VOLUNTARY CODE OF PRACTICE FOR SUSTAINABLE TELECOM

November 2019

CONTENTS

1. OBJECTIVE:

Prepare and adopt a common industry wide Voluntary Code of Practice (VCP) encompassing energy-efficient Network Planning, infrastructure sharing, deployment of energy-efficient technologies and adoption of Renewable Energy Technology (RET). The voluntary code will be focused on taking reasonable actions within the Telecom Service Providers (TSPs) operations through working with key stakeholders to find long-term solutions to optimize energy usage and resulting reduction in carbon footprint.

The objective of preparing this Voluntary Code of Practice, therefore, is to:

- Voluntarily engage with internal and external stakeholders and communities to broaden common stakeholder understanding of environmental priorities and key environmental challenges related to future technologies, products, services and infrastructure.

- Voluntarily continue upgrading equipment to greener hardware and together, as an industry, continue to hold suppliers and partners to high standards of efficiencies.

- Progressively, continue evolving efficient mechanisms and adopting frugality measures for offsetting the environmental impact from consequent emissions from the use of diesel generators forced by the lack of 24-hour grid power availability.

- To finally, implement the nationally accepted Voluntary Code of Practice in all future telecom network operations.

2. GOAL OF VOLUNTARY CODE OF PRACTICE:

Building a roadmap for achieving energy efficiency in networks thereby reducing carbon emission for period from April 2019 to March 2023 in compliance to DoT directive vide its order number 16-06/2011-CS-III dated 07/01/2019 & 20-271/2010 AS-I, Vol-II dated 15th May 2019.

Target of Average Carbon Emission w.r.t 2011-12	**2019-20**	**2022-23**
	-30%	**-40%**

3. TERMS OF REFERENCE:

The DoT order number 16-06/2011-CS-III dated 07/01/2019 & 20-271/2010 AS-I, Vol-II dated 15th May 2019, desired that the Telecom Service Providers would adopt a Voluntary Code of Practice encompassing energy-efficient Network Planning, infra-sharing, deployment of energy-efficient technologies and adoption of Renewable Energy Technology (RET) including the following elements:
(a) The network operators should progressively induct carefully designed and optimized energy efficient radio networks that reduce overall power and energy consumption.

(b) The target for reduction in 'Average Carbon Emission (tonnes of CO_{2e} per unit Petabyte)' shall be 30% by year 2019-20 taking base year as 2011-12 and 40% by the year 2022-23 taking base year as 2011-12. For TSPs, whose service had started after 2011-12, the base year average carbon emission shall be considered as the average base year carbon emission of TSP with highest subscriber base in the year 2011-12. The target shall be reviewed in the year 2022-23.

Accordingly, this Voluntary Code of practice outlines a documented approach for Service Providers to:

- enhance energy efficient Network Planning
- infrastructure-sharing
- deployment of energy efficient technologies
- adoption of Renewable Energy Technology (RET)

in a voluntary manner by adopting any or all the highlighted solutions in the section 5.

4. SCOPE:

Scope of this document is to frame a voluntary code of practice for all Basic, CMTS, UASL, Unified License, UL(VNO) licensees, ISP, NLD and ILD operators to achieve energy efficiency in their network planning, Infra-sharing, deployment of energy efficient technologies and adoption of renewable energy technology.

- The initiatives suggested in this document are voluntary in nature.
- The Telecom Service Providers (TSPs) can choose options best suited to their internal strategies to reduce the carbon footprint burden of their individual organizations.
- The practices suggested in this document shall be adopted within applicable legal/policy/regulatory frame work

5. VOLUNTARY CODE OF PRACTICE – INDUSTRY ROADMAP

TSPs can adopt all or any of the following practices to make their network energy efficient and meet their carbon footprint reduction targets in line with instructions issued by DoT and TRAI from time to time.

5.1. Energy efficiency in network planning:

5.1.1. Active Infrastructure:

Active Infrastructure includes antenna, feeder cable, Radio Base station, Radio Access Network (RAN), transmission media and Data Centres.

Units of consumption in Active Infrastructure can be reduced by the following initiatives that can be taken by the TSPs:

- **Deploying Distributed antenna systems (DAS)**: In DAS, a single antenna radiating at high power is replaced by a group of low-power antennas to cover the same area. The idea works because less power is wasted in overcoming penetration and shadowing losses, and because a line-of-sight channel is present more frequently, leading to reduced fade depths and reduced delay spread.

- **In-Building Cellular Enhancement Systems:** An in-building cellular enhancement system is a telecommunications solution which is used to extend and distribute the cellular signal of a given mobile network operator.

- **Sleep mode network elements:** Sleep mode network elements operate at low power consumption level when the traffic is low. This capability can be simply added to the network with minor software modifications in network elements. This technology has the potential to reduce power consumption.

- **Optimized Network Design:**

  - Implementing software features that increases traffic handling capacity without compromising quality of service(QoS).

  - Implementing software features that have their primary objective to reduce power consumption.

5.1.2. Passive Infrastructure:

Passive infrastructure comprises of the element which enable the active infra to operate i.e. building, tower, dark fiber, duct space, etc.

Units of consumption in passive Infrastructure can be reduced by the following initiatives:

- **Indoor (ID) to Outdoor (OD) Conversion** –Reduction in energy consumption can be achieved by deploying outdoor base stations or Tropicalisation of equipment. TSPs may deploy various solutions to convert an Indoor site to Outdoor site like;
  - Free Cooling units (FCU)
  - Natural Cooling units (NCU)

- IP- 55 (ingress Protection) Cabinets – Base Station/Transmission equipment
- Cooling cabinet based on Peltier effect
- Thermo Electric Cooling
- Micro-Cooling Units (MCU)/Transmission Cooling Units (TCU)
- Any other method

- **Migration to Battery solution (Advance VRLA/ Li-ion Battery)** – TSPs may plan to have their sites installed with advance VRLA batteries and Lithium-ion battery solutions to reduce the reliance on diesel by their network infrastructure partners.

- **Endeavor to reduce air-conditioning load -** Work to improve EER (Energy Efficiency Ratio)/ COP (Coefficient of Performance) of Air Conditioning by using at least BEE 3-star AC and introduce HVAC (heating, ventilating, and air-conditioning) economizers.

- **Deployment of HVAC (Heating, Ventilating, and Air Conditioner) systems** along with hot aisle/cold aisle configuration and manage airflow in data center to reduce energy consumption.

- **Deployment of Tower remote monitoring solutions:** Tower Remote Monitoring Solution can do remote monitoring & control of onsite equipment, and energy on a 24 x 7 basis. Business analytics on this data enables Tower Company to drive further excellence towards operational efficiency.

- **Integrated Power Management Systems (IPMS) :-**IPMS is targeted for all sites having poor grid availability where low voltage and single phasing are pertinent problems.

- **Variable Speed DC DG:** It has been found that variable speed DC DGs whose fuel consumption for similar load applications in case of DC DGs is up to 30% lesser than AC DGs thus significantly saving on diesel consumption.

5.1.3. Spectrum Sharing: Optimal amount of spectrum per operator can result in reducing the requirement for the number of sites and their energy consumption. This can be achieved by spectrum sharing by the TSPs. TSPs look forward to having more collaboration w.r.t spectrum sharing.

5.1.4. Migration from Microwave to Fiber based technology: Fiber has a minimal ecological impact, reduces waste, consumes very little energy and helps decrease greenhouse gas emissions.

5.1.5. Migration from Coaxial cable to Fiber based technology: Fiber optic cable systems waste less energy than coaxial cable systems. It has been observed coaxial cables consume 3.5 watts to transmit data over 100 meters, while fiber optic systems just use

even less than 1 watt to conduct light pulses over 300 meters. More and more TSPs are converting their copper- based infra to fiber-based infrastructure.

5.2. Infrastructure sharing:

5.2.1. Passive Infrastructure sharing: All TSPs will reduce energy demand by means of tower (Passive Infrastructure) sharing. Sharing passive infrastructure optimizes the loading at the site and that will ultimately reduce carbon emission.

5.2.2. Active Infrastructure sharing: All TSPs will reduce energy consumption by means of Active Infrastructure sharing, within the applicable policy framework.

5.2.3. Fiber sharing: TSPs endeavor to reduce carbon footprint by having more shared fiber.

5.2.4. Cloud-based technology: It is estimated that the adoption of cloud computing could lead to substantial reduction in energy usage. TSPs may use more cloud-based Technology within the applicable policy framework .

5.3. Deployment of energy- efficient technologies: TSPs will have endeavor for deploying some or all the following energy -efficient technologies to reduce the carbon footprint on their networks.

5.3.1. MORAN – MORAN stands for multiple operator radio access networks. Network Sharing is a method of sharing some portions of network architecture among multiple parties. Of course, the major motivation of network sharing is to save power or save critical locations. Network sharing may take many forms, ranging from passive sharing of cell sites and masts to sharing of radio access networks (RANs). MORAN has the environmental aspects as MNOs (Mobile Network Operators)/TSPs maintain separate logical networks with a common active and passive infrastructure. Usages of shared infrastructure will reduce carbon footprint.

5.3.2. MOCN – MOCN stands for Multiple Operator Core Network. Basic idea of this is to share Core along with Access Network part between two or more network operators. In MOCN, the sharing parties tend to be similar scales (like each of the parties are independent network operators). Usually each of these operators has some existing area where they have their own radio base stations but try to share these resources in those area where the service area of the network operators is overlapping. (as of now MOCN is not allowed in in Indian Telecom Network and can be used as and when permitted)

5.3.3. Modernization of Network – Replacing high power consumption Equipment with latest new equipment for power reduction like replacing of old legacy Equipment with SRAN (Single Radio Access Network).

5.3.4. Phasing out Legacy technology - If the legacy device/technology penetration is low in the market and intends to save power consumption of legacy technology, TSPs can plan for upgradation of their network and shut down of networks deployed using legacy technologies.

5.3.5. Other energy efficient Technologies that may be adopted by TSPs

- Optimizing Power Supply
- Utilizing wastage power available on earthwire from High Voltage transmission line on co-located sites of power companies and telecom network operators.
- MCPA (Multi Carrier Power Amplifiers)

5.4. Adoption of renewable energy technology

5.4.1. Green Sites: By restricting use of diesel to less than 100 liters in a period of quarter by optimizing site load, maximum grid supply utilization and efficient radio base station.

5.4.2. Solar Hybrid Sites: By using small capacity solar solution i.e. < 4KWp with advance batteries.

5.4.3. Rooftop Solar & Green Wheeling:

- Leveraging the opportunity provided by Open Access, TSPs can purchase green energy for its various facilities.
- TSPs can deploy rooftop solar captive plants at its Core network locations.

5.4.4. RESCO (Renewable Energy Services Company): Through Telecom and IP Industry Collaborative approach RET solution can be applied to

- Meet Backup power to meet grid deficit
- And surplus power to community uses

5.5. Other initiatives that can be undertaken by the TSPs:

5.5.1. IT operations and commercial centers:

- TSPs can continue to target Reduction in Data Centre Energy consumption and use of alternate renewable source for powering data centres

- TSPs can strive for IT network efficiency via hardware and software like reduction of power consumption at servers, work stations and use of virtual technology etc.

- Introducing of energy monitoring and management systems

- Moving towards Paperless Billing
- Reducing travel of employee and associates through extensive use of Video conferencing, Tele Presence meetings.
- Prioritizing energy efficiency through policy, tools and related KPIs such as carbon disclosure policy and science-based target setting to reduce overall demand for energy.
- Installing LED lights across offices and sites
- Greening Data Centres with LED lights, green equipment and optimization of hardware and cooling.

5.5.2. Outreach and Partnerships:

- Co-operation with organizations, professional service companies / Subject Matter Experts
- Development of Innovative models
- Partnerships with Vendors
- Recycling of Phones and e- waste
- Education, encouragement and volunteerism to employees
- Regular Energy Audits
- Encourage all employees and associates of Telecom industry to adopt energy efficient life style
- Promoting telecom solutions to reduce intra and intercity travel through virtual meetings.

6. CONTRIBUTORS:

Sl No	Organization Name
1	Department of Telecommunications (DoT)
2	Director General Telecom (DGT)
3	Telecommunication Engineering Center (TEC)
4	Indian Telephone Industries Limited (ITI)
5	Mahanagar Telephone Nigam Limited (MTNL)
6	Power Grid Corporation of India Limited (PGCIL)
7	Rail Tel Corporation of India Ltd
8	Association Of Competitive Telecom Operators (ACTO)
9	Broadband India Forum
10	Cellular Operators Association of India (COAI)
11	European Union Seconded European Standardization Expert for India (EU SESEI)
12	Internet Service Providers Association Of India (ISPAI)
13	Manufacturers' Association for Information Technology (MAIT)
14	Tower and Infrastructure Providers Association (TAIPA)
15	Telecom Equipment Manufacturers Association (TEMA)
16	Telecom System Design & Manufacturers Association (TSDM)
17	M/s Airtel
18	M/s Amararaja Batteries Ltd
19	M/s Amtron
20	M/s Adpay Mobiles
21	M/s Conformity testing Labs
22	M/s Ericsson India Pvt Ltd
23	M/s Orange Business Services
24	M/s Quadrent Televenture Ltd
25	M/s Reliance Jio Infocomm Limited
26	M/s Siechen Technologies
27	M/s Shiva Telecom
28	M/s Vihaan Networks Ltd
29	M/s Vodafone-Idea Limited

7. Abbreviation

BEE	Bureau Of Energy Efficiency
BTS	Base Transceiver Station
CMTS	Cellular Mobile Telephone Service
COP	Coefficient Of Performance
CO_2	Carbon Dioxide
CTS	Consolidated Telecom Service
DAS	Distributed Antenna Systems
DGs	Diesel Generator
DoT	Department Of Telecommunication
EER	Energy Efficiency Ratio
FCU	Free Cooling Units
HVAC	Heating, Ventilating, and Air-Conditioning
ILD	International Long Distance
IPMS	Integrated Power Management Systems
ID	Indoor
IP	Ingress Protection
ISP	Internet Service Provider
MCU	Micro-Cooling Units
MCPA	Multi Carrier Power Amplifiers
MNO	Mobile Network Operator
MOCN	Multiple Operator Core Network
MORAN	Multiple Operator Radio Access Networks
NCU	Natural Cooling Units
NLD	National Long Distance
OD	Outdoor
RAN	Radio Access Networks
RESCO	Renewable Energy Services Company
RET	Renewable Energy Technology
TCU	Transmission Cooling Units
TRAI	Telecom Regulatory Authority of India
TSP	Telecom Service Providers
UASL	United Access Service Licence
UL(VNO)	Unified License (Virtual Network Operators)
VCP	Voluntary Code of Practice
VRLA	Valve-Regulated Lead-Acid Battery

***