



5G and Connecting 1 Billion People: Indian Perspective

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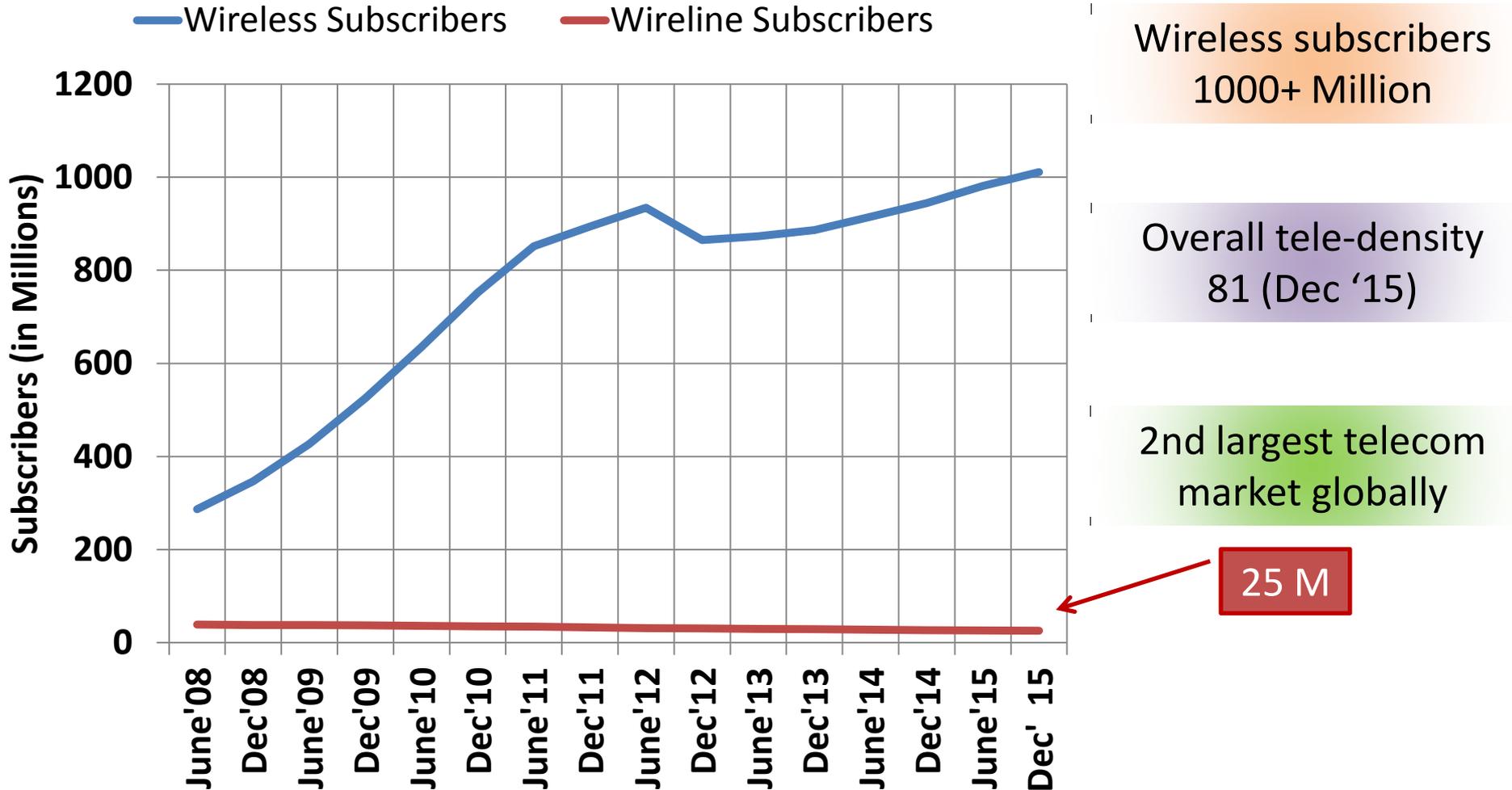
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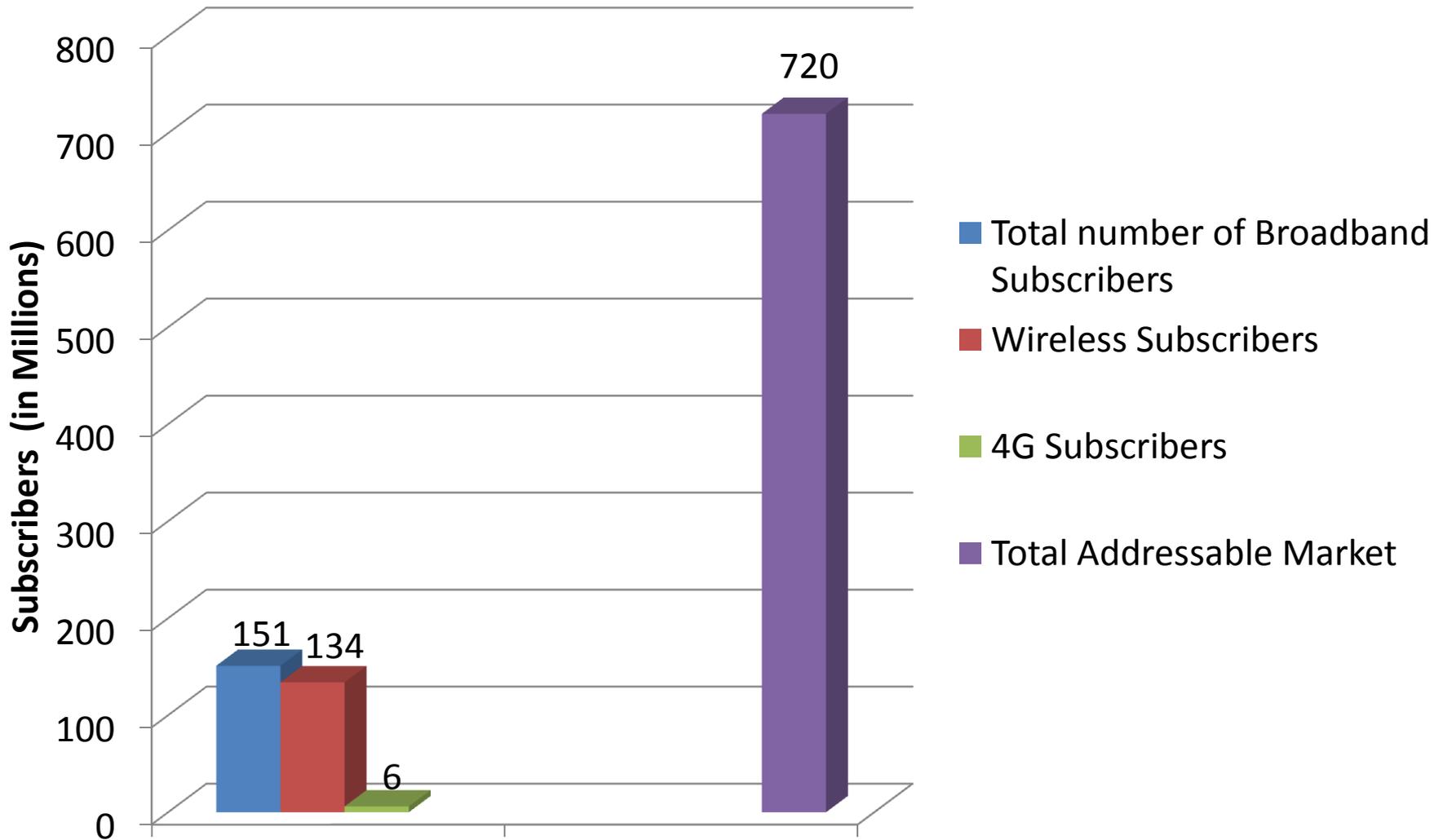
Telecom in India: Subscriber Base

Subscriber Base



Broadband Penetration

As of April 2016



National Priorities

Affordable and reliable broadband – major public policy goal of Government of India

Major Government Initiatives

- *BharatNet*
Broadband to 6,40,000 villages
Optical fiber to 2,50,000 Gram Panchayats
- *Digital India*
e-Gov services and applications
- *Smart City*
100 smart cities

National M2M Roadmap (launched in May 2015)

- *Transport, Utilities, Automotive*

Traffic Growth in India – 5G?

- India needs primary broadband connectivity to 250 M homes, for 250 GB/month being delivered at 2 Mbps
- Translates to 100 Exabytes per month for India alone which is 8x the expected global mobile traffic by 2017!!

What does India need for 5G?

- Can we avoid new BTS roll outs?
 - We have 12,11,261 BTSes already in India
- Can we have more efficient use of spectrum?
 - Cost is transferred to end-customer
 - Makes the solution unaffordable
- Do we need to support high-speed mobility (300 km/h)?
 - in cities 40-60 km/h; 80-100 km/h on highways
 - Mobility is required but Fixed Primary Access is key

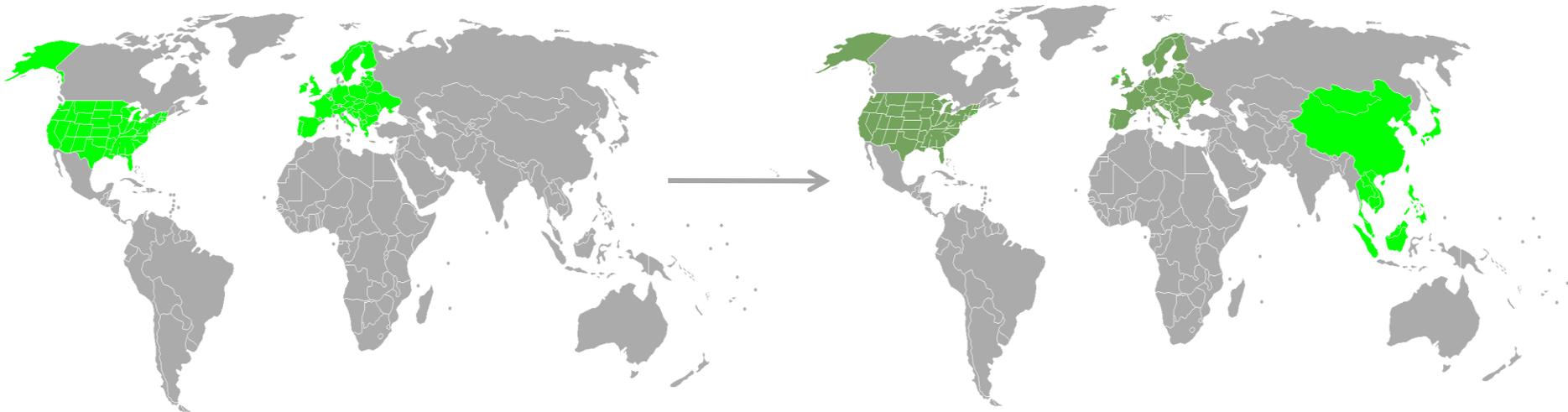
We need a focussed and cost-effective solution!

Telecom Product Sector: A Perspective

- Few telecom products made in India
 - Components are still 100% imports
 - High outflow of foreign currency \$\$
- No common interface to represent Indian industry and also Indian requirement
- Could not leverage 80's success-C-DoT
- Relied on imported technology subject to standards developed in US and Europe
 - ETSI standards have formed part of large no of systems
- Till recently, India the only country in the top telecom market with no umbrella body focussing on standards
- Marginal value addition
 - In-significant contribution in IPRs, patents
- No eco-system for IPR based high end telecom equipment product development

Global IPR Scenario

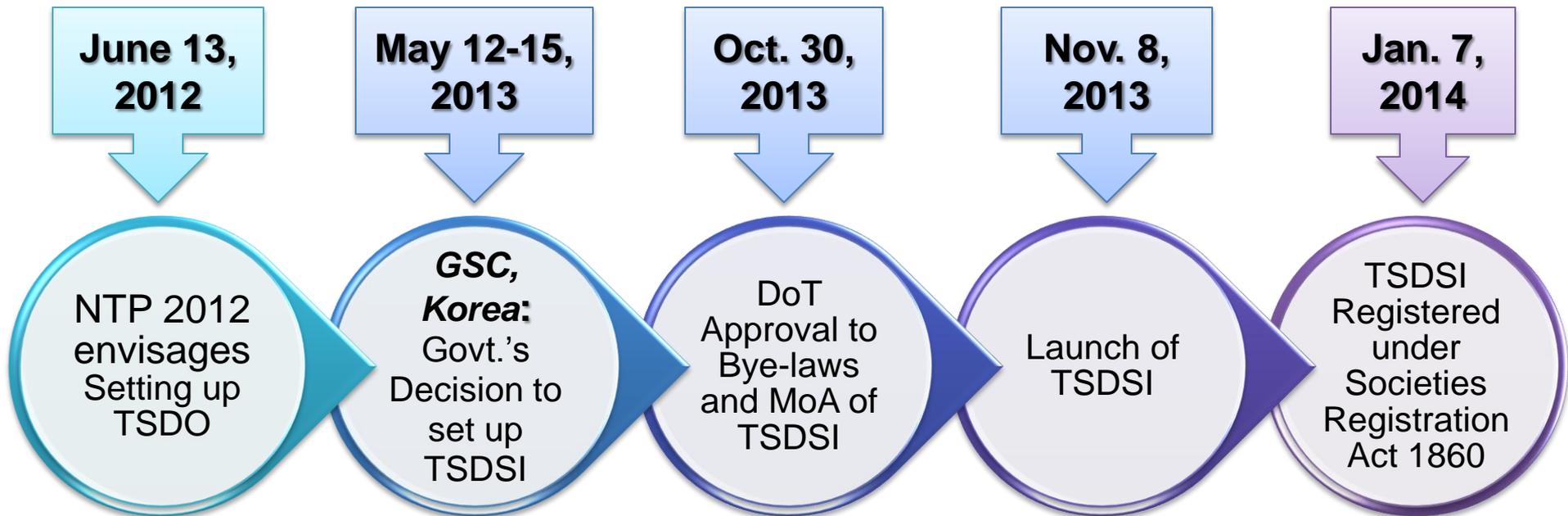
- Nations increasingly aware of IPR and use of IPR reserves to position trade policy
- China- a good example
- Balance of IPR shifting to Asia/Pacific
 - Significant IPR in LTE being held by Asia Pacific (China/Korea/Japan)
 - Earlier almost 90% IPR held by Western world



Telecom Standards Landscape

- 3GPP
 - Driving next generation wireless standards
 - GSM, EDGE, HSPA, LTE (2G, 3G, 4G, 5G.....)
 - Partnership project with 6 global SDOs-ETSI, ATIS, ARIB, TTC, TTA, CCSA (now TSDSI also a partner)
 - Participation only through partner SDO
 - **Major hurdle for India until TSDSI**
- IEEE
 - Driving standards such as WiFi, WiMAX, Ethernet etc
 - Individuals/Entities can participate
- IETF
 - Driving Internet related standards- TCP, IP, etc
- ITU
 - Govt administrators (DoT)

Birth of TSDSI !



Acronyms Used Above

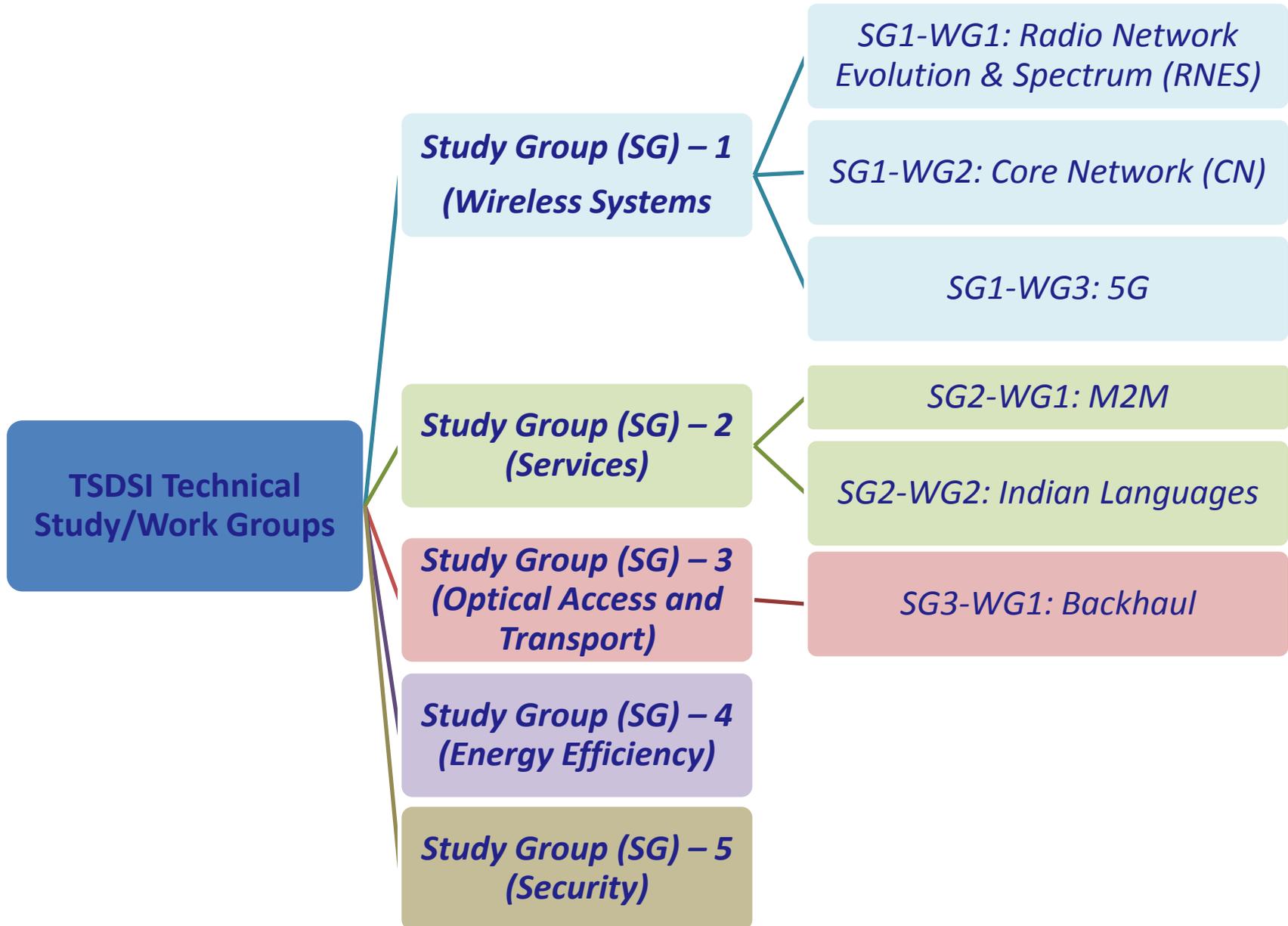
TSDSI	Telecommunications Standards Development Society, India
TSDO	Telecommunications Standards Development Organization
NTP 2012	National Telecom Policy 2012
GSC, Korea	Global Standards Collaboration Meeting held at Jeju, Korea
DoT	Department of Telecommunications
MoA	Memorandum of Associations



TSDSI Charter

- Align with national priorities and Promote India specific requirements and standardizing solutions for the same
- Help to create an eco-system for telecom equipment/device manufacturing in India
- Contribute to various international telecom standards forums towards the development of global standards

Technical Groups in TSDSI



Summary

- Govt has set an ambitious goal of Digital India and Make in India
- Mobile data traffic expected to grow exponentially
 - Spectrum requirement will grow exponentially
 - Energy cost will also go
- Primary Broadband and Rural connectivity are the crying need
 - Need 5G Standards and 5G Spectrum Management to address this gap !
- TSDSI has an important role to play
 - Driving next generation standards to meet national priorities
 - Help create an ecosystem of manufacturing in India
 - Make in India

Technical Priority Areas in TSDSI

- 5G Physical Layer
 - mmWave
 - Massive MIMO
 - Access using Licensed and Unlicensed band
 - Relay
 - Spectrum Requirements for 5G
 - 5G Security and Energy performance
- TDD NB IoT
- NFV Performance Evaluation: Workload Design
- Control and Management of Large Scale WLAN

IPR Policy of TSDSI

- Aligned with global SDOs
- FRAND Licensing
- Essential IPR
 - Technically essential!
- Disclosures
 - Timely disclosures
- Licensing
 - Owner of Essential IPR to give undertaking within 3 months to agree to grant license on FRAND terms
 - Reciprocity
- Injunctive relief not specified

Thank You