STUDY GROUP
Networks
SGN

tsdsi
India's Telecom SDO

Telecommunications Standards Development Society, India

Telecommunications Standards Development Society, India (TSDSI), is an autonomous 'not for profit' Standards Development Organization for Telecom products and services in India. Our membership comprises stakeholder organizations from all sections of the Telecom ecosystem in India, Industry, Operators, Value Added Service Providers, Manufacturers, R&D and Test Labs, Academia, PSUs and the Govt. We are recognised by the Department of Telecommunications, Government of India, as India's Telecom SDO.

Technical activities of TSDSI are conducted in two Study Groups, Study Group - Networks and Study Group - Services and Solutions.

The Study Group - Networks handles standardisation activities broadly in areas of:

1. Wireless communication systems, including overall system architecture, Radio-based access and Mobile core networks, the functional elements constituting these networks and the interfaces/protocols between these networks, Software Defined Network (SDN) and Network function virtualization (NFV) of the access and core networks.
2. Backhaul using wireless & wireline, microwave, optical and/or packet based transport networks and related SDN & NFV aspects, systems, equipment, optical fibre cables, along with the related control plane, network management, performance monitoring & reporting, synchronization, interfaces, multi-layer optimization techniques and testing aspects.
3. Spectrum studies related to the above areas and technical recommendations.
4. Interference studies, including co-channel, adjacent channel, and inter-system interference.

Some of the current focus areas of Study Group - Networks are:

Contribution to Futuristic Technologies

A. Submission of Radio Interface Technology (RIT) proposal for 5G (IMT2020) by TSDSI to ITU-R

A submission has been made by TSDSI to ITU-R WP 5D in its meeting#32 (held in Brazil from 9th to 17th July, 2019) as a part of ITU-R process for inclusion of TSDSI standards in final ITU-R Recommendations for IMT 2020 RIT.

The TSDSI proposal includes the following important features:

1. pi/2 BPSK modulation with spectrum shaping in uplink which has 3dB lower PAPR waveform; permitting the increase in uplink range. This is an enabler for implementation of LMLC which will lead to enhanced 5G coverage at lower cost especially in rural areas.
2. pi/2 BPSK modulation for NB-IoT for improved urban penetration and increased rural coverage with no cost impact on the device.
3. Intelligent BWP configurations for additional granularity in the UE frequency scheduling and better utilization of available resources.
4. Low latency precoded Sounding Reference Signal (SRS) transmission resulting in performance gains with mobility.
5. Optimizing Phase Tracking Reference Signal (PTRS) density through intelligent threshold parameters which is useful for high frequency (mm wave) communications.

B. Contribution to 3GPP Release 17

A consolidated proposal on new features to be included in Release 17 developed in Study Group Networks has been presented on behalf of TSDSI to 3GPP Plenary #84 in June 2019. This proposal contains the salient features of various enhancements required to enable an effective deployment of 5G in India. This framework covers many common areas of mutual interest to TSDSI and 3GPP that would enable active participation from TSDSI for conducting normative work in Release 17.

The proposed areas of work in TSDSI are as follows:

1. Capacity and Coverage enhancements (compared to Release-16)
2. In-Band Full-Duplex Study Proposal
3. IAB enhancement
4. MBMS support for 5G NR
5. Support for SA Deployment Option-6
6. Consider DU and RU split options 3, 6 and 7

Discussions on final features that are to be included as a part of Rel 17 are in progress, where TSDSI has been called upon to take the responsibility of reporting progress on "Topics for (5G) New Radio deployment in Developing Countries" at the 3GPP Technical Meetings.

Study of Channel Characteristics for 60 GHz

V-Band ranging from 57 to 66 GHz is found to possess high oxygen absorption which implies immunity to interference and enhanced frequency re-use. This makes V-Band suitable for high capacity transmissions over shorter distances. This spectrum can be utilized to support various high capacity backhaul and access technology deployments either through point-to-point or mesh topologies. As 5G wireless technologies are anticipated to meet IMT2020 requirements like higher throughput, capacity, and hyper-dense deployments by exploiting the largely untapped millimeter wave spectrum, the V-Band spectrum is expected to play a critical role in making 5G a reality in near future.

In this context, a Technical Report (TR) on band characteristics of 60 GHz has been developed in the SG-Networks during September 2019. This report comprises of inherent characteristics of the band as well as the compatibility aspects i.e. coexistence between the proposed MGWS (Multi Gigabit Wireless System) application w.r.t some of the planned services and systems operating in the frequency range of 57 GHz to 66 GHz. This report examines coexistence for deployment scenarios across various links in V band including MGWS and existing FS (Fixed Service)

systems, WLAN and WPAN applications operating in 57-59GHz and 64-66GHz at indoors. It has been found that, there is an insignificant risk of interference for Point to Point FS links. Some precautionary provisions need to be considered while deploying FLANE (Fixed Local Area Network Extension) applications to coexist with Point to Point FS links.

Broadcast Offload

In the recent past, mobile personalized devices like smartphones and tablets have become the preferred means of media consumption globally. Worldwide, Digital Terrestrial Broadcast (DTB) market is shrinking accordingly, which is leading to a situation where many administrations, are considering to deallocate spectrum from the broadcast services to cellular services.

Globally, Internet video traffic is expected to be 82% of all consumer Internet traffic by 2022, with 1.1 million minutes of video streamed or downloaded every second. In this era customer avails content anytime, anywhere on a multitude of devices including the mobile phone largely through Internet-OTT platforms. This exponential rise in per capita video consumption especially on the mobile phone poses unprecedented challenges to telecom networks, compelling network operators to look at more efficient video delivery mechanisms.

To address these challenges, I SG Networks had taken up a study and the technical report on the same has been finalized in the SGN Meeting in September 2019.

This report addresses deployment scenarios, link budget, interference profiles in various deployment scenarios and highlights the possible deployment constraints which in turn could help Government to decide on an appropriate model of allotment of spectrum. A comparison between the ATSC 3.0 and eMBMS/FeMBMS for broadcast offload to mobile devices has also been carried out in this report. Further, the report includes the roll out models and infrastructure cost to encourage the business development aspects of the same.

Performance Measurements of Dual SIM Devices

In India, with evolution and rapid penetration of mobile phones, dual SIM phoneshave gained immense popularity. Indian markets are flooded with various types of dual SIM modelsrunning on Android/IOSplatforms. Currently, around 300 Mn dual SIM handsets are in use andit is expected to be a market of 700 Mn phones in the next 3-4 years.Availability of an extra SIM card slot enables the users to enjoy the service from any two different operators at the same point of time. However, some performance gaps are noticed for Dual SIM phones.

To address the issues regarding the performance measurements of the Dual SIM phones a study was conducted by SG Networks and a technical report has been finalized in September 2019 meeting. This report describes the various implementation models and challenges associated with the Dual SIM phones. This reportestablishes a reproducible, standard test method to gauge the performance impact/degradation indual-sim devices implementation.

Other Focus Areas Include

A. Study of FiDAR/FiCAD

The upcoming 5G systems are expected to have a central unit and a distributed unit connected over Flexible interface (Fx). This study is to address the two parts FiCaD (Flexible interface between CU and DU) and FiDaR (Flexible interface between DU and RU) of the interface. The study plans to include the flexibility aspect in FiDaR and bounds on delay and jitter on the FiCaD and FiDaR. Further, it will also explore the ability to transport FIDaR over microwave backhaul.

B. NB-IoT Extension

In high load traffic conditions, due to growth in IoT devices, CAT-M1 deployment in LTE networks become unviable. NB-IoT is the option in such cases. However, carrier size of 200 KHz may be insufficient to handle such traffic. A solution to increase the bandwidth of NB-IoT to 400 KHz with option to switch between 200 KHz and 400 KHz channel or through carrier aggregation is proposed to be designed.

C. Enabler for Private networks

4G and 5G technologies enable a single physical network to support number of virtual networks with different performance characteristics. This raises the possibility of creating private networks to meet the requirements for different verticals. To use the full potential of technologies, it is important to fill the gap in the existing standards. It is proposed to identify the gaps and create standards in this area.

D. Enhancements in Resource Multiplexing for Integrated Access and Backhaul (IAB) Network

Enormous increase of requirements in backhaul capacity is envisioned due to the higher data rates. A wireless channel with huge bandwidth is necessary for backhaul link. IAB plans to use the mmWave band frequencies which can support both the access and backhaul links. In TSDSI, enhancements of resource multiplexing for IAB has started in SG-Networks.

PUBLISHED STANDARDS

Standard on CPRI Fronthaul

Report on Broadcast Offload

Report on Performance of Dual Sim Devices

Report on Channel Characteristics of 60 GHz

TRANSPOSED STANDARDS

TSDSI, being an organization partner of 3GPP, has

- transposed a set of 3GPP specifications corresponding to update of ITU – R M.2012 Revision 4 (IMT Advanced)
- transposed a set of select 3GPP specifications corresponding to update of ITU – R M.1457 Revision 14 (IMT 2000)

The transposed standards have been submitted to ITU by following the due process. The transposed standards are available at https://tsdsi.in/3gpp/.

KEY CONTRIBUTIONS TO GLOBAL STANDARDS

ITU

- RIT Submission for IMT 2020
- Submission of Transposed standards based on 3GPP specifications for M. 2012 Rev 4 (IMT Advanced) and M.1457 Rev 14 (IMT 2000).

3GPP

- TSDSI members with inputs from ISRO and Reliance JIO as rapporteur, have successfully introduced NavIC as a work item in the 3GPP RAN plenary meeting held in Newport Beach, CA, USA on 21st September 2019. NavIC consisting of seven IRNSS satellites launched by India, is an autonomous regional navigation system with the objective of offering Positioning, Navigation and Timing services to the users in its service area. As 3GPP based standards are used worldwide, it is crucial to include the NavIC system as a part in 3GPP Release 16 specifications. This will enable the widespread usage of NavIC chipsets which will become available on mobile devices. The handheld devices using 4G and 5G networks with NavIC capability can use assisted-NavIC solution in place of or in addition to other constellations like GPS. The specifications will be available in March 2020 and TSDSI will adopt these specifications as a TSDSI standard. This is a significant achievement for India and TSDSI.
- Contribution of a set of proposals for inclusion in the features of Release 17.

Published in October 2019

tsdsi India's Telecom SDO

Telecommunications Standards Development Society, India

REGISTERED OFFICE: 2nd Floor, C-DoT Campus, Mandi Road, Mehrauli, New Delhi 110030, INDIA

www.tsdsi.in secretariat@tsdsi.in +91 11 26597254 company/tsdsi @TSDSI_India