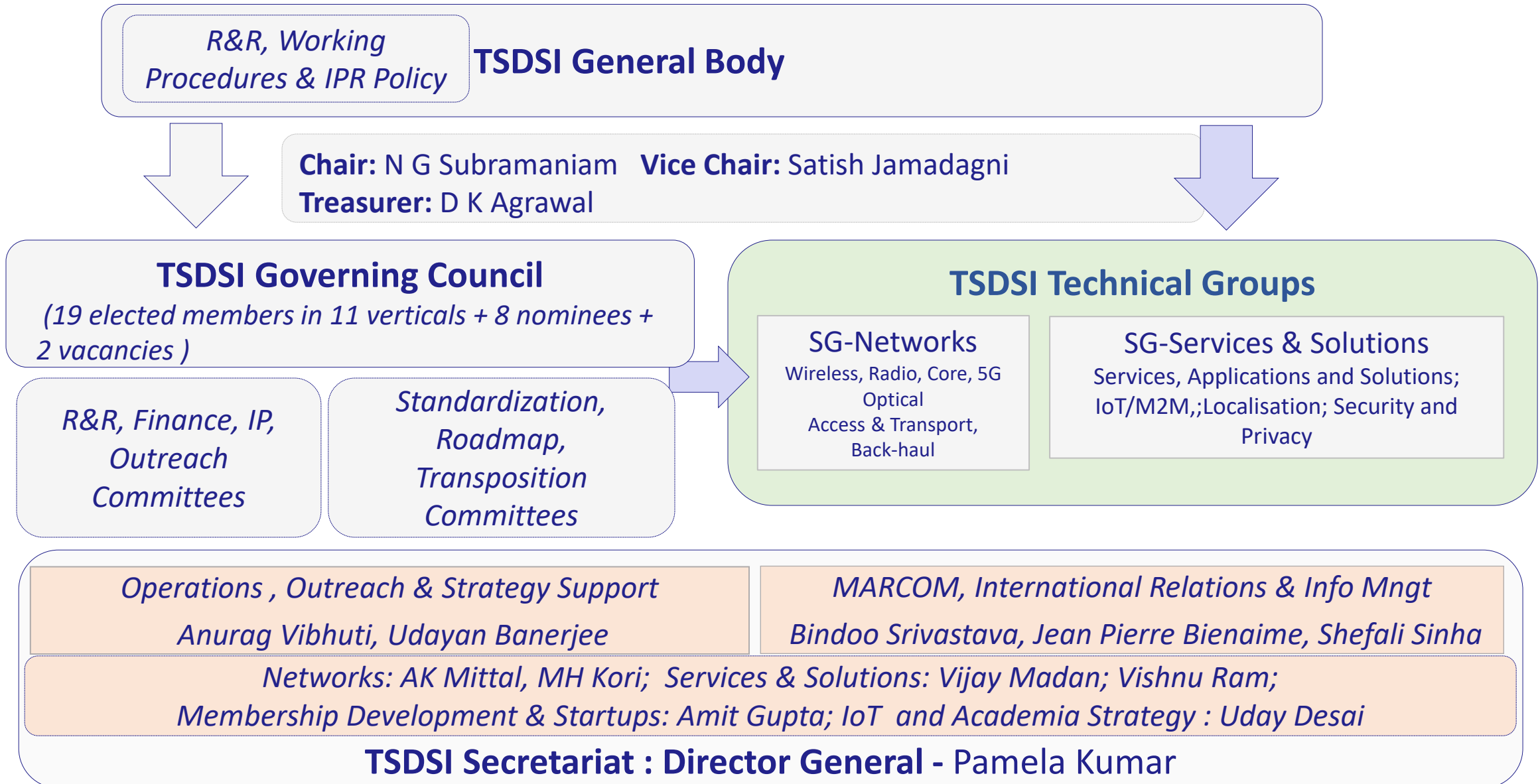


## **TSDSI Induction Program**

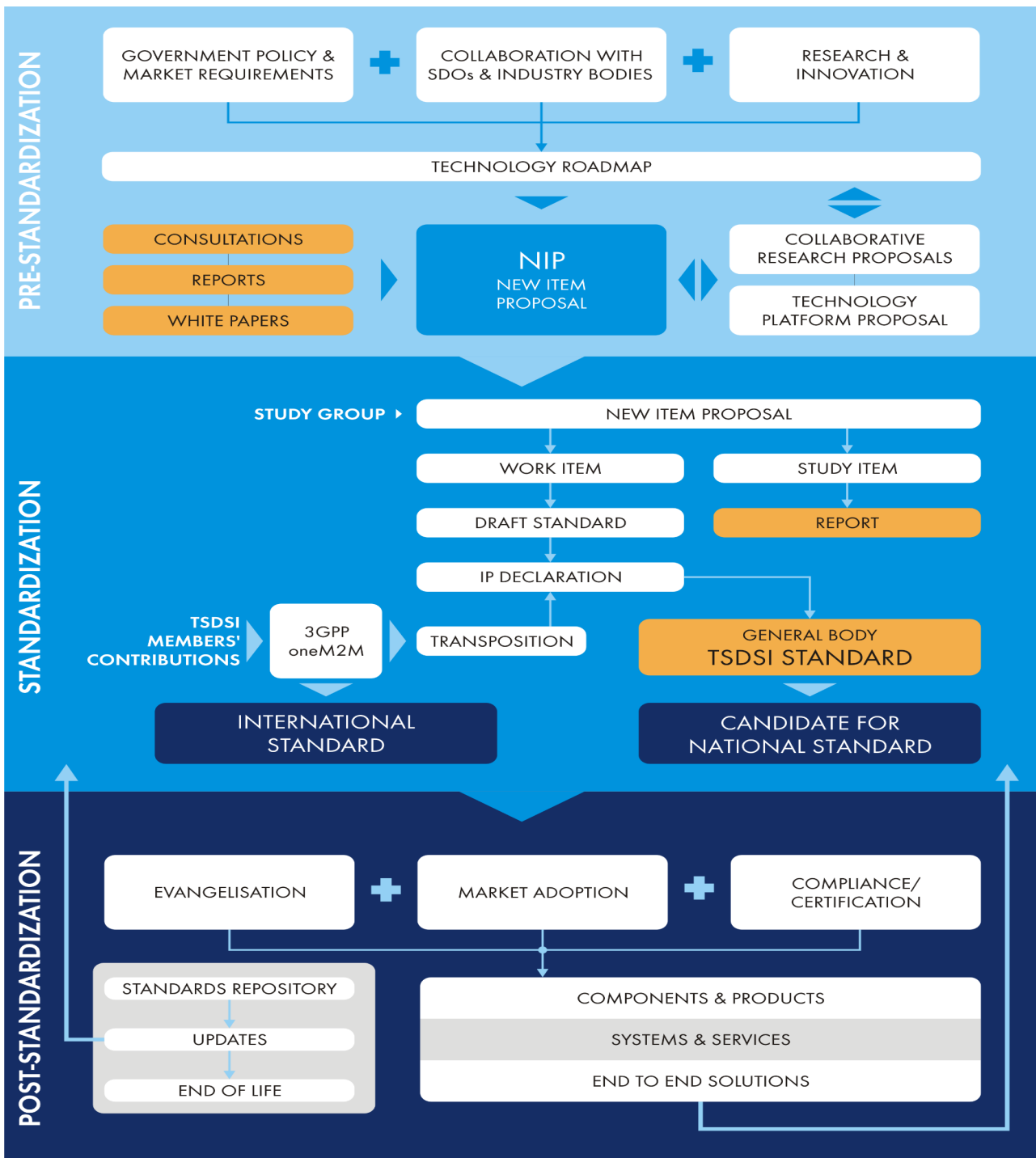
# **Standardization Life Cycle**

**AK Mittal, Advisor-Networks, TSDSI**  
**22 May 2021**

# TSDSI – Organization



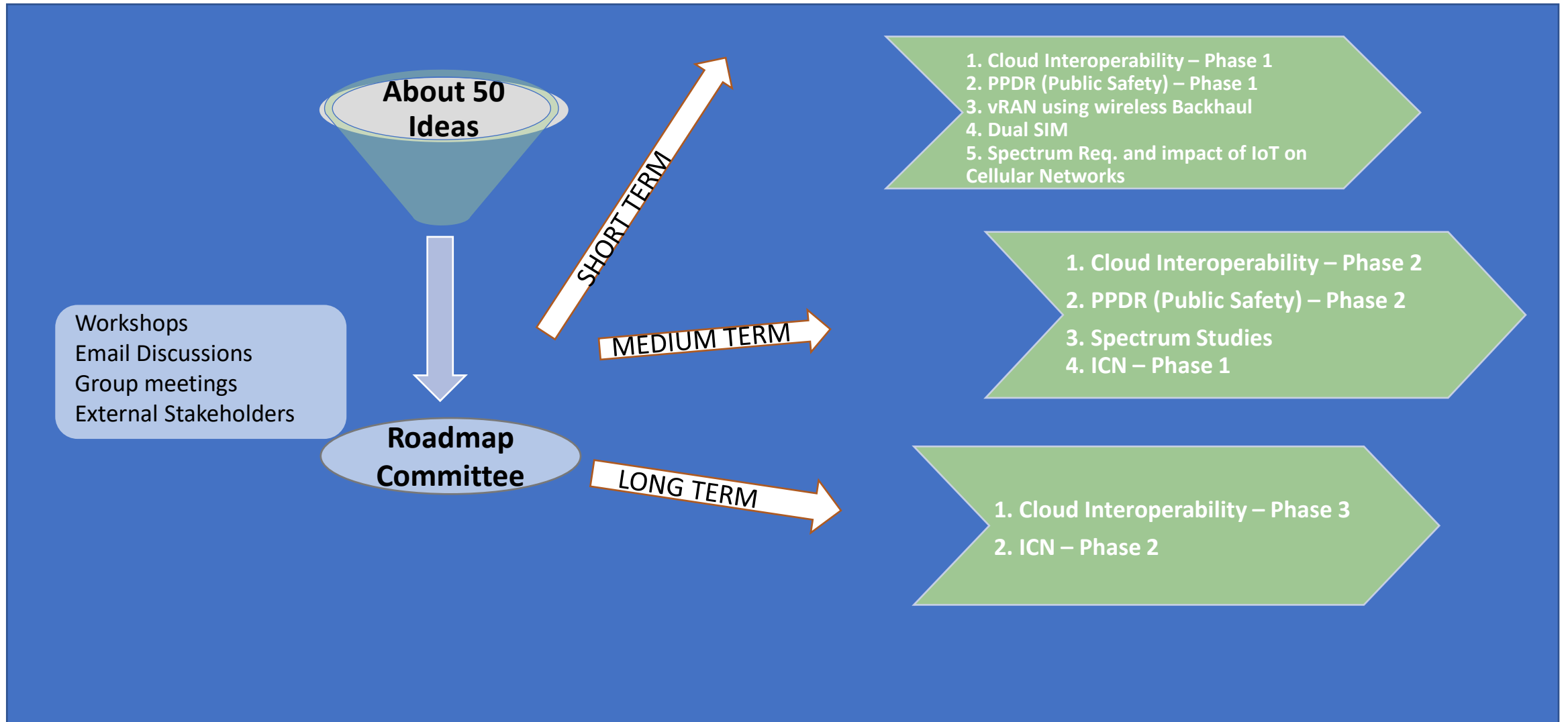
# Standardization Process @TSDSI



# Pre-Standardization Activities

- Pre-standardization activities help in developing ideas for technical studies and standards work in the Study Groups and also for gathering support from stake holders
- Activities like workshops, TRIP Forums etc are organized by TSDSI
- Example of workshops conducted by TSDSI:
  - 1) AI/ML
  - 2) PPDR
  - 3) 5G RIT
  - 4) Drone Communications
  - 5) Broadcast offload
  - 6) Beyond 5G (6G)
- Roadmap is created with internal and external stakeholder participation. Currently work is on for updating TSDSI Roadmap to V2.0. Two workshops were organized.
- TRIP (Technology Roadmap Item Proposal) Forum to focus on key topics involving non-member experts e.g., Mobile Data Privacy & Protection (MDPP) and Contact tracing and Proximity Detection
- Task Force on Open Initiatives

# TSDSI Roadmap V1.0 (2018-20)



# TSDSI Roadmap V2.0



Workshops  
Email Discussions  
Group meetings  
External Stakeholders



- NDCP 2018 Spectrum
- Rural Broadband Architecture
- Flexible Dynamic Spectrum Access Architecture
- CSI Enhancements for 5G
- Smart IoT Data Pruning at the End Nodes
- Mobile Data Protection & Privacy
- Contact Tracing & Proximity Detection
- Applications & Security
- O-RAN
- IEEE802.16T
- Cloud – Interoperability
- IMT2020 & Beyond @ ITU
- Rural Coverage Enhancement
- Security Requirements
- Co-existence of Satellite & Terrestrial
- Quantum Key Distribution
- Virtualization for Open-Disaggregated RAN
- Development of VLC/LiFi Standards
- Proposal for Unified Interface to 5G Cloud Resource
- Autonomous Electric Cargo Vehicles
- 4G/5G Fronthaul & Backhaul, Wireless-to-Building (WTTB), Rural Broadband

Colour Code	Meaning
<span style="background-color: #00C853; width: 20px; height: 10px; display: inline-block;"></span>	Taken Up in Study Groups
<span style="background-color: #8BC34A; width: 20px; height: 10px; display: inline-block;"></span>	Taken Up in Special Interest Groups
<span style="background-color: #C8E6C9; width: 20px; height: 10px; display: inline-block;"></span>	Items Under Discussion
<span style="background-color: #E8F5E9; width: 20px; height: 10px; display: inline-block;"></span>	Items in Proposal Stage

# Focus Areas of Work in Study Groups (1/2)

## Study Group- Networks

There are 17 active Study and work items ongoing in Study Group Networks.

Focus areas of work in SGN for the current year are as follows:

- 6G
- Spectrum Studies
- Broadcast Offload
- 5G Enhancements
- Open Systems
- Wireless Backhaul
- Narrow Band IoT

# Focus areas of Work in Study Groups (2/2)

## Study Group- Services & Solutions

There are 11 active Study and work items ongoing in Study Group Services and Solutions.

Focus areas of work in SGSS for the current year are as follows:

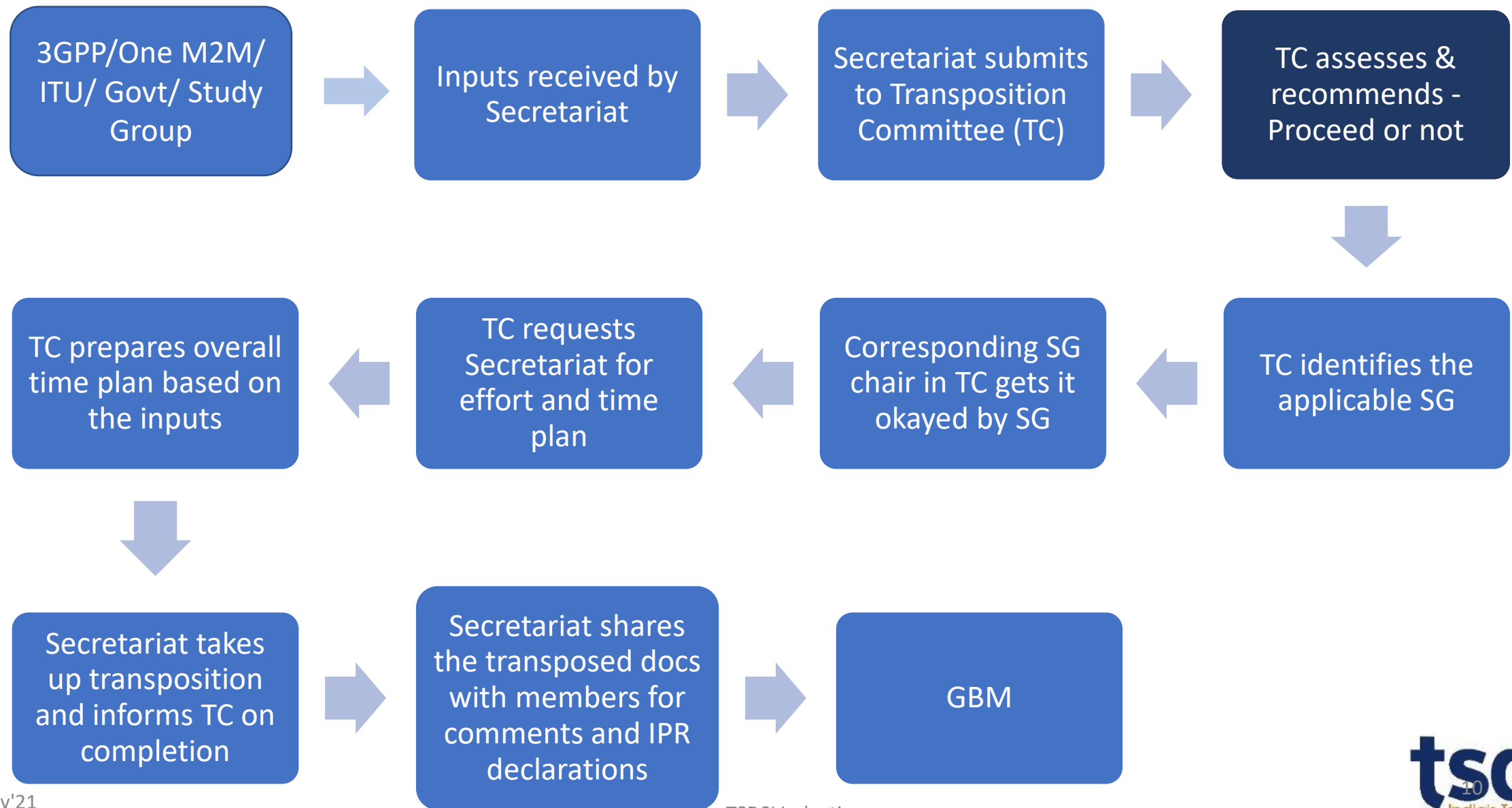
- IoT/M2M
- Security, Trust, Privacy & Protection
- Smart Infra & Use Cases
- Cloud Interoperability & Portability
- Applications/Services Layer Standards (Fintech, Energy Sector and Rural Applications & Services)



# Standardization through Transposition of Specifications

- TSDSI is a partner organization of 3GPP and oneM2M
- Both of these organizations are non-legal entities
- Specifications developed by them are transposed by partner organizations to convert them into their own standards
- Since the specifications have been developed in the study groups/working groups of these organizations, a separate method for approval of the transposed specifications as TSDSI standards has been adopted

# Typical Transposition Process



# Adoption of TSDSI standards by TEC as National Standards

- Telecom Engineering Centre, DoT has the mandate to adopt TSDSI standards as national standards
- TSDSI sends its standards to TEC for adoption
- TEC follows a process of public consultation by making the standards available on its website
- Public comments received are examined by the Consultative Committee (CC) set up TEC which has participation from government, industry, academia etc
- The standard is finally adopted as national standard based on the recommendations of the CC and thereafter of the TSAC (Telecom Standardization Advisory Committee) of TEC

# TSDSI at a Glance - Metrics

## Published Standards and Reports

Group	Technical Reports Published	Technical Reports in Draft	Technical Standards Published
<b>Study Group - Networks</b>	<b>4</b>	<b>1</b>	<b>2465</b>
<b>Study Group - Services &amp; Solutions</b>	<b>82</b>	<b>2</b>	<b>136</b>

# About Some Recent Standards and Technical Reports(1/2)

- TSDSI Radio Interface Technology (5Gi) standard is now part of ITU-R Recommendation M.2150
- TSDSI Standards on IMT Advanced (corresponding to ITU-R M.2012-4) and transposed one M2M Rel 2 standards adopted as National Standards by Telecommunications Engineering Centre (TEC)
- “CPRI Fronthaul Transport” standard developed by TSDSI has been taken up by TEC for adoption as National Standard.
- NavIC (Satellite based Indian Navigation System of ISRO) is now part of 3GPP Release 16 based on proposal introduced by TSDSI IM.
- As part of its effort in developing Cloud Interoperability & Portability standards, TSDSI submitted a technical report to DOT which is now followed by work on developing standards.

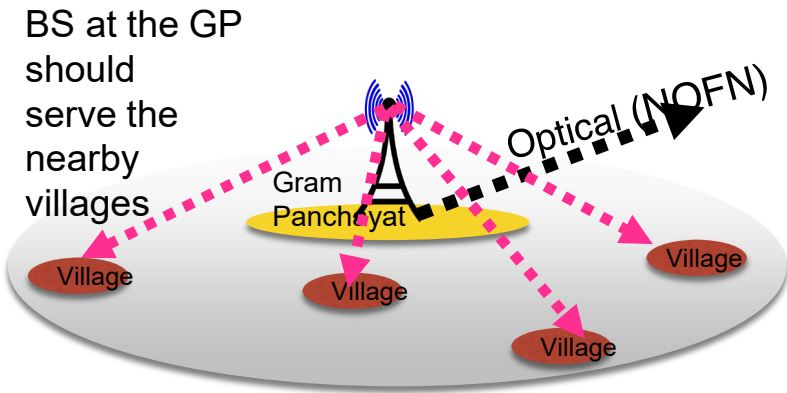
# About Some Recent Standards and Technical Reports(2/2)

Some Technical Reports published

- Channel Characteristics of 60GHz for 4G/5G Backhaul
- Performance Measurements for Dual SIM Devices
- Broadcast offload
- Information Centric Networking
- Public Protection and Disaster Recovery
- NB-IoT capabilities for Energy Metering
- Smart IoT Communication: Context Specific Data Pruning in Smart IoT Applications
- Drone Communication Services Support in Cellular Network
- Reducing Threats to the National Critical Infrastructure Using DNS
- Cloud Interoperability & Portability (CIP) Standard Reference report

**Thank You**  
*akmittal@tsdsi.in*

# Journey of TSDSI RIT qualifying for Inclusion in IMT2020 (aka 5G) specifications



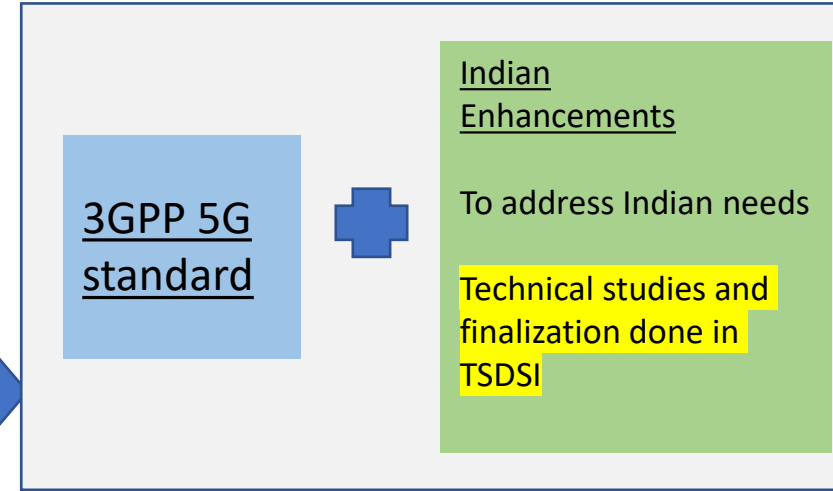
Config A  
700 MHz  
ISD 1.732km  
120/500 km/h

Config B  
4 GHz  
ISD 1.1732km  
120/500 km/h

Existing rural models  
3G, 4G, 5G

Config C (LMLC)  
700 MHz  
ISD 6 km  
3/30 km/h

New model  
5G



India Requirement

TSDSI's Low Mobility Large Cell (LMLC) Requirement incorporated as a mandatory Requirement at ITU in Q3 2017

TSDSI RIT (5Gi) is now part of upcoming ITU-R Recommendation M.[IMT-2020.SPECS]



# Benefits of TSDSI RIT

Rural coverage (exceeding ITU requirements)

Affordable

Improved performance only with primarily software changes

Globally inter-operable and compatible

Improved building penetration for NB-IoT

Important for smart cities mission

# Ecosystem Impact

## Device

1. Software changes
2. Some vendors might change PA
  - Even then, high volumes in India should maintain price
3. Fully inter-operable (roaming)

## Infrastructure

1. Only software changes
2. Inter-operable with devices minus Indian enhancements

## Testing

1. One-time investment for additional testing
2. Test equipment manufacturers to incorporate Indian enhancements
3. Impact on cost of network or equipment negligible

Long-term benefits outweigh the initial work and one-time cost