: A User Centric Approach” released

TSDSI signs MoU with ORAN Alliance

TSDSI felicitates Hall of Fame 2021 Awardees - Mr RK Pathak (Organization Building) & Prof Bhaskar Ramamurthi (Champion)
Dear Members,

Hope you and your families are doing well!!

Looking back at the last 6 months and in fact the entire 2021, the Pandemic has had a major impact on all of us. However, as we started compiling the data of the TSDSI activities for the Newsletter, we were pleasantly surprised to see that almost all metrics show a steady increase in the level of activities at TSDSI. Thanks to your enthusiastic participation and the excellent teamwork within the secretariat, TSDSI has passed the Test of Resilience with flying colours.

The Study Groups have had a packed agenda (of 11+ items) for 2 full days, with average 65 attendees (from 33 average organisations) and the need is being felt to extend these by another day. TSDSI’s footprint on Global SDOs (ITU-T&R, 3GPP and oneM2M) is steadily growing with 10+ member delegations and significant contributions and 6 leadership positions. TSDSI MARCOM activities continue unabated @ 1+ event per week spreading excitement around Standards Development in the ecosystem.

The Highlights have been:

1. 20% Growth in Membership to 94.
2. 69 MARCOM activities, 197 speaking engagements in CY 2021 of outstanding quality & global reach. A few deserve special mention:
   a. TTDD 2021 - 4 days, 86 speakers, 500+ delegates
   b. 6 Part TSDSI-ITU Webinar series - 3 webinars conducted, engaging 30 countries
   c. Standards Driven Research Workshops at NCC, IEEE-ANTS and COMSNETS
3. Lowering barriers for Participation in Global SDOs - Complementary registrations @ 3GPP & oneM2M offered to members. ITU sector membership enabled.
4. 5Gi features being incorporated in 3GPP
5. Contributions to IMT-2030 vision and technology trends at ITU-R WP5D

As we look to the future, the focus is going to be on:

1. Implementation of the Global SDO Strategy released by the Task Force to enhance contributions and engagement at Global SDOs
2. Mobilisation of the 9 Roadmap Clusters to create steady stream of NIPS for the SGs
3. StrengthenGovt Interface: Ensure strong support to Govt Initiatives and enhance engagement of Govt agencies.
4. Successful rollout of SGSS Working Groups, SMX Category of Membership, SDR Task Force and Industry Task Force
5. Institutionalising the Process & Quality framework with SOPs, Audits and Performance Dashboard.

A detailed TSDSI performance score card for FY 2021-22 (YTD Q3) is provided overleaf.

This year a big learning has been the effectiveness of remote working, virtual meetings and events. We will continue to leverage these as we move towards normalcy. We will also pursue the institutionalisation of hybrid meetings by Global SDOs to enable stronger participation from TSDSI members.

Congratulations to Prof Bhaskar Ramamurthi and Mr R K Pathak, for the well-deserved recognition as TSDSI Champion and Fellow - Organization Building respectively in the Hall of Fame 2021. A BIG thank you to the outgoing SG Networks Chair – Mr Satish Jamadagni, and SG-Services & Solutions Chair-Mr Akhilish Srivastava, who led this group for two terms from Sep 2017 through Aug 2021. A very warm welcome to the technical leaders elected in Aug 2021- R Prakash and Samar for SGN and Sharad and Mahesh for SGSS. Congratulations to Tata Communications Ltd and Keysight, the new entrants to the GC.

On behalf of the Secretariat, I look forward to your enhanced participation and contributions at TSDSI and the Global SDOs.

Regards,

Pamela Kumar, Director General
## Performance Dashboard

### Enhancing Technical Activities

<table>
<thead>
<tr>
<th>Study Group metrics (per meeting):</th>
<th>Outcomes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Average 11 NIPs/SWICS (Goal 10)</td>
<td>- 4 TR's Published (ILFTA, UDDP, MKYC, Open Disaggregated RAN)</td>
</tr>
<tr>
<td>- Average 33 members (Target 30)</td>
<td>- Transpositions:</td>
</tr>
<tr>
<td>- Average 65 attendees per meeting</td>
<td>- 3GPP Rel 10 to 16 for IMT Advanced Revision 5: 589</td>
</tr>
<tr>
<td>- 59 unique companies</td>
<td>- oneM2M Rel 3 - 27 TS/TR (Goal 8 TS/TR)</td>
</tr>
</tbody>
</table>

### Global SDO outcomes:
- 2 contributions on Vision and Future Technology trends for IMT for 2030 and beyond were submitted to ITU-R WP5D.
- oneM2M: 400+ cumulative contributions by CDOT;
- 3GPP: 5G1 merger in Rel 17

### Global SDO metrics:
- Average delegates/meeting (goal 10) 10@ITU-R, 10@3GPP, 11@oneM2M
- Contributions/meeting: 2@3GPP, 2@ITU-R, 3@ITU-T, 36@oneM2M (goal 10/SDO)
- # of iMs: 55@3GPP, 58@oneM2M

### Higher Impact in Global Forums

- Global SDO outcomes:
  - Leadership Roles:
    - Chair 3GPP PCG, 3GPP SA6 Chair, 3GPP SA3 Vice Chair
    - oneM2M SC Vice Chair, oneM2M MARCOM Vice Chair, SDS Vice Chair oneM2M
    - ITU SG5 Rapporteur, ITU DG chair
  - Support to Global SDOs:
    - 3GPP: 3 Year deputation at MCC completion in end of 2022
    - oneM2M: 52 Mandays for CY21, 180+ for CY 22

### Affiliations:
- 5G Multi-lateral MoU signed, Indo-EU Partnership
- Project extended till 2023 - supports 3 CoEs
- 12 Events with 7 Global Partners (Goal 10)
- 20 International Speakers @TTDD 2021

### Establishing TSDSI as a World Class SDO

#### Membership Development
- 94 Members (Goal 90)
- TSDSI Tech Deep Dive 2021: 4 days - 10 sessions, 86 Speakers & 500+ unique delegates
- 6 Part TSDSI - ITU Webinar Series on Digital Technology Innovations - 3 webinars conducted, engaging 30 countries
- "Standards driven Research" Outreach workshops
- Total 30 events organised in CY 2021 and 39 speaking opportunities

#### Organisational
- IT Support for world Class Virtual working/events
- Legal and IPR Framework - OCF & ORAN MoUs, IEEE & ATSC Agreements

#### Strategic Task Forces
- Startup Strategy - Implementation of recommendations
- Application/Services Layer Strategy - WG
- Open-Source Strategy - White paper & NIPs
- Global SDO Strategy - Draft Report submitted to GC
- Standards Driven Research
- Industry Strategy

#### Global Engagements:
- Process & Quality: Accreditations CERT-In, ITU A.5/A.6; 14+ SoPs Drafted - Internal Audits initiated,
- Strengthening the Secretariat (19 + 8 part time)
- Government Interface to be streamlined
- Synergy with TEC and BiS
Standardization Activities

Study Group - Networks

Technical Reports Released:

• Virtualization for Open-Disaggregated RAN [https://bit.ly/3yIulsW]: The report studies the O-RAN architecture for assessing gaps with respect to India specific requirements.

Work on development of technical reports on the following topics is in progress:

• Dynamic Joint Deployment of SDN Controllers and Hypervisors for Frugal 5G and Beyond (SI 180): Study of adaptive load balancing by properly positioning the controller and hypervisor entities at H-C planes according to their potential positions.

• Proposal for study on use cases, requirements, and technologies towards 6G (SI 70): The group is working on study of use cases, requirements and technologies beyond 5G that will drive 6G. This study will establish KPIs for these requirements; identify technology trends including candidate technologies to address these KPIs, corresponding spectrum requirements and related aspects; and study Network evolution and the respective performance parameters.

• Spectrum Studies:
  - 6GHz spectrum for IMT applications in India (SI 73) - Study of 6GHz band usage for Licensed applications and use cases primarily focussing on 6425 MHz - 7125 MHz spectrum in India.
  - 6GHz spectrum for license-exempt wireless applications in India (SI 74) - Study of 6 GHz band usage for license - exempt applications of Wi-Fi and NR-U services and use cases primarily focussing on 5925 MHz - 6425 MHz spectrum.

• Study of open and disaggregated design for IP Transport in 5G (SI 92): Study of existing IP Transport and Management Architecture, their protocols or interfaces required for an open and disaggregated IP Transport that leverages new technologies like SDN, NFV. Suggest future work-items that are necessary for a flexible IP Transport Network that supports new service offerings and applications promised by 5G.

• Study of existing ITU/IEEE standards on VLC/LiFi and gap analysis. Identification of Use cases from International and Indian Context (SI 89): VLC is high speed, bidirectional and networked wireless communications using light, providing a similar user experience as traditional 802.11 technologies, such as mobility including handover and multiple access, except using the light spectrum. The study focusses on the current status of VLC/LiFi standards status, identify gap areas and suggest possible areas where standardization activities can be taken up. The areas may include developing PHY and MAC layer standards for VLC, LiFi Co-existence standards, developing Co-existence systems for LiFi and VLC enabled IoTs etc.

Work on development of technical specifications on the following topics is in progress:

• Characterization of E-band for 4G/5G Backhaul & Rural Broadband (WI1-NIP 258): There are two parts to this NIP:
  1. To make a comprehensive analysis of the effectiveness of E-band solutions, economically and technically, to cater to the Indian Telecom network requirements for the coming future.
  2. To explore and make contribution (as found necessary) to the current draft of ETSI EN 302 217 [4] to accommodate a multi-beam E-band device which is a new kind of device developed in India. This study will also explore ways to ensure interoperability between E-band radios of different vendors.

• Evaluation of the existing IAB architecture in 5G Networks (WI1-NIP248): Evaluation of existing Relay/IAB architecture in 3GPP 4G LTE/5G NR Networks in order to standardize a new generic and flexible Relay/IAB Architecture along with the associated protocols.

• Extension of Broadcast offload (WI1-NIP226): Study utilization of UHF DTT spectrum to provide supplementary download services, closely coupled with a cellular network.

• Open Radio initiative: Towards a Open, Disaggregated RAN (WI1-NIP271): This work item aims to publish standards in the areas of open interfaces that will facilitate multi vendor interworking, network management, network automation and network intelligence on aspects that are not covered by different organizations and bodies yet (3GPP and O-RAN).
ACTIVITIES

Study Group - Services and Solutions

Technical Reports Released:

- Smartphone User Data and Privacy Protection [SI 90]: Study on 3GPP User Plane Data Protection for 5G. The report assesses the impacts of enabling 5G Multi-access Edge Computing (MEC) for user data security endpoints for use-cases of Internet of Things (IoT), Internet of Skill (IoS), and Industrial Internet of Things (IIoT). The report includes a summary of the key findings and recommendations for future work.

- Digital Process for Know Your Machine Custodian [SI 75]: The report outlines a Trust framework for verification and transfer of custodian and machine relationship for the massive M2M domain.

- Support for Indian Languages in Mobile Transactions [SI 86]: The report assesses the numbering and addressing requirements for IoT devices and applications, various numbering mechanisms, understanding evolving status of standards to make recommendations towards globally unique IoT identifiers.

- IoT Identifier [SI 75]: The report assesses the numbering and addressing requirements for IoT devices and applications, various numbering mechanisms, understanding evolving status of standards to make recommendations towards globally unique IoT identifiers.

Work on development of technical reports on the following topics is in progress:

- Study on Edge Intelligence standards for Haptics related IIoT use cases [SI 91]: The report summarizes the basic features of a 5G Broadcast System for linear television, radio, IPTV and file-casting services. It also documents these as an implementation profile of a subset of 3GPP specifications to address these features. It also provides the description of 3GPP solutions that may be utilized to deploy linear television, radio services, IPTV and file-casting.

- Service Delivery using 5G Broadcast for TV, Radio, IPTV and File-casting [SI 91]: This report summarizes the basic features of a 5G Broadcast System for linear television, radio, IPTV and file-casting services. It also documents these as an implementation profile of a subset of 3GPP specifications to address these features. It also provides the description of 3GPP solutions that may be utilized to deploy linear television, radio services, IPTV and file-casting.

- Study of Post-Quantum-Cryptography for 5G Networks [S178]: This technical report documents the study of Post-Quantum-Cryptography for future 5G Networks and various Application Verticals. It will include the study of existing security algorithms in 5G Networks and thereafter analyzing Quantum Threats to Security Algoritms used in 5G Networks.

- Rural Broadband Services & Architecture [SI 86]: The report on Rural Broadband Services Architecture aims to study rural use cases, identify requirements relating to network slicing, network security and network management, study current broadband infrastructure in rural areas, and ongoing architectural efforts and identify gaps. How to deliver both broadband and IoT services in rural areas by integrating different access and backhaul wireless technologies is highlighted with an aim for increasing the utilization of BharatNet.

- Public Protection & Disaster Recovery Use Cases & Architecture [SI 86]: Study of technical aspects for deployment of a Pan-India Broadband PPDR network based on PS-LTE and 5G technology.

- Communication Requirement for Energy Sector [SI 87]: Analysis of Key nodes of Advanced Metering Infrastructure topologies with respect to packet types, flow direction, volumes and transmission frequency of data and of quality of services.

The group is working on following technical activities:

- Use Cases & Trials for Automotive [NIP 260]: This study will compile findings from trials of remote patient monitoring system in vehicles (Next Generation Ambulance) and C-V2X use cases using 5G technology.

- Feasibility of Open-Source for 5G - Applications [NIP 272]: The focus of this study is on creating a study report for available Open-source options for RAN Intelligent Controller (RIC) framework. RIC framework will provide the platform to host the APPs to optimize the RAN functionalities like RRM, SON etc. RIC framework will also provide the open APIs for the APP development. An email discussion has been initiated to refine the scope of this NIP.

- Study UAV/Drone 3GPP-5G standards applicability to India use cases [NIP 274]: A new proposal has been submitted in the December’21 plenary on Study UAV/Drone 3GPP-5G standards applicability to India use cases. The enhancements and architecture changes introduced in 3GPP (5G) specifications relevant for Indian scenario and use-cases would be beneficial for Indian regulatory and industry members working on UAV related products and applications to understand the availability and technical aspects of these features so that it can be considered in their relevant roadmap. For regulatory related to UAV, this study will form the basis for defining additional requirements relevant for new scenarios.

Snapshot of Technical Activities:

<table>
<thead>
<tr>
<th>Study Group</th>
<th>Technical Reports</th>
<th>Technical Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Published In Progress Published In Progress</td>
<td></td>
</tr>
<tr>
<td>Networks</td>
<td>6 3</td>
<td>2,633 -</td>
</tr>
<tr>
<td>Services &amp; Solutions</td>
<td>87 6</td>
<td>136 -</td>
</tr>
</tbody>
</table>
List of Technical Meetings held in this period:

<table>
<thead>
<tr>
<th>Group</th>
<th>Date</th>
<th>Attendees</th>
<th>Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networks Technical Plenary</td>
<td>10-11 Aug 2021</td>
<td>33</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>8-9 Dec 2021</td>
<td>31</td>
<td>09</td>
</tr>
<tr>
<td>Services &amp; Solutions TP</td>
<td>7-8 Sep 2021</td>
<td>32</td>
<td>07</td>
</tr>
<tr>
<td></td>
<td>21-22 Dec 2021</td>
<td>25</td>
<td>10</td>
</tr>
</tbody>
</table>

* All meetings were held online

TSDSI welcomes volunteering offers from members and organizations to organise discussion workshops and knowledge sharing webinars on any active study or work items listed on our website. Please contact outreach@tsdsi.in for the same.

Liaison Statements

**Incoming LS:**
TSDSI received 4 Liaison Statements (LS) in the reporting period:
- ITU-R WP 5D has sought views for development of draft new Recommendation on IMT Vision for 2030 and beyond
- ITU-R WP 5D has decided to start the work towards two new Recommendations for “Generic unwanted emission characteristics of mobile stations using the terrestrial radio interfaces of IMT-2020” and “Generic unwanted emission characteristics of base stations using the terrestrial radio interfaces of IMT-2020”. WP 5D has sent an LS inviting proponents of IMT-2020 to provide relevant materials for these new Recommendations consistent with the recommendation ITU-M.2150
- ITU-R WP 5D is developing a draft new Report ITU-R M.[IMT.INDUSTRY] on “Applications of IMT for specific societal, industrial and enterprise usages”. It has sent an LS inviting the External Organizations to provide information on industrial and enterprise on its usage, applications, required capabilities, technical and operational aspects, and any other related material that would facilitate the completion of this Report
- JCA-IMT2020 of ITU-T has sent an LS soliciting inputs for update of information in the IMT2020 roadmap

**Outgoing LS:**
Following LSs were sent out in the reporting period:
- Liaison sent to NSCS with TSDSI response on their feedback on the TSDSI TR on “Reducing Threats to the National Critical Infrastructure Using DNS”
- LS response to JCA-IMT2020 on their invitation to update the information in the IMT2020 Roadmap
- LS sent to TEC with clarifications on the queries raised by TEC Consultative Committee related to adoption of TSDSI CPRI Fronthaul standard as a National Standard
- LSs have been sent to WPC, Prasar Bharati, DoT and TEC for spectrum allocation for various services in India between 95 GHz to 300 GHZ range for study of 6G spectrum requirements and related aspects for India

Liaisons Statements can be viewed at https://tsdsi.in/laison-statements/

Strategic Initiatives

Creation of Working Groups in Study Group - Services & Solutions:
In order to bring focus and streamline technical activities of SGSSS, 3 working groups have been formed and activities assigned to them as per the table below:

<table>
<thead>
<tr>
<th>WG1: Security-Trust-Privacy-Data Protection Standards</th>
<th>WG2: Applications and Services Layer Standards, AI/ML</th>
<th>WG3: Smart Infra, Critical Communications, Cloud &amp; IoT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Mr Aurindam Bhattacharya Secretariat SPOC: Mr Vijay Madan</td>
<td>Chair: Mr Sharad Arora Secretariat SPOC: Mr Vishnu Ram</td>
<td>Chair: Mr Mahesh Nayaka Secretariat SPOC: Mr Rajesh Kapoor</td>
</tr>
<tr>
<td>• IoT Identifier [SI 75]</td>
<td>• Indian Language support for Financial transaction [SI 67]</td>
<td>• Common user profile to promote accessibility in audio visual media [SI 76]</td>
</tr>
<tr>
<td>• Know-Your-Machine-Custodian (KYMC) [SI 77]</td>
<td>• Use Cases and Trials - 5G for Automotive (WT-NIP260)</td>
<td>• Rural Broadband Services &amp; Architecture [SI 85]</td>
</tr>
<tr>
<td>• Need of Post Quantum Cryptography in 5G Networks [SI 78]</td>
<td>• Creation of Edge Intelligence standards for latency and privacy management [SI 90]</td>
<td>• Study of technical aspects for deployment of a pan-India Broadband PPDR network based on PS-LTE and 5G technology [SI 86]</td>
</tr>
<tr>
<td>• Inter-Domain Service Automation (IDA)*</td>
<td>• Inter-Domain Service Automation (IDA)*</td>
<td>• Cloud Interoperability &amp; Portability Standards</td>
</tr>
</tbody>
</table>

*NIPs to be approved
Global SDO Strategy Task Force: The Global SDO Task Force has submitted its report to the Governing Council. It recommends actions in 5 broad areas listed below:
- Consistent Participation and Contributions
- Lowering Financial Barriers for engagement
- Capacity building
- Infrastructure
- Engagement models.

Governing Council, in its 35th meeting held on 25 November 2021, has extended the term of the Task Force by 3 months to elaborate the recommendations into an implementation strategy with action items and responsibilities.

Application/Services Layer Standards (ASLS) Task Force: This task force has been dissolved subsequent to the creation of the work group on Application and Services Layer Standards, AI/ML under the Services and Solutions Study Group.

Open-Source Strategy Task Force: The Task Force released a white paper on “Feasibility of Open-Source for 5G” in October 2021 during the TSDSI Tech Deep Dive 2021. Its term has been extended for 3 months to work on recommendations for next steps.

Standards Driven Research (SDDR) Strategy Task Force: The Governing Council, in its 35th meeting held on 25 November 2021, has approved formation of a Standards driven Research Strategy (SDDR) Task Force to study challenges faced by academics in participating in Standards development activities and come out with recommendations on how to facilitate sustained contributions by Academia into Standards. The Task Force, co-chaired by Prof Radhakrishna Ganti and Prof Arzad Alam Kherani, will work under the standardization committee, co-opting members from the Outreach and Roadmap committees, and an approved duration of 6 months.

Industry Task Force: The formation of an Industry Task Force under the Standardisation Committee has been approved by the Governing Council for a period of 6 months. The objective of the Task Force is to identify areas & mechanisms for enhanced engagement by Industry at TSDSI. It will be co-chaired by Mr Ashwani Kumar (Huawei) and Mr Manish Varma (Nokia).

Strategic Initiatives


White Paper on “Privacy & Personal Data Protection on Mobile Devices: A User Centric Approach” by MDPP TRIP Forum - A white paper titled “Privacy & Personal Data Protection on Mobile Devices: A User Centric Approach” (https://bit.ly/3s6teQZ) was published on TSDSI website. This version focuses on control over privacy and protection of personal data for smartphone, feature phone, and tablet users. It is intended for ecosystem stakeholders such as device manufacturers, smartphone vendors, system integrators, service providers, app/website developers, API/Middleware developers, OS vendors, and Government stakeholders such as regulatory bodies overseeing Personal Data Protection and Cyber Security, NSC, MeitY, CERT-In, TEC, DoT.

TSDSI-ITU Webinar Series on “Digital Technology Innovations - Case Studies from India and the Asia-Pacific Region”: TSDSI in collaboration with ITU has launched 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. Three webinars have been organized as part of this series in the reporting period:

- The Inaugural session on India Stack and ITU’s Initiatives on Digital Innovation (https://bit.ly/3ohBht9) held 2 September 2021 showcased India Stack. Additionally, it highlighted the International Telecommunications Union (ITU) and engagement models, including the International Centre of Digital Innovation (I-CoDi).


Pre-standardization Activities

**TSDSI Standardisation Roadmap 2.0:** TSDSI’s Standardisation Roadmap 2.0 for standards development till 2023, was approved by the Governing Council in its 35th Meeting held on 25 Nov 2021.

Roadmap 2.0 has been created after a broad-based stakeholder consultation process undertaken by the TSDSI Roadmap Committee. Several workshops were conducted inviting members and external organizations to gather inputs on the need of standardization in different areas. The topics are aligned with the expected future course of technological development as may be noted from the titles of the clusters like Security, 6G/5G Enhancements, AI/ML, Cloud, Spectrum Studies etc. Some of the topics have already matured to a stage of being introduced in TSDSI study groups for further work and others are expected to follow in due course. Topics covered in the roadmap are in addition to the ongoing work in the Study Groups or any other item introduced in the Study Groups for development of standards.

**Following TSDSI standards are under consideration by TEC for adoption as national standards:**
- CPRI-Fronthaul Standard (STD 5000 V1.0.0)
- TSDSI Transposed oneM2M Rel 3 Standards
- TSDSI Transposed Standards for 3GPP Release-15

Post-Standardisation Activities

Roadmap is a dynamic document as the needs for standardization in different areas will continue to emerge and TSDSI will remain responsive to India specific standardization needs.
The National Centre for Communication Security (NCCS) wing of DoT has requested TSDSI to transpose the security standards for 5G elements covered under “Series 33” specifications of Release 16 and Release 15 of 3GPP Standards.

**Merger of 5Gi and 3GPP 5G specifications:** TSDSI members submitted a proposal during the 3GPP TSG RAN plenary #94e meeting held in December 2021, where a way forward for enabling the merger of 5Gi into 3GPP 5G specifications in Release 17 was agreed. TSDSI is taking the next steps to approve the outcome of the RAN#94e. The proposal of merger is now expected to be finally approved in 3GPP, earliest in the next TSG RAN plenary (#95e) to be held during March 2022.

SA Release 18 prioritization workshop was scheduled on 9 & 10 December 2021 followed by the 3GPP Plenary meetings (RAN, SA & CT). The main focus of the workshop as well as this Plenary meeting was to finalize the content of Release 18. As an outcome of the same, contents of Release 18 have now been frozen as a package, in a joint meeting of TSGs during the same period.

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

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of Meetings</th>
<th>No. of Participants</th>
<th>No. of Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAN</td>
<td>16</td>
<td>240</td>
<td>81</td>
</tr>
<tr>
<td>CT</td>
<td>11</td>
<td>72</td>
<td>30</td>
</tr>
<tr>
<td>SA</td>
<td>26</td>
<td>160</td>
<td>47</td>
</tr>
</tbody>
</table>

**oneM2M**

TSDSI and C-DOT organized a four-day webinar series on “The National Standards for IoT - Smart Cities Perspective” from 5 - 8 July 2021, to give an insight into the rich features of oneM2M as well as various aspects of IoT including security, privacy, trust, interoperability and testing in the backdrop of Smart Cities. The series featured excellent presentations by Researchers and office bearers of oneM2M, TSDSI members and industry experts and key user segment stakeholders from India and abroad. It had 29 Speakers and Panelists and saw participation of 245+ unique attendees.

oneM2M TP 51 was held from 30 August 2021 to 17 September 2021 in online mode and oneM2M TP 52 was held from 29 November 2021 to 3 December 2021 in hybrid mode (i.e. P2F + online mode) in ETSI, France. These technical plenaries were attended by following IMs of TSDSI - IIT-Bombay, BSNL, C-DOT, Cisco, TEC (DoT), ERNET, Facebook India, IIT-Delhi, IIT-Bhilai, IIT-Kharagpur, ISRO, IDRBT, IIT-Hyderabad, Lekha Wireless, NSGM, oneMedia, Prasar Bharti, UIET, Saankhya Labs, Sensorise, Signalchip Innovations, Tata Communications, TCS, Tech Mahindra, Tata Motors, Tejas Networks, Wipro and INVAS Technologies. A total of 25 agreed contributions were submitted in this period.
PARTNER ENGAGEMENTS

TSDSI and O-RAN Alliance signed an MoU to cooperate to grow the open interfaces and open RAN ecosystem, exchange information regarding challenges and use cases pertinent to problems in India subcontinent region and contribute to open standard definition and proliferation.

**TSDSI-SGIA Webinar on 5G Trials & Pilots:** TSDSI in partnership with SGIA organized a webinar on “5G Trials & Pilots” ([https://bit.ly/348rqic](https://bit.ly/348rqic)) on 22 September 2021. The webinar facilitated exchange of information, lessons learnt and areas for collaborative 5G tests & pilots. Examples from smart city, smart grids, media broadcast and production from India and Europe were discussed. Ms Neha Satak (Astrome Technologies), Mr A K Mishra (NSGM), Prof Arzad Alam Kherani (IIT Bhilai) and Mr Prashant Maru (Saankhya Labs) presented their work.

In the framework of IEEE 5G World Forum, the 4th Worldwide 5G Industry Fora Conference was held virtually on 13 October 2021, with the participation of 15 worldwide high-level speakers split within 3 panels, including Ms Pamela Kumar for India/TSDSI. The conference discussed 5G Trends, Applications and Collaborations, Regional Visions, Verticals trials and pilots, & Inter-Regional Cooperation activities.

**8th Global 5G Event:** As one of the signatories of the Multilateral MoU for 5G Global Events (along with 5G Americas, 5G Brasil, IMT2020 PG China, SGIA Europe, 5G Forum Korea and SGFM Japan) TSDSI participated in the 8th Global 5G Event organised online by IMT2020 (5G) PG China on 14 - 15 October 2021. Ms Pamela Kumar (TSDSI), Mr Vinay Shrivastava (RIL), Dr Kumar Sivarajan (Tejas Networks) and Dr Abhishek Thakur (IDBRT) shared their views in the sessions on 5G Trends and Policies, Beyond 5G, 5G Commercialization & 5G Solutions for Vertical Industries respectively. Prof V Kamakoti (IIT Madras) from TSDSI moderated the Session on 5G for Pandemic Control.

**TSDSI-ETSI Joint Session on “The path to 6G: Workshop on EU-IN vision for beyond 5G standards” @IMC2021:** TSDSI and ETSI jointly organised a session on day 1 (8 December 2021) of India Mobile Congress 2021 conference on the topic of “The path to 6G: Workshop on EU-IN vision for beyond 5G standards”. The session was sponsored by InDiCo. The objective of the session was to lead to identification of areas of common interest for research and pre-standardization activities in the area of “Beyond 5G”, and explore strategies for bringing vertical sectors from both regions on board in the critical phase of use cases and requirements definition, with a view to form a strong basis for the definition of one globally harmonised technical solution meeting these requirements.

The session fostered exchange of views among EU and India experts on Vision and Roadmap, policy initiatives and initiate a discussion on recommended steps for facilitating early alignments for development of globally harmonised standards in the beyond 5G landscape. It featured experts from India and Europe sharing considerations on the above topics, followed by a panel discussion.

**TSDSI-BIS Joint Online Workshop on “Drone Connectivity, Operations and Standards”** ([https://bit.ly/3L0iigh](https://bit.ly/3L0iigh)) on 4 October 2021. This workshop aimed to serve as a platform for aviation and telecom industries to collaborate for drafting standards to serve the connectivity needs for Drone Services. It discussed India based use cases, requirements, deployment experiences and challenges, and areas for standardization.

**India-EU Partnership Project (PP) on Cooperation for ICT Standardization**

6 activity proposals related to oneM2M (ranging from hackathons, webinars and support for establishing a oneM2M certification ecosystem in India) have been approved in the project. Discussions on few other proposals are in progress.

The project held its steering committee meeting on 17 December 2021 to review status of its activities.

A set of webinars related to oneM2M are being organised in Jan-Feb 2022 time frame. Please visit [https://www.indiaeu-ictstandards.in/webinars/](https://www.indiaeu-ictstandards.in/webinars/) for details.
Governing Council Updates

Keysight Technologies (represented by Mr Sandeep Kapoor) and Tata Communications Ltd (represented by Mr Neeraj Dindore) have been elected to the Governing Council in the CAT4 and CAT11 categories respectively, in the elections held in August 2021.

The representatives of Apple (Mr Srinivasa Vasudevan), NOKIA (Mr Randeep Raina) and WiPRO (Mr Subhas Mondal) on the Governing Council have been replaced by Mr Ganesh Shivalingaiah, Mr Manish Verma and Mr Manjunath Iyer respectively. Nominees from WA - DoT (Mr G K Agrawal) and Meity (Ms Geeta Kathpalia) have been replaced by Mr R K Saxena (WA) and Mr S K Marwaha respectively. The contributions of Mr Cheladurai Adisesi, who represented WiPRO briefly on the Governing Council are acknowledged with thanks.

Following changes have been effected to the GC Standing Committees SC): Mr Ashwani Kumar, Huawei has moved from the Rules & Regulations SC to Budget & Finance SC. Mr Sai Dhiraj, WiSig has joined the Budget & Finance SC. Mr Manish Verma (NOKIA) has joined the Legal and IPR SC as Co-Chair. Mr Ganesh Shivalingaiah (Apple) has also joined this SC. Mr S K Marwaha (MeitY) has joined the Rules and Regulations

Finances

A nominal increase of 5% in TSDSI membership fees has been approved by the GC in its meeting held on 25 November 2021. This will be applicable for FY 22-23 and FY 23-24. Visit https://tsdsi.in/membership/ to view membership fee details.

TSDSI thanks Tata Consultancy Services (TCS) for supporting the TSDSI Tech Deep Dive Conference 2021 as its Platinum Sponsor and Sterlite Technologies Limited, Sensorise Digital Services Limited and ATSC for sponsoring select sessions.

Operational Matters

TSDSI conducted its 34th & 35th Governing Council Meetings online on 27 July and 25 November 2021 respectively. The 16th GBM was held online on 18 August 2021.

Elections for the 4th Slate of Technical Group Chairs along with those for 2 vacant positions in GC were conducted on 31 August 2021. The new technical group leadership is as follows:

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<thead>
<tr>
<th>Group</th>
<th>Chair</th>
<th>Vice Chair</th>
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</thead>
<tbody>
<tr>
<td>SG - Networks</td>
<td>R Prakash</td>
<td>Samar Shailendra</td>
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<tr>
<td>SG - Services and Solutions</td>
<td>Sharad Arora</td>
<td>Mahesh Nayaka, Mysore Annaliah</td>
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Outreach

TSDSI Tech Deep Dive (TTDD) 2021

The TSDSI Flagship Conference - TSDSI Technical Deep Dive (TTDD) Conference brings together experts from around the world to discuss topics related to global standardisation activities, and, emerging and futuristic technology trends. The 4th Edition of the conference - TTDD 2021 was organised in fully online mode from 25 to 28 October 2021. The theme of the conference was “Standards for Digital Transformation in the New Normal”. A very eminent set of 85 speakers from within and outside India, including experts from peer SDOs and Global Forums – such as ATIS, ATSC, ETSI, ITU, MTSFB etc; and regions – Bangladesh, Sri Lanka, Cook Islands, Africa, Malaysia apart from Korea, Europe and US joined the technical sessions in 10 thematic areas. Approx. 500+ unique delegates (with 62 from outside India) participated. Session wise participation ranged between 80 to 160 unique delegates. Key Highlights of the technical sessions are given below:

Shri K Rajaraman Chairman DCC and Secretary (Telecom), Ministry of Communications, in his inaugural address, emphasised the need for Technologies and Standards to be “inclusive and appropriate”. Mr N G Subramaniam, Chair, TSDSI stated that as we move into 5G era, Apps and marketplaces are evolving rapidly. “IoT, IoT, Open Technologies, Quantum, Cloud and Interoperability, Open RAN, Broadcast and Non-Terrestrial Networks are significant opportunity areas. TSDSI has a critical role in engaging the ecosystem and assisting in sustainable development”.

Session #1: Critical Communications – deliberated on public safety, railways, military settings through the lens of resilience, reliability, availability and security. Speakers opined that there is need for combination of technologies and collaborative approach among researchers, technologists, SDOs, disaster management agencies and the Government for CC in the Country.

Session #2: Vision for 6G - Requirements/Use Cases/Applications: discussed TSDSI and Global work in development of Vision for 6G Requirements, potential use cases and technology trends. Terahertz band operations, massive bandwidth, novel antenna technology, connectivity to remote areas, intelligent spectrum sharing, intelligent reflective surfaces were discussed as potential 6G technology solutions.

Session #3: Levelling the Digital Divide for Rural and Remote Areas discussed terrestrial, non-terrestrial & submarine infrastructure and technologies for delivering high speed mobile broadband to the unconnected in India and similar regions. Satellite based technologies are emerging as a strong contender for levelling the rural-urban digital divide.

Session #4: Securing 5G, IoT, AI and Beyond - discussed at scale design, deployments of security infrastructure including test and certification aspects in context of IoT, Smart Cities, Private Networks and 5G. It emphasised the need to implement registration of trusted IoT Service Providers and certified devices and Apps, use case classification, quantum ready technologies, and capabilities to ensure security of open systems etc. It recognised the role of AI based autonomous multi-agent systems for diagnosis and corrections.
Session #5: Spectrum considerations for 5G and beyond — discussed spectrum for access, backhaul and coexistence of satellite and terrestrial services. The spectrum studies work at ITU in respect of various agenda items of WRC-23 was also highlighted. The future of the wireless is to increase capacity in coverage radios and coverage in capacity radios and new innovations are expected to focus on this. Additional frequency bands are also required to be allocated based on studies to meet the future demand.

Session #6: Role of Private Networks in India’s Digital transformation - AI/ML, federated learning, transfer learning, disaggregated architecture patterns such as open RAN & edge cloud systems present opportunities for growth of Private Networks. It raised the question of whether micro-entrepreneurs offering geo-fenced private Networks based solutions in rural and similar setups can enable digital inclusion and be as impactful as the UPI.

Session #7: Open Technologies for the Access Networks - The session discussed the rapidly evolving “Open, disaggregated and programmable” solutions landscape and adoption challenges such as maturity, complex system integration, security etc.

Session #8: Impact of Quantum Technologies on Telecom Networks - discussed potential impact of quantum computers and algorithms on cryptographic security of legacy and upcoming telecom networks. Telecom networks can adopt a strategy of Planned Migration to Quantum-Safe-Cryptography. Quantum Machine Learning can be a key enabler in improving services and performance of Data-centric Future Telecom Networks.

Session #9: Application and Services - Experts acknowledged the role of the extensive coordination between govt., academia, research houses, highly skilled startups, system integrators, Operators in the emerging 5G story. Timely participation in standards development were crucial learning and a turning points. Availability of test lab facilities for startups is critical to retain the momentum.

Session #10: Evolution of Broadcast and Non-Terrestrial Networks - explored the potential of broadcast-broadband convergence to offer services that go beyond on-demand content consumption, such as disaster management, & unification of non-terrestrial and terrestrial networks to cover un or under served regions.

Standards Driven Workshops

“Standards Driven Research” @ NCC 2021: TSDSI organised an online workshop on “Standards Driven Research (SDR)” on 29 July, 2021, under the aegis of NCC 2021 to encourage researchers from Academic Institutes to develop and contribute their research ideas into formal standards development activities at National and Global levels. The workshop concluded that consistent and visible participation in global standards forums meetings in large numbers is essential to make an impact. Involvement in Standards requires long term engagement with standards bodies, tremendous amount of travel to meetings requiring fundings and time commitments. TSDSI has taken many initiatives to lower the barriers for the research to take advantage of the current “virtual meetings” at ITU, 3GPP and oneM2M. TSDSI will engage with academicians to facilitate their joining appropriate standards activities as per their research interests.

A 2nd SDR Workshop @ IEEE ANTS 2021 — with focus on Financial Inclusion was organised in partnership with IEEE ANTS on 14 December 2021. Ongoing research and standards development activities for financial inclusion including potential of leveraging private networks for delivering financial services to rural areas were the topics of discussion.

TSDSI organised a webinar in partnership with IIT Bombay on 9 July 2021, to present an overview of the DoT sponsored project ‘Indigenous 5G Testbed’ and showcase IIT Bombay’s contribution towards the same. Two webinars were organised in partnership with IIT Delhi to showcase the IIT Delhi’s independently developed Test beds on LiFi 5G and 5G Security on 5 August and 24 September 2021 respectively.

A Live Virtual Tour of a Smart Factory- to demonstrate potential of connectivity/technology (4G /5G and 6G in future) in Private Wireless Networks for Smart Factory Use Cases (Industry 4.0) deployed in a Manufacturing facility based in Nokia Factory in Chennai, India was organised on 25 August 2021.

TSDSI and IIT Delhi jointly organized the “MEC 5G Hackathon: The MEC 5G Challenge” on 24 September 2021 where participants showcased applications developed in MEC enabled 5G network environment using ETSI MEC technologies.

Ms Pamela Kumar, DG TSDSI, presented her views, on behalf of TSDSI in a panel discussion in the Worldwide 5G Industry Fora Session in IEEE 5G World Forum 2021, held online on 13 October 2021. She also delivered
- Keynote on “Broadcast-Broadband Convergence in India - Riding the 5G Wave” in the 75th Broadcast Engineering and Information Technology Conference (BEITC) hosted by the National Association of Broadcasters, USA.
- Talk on “Standards driven Research – The most efficient way to achieve ATMA NIRBHAR BHARAT” at the Weekly Webinar Series organised by IEEE Kerala Section on 15 December 2021.

TSDSI partnered with IEEE-SA & Satcom Industry Association (SIA-India) to organise a workshop on “Standardization in Satellite Ground Segment” as part of SIA-India Virtual Conference on Satellite Ground Segment in India - Way forward on 17 December 2021. It discussed standards development activities in context of Satellite Ground Segment.

If you are interested in getting an outreach workshop conducted for your organization or your industry segment, please contact outreach@tsdsi.in
TSDSI MEMBERSHIP UPDATE

TSDSI welcomes the following members who have joined us in the reporting period:

**Corporate: (3)**

- IIIT Bangalore - [https://www.iiitb.ac.in/](https://www.iiitb.ac.in/)  Institute of Information Technology (IIIT) Bangalore is one of the premier research universities with a world class academic program in India. Its focus areas include research in telecommunications related to protocols, physical layer communication and spectrum allocation policy.

- C DAC - [https://www.cdac.in/](https://www.cdac.in/) Centre for Development of Advanced Computing (C-DAC) is the premier R&D organization of the MeitY for carrying out R&D in IT, Electronics and associated areas to help strengthen national technological capabilities in the context of global developments.

- Indian Institute of Technology Roorkee - [https://www.iitr.ac.in/](https://www.iitr.ac.in/) IIT Roorkee is among the foremost institutes of national importance in higher technological education and in engineering, basic and applied research.

**Associate: (1)**

- IAMAI - [https://iamai.in](https://iamai.in) The Internet & Mobile Association of India (IAMAI) is a not-for-profit industry body registered under the Societies Act, 1896. with a mandate is to expand and enhance the online and mobile value-added services sectors. IAMAI has been tasked by the National Security Council Secretariat (NSCS) to execute a project related to Citizen Mobile Security and they will seek guidance and support from TSDSI members for this project which involves all the layers of Mobile Ecosystem.

**Observer: (8)**

- Tata Tele Services Limited - [https://www.tatateleservices.com](https://www.tatateleservices.com) is a leading enabler of digital connectivity and cloud solutions to enterprises. Its services range from connectivity, collaboration, cloud, SaaS, security, IoT, and a wide range of marketing solutions.

- Simulanis Solutions Private Limited - [https://www.simulanis.com/](https://www.simulanis.com/) Simulanis national-award-winning XR technology company in India, provides immersive generic XR software for training and productivity use-cases over their web-based platform. The products spread across industries such as pharmaceuticals, automotive, automation, telecom and oil and gas.

- INVAS Technologies (P) Ltd - [www.invas.in](www.invas.in)  INVAS Technologies, established in 2006, with deep expertise in test and measurement equipment for access as well as backhaul telecom networks, provide latest technology products and integration service for telecom systems to the Government as well as private sector. They are willing to work with Government agencies to carry out initial trials and testing for new technologies (5G and beyond) without commercial interests.

- Amantya Technologies Private Ltd - [https://amantyatech.com/](https://amantyatech.com/)  Amantya is a product engineering services organization with deep expertise in the area of 5G - RAN and Core domains. They have developed a 5G SA Core and 5G Network in a Box (integrated RAN and Core solution in a box) and also provide end to end (device to edge to network to cloud) 5G based solutioning services leveraging its inhouse solution accelerators and integration expertise.

- COSGrid Systems Private Ltd - [https://www.cosgrid.com](https://www.cosgrid.com)  COSGrid Networks founded in 2016 provides a secure SD-WAN & SASE solution that delivers superior WAN connectivity to Enterprise branch offices, remote working employees, IoT and Cloud.

- Innogle Technologies Pvt Ltd - [https://www.innogle.com/](https://www.innogle.com/)  A women Led Startup, Innogle Presents An Award winning patent product Kadalcompass which creates a Digital Ocean by establishing an intranet between the Vessels and connect the internet using LoRA gateway and 5G/4G Gateways which provide comprehensive real-time solution using an emerging technology of IoUT (Internet of Underwater things) and AI Vision to trace the Fishermen/Ocean workers within 20 Sec.

- QuNu Labs Pvt Ltd - [https://www.qnulabs.com/](https://www.qnulabs.com/)  QuNu Labs Pvt. Ltd (also referred as QNu Labs) is a Bangalore based startup with the distinction of being the first Quantum Security Technology Company out of India that offers unhackable data security.

TSDSI member list can be viewed here [https://tsdsi.in/present_members/](https://tsdsi.in/present_members/).

To apply for TSDSI membership, please visit [https://tsdsi.in/membership/](https://tsdsi.in/membership/).
On Diversity, Localisation and 6G for India

Satish Jamadagni, Reliance Jio

As 5G standardization is complete and deployments are going strong across the world, there are initial discussions on what 6G should be. Globally efforts are on to define 6G. So far, we have seen multiple geographies announce 6G development programs, the Next G Alliance in the U.S. and Canada; Hexa-X, RISE-6G, and NEW-6G in Europe are a few examples. Japan, Korea, and China have also announced programs on 6G. In India, a Technology Innovation Group on 6G has been set up by DoT.

On the standards front, the ITU-R has initiated work on developing a recommendation on vision for IMT for 2030 and beyond ITU-R M.[IMT.VISION 2030 and BEYOND], intended to address the “Motivation on driving factors for future technology trends towards 2030 and beyond” and drive the direction of 6G technologies. In India, 6G standards development efforts are being led by TSDSI. TSDSI submitted its “Initial 6G Vision” to the ITU-R M. [IMT.VISION 2030 and BEYOND] document in June 2021.

TSDSI began work on 6G with a workshop in January 2020. A technical study on use cases, requirements, and technologies for 6G is underway at TSDSI. It aims to establish use cases, KPIs for these requirements; technology trends including candidate technologies to address these KPIs, Network evolution, corresponding spectrum requirements and related aspects. TSDSI has also made an initial contribution to the ITU 6G Vision document. TSDSI’s 6G vision focuses on 4 pillars- “Ubiquitous Intelligent Mobile Connected Society”, “Bridging the Digital Divide”, “Personalization and localization” and “data ownership segregation”. Some of the other emerging drivers got 6G cover

A critical enabling technology for achieving most of the above will be by embedding “intelligence” across the network stack. By Intelligence we mean the use of “Artificial Intelligence” or AI which include reasoning, knowledge representation, learning, perception etc for stated objectives. AI relies on the timely availability, quality, and integrity of data. More the data better it is as data always needs to be analyzed in a context. The ability to analyze the data from a small locality or at hyper local levels always works better for “intelligence engines” to arrive at inferences through what is termed as “specialization” which contrasts with “generalization” which is extrapolation to a larger context. As an example, behavioral patterns of a person can be better inferred by analyzing the local context. This is critical to achieve AI enabled networking for 6G for to cater to use cases of personalization.

Local/hyperlocal data can lead to better use of AI across the telecom stack. AI algorithms work better when more data is available to arrive at “specialization” which in turn leads to better “generalization” in the learning process. “Specialization” is a set of concepts automatically extracted from a corpus of data, preferably providing “local or hyper local” context. Generalization/specialization relation lead to better construction of a hierarchy in the available data and thus mapping to a better network model.

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How does this impact a 6G network design you ask? The idea is to design a network built to serve local/hyper local requirements (data access and voice services) and then draw a larger network of networks. This “localized network” approach is the exact opposite of the conventional centralized core hub and spoke framework. Why a “Network of Networks” (NoN) approach for 6G?, local or hyper-Local Data embedded well into the access network could change: improved local search optimizations from data insights, Faster and dynamic updates in services such as maps, local data consumption models leading to better broadcast technologies, super targeted advertisements, Hyper-local data also promises to bring in better optimizations in MIMO technologies (targeted beam forming), helps better use of technologies such as Intelligent Reflective Surfaces (IRS) all leading to a refined user experience. It must be noticed that a broader “NoN” trend is in some sense already underway through “private network deployments” but that is still in its infancy.

In conclusion, understanding Indian demography leads to an emphasis on “local and hyper local” contexts and the preference to use a “network of networks” approach in designing 6G. A network of networks can be a combination of multiple ownerships across data, spectrum, network types and assets, use case providers, application providers etc in an open disaggregated manner.

Satish Jamadagni
Vice Chair, TSDSI
(VP & Head of Standards - Reliance Jio)

Satish Jamadagni is currently the Vice President and head of standards in Reliance Jio. He has 23 years of industry experience in the telecom domain. He is also the previous Chair of a TSDSI working group (5G-Networks). He is active in 3GPP, GSMA and in O-RAN. Earlier he was a Co-Chair of the Asia Regional Operators Group; Small Cell Forum (SCF) and was on the board of the International Multimedia Teleconferencing Consortium (IMTC). He has around 150 granted patents in the wireless domain.
TSDSI “Hall of Fame 2021”

TSDSI admitted Prof Bhaskar Ramamurthi and Mr R K Pathak to the TSĐSI Hall of Fame 2021. They were felicitated in an online awards ceremony held on 7 January 2022 on the occasion of TSĐSI Founders Day.

TSĐSI Hall of Fame 2021 Champion

Prof Bhaskar Ramamurthi
Director, IIT Madras

“His leadership role in catalysing the government, industry and academia to set up TSĐSI and steering it successfully through its start-up phase to become a globally respected SDO.”

TSĐSI Fellow 2021 Organization Building

Mr R K Pathak
Deputy Director General, International Cooperation, DoT, Govt. of India

“Being a pillar of support for TSĐSI from its conception, championing TSĐSI within DoT in its formative years and laying a solid foundation for TSĐSI by leading the drafting of its rules, regulations and working procedures.”

Mr Vishnu RAM OV from TSĐSI Secretariat received an appreciation certificate from ITU-T SG 13 (Future networks (& cloud)) Chair “In recognition of the contribution to ITU-T Study Group 13 standardization activities and the excellent work performed”.

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Upcoming Meetings

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<td>TSDSI GBM#17</td>
<td>1 Feb 2022</td>
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<tr>
<td>oneM2M TP#53</td>
<td>7 - 18 Feb 2022</td>
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<tr>
<td>ITU-R WP SD#40 e-meeting</td>
<td>7 - 23 Feb 2022</td>
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<td>TSDSI SGSS TP*</td>
<td>3 - 4 Mar 2022</td>
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<td>3GPP RAN/SA/CT#95-e</td>
<td>14 - 24 Mar 2022</td>
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<tr>
<td>ITU-T Collaboration on ITS Communication Standards (CITS) e-Meeting</td>
<td>18 Mar 2022</td>
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<td>ITU-R WP SD WG Spectrum Meeting</td>
<td>19 - 22 Apr 2022</td>
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<td>3GPP PCG#48-e/OP#47-e</td>
<td>26 - 27 Apr 2022</td>
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<td>oneM2M TP#54</td>
<td>9 - 13 May 2022</td>
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<td>31 May - 2 Jun 2022</td>
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<td>3GPP RAN/SA/CT Plenary#96</td>
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<tr>
<td>ITU-R WP SD#41</td>
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* Tentative Dates

Upcoming Events

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<td>7 Jan 2022</td>
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<td>SDR@ COMSNETS 2022</td>
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<td>TSDSI Outstanding Technical Contributions Awards FY21</td>
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<td>ITU-T Global Standards Symposium</td>
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<td>ITU Future Networked Car Symposium</td>
<td>22 - 25 Mar 2022</td>
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<td>ITU-D WTDC</td>
<td>6 - 15 Jun 2022</td>
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ABOUT TSDSI

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

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

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