Telecom Regulatory Authority of India

Consultation Paper

on

Digital Inclusion in the Era of

Emerging Technologies

14th September 2023

Mahanagar Doorsanchar Bhawan

Jawaharlal Nehru Marg

New Delhi – 110 002

Website: www.trai.gov.in

Written Comments on the Consultation Paper are invited from stakeholders by 16.10.2023 and counter-comments by 31.10.2023. Comments and counter-comments will be posted on TRAI's website. Comments and counter-comments may be sent, preferably in electronic form, on the email ID: advisorit@trai.gov.in and ja-cadiv@trai.gov.in.

For any clarification/ information, Anand Kumar Singh, Advisor (CA&IT), TRAI, may be contacted on Telephone No. +91-11-23210990.

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CHAPTER 1 – INTRODUCTION

Background

1.1 Digitalisation of the economy and society has become irrevocable, and it is set to penetrate every sector of the economy and human life deeply. Digitalisation helps in staying connected across distances and at any time for accessing information, receiving basic services including health care, working or studying from home, financial transactions, staying in touch with friends and family, entertainment, etc. Online connectivity is a means for self-empowerment providing enhanced personal and societal well-being and promoting digital livelihoods in the process.

1.2 Digital inclusion depends upon the availability of the digital connectivity infrastructure and the capacity of citizens to use it. While availability of the basic access infrastructure is a necessary condition for digital inclusion, it cannot be treated as a sufficient condition. A robust policy framework provides the right impetus to digital inclusion. A collaborative effort on part of every stakeholder is the key to digital inclusion. The concept of digital inclusion must therefore go beyond basic access. It can create opportunities for addressing the issues arising out of unequal opportunities to access to services and facilitate equitable distribution of the benefits across geographies to all sections of society.

India's Revolutionary Journey towards Digital Inclusion

1.3 India has made a remarkable journey in digital transformation over the years and is now the second-largest telecom market in the world in terms of telecom subscribers. India is also the fastest growing telecom market in the world with a growth rate of active mobile broadband subscriptions being as high as 40.8% during the period 2014-21[1]. The gross revenue of

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[1] https://icrier.org/pdf/State_of_India_Digital_Economy_Report_2023.pdf

the Telecom sector of India in FY 2021-22 was ₹2,78,183 crore[2]. Notably, the number of telecom subscribers was 1,170.38 million in December 2022, which is a considerable improvement from nearly a decade ago when the total number of telecom subscribers was 970.97 million. This surge in telecom subscribers can be attributed to the robust telecom infrastructure that was set up throughout the country providing near universal telecom coverage to the populace of India with efforts to achieve ubiquitous connectivity throughout the country. The broadband subscriptions in the country increased from 85.74 million in 2014 to 832.20 million in December 2022, as shown in the graph below:

Graph 1: Growth of broadband subscribers in the country
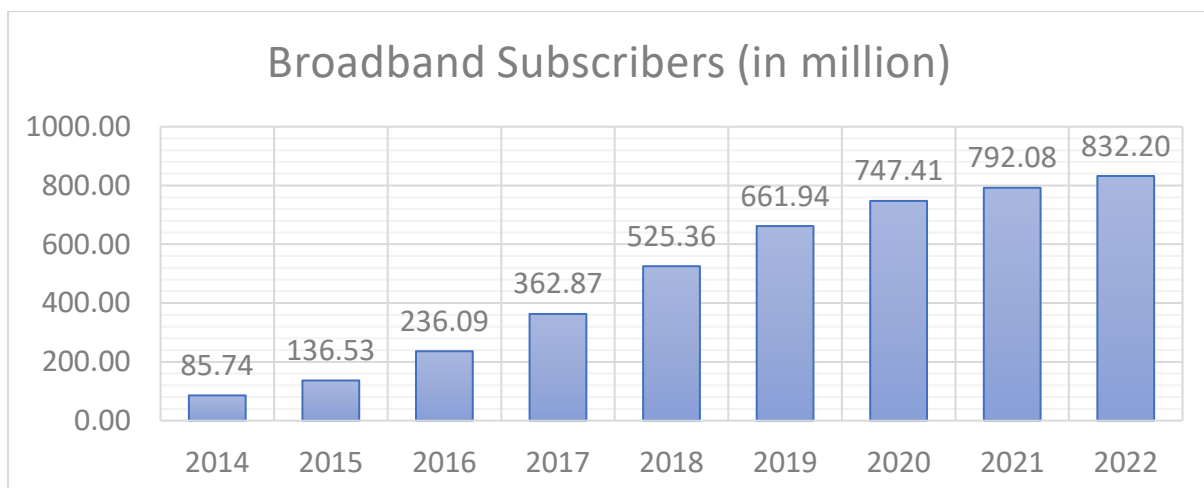
Source: TRAI Performance Indicator Report

1.4 The number of internet subscribers has increased from 267.39 million in 2014 to 865.90 million in December 2022. The internet density in the country has increased from 21.37 in 2014[3] to 62.56 as of September 2022, showing a significant improvement in internet usage over the years.

1.5 Over the years, usage of wireless data has increased exponentially due to deployment of new technologies based on 4G and 5G and also due to the

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[2] https://trai.gov.in/sites/default/files/QPIR_03022023_0.pdf
[3] based on the population (census 2011).

decreasing cost of mobile internet data in the country. The wireless data usage per subscriber per month has increased from 89.43 MB in 2014 to 17.11 GB in December 2022 showing a huge jump in the data consumption in the country[4]. This is largely on account of drastic reduction in data prices in the country. The average revenue realization per GB for mobile data decreased from ₹269 to ₹10.10 during the same period[5].

1.6 In India, 1GB mobile broadband plans are available at nearly 1.1% of Gross National Income (GNI) per capita (~₹150) which is below the target of less than 2% of monthly GNI per capita[6] set by the Broadband Commission for 2025.

1.7 To transform India into a digitally empowered society and a knowledge economy, Government of India launched the **Digital India** programme in July 2015. It is part of the e-governance initiatives taken by the government to move towards SMART (Simple, Moral, Accountable, Responsive and Transparent) governance. The Digital India programme is an umbrella programme that covers many departments and weaves together many ideas and thoughts into a single comprehensive vision. It includes many existing as well as new schemes so that each of them is seen as a part of a larger goal, implemented in a synchronised manner with multiple line ministries. The Digital India Programme is centred around three key vision areas:

  (a) Digital Infrastructure as a core utility to every citizen,
  (b) Governance & Services on demand, and
  (c) Digital Empowerment of citizens.

1.8 To provide ubiquitous connectivity, India has made tremendous efforts to reduce the coverage gap through multiple policy initiatives like the **National Digital Communications Policy 2018** (NDCP 2018) and the

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[4] https://trai.gov.in/sites/default/files/QPIR_31052023_0.pdf
[5] https://trai.gov.in/sites/default/files/QPIR_31052023_0.pdf
[6] https://www.broadbandcommission.org/advocacy-targets/2-affordability/

National Broadband Mission 2019 (NBM 2019). NDCP 2018 and NBM 2019 envisage to promote 'Broadband for All' by creating robust digital communications infrastructure in the country for socio-economic development while ensuring service quality and environmental sustainability.

1.9 India has followed a robust policy of attracting investments in the Telecommunications sector by fostering competition, easy entry of new players and technology neutral policies. TRAI has also followed a policy of forbearance and light-touch regulations. This has resulted into a huge investment by the private sector in digital connectivity infrastructure in form of towers, fiberization and penetration of wireless communication in every nook and corner of the country. In December 2022, the number of Mobile Base Transceiver Stations (BTS) and mobile towers were 2.398 million and 740 thousand, respectively[7]. As per National Investment Promotion and Facilitation Agency, the Telecom sector is the 3rd largest sector in India in terms of FDI inflow, contributing 6.43% of total FDI inflow, and contributes directly to 2.2 million employment and indirectly to 1.8 million jobs[8].

1.10 **BharatNet** project, launched by the Government envisages to connect all the villages and Gram Panchayats (GPs) or Village Councils of India by high-speed broadband internet connectivity through optical fibre cable (OFC) links. As of 2022, over 1,85,975 GPs have been made service ready.

1.11 The **Common Service Centres** (CSCs) set up across the nation through the Ministry of Electronics and IT (MeitY) help citizens to access various citizen centric services available on digital platforms provided by the Government or its agencies. As of October 2022, total 5,21,225 CSCs are operational across all States & Union Territories of the country, out of which, total 4,14,766 CSCs are operational at Village/ Village Council

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[7] DoT Annual Report, 2022-23.
[8] https://www.investindia.gov.in/sector/telecom

level[9,10]. More than 400+ services across the country are being delivered through CSCs (CSC SPV Portal) to the citizen across the country. Some of the services made available through CSCs include banking services, Aadhaar enrolment and updation, digital literacy training, telemedicine, e-governance services, financial inclusion services like Prime Minister's Jan Dhan Yojana (PMJDY), and agriculture services[11].

1.12 To address the challenge of providing mobile connectivity to remote and rural areas, where the setup costs for infrastructure such as mobile towers, fibre cables, and base stations are high and revenue generation is limited, **Universal Service Obligation Fund (USOF)** has been established by the Government. The USOF serves as a financial instrument to support connectivity projects in these underserved areas. The primary objective of the USOF is to ensure affordable access of reliable and widespread telecom network in rural and remote regions. To achieve this goal, several schemes have been/ are being implemented through the USOF.

1.13 Further, the country has been actively investing in the development of a robust **Digital Public Infrastructure (DPI**) to facilitate digital transformation and enhance public services. The government has undertaken several initiatives to establish a strong foundation for digital infrastructure across the country.

1.14 **India Stack** is a set of technological products and frameworks owned and maintained by various agencies. The products and frameworks under India Stack include Aadhaar, e-KYC, e-auth, DigiLocker, UPI and Account Aggregator framework[12]. It aims to enable presence-less, paper-less and cash-less service delivery in India with its three economic primitives of Identity, Data and Payments. Other examples of DPI initiatives undertaken by the government for financial inclusion are

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[9] https://meity.dashboard.nic.in/
[10] MeitY, Annual Report 2022-23
[11] https://cscspv.in/
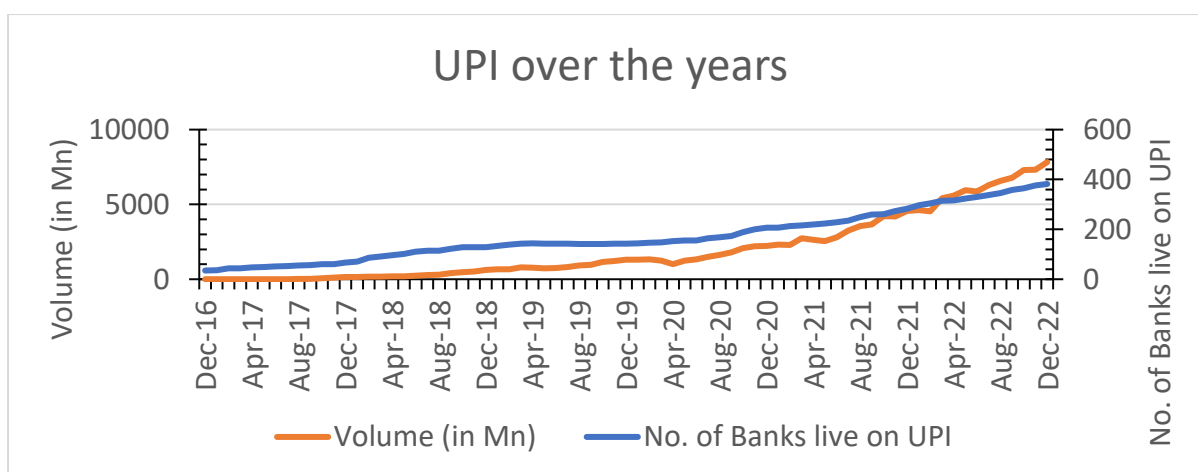[12] https://indiastack.org/

Unified Payment Interface (UPI), **Direct Benefit Transfer** (DBT), **Aadhaar, E-RUPI**, etc. These initiatives are driving the increased usage of digital technologies and digital transformation in the country. Launched in 2016, UPI has revolutionized the way individuals and businesses conduct digital transactions in the country. UPI provides a seamless platform for users to link bank accounts to a mobile application, empowering citizens across all segments to carry out financial transactions through smartphones without visiting the bank. Further, Aadhaar provides a unique identity to an individual which is used for the authentication of personal identity in various kinds of applications. DBT has proved to be of great benefit to individuals for transfer of various subsidies to them without the involvement of any intermediaries. As per the DBT website of Government of India[13], as of March 2023, ₹ 29840 billion (₹ 29.84 Lakh Crore) has been transferred directly to beneficiaries by the government. E-Rupi is another initiative taken by the government to bring about digital transformation, which is a cashless and contactless instrument for digital payment.

1.15 The growth of UPI in terms of adoption and transactions is illustrated in the following graph.

Graph 2: Growth of UPI over the year

Source: National Payment Corporation of India[14]

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[13] https://dbtbharat.gov.in/
[14] https://www.npci.org.in/what-we-do/upi/product-statistics

1.16 The **Prime Minister Jan Dhan Yojana (PMJDY)** has played a vital role in driving financial inclusion in India by enabling access to financial services through the banking system. Together with the JAM trinity (Jan Dhan-Aadhaar-Mobile), which combines Aadhaar identification and mobile verification, the PMJDY has facilitated transparent and efficient money transfers through Direct Benefit Transfer (DBT) to beneficiaries. Also, National Payment Corporation of India (NPCI) developed a digital payment solution based on **Unstructured Supplementary Service Data (USSD) gateway** for the users of feature phones. To protect the interests of USSD users and to promote digital financial inclusion, TRAI through its Sixty-Eighth Amendment of the Telecommunication Tariff Order, 1999 (dated 24 November 2021), has made the charges for outgoing USSD session for USSD-based mobile banking and payment services to ₹0.00 from earlier ₹0.50.

1.17 The initiatives mentioned above made a significant impact by empowering the people of India and facilitating increased usage of the internet and other digital technologies in India. As of December 2022,[15] 1.35 billion Aadhaar identities have been generated, 5.6 billion documents were issued on DigiLocker, and 750 hospitals are onboard with the E-hospital initiative. The cumulative number of payments through digital transactions as of December 2022, is 330 billion[16]. Further, the MyGov portal registered 29.7 million users[17] who are part of the participative governance.

1.18 To improve the affordability of digital devices such as smartphones, the Central Government has undertaken initiatives for promoting indigenous manufacturing in the country. The National Policy on Electronics (NPE) promotes domestic manufacturing and export of electronic devices. The Production Linked Incentive (PLI) scheme and Design Linked Incentive (DLI) Scheme offer incentives for manufacturing

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[15] https://meity.dashboard.nic.in/
[16] https://meity.dashboard.nic.in/
[17] https://www.meity.gov.in/content/performance-smartboard

mobile phones, electronic components, and other devices, as well as support in the form of additional incentive for semiconductor design development in India.

1.19 The Government of India through MeitY and the Ministry of Education has also undertaken various skilling initiatives to impart digital literacy to the eligible citizens. Some of these initiatives are PMGDISHA programme, which aim to digitally literate 60 million people from the rural areas, the Digital Skilling Programme, FutureSkills, the National Digital Literacy Mission (NDLM) and Digital Saksharta Abhiyan (DISHA).

1.20 At macro level, the performance of the country is very impressive. However, at micro and disaggregated levels there appear to be variations in the usage of the internet and broadband services across different sections of society and geographies. These variations need to be investigated very critically and holistically to ensure that each citizen of the country is further empowered to be part of the digital journey, and no one is left behind.

Identifying the variations

1.21 There is a need to identify the potential areas where policy intervention may be required to ensure 100% digital inclusion. The usage gap of mobile internet in India is 61% in 2021 as per the report published by GSMA[18]. Usage gap is the number of people not using mobile internet despite living in areas having mobile connectivity.

1.22 The internet density in urban areas of the country is 104.77%, whereas, in rural areas, it is 38.33% as of September 2022. The two figures indicate a gap of more than 66% in internet penetration in the urban and rural areas of the country[19]. Further, there is a gender gap in terms

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[18] https://www.gsma.com/mobileeconomy/wp-content/uploads/2022/07/GSMA_APAC_ME_2022_R_Web_Final.pdf
[19] https://www.trai.gov.in/sites/default/files/QPIR_23112022.pdf

of usage of internet. Against 51% of the men, only 30% of the women were able to use the internet in 2021 indicating a gap of 21%[20].

1.23 Adoption of UPI and other digital financial services has increased significantly in the country, but the digital payments are only made by a portion of populace and the usage of the services is not universal. However, the extraordinary penetration of UPI payments in the country has allowed even the smallest vendor and citizens with feature phones to have access to digital payments and the gap is likely to reduce significantly in the coming years.

Emerging Technologies: Challenges in Digital Inclusion

1.24 While emerging technologies hold great promise for advancing digital inclusion, they also present challenges that can create gaps in access and participation. The rapid pace of technological advancements and the associated costs of adopting and utilizing these technologies can widen the digital divide, particularly for marginalized communities and underserved regions. Unequal access of infrastructure, limited digital literacy, and affordability issues could hinder the equitable distribution and utilization of emerging technologies, exacerbating existing disparities in digital inclusion. To ensure comprehensive digital inclusion, it is imperative to address the gaps which are likely to arise due to emerging technologies by implementing targeted policies, investing in infrastructure development, promoting digital literacy programs, and fostering affordable access to emerging technologies for all segments of society. Furthermore, there is also a need to generate use cases for emerging technologies for individuals as well as businesses (MSMEs) to take benefit from, so that they can actively participate in the digital economy.

1.25 In order to keep pace with new technological innovations and to ensure that the benefits of emerging technologies are available to all segments

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[20] GSMA Gender Gap Report 2022

of society, it is essential to upgrade and impart digital skills that are required for using new technologies on a continual basis.

Digital divide is a global phenomenon

1.26 In order to identify the gaps in digital inclusion, several international indices have been developed by various international organisations such as Mobile Connectivity Index, Affordability Drivers Index, Network Readiness Index. These global indices are further explored in detail in Chapter 2.

1.27 According to GSMA, the global usage gap of mobile internet stands at 40%, meaning that 3.2 billion people are not using mobile internet despite living in connected areas. As per ITU, 2.7 billion people remain offline. Furthermore, there were 259 million more men than women using the Internet in 2022[21]. Also, Globally, 82% of the people are using the internet in urban areas, but the number of internet users in the rural areas is only 46% showing an urban-rural ratio of 1.77. These numbers show that Digital Divide is a problem in several countries.

1.28 To address digital divide, countries such as India, US, UK, Canada, Australia, Singapore, etc. have initiated many programmes, with some of the programmes being coordinated at the highest level of the governments. International Telecommunication Union (ITU) has also set aspirational targets for 2030[22] as a part of the United Nations (UN) Secretary-General's Roadmap for Digital Cooperation.

1.29 To address the issues of variations in access to the existing as well as new technologies, and the adoption of same by all sections of society crossing the hurdle of digital divide, will require much higher levels of

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[21] https://www.itu.int/hub/publication/d-ind-ict_mdd-2022/
[22] https://www.itu.int/itu-d/meetings/statistics/wp-content/uploads/sites/8/2022/04/UniversalMeaningfulDigitalConnectivityTargets2030_BackgroundPaper.pdf

internet usage, among various sections of population for which policy level interventions are necessary.

G20 New Delhi Leaders' Declaration[23] (9-10th Sept 2023)

Recently concluded G20 Summit in New Delhi, India has also highlighted importance of an inclusive digital society across the world. **The Declaration** captures following points related to Digital Inclusion:

1.30 ***E. Technological Transformation and Digital Public Infrastructure***

Para 55. Technology can enable rapid transformations for bridging the existing digital divides and accelerate progress for inclusive and sustainable development. Digital public infrastructure (DPI), as an evolving concept and as a set of shared digital systems, built and leveraged by both the public and private sectors, based on secure and resilient infrastructure, and can be built on open standards and specifications, as well as opensource software can enable delivery of services at societal scale....

Fostering Digital Ecosystems

Para 60. *....resolved to deploy all available digital tools and technologies and spare no effort in fostering safe and resilient digital ecosystems and ensuring that every citizen on our planet is financially included.*

Harnessing Artificial Intelligence (AI) Responsibly for Good and for All

Para 61. *...to leverage AI for the public good by solving challenges in a responsible, inclusive and human-centric manner, while protecting people's rights and safety...* and

G. Gender Equality and Empowering All Women and Girls.

Para 63. The G20 reaffirms that gender equality is of fundamental importance, and that investing in the empowerment of all women and girls, has a multiplier effect in implementing the 2030 Agenda.

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[23] https://www.g20.org/content/dam/gtwenty/gtwenty_new/document/G20-New-Delhi-Leaders-Declaration.pdf

Details on importance of the Gender Equality and Empowering all Women and Girls, as resolved by the G-20 nations on bridging gender digital divide are further discussed in Chapter 3 Para 3.91.

Mandate of TRAI concerning Digital Inclusion

1.31 As per the section 11(1)(a) of TRAI Act 1997, TRAI (hereinafter referred to as the Authority) has been mandated to make recommendations either *suo motu* or on a request from the licensor on:

(iv) Measures to facilitate competition and promote efficiency in the operations of telecommunications services to facilitate growth in such services.

(v) Technological improvements in the services provided by the service providers.

(vii) Measures for the development of telecommunication technology and the other matters relatable to the telecommunication industry.

Accordingly, the Authority has decided to take up the issue of "*Digital Inclusion in the Era of Emerging Technologies*" *suo motu* for consultation with the stakeholders with a view to make recommendations to the Government of India on this important subject matter.

Objective and Outline of this Consultation Paper

1.32 This consultation paper has the following broad objectives:

(i) To study the issues related to uneven adoption of new technologies by various sections of the society and economic enterprises and how the new technologies can be used for bridging the digital divide and ensuring that the new technologies do not lead to digital exclusion.

(ii) To study and appreciate the current state of digital inclusion in the country.

(iii) To identify the issues in variations in digital inclusion across different sections of the society.

(iv) To review the existing initiatives taken by the Government of India and various State Governments to bring about digital inclusion.

(v) To learn about the international practices in digital inclusion and to apply the learnings in the Indian context.

(vi) To identify the challenges and opportunities in digital inclusion, especially the MSME sector, in the journey of becoming a digital economy.

1.33 After this introductory chapter, Chapter 2 provides the status of digital inclusion in India. Chapter 3 discusses the Strategy for digital inclusion i.e., Digital Connectivity, Affordability for connectivity and devices and Digital Literacy. This chapter also discusses various initiatives undertaken in India, other countries, and by international organizations. Chapter 4 discusses issues relating to digital inclusion in MSMEs. Chapter 5 summarises various issues brought out in different chapters.

CHAPTER 2 - DIGITAL INCLUSION AND ITS STATUS

Digital Inclusion: Definition

2.1 The World Economic Forum defines Digital Inclusion[24] as "*a movement to ensure that everyone can participate fully in the digital world, and one of the main goals is to ensure that every person can affordably participate in the digital economy.*"

2.2 The United Nations (UN) has defined Digital Inclusion[25] as "*equitable, meaningful, and safe access to use, lead, and design of digital technologies, services, and associated opportunities for everyone, everywhere*".

2.3 For achieving Digital Inclusion in the country, it is necessary to first understand Digital Divide. According to the Organization of Economic Co-operation and Development (OECD), the Digital Divide[26] is defined as "*the gap between individuals, households, businesses, and geographic areas at different socio-economic levels with regard both to their opportunities to access Information communication technologies (ICT) and to their use of the internet for a wide variety of activities.*"

2.4 In simpler terms, *Digital Inclusion is the process of bridging Digital Divide.* To achieve Digital Inclusion, the penetration of accessibility and usage of internet and other digital technologies need to be promoted in the country. Digital Inclusion is crucial in today's society, as it enables individuals and communities to access essential services, information, education, employment opportunities, healthcare, government services,

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https://www3.weforum.org/docs/WEF_Guideboo_to_Digital_Inclusion_Bond_Financing.pdf
25
https://www.un.org/techenvoy/sites/www.un.org.techenvoy/files/general/Definition_Digital-Inclusion.pdf
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and social connections. It plays a significant role in reducing inequalities and promoting social and economic development.

2.5   To draw appropriate strategy for digital inclusion, it is imperative to identify the gaps among different sections of society.

Identifying the Gaps

2.6   Digital divide is a global challenge. Each country has its own opportunities and challenges based on its geography, culture, infrastructure development, socio-economic conditions, education and literacy levels, etc. Study of various reports of international and national agencies indicates the existing gaps in digital inclusion in the country. The same is discussed in the following paragraphs.

Usage Gap

2.7   As per GSMA, in 2021[27], global mobile internet coverage is around 95% of the global population. However, only 55% of the global population is using mobile internet. Meaning, 40% of the global population (3.2 billion people) are not using the mobile internet[28]. This figure is well over one third of the world's population. This 'Usage Gap', as termed by GSMA, is defined as the fraction of people living in areas connected to the mobile internet without access to the internet despite living in connected regions. The following two graphs show the global usage gap over the years and the usage gap in various regions.

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[27] https://www.gsma.com/r/somic/
[28] https://www.gsma.com/r/somic/

Graph 3: Global Usage Gap
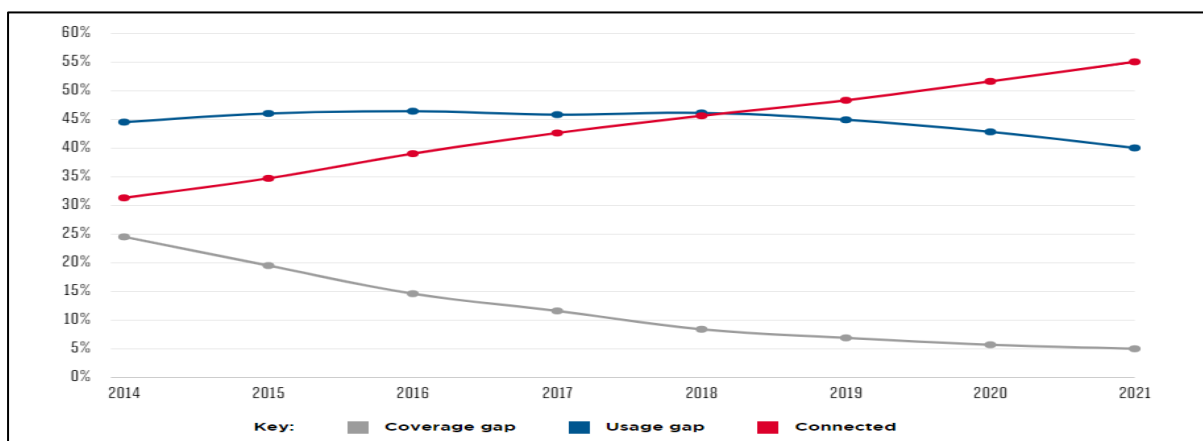
Source: GSMA: State of Mobile Internet Connectivity Report 2022[29]

Graph 4: Usage gap in different regions of the World and India
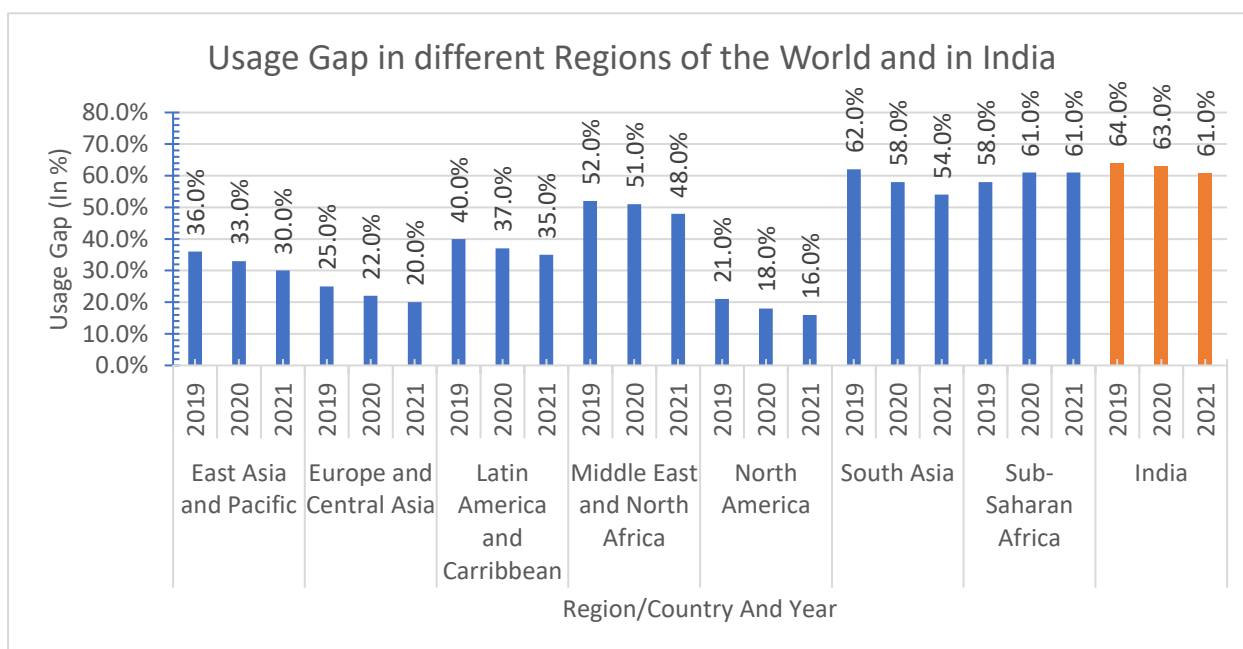
Source: GSMA: State of Mobile Internet Connectivity Report 2022[30]

2.8 The usage gap in Sub-Saharan Africa is the highest in the world with a usage gap in 2021 being 61% followed by South Asia at 54%. It can also be seen that, while usage gap in India is high at 61%, it is steadily decreasing over the years.

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[29] https://www.gsma.com/r/somic/
[30] https://www.gsma.com/r/somic/

2.9 It may be mentioned that, if we consider the DPI penetration in India, access to internet through public platforms such as CSCs, civic centres, banking correspondents, etc., spread across the country, more people have been able to use various citizen-centric services using the internet. Such users and usage are not reflected in the report mentioned above. Similarly, the reports and indices of the international agencies mentioned in the following discussions have also not considered the above aspect.

2.10 GSMA also conducted a survey on barriers to mobile internet use[31], in which, the respondents that were aware of mobile internet but had not used it in the previous three months were asked what stops them from using the internet on a mobile phone. For the respondents from India, two of the most common barriers were, handset cost and data cost in the urban area whereas, for the rural area, the main barriers were affordability and reading and writing difficulties due to non-availability of information in vernacular languages and digital skills.

Rural-Urban Gap

2.11 The number of broadband subscribers in urban and rural areas was 497.14 million and 335.06 million, respectively as of December 2022 as per TRAI's Performance Indicator Reports[32] and it indicates the rural-urban diversity.

2.12 Further, the Graph 5 below indicates the difference between rural and urban internet teledensity as of December 2022. As can be seen, the internet teledensity in rural area is less than half of that in the urban areas as shown in Graph 5 below[33]. It may also be noted that rural-urban gap was increasing till 2019, however after 2019, it is fast

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[31] https://www.gsma.com/r/somic
[32] https://www.trai.gov.in/sites/default/files/QPIR_31052023_0.pdf
[33] https://www.trai.gov.in/sites/default/files/QPIR_31052023_0.pdf

decreasing due to the efforts made to improve the coverage in rural areas.

Graph 5: Number of Internet Subscribers per 100 population (Internet Teledensity) in India and difference between rural and urban internet teledensity
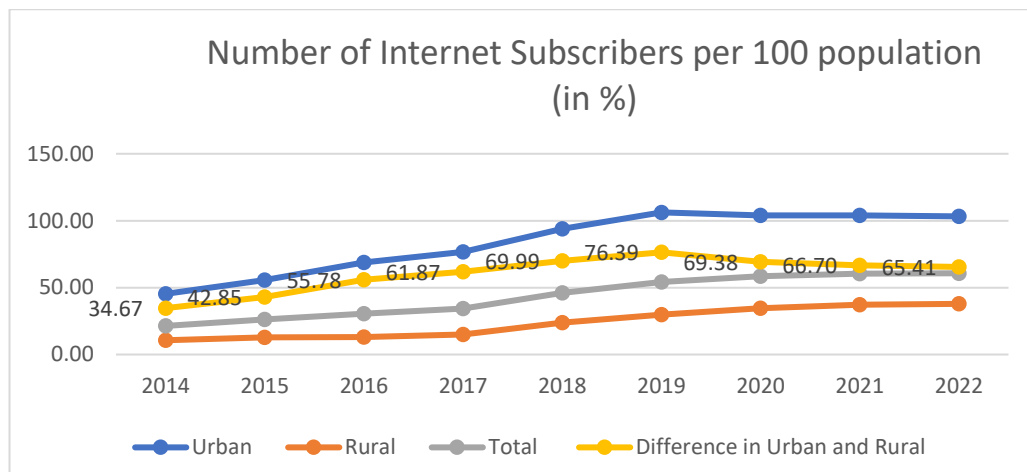
Source: TRAI Performance Indicator Reports

Graph 5 also shows the growth of internet subscription in rural areas in the last few years. However, the internet usage by rural population needs to increase at a much faster rate for rural-urban gap to be bridged.

Gender Gap

2.13 As indicated in the graph below, though there was an increment in mobile internet use in India for women from 21% (2019) to 30% (2020) during COVID-19 and the subsequent lockdowns, however this number has remained constant during 2020-21 with no increment in it. In comparison, the proportion of Indian men using mobile internet grew from 45% in 2020 to 51% in 2021[34]. This figure was 42% in 2019. This lower usage of the internet by women as compared to men represents the gender gap in mobile internet usage.

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[34] https://www.gsma.com/r/wp-content/uploads/2022/06/The-Mobile-Gender-Gap-Report-2022.pdf

Graph 6: Mobile internet usage gap between men and women (in % of total adult population)

Mobile internet usage for men and women (in %)

Year	Men	Women
2019	42	21
2020	45	30
2021	51	30
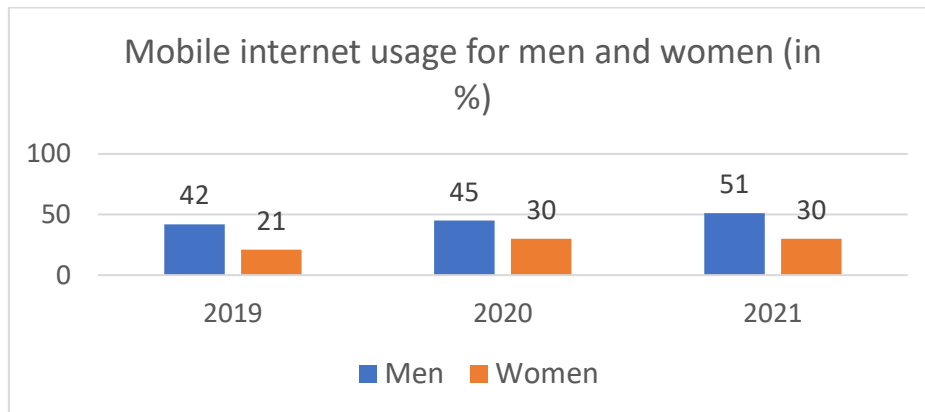
Source: GSMA Gender Gap Report 2022[35]

2.14 The gender gap can also be observed in the smartphone ownership[36] among men and women in the country. Close to half of the male population of India owns a smartphone, while this number is only over a quarter of the female population for the country. This is shown in Graph 7.

Graph 7: Smartphone ownership in the country for 2019-21

Smartphone Ownership in India (%)

	2019	2020	2021
Women	14	25	26
Men	36	41	49

Source: GSMA Gender Gap Report 2022[37]

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[35] https://www.gsma.com/r/wp-content/uploads/2022/06/The-Mobile-Gender-Gap-Report-2022.pdf

[36] GSMA Gender Gap Report 2022

[37] https://www.gsma.com/r/wp-content/uploads/2022/06/The-Mobile-Gender-Gap-Report-2022.pdf
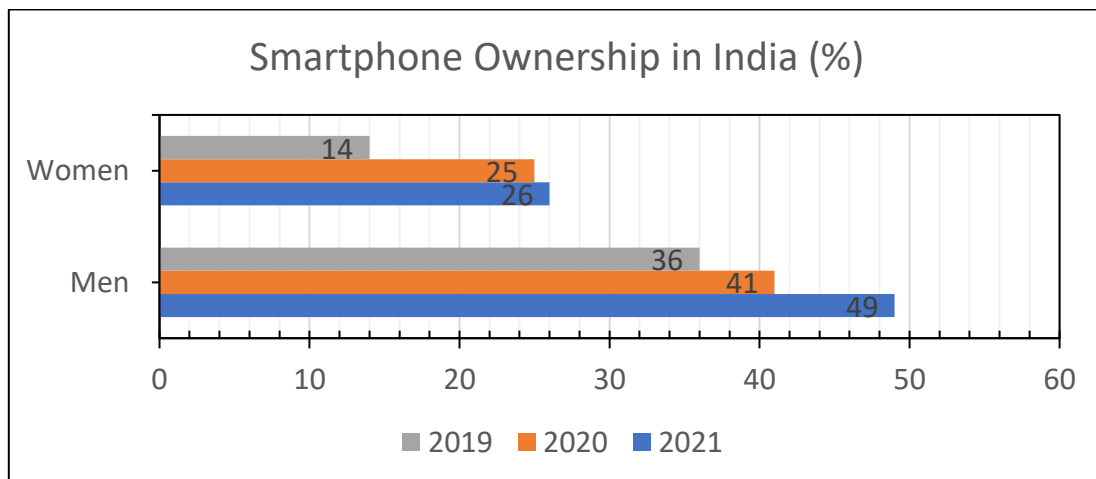
2.15 In a survey conducted by GSMA to identify the barriers towards mobile ownership[38], 37% of the surveyed women and 35% of the surveyed men reported handset costs as one of the most important barriers towards mobile ownership in India. With the introduction of 5G, this issue becomes more critical since 5G smartphones are considerably more expensive than 4G smartphones.

Gaps in the Internet Density in States and UTs

2.16 In India, TRAI monitors the internet growth and density across States and Union Territories (UTs) and publishes Performance Indicator Reports, which provide insights into the internet density and internet usage patterns in different States/UTs of the country. These reports shed light on the variations in internet penetration and accessibility across States and UTs. From the reports, it is evident that the internet usage and density differ significantly from one state to another, highlighting the presence of gaps and disparities in connectivity throughout the country.

2.17 Graph 8 indicates the internet density[39] in the different states in the country in June 2022 as per TRAI's Performance Indicator reports.

Graph 8: Internet density in different states of the country
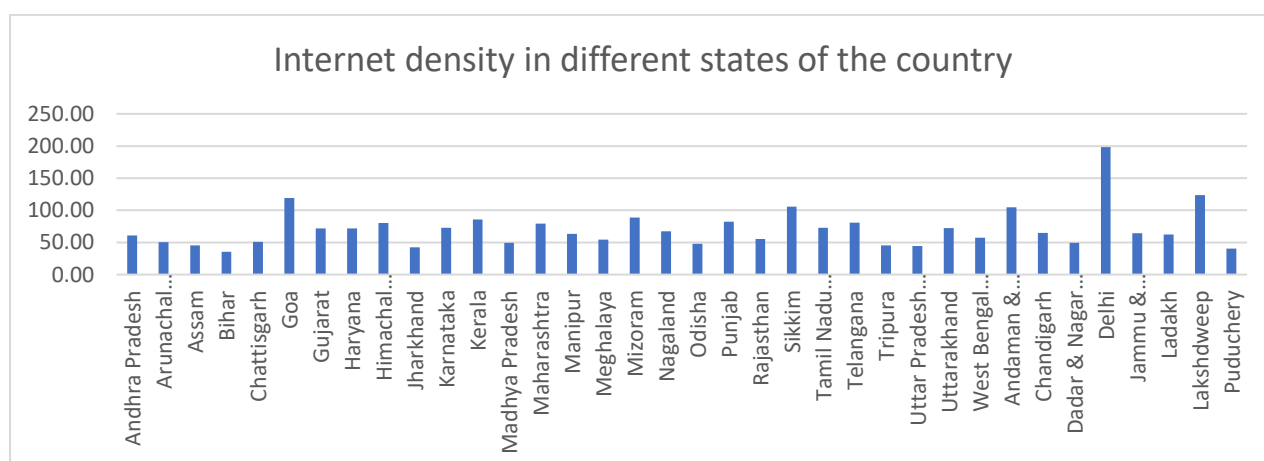
Source: TRAI's Performance Indicator Report, June 2022

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[38] GSMA Gender Gap Report 2022
[39] https://trai.gov.in/sites/default/files/QPIR_23112022.pdf

The internet density is highest in Delhi at 198.03%, followed by Lakshadweep at 123.82% and Goa at 119.04%. Bihar has the lowest internet density among the states and UTs at 35.31%.

2.18 TRAI also monitors and publishes the **internet density across Licensed Service Areas (LSAs)[40]** in the country. The reports if compared from December 2014 to December 2022 highlight the growth pattern of internet density across various LSAs and its variations from one state to another.

2.19 Graph 9 indicates the internet density[41] growth in the different LSAs in the country as of December 2022 in respect to that in 2014. The graph also indicates the growth rate of internet density in different LSAs as well as the overall country during this time.

Graph 9: Internet density in different Licensed Service Areas of the country
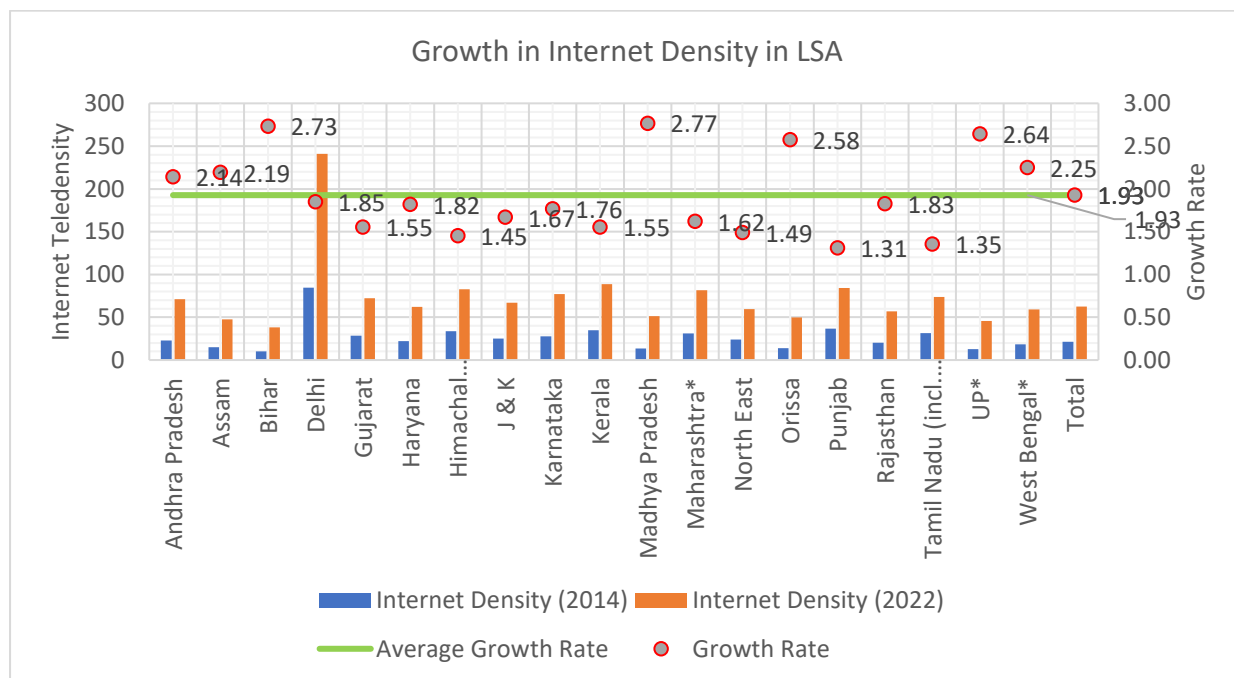
Source: TRAI's Performance Indicator Report

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[40] As defined in DoT License Conditions
[41] https://trai.gov.in/release-publication/reports/performance-indicators-reports

The above graph shows overall growth of internet density in LSAs as 62.56 in December 2022 in comparison to 21.37 in December 2014. The Graph above also highlights that there has been higher growth in LSAs having lower internet density, which indicates the efforts of the service providers and the government to include more and more people in the digital ecosystem.

Internet Connectivity in Schools in India

2.20   Internet connectivity in schools provides students and teachers access to a vast array of resources and educational materials. It enhances learning opportunities through e-learning platforms, virtual classrooms and collaborative projects as well as fosters students' critical thinking and problem-solving skills. Moreover, it promotes digital literacy, prepares students for a modern work culture, and streamlines communication among students, teachers, and parents. Thus, in light of new technologies like e-learning platforms, smart classrooms, etc. based on 5G, internet connectivity in schools becomes very critical as the students in schools that lack internet connectivity may be deprived of these educational tools.

2.21   The Department of School Education and Literacy released the report on Unified District Information System for Education Plus (UDISE+) 2021-22[42]. This report provides the number of schools with internet facility across various States and Union Territories (UTs). The Graphs below show the availability of internet in schools for various states and UTs of the country.

2.22   Graph 10 shows a group of states that have over 90% of internet connectivity in schools. Delhi has 100% of its schools connected to the

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[42] https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/udise_21_22.pdf

internet. It shows that very few states in the country have more than 90% internet connectivity to the schools.

Graph 10: States/UTs with highest internet connectivity in schools

School Internet Connectivity: High Connectivity

State/UT	Value
Delhi	100.00
Chandigarh	98.71
Puducherry	98.37
Lakshadweep	97.37
Kerala	95.19
Gujarat	91.96
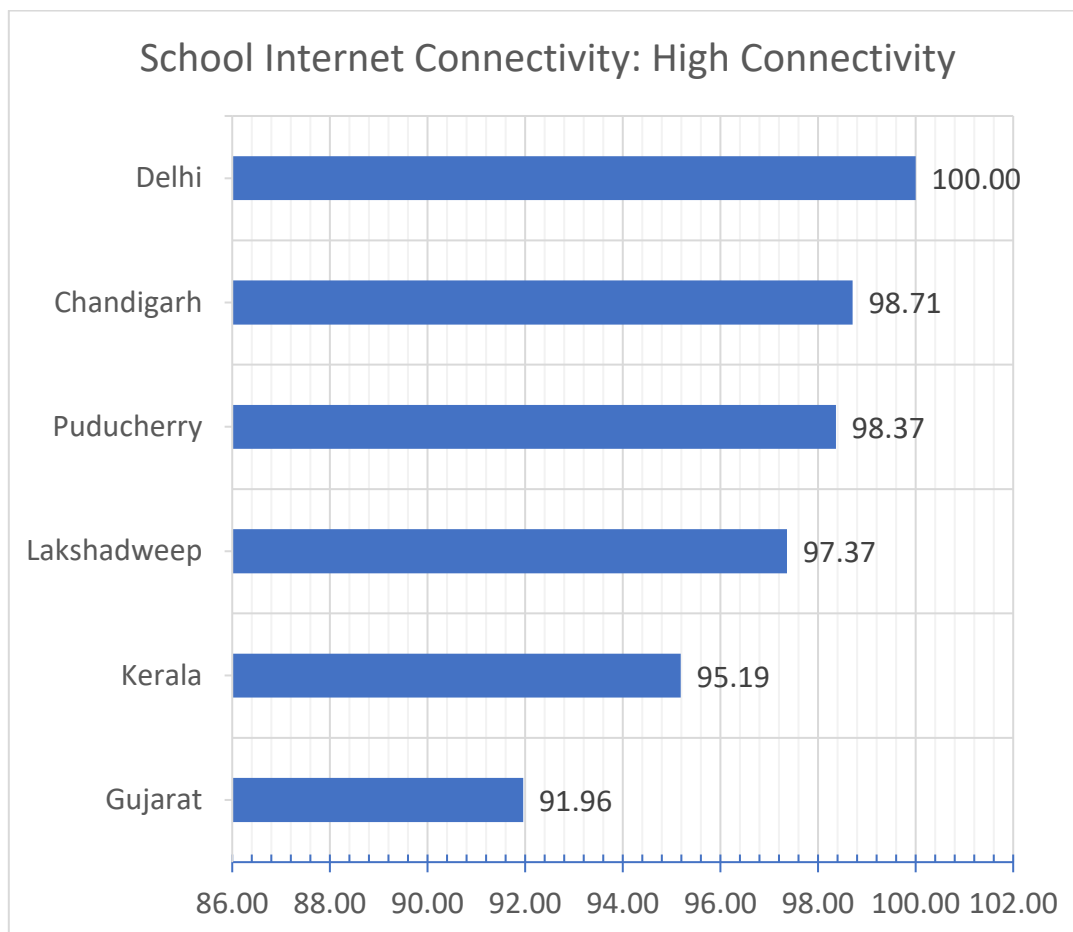
Source: Unified District Information System for Education Plus (UDISE+) 2021-22[43]

2.23 Graph 11 shows the states/UTs that have 20% to 60% of the total schools connected to the internet. Many of the states in the country lie in this category showing that while the internet connectivity for schools is present in these states/UTs, more efforts are required to provide internet in all the schools for good quality online education to the students.

[43] https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/udise_21_22.pdf

Graph 11: Percentage of Schools having internet connectivity in the country

Internet Connectivity in Schools across States in India

State	Value
Rajasthan	59.86
Punjab	59.31
Goa	58.21
Dadra and Nagar Haveli and Daman…	57.39
Andhra Pradesh	56.09
Haryana	51.24
Nagaland	50.88
Maharashtra	47.95
Andaman and Nicobar Islands	44.95
Ladakh	42.74
Tamil Nadu	37.56
Jharkhand	37.29
Chhattisgarh	36.69
Himachal Pradesh	34.47
Sikkim	34.47
Jammu and Kashmir	29.74
Karnataka	29.55
Madhya Pradesh	27.52
Uttarakhand	27.37
Manipur	23.07
Telangana	22.95
Arunachal Pradesh	22.04
Uttar Pradesh	21.14

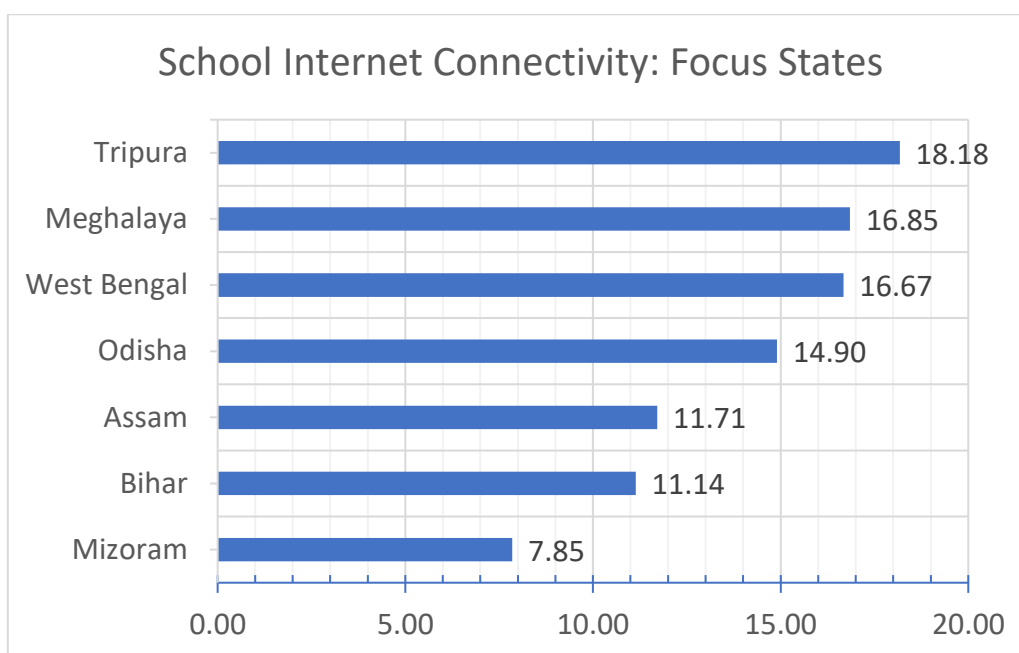*Source: Unified District Information System for Education Plus (UDISE+) 2021-22[44]*

2.24 Graph 12 shows the Focus States in internet connectivity in schools. These Focus States can be considered as the states where most of the schools (more than 80%) do not have internet connectivity. The lack of

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[44] https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/udise_21_22.pdf

internet connectivity in schools may deprive the students to access quality online education and learn the opportunities of the vast potential associated with availability of internet and new technologies.

Graph 12: Focus States: States/UTs where the internet connectivity in schools is lowest in the country

School Internet Connectivity: Focus States

State	Value
Tripura	18.18
Meghalaya	16.85
West Bengal	16.67
Odisha	14.90
Assam	11.71
Bihar	11.14
Mizoram	7.85

Source: Unified District Information System for Education Plus (UDISE+) 2021-22[45]

Emerging Technologies: Opportunities and Challenges

2.25   The explosive growth of digital technologies in recent years have created and given new possibilities and opportunities to the people. The dependence on these technologies both for personal and professional communications, financial transactions and information gathering and sharing has changed everybody's way of living. These new technologies, accessible to individuals and groups have acted as a catalyst for the social inclusion of people across societies and geographies. Access to digital platforms using new technology has made it easier for people to share ideas through voice, text and pictures/videos, learn new things,

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[45] https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/udise_21_22.pdf

adopt and upskill themselves with ease to excel in their professions. Further, in education sector availability and access to content, new skills, open universities and experience sharing has made studies and training more accessible and affordable. People in the rural areas or the financially deprived, who could not afford quality education earlier due to various logistic issues in cities/metros, have many possibilities to access required contents in the digital era. Leveraging technology to its fullest potential, is a positive step to enable the successful integration of various diversities to achieve inclusion.

2.26   Emerging technologies, if not made accessible to those who are still striving for adoption of currently available technologies, may lead to increased disparities further and such users may miss out opportunities extended through use cases operating on such technologies[46]. The Internet of Things (IoT) offers innovation and convenience but requires reliable and affordable internet connectivity. Therefore, timely bridging of such gaps may help people of different segments to leverage the advantages and progress together.

2.27   It is important to note that 5G technology by itself does not inherently cause digital exclusion. On the contrary, 5G has the potential to greatly improve connectivity and enhance digital access for individuals and communities. However, some factors like availability of 5G infrastructure, investments for development of 5G networks, affordability of 5G smartphones, imparting of necessary skills for use of new technologies, etc. if not looked into and addressed in time, the differential adoption of 5G could contribute to widening of digital gap.

2.28   Further, the deployment of 5G networks requires significant investment in infrastructure development, therefore the service providers may look into commercial viability before deploying the same in remote or rural areas. This could lead to a digital divide in rural or underserved areas

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[46] WEF, https://www.weforum.org/agenda/2022/06/technology-is-alienating-people-and-it-s-not-just-those-who-are-older

with no or limited access to 5G connectivity, exacerbating the existing rural-urban gap.

2.29 Another factor is the affordability of 5G services and devices. While 5G can provide faster speeds and enhanced capabilities, the cost of accessing 5G networks and purchasing compatible devices may be prohibitive for some individuals or communities with limited financial resources. This affordability barrier could result in exclusion from the benefits of 5G technology and access to the everchanging digital economy.

2.30 Artificial Intelligence (AI) technology requires computing power and infrastructure to function effectively. These technologies, if used responsibly and effectively, have been found an effective in managing health care system, agriculture, education, citizen empowerment thereby reducing digital divide. However, not everyone, especially those in remote/rural or underserved areas have access to these resources due to lack of telecom infrastructure capable of supporting the requirements of the AI systems. The lack of access to AI technologies may exclude many sections/communities of the society and therefore can widen the digital divide between those who can access and afford and those who cannot, and therefore limiting the opportunities for these communities[47] to be benefitted from AI-driven applications.

2.31 Bias and ethical considerations also contribute to the digital divide in relation to AI. Biased AI systems trained on skewed data can perpetuate existing inequalities and discrimination, particularly impacting marginalized and underserved communities. This exacerbates the divide and widens existing disparities. Additionally, concerns about trust and privacy surrounding AI's data usage and potential misuse create reluctance in adopting AI technologies, particularly among communities historically subjected to surveillance and discrimination

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[47] https://www.unescap.org/sites/default/files/StateofICT2017_16Jan2018.pdf

by not accounting the data related to their concerns while modelling AI Applications.

2.32 The cost of developing and deploying AI systems, AR/VR, M2M, robotics, cloud computing, Industry 4.0 and beyond solutions can also be prohibitive for some businesses, especially, MSMEs and small traders. This economic disparity could further widen the digital divide, as businesses that cannot afford to invest in adopting these technologies in their business operations may miss out on the benefits and opportunities it offers and they may lose out in competition and market access as the new technologies are likely to reduce the costs of manufacturing and providing services. The reduction in costs is likely to happen because of improvements in productivity, reduction in wastage, reduction in power consumption, reduction in manpower requirements, etc.

Global Indices

2.33 Several international organisations have developed indices for measuring coverage and usage of digital technologies in the country to evaluate the impact of digital divide as well as the progress made in digital inclusion. Some of the indices are discussed below:

GSMA's Mobile Connectivity Index (MCI)[48]

2.34 The Mobile Connectivity Index (MCI) measures and tracks enablers of mobile internet connectivity. It measures the performance of 170 countries, covering 99% of the global population. The major focus of MCI is on following four key enablers of mobile internet adoption:

- infrastructure,
- affordability,
- consumer readiness, and
- content and services.

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[48] https://www.mobileconnectivityindex.com/#year=2021

Infrastructure refers to the availability of mobile internet coverage in the region with sufficiently high performance, including access to electricity and spectrum. It includes the three indicators, i.e., Network Coverage, Network Performance and Spectrum.

Affordability enabler measures the affordability of devices and tariffs along with any taxation. It includes the three indicators, i.e., Mobile Data Affordability, Handset Affordability and Taxation.

Consumer Readiness refers to the ability of citizens to be able to use the services being offered. It includes the three indicators, i.e., Basic Skills, Gender Equality and Mobile Ownership.

Contents and Services enabler includes the availability and relevance of online content along with cybersecurity. It includes the two indicators, i.e., Local Relevance and Online Security.

2.35 The MCI scores countries based on the above indicators and other sub-indicators, all with the score having a maximum of 100. India's overall index score is 61.3 out of 100. The scores for each enabler are 58.2 for infrastructure, 69.4 for affordability, 47.1 for consumer readiness, and 74.3 for content and services.

2.36 The low score for the consumer readiness enabler, indicates that more efforts are needed to increase awareness about internet and digital skills, particularly in the rural areas in the country to improve score on this parameter. The low score in Gender Equality indicator indicates the gender gap in both smartphone ownership and internet usage in the country.

2.37 The above scores indicate that to achieve digital inclusion, there is a need to work on not only resolving the issues on availability of digital connectivity infrastructure but also to look for measures to increase digital affordability by making smartphones available at lower price and

digital literacy levels to increase the adoption of the internet and new technologies in the country.

Affordability Drivers Index by the Alliance for Affordable Internet (A4AI)[49]

2.38 This index is a tool to assess affordability of broadband for 72 low- and middle-income countries (LMICs) and focuses on two key aspects driving affordability: Communication Infrastructure and Access to the internet. A comprehensive set of indicators that are considered during the analysis in this index include the following:

(a)   Work and targets of National Broadband Plan set up by a country,

(b)   Universal service access funds to subsidise access to underserved and underprivileged population,

(c)   Regulatory decisions taken by the national ICT/telecom regulator,

(d)   Percentage of individuals using the internet,

(e)   Resource sharing across telecom operators in the country, and

(f)   A cluster of bundled ITU indicators.

2.39 India scored a total of 72.32 out of 100 and the country was highly ranked among the LMICs (10th out of the 72 LMICs). In the Communications Infrastructure sub-index, India scored 60.88 out of 100 with 12th rank and 75.5 out of 100 with 13th rank in the Access Sub-index. The score of India is better as compared to many other countries referred in this index for broadband affordability. Despite the overall high score, analysis of various parameters in this index highlights some issues relating to affordability of broadband in the country. The score of the country is low on following parameters and needs to be focussed:

(g)   "USAF used to subsidise access for underserved and underprivileged population".

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[49] https://a4ai.org/research/affordability-drivers-index/

(h) "To what extent do the country's broadband policies include strategies and programmes to improve access and use among women and girls?"

(i) "Percentage of individuals using the internet".

Network Readiness Index (NRI) 2022[50]

2.40 The Network Readiness Index, published by the Portulans Institute, measures the landscape of network readiness for 131 countries. The Network Readiness Index (NRI) was first published in 2002 by the World Economic Forum as part of the Global Information Technology Report but later editions were published by Portulans Institute. The primary level of NRI consists of four pillars: Technology, People, Governance, and Impact. These pillars further break down into sub-pillars, forming the secondary level. At the third level, individual indicators are allocated across the various sub-pillars and pillars of both the primary and secondary levels. In NRI, Inclusion is a sub-pillar under the Governance pillar.

2.41 India was ranked 61st with an overall score of 51.19. India's scores under the different pillars were 47.84 for Technology, 50.90 for People, 50.96 for Governance and 55.07 for Impact. At the same time, India ranked 97th in Inclusion sub-pillar with a score of 51.68.

2.42 There are 58 indicators in NRI, including Mobile Tariffs, Handset Prices, Population covered by at least a 3G mobile network, Internet access in schools, ICT skills in the education system, Online access to financial account, etc. Some of the indicators which need to be looked into for an overall improvement in Digital Inclusion are mentioned below:

(a) Handset Prices,

(b) Internet Access to Schools,

(c) ICT skills in the education sector,

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[50] https://networkreadinessindex.org/

(d)   Gender Gap in internet usage,

(e)   Online access to financial account,

(f)   Socio-economic and Rural gap in digital payments.

2.43   The discussions above indicate that key areas which need to be identified and addressed to bridge the digital divide and improve overall rankings in various global indices include the following:

(g)   **Digital Connectivity,**

(h)   **Digital Affordability, and**

(i)   **Digital Literacy.**

International Practices for Digital Inclusion

2.44   Many international organisations and countries across the world have undertaken various initiatives to minimise digital divide. Some of these are indicated below:

Sustainable Development Goals by United Nations[51]

2.45   The SDGs are a set of 17 global goals adopted by the UN in 2015 to achieve a more sustainable and equitable world by 2030. Goal 9, "Industry, Innovation and Infrastructure," and Goal 4, "Quality Education," are of relevance for digital inclusion.

2.46   Goal 9 aims to "build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation." This target recognizes the importance of digital inclusion for economic growth, social inclusion, and sustainable development.

2.47   Goal 4 aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." This goal includes a target to "substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for

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[51] https://sdgs.un.org/

employment, decent jobs and entrepreneurship" by 2030. This target recognizes the importance of digital skills for employability and entrepreneurship in the 21st century.

2.48   Together, these goals emphasize the importance of digital inclusion in achieving sustainable development. Digital inclusion refers to ensuring that everyone, regardless of their socio-economic status or geographical location, has access to digital technologies and the skills to use them effectively. This includes access to affordable and reliable internet services, digital devices, and digital literacy programs.

Broadband Advocacy Targets for 2025[52] by Broadband Commission, ITU

2.49   In 2018, at its special session during the Annual General Meeting of the World Economic Forum, the Broadband Commission set up a total of seven advocacy targets[53] to be completed by 2025. The seven advocacy targets are given below:

(i)   **Making broadband policy universal**: By 2025, all countries should have a funded national broadband plan (NBP) or strategy or include broadband in their universal access and service (UAS) definition.

(ii)   **Making broadband affordable**: By 2025, entry-level broadband services should be made affordable in developing countries by making it less than 2 per cent of monthly gross national income (GNI) per capita.

(iii) **Getting people online**: By 2025, broadband-Internet user penetration should reach:

(a)   75 per cent worldwide,

(b)   65 per cent in developing countries, and

(c)   35 per cent in the least developed countries.

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[52] https://www.broadbandcommission.org/advocacy-targets/
[53] https://www.broadbandcommission.org/wp-content/uploads/dlm_uploads/2021/12/State_of_Broadband_2021-E-comp.pdf

(iv) **Digital skills and literacy**: By 2025, 60 per cent of youth and adults should have achieved at least a minimum level of proficiency in sustainable digital skills.

(v) **Digital financial services**: By 2025, 40 per cent of the world's population should be using digital financial services.

(vi) **Getting businesses online**: By 2025, improve the connectedness of micro-, small- and medium-sized enterprises (MSMEs) by 50 per cent, by sector.

(vii) **Achieving gender equality in access to broadband by 2025**: By 2025, gender equality should be achieved across all targets.

UK, Digital Strategy for Wales[54]

2.50 The strategy outlines a national vision for jointly adopting a digital approach across Wales while ensuring people in Wales experience modern and efficient public services supported by good, ethical, use of data, and to stimulate innovation in the economy and support businesses to develop the resilience they need to succeed.

The vision of the strategy is supported by six missions:

(i) delivering user-centric digital services,

(ii) ensuring digital inclusion for all,

(iii) developing digital skills,

(iv) driving economic growth through digital innovation,

(v) improving digital connectivity, and

(vi) fostering collaboration and data utilization to enhance services.

Singapore, Smart Nation Singapore[55]

2.51 The Smart Nation and Digital Government Office (SNDGO), launched in 2014, under the Prime Minister's Office (PMO) of Singapore, plans and prioritises key Smart Nation projects and drives the digital transformation of Singapore under the programme Smart Nation Singapore. The vision of Singapore for digital transformation is of a digital-first Singapore where, a Digital Government, Digital Economy

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[54] https://www.gov.wales/digital-strategy-overview
[55] https://www.smartnation.gov.sg/

and Digital Society will act as three pillars of a smart Singapore and harness technology to effect transformation in health, transport, urban living, government services and businesses. Singapore has shown tremendous growth in the past decade in digital transformation. In KPMG's global ranking of leading technology innovation hubs outside of Silicon Valley/San Francisco in 2021, Singapore clinched the first rank[56].

Issues for consultation

Q.1 **What should be the definition of Digital Inclusion? What all parameters should it include to highlight disparities across different segments of society to have a realistic assessment from a policy perspective? Please provide your answer with suitable justification.**

Q.2 **Do you agree that the indices mentioned above and developed by various international organisations adequately represent the status of Digital Inclusion in the country? What other indices and factors need to be considered to identify the gaps in Digital Inclusion in the country?**

Q.3 **Are Digital Connectivity, Digital Affordability and Digital Literacy the main factors responsible for Digital Inclusion in the country? Do you agree that by addressing these, Digital Inclusion can be achieved in the country? If not, please suggest other factors responsible for Digital Divide that need to be addressed to ensure Digital Inclusion?**

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[56] https://home.kpmg/sg/en/home/media/press-releases/2021/07/singapore-tops-2021-ranking-for-leading-technology-innovation-hubs-kpmg-survey.html

CHAPTER 3 - STRATEGY FOR DIGITAL INCLUSION

3.1 In the previous chapter, some of the gaps for Digital Inclusion in the country have been discussed. Based on the discussion, key areas which need attention to enhance digital inclusion in the country are identified and reproduced below:

    (a)   Digital Connectivity,

    (b)   Digital Affordability, and

    (c)   Digital Literacy.

Before taking up further discussions and deliberation on above key factors in detail, let us understand meaning of universal and meaningful connectivity as defined in United Nations document.

Universal and Meaningful Connectivity

3.2 UN and ITU have announced a set of indicators and targets for universal and meaningful digital connectivity to be achieved by 2030 in the document, "*Achieving universal and meaningful digital connectivity setting a baseline and targets for 2030*" in 2022[57]. The document presents two sets of indicators to measure the universal and meaningful connectivity for countries around the world and establishment of a dashboard by ITU to track the progress made by countries towards the targets.

3.3 UN document referred above states that "*Universal Connectivity*" can be defined as- "*connectivity for all*". However, merely providing basic connectivity to every person is not sufficient. The connectivity should be meaningful as well. UN document has also defined Meaningful Connectivity, which states that the *"Meaningful Connectivity is a level of connectivity that allows users to have a safe, satisfying, enriching and*

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[57] https://www.itu.int/itu-d/meetings/statistics/wp-content/uploads/sites/8/2022/04/UniversalMeaningfulDigitalConnectivityTargets2030_BackgroundPaper.pdf

productive online experience at an affordable cost". Both universal and meaningful connectivity must be present for digital inclusion efforts to succeed, as neither universal connectivity with poor quality nor meaningful connectivity for the few will yield any significant benefits towards digital empowerment of the society.

3.4   It is important to note that universal digital connectivity is not limited to the connectivity through smartphones but also connectivity to the places where people generally connect to the internet (homes, schools & community centres, and businesses). This is especially important in the concepts like working from home (WFH) and working from anywhere (WFA). Thus, the universality of connectivity can be measured by how many individuals, households, communities, and businesses have access to the internet. Meaningful connectivity, on the other hand, is enabled by robust digital connectivity infrastructure, affordable digital devices and high digital skill levels among the populace.

The above illustrations once again identify the focus areas of meaningful connectivity as **Digital Connectivity, Digital Affordability** and **Digital Literacy**. The indicators and targets specified by the UN for each of the three key areas are discussed below in the specific sections.

A. Digital Connectivity

Background

3.5   The number of internet subscriber in the country has increased significantly in the last few years, mainly due to penetration of 4G services across the length and breadth of the country, decreased data costs, increased availability of smartphones, and the establishment of high-speed connectivity infrastructure. In 2022 out of 6,44,131 inhabited villages (as per data of Registrar General of India as of November 2019) in the country, 5,98,951 villages have 4G broadband

coverage[58]. This shows that only 45,180 villages (7%) do not have access to mobile broadband internet. The efforts are on by the telecom service providers and the government for increasing the coverage to 100%.

3.6   Apart from complete coverage in the country, redundancy of the telecom networks and equipment is also important to ensure that the telecom services, especially the internet is always available to the subscribers in the country. The redundancy of connections requires alternate fibre routing or multiple mediums for accessibility or operators operating on independent mediums for both mobile broadband and fixed broadband services. With a close coordination between service providers, infrastructure providers, the government and external agencies operating on telecom routes, the redundancy of telecom services can be ensured. Redundancy of connection by having both universal mobile broadband and universal fixed broadband availability in the country or ensuring the presence of mobile broadband coverage by two or more TSPs is ideal for smooth access of telecom services.

3.7   One of the important factors to improve the digital connectivity in the country is fiberization of mobile towers. The fiberization for backhaul assumes critical importance in light of 5G based new technologies. Lack of fiberization of the mobile towers, which is 35.11% only as of June 2022, hampers the quality of internet access. Globally, Thailand (90%) is leading in terms of fiberization of towers, closely followed by Malaysia (80%). US and Japan also have well over 75% of the mobile towers fiberized[59]. The total Optical Fibre Cable (OFC) laid in India is approximately 34.62 Lakh Km[60].

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[58] Lok Sabha Starred Question No. 217, DISTRICTS DEPRIVED OF 4G NETWORK, answered on 21st December 2022.
[59] https://www.ey.com/en_in/telecommunications/how-digital-infrastructure-rollout-will-transform-india
[60] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1843752

Efforts and Initiatives undertaken in India to improve Digital Connectivity

3.8   To promote inclusive digital growth in the country, various initiatives have been taken by the TRAI and Government. These initiatives are discussed below:

Efforts of TRAI in Digital Connectivity:

3.9   In order to ensure reach of good quality Digital Connectivity Infrastructure across the country, TRAI has released several recommendations to the Government. Government has accepted many of these recommendations and taken various policy decisions to implement the same. Following table shows the key recommendations and status of action taken by the government on each recommendation:

S. No.	Name of Recommendation	Action(s) taken by the Govt./Key Recommendations under consideration with the Govt. (relevant for Digital Connectivity)
1	Recommendations on Improving Telecom Services in the North-eastern States: An Investment Plan – 2013	i. Comprehensive Telecom Development Plan for North-eastern States (under implementation).
2	Recommendations on Improving Telecom Services in Andaman and Nicobar Islands and Lakshadweep – 2014	i. Comprehensive Telecom Development Plan for Islands including Provisioning of Satellite and submarine cable connectivity to Andaman (Already implemented) and Lakshadweep islands (under implementation).
3	Recommendations on Delivering Broadband Quickly: What do we need to do – 2015	i. National RoW policy adopted. ii. In Telecom sector, to expedite the RoW permissions, GatiShakti Sanchar Portal was launched.
4	Recommendations on Implementation Strategy for BharatNet – 2016	i. BharatNet is to be implemented through CPSU, PPP and State-led models. ii. A PPP model that aligns private incentives with long term service delivery in the vein of the Build-Own-Operate-Transfer/Build- Operate-

		Transfer models of implementation be the preferred means of implementation. However, the bids invited against PPP models were not successful and the roll-out plan is under review.
5	Recommendations on 'Proliferation of Broadband through Public Wi-Fi Networks' – 2017	Prime Minister's Wi-Fi Access Network Interface (PM-WANI) approved in December 2020.
6	Recommendations on Making ICT accessible for Persons with Disabilities – 2018	DoT issued instructions to TSPs to provide special desk/call centres for PwD
7	Recommendations on Roadmap to Promote Broadband Connectivity and Enhanced Broadband Speed – 2021	i. Updated minimum of broadband speed (2 Mbps). Under Consideration ii. Pilot DBT scheme for rural fixed-line broadband subscribers iii. Establishment of Common Ducts and Posts Development Agency (CDPDA), iv. Exemption of license fee on revenue accruing from fixed line broadband services.
Recommendations that have been recently released and are under consideration by DoT		
8	Regulatory Framework for Promoting Data Economy Through Establishment of Data Centres (DCs), Content Delivery Networks (CDNs), and Interconnect Exchanges (IXPs) in India - 2022	To boost the digital infrastructure ecosystem in the country including DCs, CDNs and IXPs.
9	Recommendations on "Use of Street Furniture for Small Cell and Aerial Fiber Deployment" - 2022	i. Inter-sectoral co-ordination to ensure fastest possible deployment of small cells using street furniture. ii. Inclusion of provision in the GatiShakti Sanchar Portal for bulk processing of site applications, including RoW and power connection. iii. Drone-based mapping in the GIS system

10	Recommendations on "Improving Telecom Connectivity/ Infrastructure in far-flung areas of Himachal Pradesh" – December 2022	i. Satellite connectivity through VSAT. ii. Backhaul connectivity to villages. iii. Connect through VSAT media to the villages that are yet to be connected under BharatNet project until the OFC backhaul is made available through BharatNet.
11	Recommendations on "Improving Telecom Coverage and Backhaul Infrastructure in far-flung areas of Ladakh" - 2023	i. Connect 19 unconnected villages in Ladakh through VSAT connectivity under BharatNet. In 12 villages, this can serve as backhaul to provide 4G connectivity. ii. For the remaining 7 villages, implement shared VSAT connectivity until OFC media is extended. iii. Establish VSAT based communication overlay in strategic border areas as a backup communication medium alongside terrestrial connectivity; Govt. should bear the operational costs of running these sites.
12	Recommendations on "Rating of Buildings or Areas for Digital Connectivity" – 2023 (under consideration)	i. Amendment in the Model Building Bye-Laws (MBBL) and National Building Code of India (NBC) to include provisions for Digital Connectivity Infrastructure (DCI) in building regulations. ii. Integration of DCI into building development plans alongside other essential services. iii. Collaboration with State Governments/UTs to incorporate DCI provisions in areas not covered directly by MBBL. iv. BIS should establish mandatory requirements for DCI compliance for building certificates. v. Inclusion of provisions for rating buildings based on their Digital Connectivity, similar to the rating system for green buildings.

3.10 Further, In Oct 2022, TRAI also wrote to DoT regarding the steps that need to be taken to improve digital connectivity in Sikkim. Salient points are given below:

(i) VSAT based connectivity should be considered instead of OFC for BharatNet in hilly and difficult terrains where maintenance is likely to suffer due to lack of required resources. For villages that do not have OFC backhaul, interim connectivity may be provided on Satellite medium through VSAT equipment under "4G saturation Scheme". The VSAT connectivity can be surrendered as soon as stable OFC backhaul is made available.

(ii) Restore two underground OFC routes of BSNL from Siliguri by re-laying some cable to Gangtok to ensure redundancy and adequate backhaul connectivity.

(iii) Allocate 2 fibres from District Headquarters (DHQ) to respective Blocks to provide adequate bandwidth to all TSPs through Power Grid Corporation of India Limited (PGCIL's) power line and OFC laying.

Policy Initiatives by the Government:

3.11 To provide ubiquitous connectivity in the country, the government has formulated various policies and missions from time to time. These policies and missions are National Broadband Plan (2004), National Telecom Policy (2012), National Digital Communication Policy (2018) and National Broadband Mission (2019).

3.12 National Digital Communication Policy (NDCP) 2018 and National Broadband Mission (NBM) 2019 aim to provide 'Broadband for All' in the country. NDCP 2018 envisages the inclusion of uncovered areas and digitally deprived segments of society along with provision of universal broadband connectivity at 50Mbps to every citizen. Some of the important objectives of NDCP 2018 that are relevant for digital connectivity are[61]:

(a) Provide Universal broadband connectivity at 50 Mbps to every citizen.

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[61] https://dot.gov.in/sites/default/files/Final%20NDCP-2018_0.pdf

(b) Provide 1 Gbps connectivity to all Gram Panchayats of India by 2020 and 10 Gbps by 2022.

(c) Enable 100 Mbps broadband on demand to all key development institutions, including all educational institutions.

(d) Enable fixed line broadband access to 50% of households.

(e) Achieve 'unique mobile subscriber density' of 55 by 2020 and 65 by 2022.

(f) Enable deployment of public Wi-Fi Hotspots; to reach 5 million by 2020 and 10 million by 2022.

3.13 NBM 2019 aims to achieve availability of broadband connections in every nook and corner of the country. The main objectives of NBM 2019 are as follows:

(i) To facilitate universal and equitable access to broadband services for growth and development throughout the country and especially in rural and remote areas.

(ii) To address policy and regulatory changes required to accelerate the expansion and creation of digital infrastructure and services.

(iii) Creation of a digital fibre map of the Digital Communications network and infrastructure, including Optical Fiber Cables and Towers, across the country.

(iv) Work with all stakeholders including the concerned Ministries/ Departments/ Agencies, and Ministry of Finance, for enabling investments for the Mission.

(v) Work with the Department of Space, to make available adequate resources required for extending connectivity to far flung areas of the country through satellite media.

(vi) To encourage and promote adoption of innovative technologies for proliferation of broadband, especially by the domestic industry.

(vii) Seek cooperation from concerned stakeholders by developing innovative implementation models for Right of Way (RoW).

(viii) To work with States/UTs for having consistent policies pertaining to expansion of digital infrastructure including for RoW approvals required for laying of OFC.

(ix) To develop a Broadband Readiness Index (BRI) to measure the availability of digital communications infrastructure and conducive policy ecosystem within a State/UT.

(x) Promote direct and indirect employment as a result of development of Digital Communications infrastructure across the country and through the digital economy.

3.14 The status of NBM 2019 as per DoT's Annual Report 2022-23[62] are:

(a) Broadband Connectivity to Villages: Under the BharatNet Project, BBNL has ensured that a total of 0.184 million Gram Panchayats are service ready.

(b) Laying of Optical Fibre Cable (OFC): Total Optical Fibre Cable (OFC) laid is approximately 3.55 million Km as of September 2022. It is envisaged to be increased up to 5 million Km by 2024-25.

(c) Fiberization of Towers: Up to June 2022, 0.733 million mobile towers have been installed. Out of which, 35.98% of the mobile towers have been fiberized. It is expected that by 2024-25, the number of towers will have increased to 1.5 million with a fiberization of 70%.

(d) It is envisaged to achieve broadband speeds of up to 50 Mbps by 2024-25.

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[62] https://dot.gov.in/reports-statistic/2471

3.15 The objectives of the National Broadband Mission also include to expedite the laying of Optical Fibre Cables and increase the fiberization of mobile towers. Both objectives require speedy processing of Right of Way (RoW) applications. To resolve this issue, GatiShakti Sanchar Portal[63] has been launched in March 2022 as a single interface portal to facilitate the RoW application process. The objective of the portal is to act as an enabler to the objective of "Ease of doing business" for telecom infrastructure. Within a few months from the launch of portal, the pendency of RoW applications approval has decreased drastically.

Digital India Programme:

3.16 Digital India programme envisages to prepare India to be a global knowledge centre in future. The Digital India programme is a part of the e-governance initiatives taken by the Government of India to move towards SMART governance i.e., Simple, Moral, Accountable, Responsive and Transparent governance.

3.17 The Digital India programme is an Umbrella Programme that covers many departments and weaves together many ideas and thoughts into a single, comprehensive vision so that each of them is seen as part of a larger goal. The programme pulls together many existing as well as some new schemes. The existing schemes are restructured and re-focused and then implemented in a synchronised manner.

3.18 The vision of the Digital India programme is centred around the following three key vision areas:
   (a)   Digital Infrastructure as a core utility to Every Citizen,
   (b)   Governance & Services on Demand, and
   (c)   Digital Empowerment of Citizens.

3.19 The Digital India programme aims to improve e-Governance in the following nine pillars of growth areas[64]:

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[63] https://pib.gov.in/PressReleseDetail.aspx?PRID=1825332
[64] https://digitalindia.gov.in/programme-pillars/

(a)   Broadband Highways

(b)   Universal Access to Mobile Connectivity

(c)   Public Internet Access Programme

(d)   e-Governance – Reforming Government through Technology

(e)   e-Kranti – Electronic Delivery of Services

(f)   Information for All

(g)   Electronics Manufacturing

(h)   IT for Jobs

(i)   Early Harvest Programmes

Schemes under Universal Service Obligation Fund (USOF):

3.20   The USOF, established under the Indian Telegraph Act 1885 is the pool of funds generated by 5% Universal Service Levy that is charged to all the telecom service providers on their Adjusted Gross Revenue (AGR). The objective of the USOF is to provide support for affordable access to a reliable and ubiquitous telecom network to remote and rural areas. As of October 2022, the balance amount of the fund is ₹64,774.22 Crore[65].

3.21   The Government of India has undertaken various initiatives funded through the Universal Service Obligation Fund (USOF) to improve connectivity in rural areas. Most of these initiatives have the geographical focus in provisioning of connectivity to all unconnected villages and have special focus in the North-Eastern states, Island regions, Border villages, Aspirational districts, etc. The projects under USO Fund are as follows:

(i)   <u>Comprehensive Telecom Development Plan (CTDP) for the North-Eastern Region:</u> The project aims at providing mobile connectivity in the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The Project includes:

(a)   **Uncovered villages and National Highway (NH) sites**: Started in December 2017, the project aims to provide mobile

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[65] https://usof.gov.in/fund-status

connectivity to 2128 uncovered villages and along the National Highways of Assam, Manipur, Mizoram, Nagaland, Sikkim, Tripura, and Arunachal Pradesh by installation of 2004 mobile towers at a cost of ₹16.55 billion.

(b) **Uncovered Villages of Arunachal Pradesh and two Districts of Assam**: Started in October 2021, the project aims to provide mobile connectivity to 2374 identified uncovered villages of Arunachal Pradesh and two districts of Assam by installation of 1511 4G based mobile towers at a cost of ₹ 20.29 billion.

(c) **Uncovered Villages and National Highways of Meghalaya:** Started in September 2020, the project aims to provide 4G mobile connectivity to 1164 uncovered villages and the National Highways of Meghalaya by installing 878 mobile towers at a cost of ₹7.26 billion.

(ii) Uncovered Villages Project: This scheme aims to provide mobile connectivity to various uncovered villages and aspirational villages under the following projects:

(a) **7287 Aspirational Villages**: Started in May 2022, the project aims to provide 4G based mobile services in 7287 uncovered villages of 44 aspirational districts of five states, viz., Andhra Pradesh, Chhattisgarh, Jharkhand, Maharashtra, and Odisha with an estimated cost of ₹64.66 billion.

(b) **354 Uncovered Villages Project**: Started in April 2020, the project aims to provide mobile services in 354 uncovered villages in the border areas of Jammu and Kashmir, Ladakh, Himachal Pradesh, Uttar Pradesh, Bihar, Rajasthan, Gujarat, Uttarakhand, and other priority areas by installing 354 mobile towers at a cost of ₹3.36 billion. Till July 2022, 262 villages have been provided internet coverage by installation of 243 mobile towers.

(c) **502 Uncovered Villages Project**: Started in March 2021, the project aims to provide 4G based mobile services in 502 uncovered villages of 24 aspirational districts of four states, viz., Uttar Pradesh, Bihar, Madhya Pradesh, and Rajasthan at a cost

of ₹6.86 billion by installing a total of 462 mobile towers. As of August 2022, a total of 102 villages have been connected by installing 81 mobile towers in the project areas across the four states.

(d) **Saturation of 4G Mobile Services**: This project started in February 2023, aims to provide 4G mobile coverage to all unconnected villages in the country. It includes providing 4G mobile services in 24,680 uncovered villages in remote and difficult areas across the country with a provision to include 20% additional villages (approximately, additional 5000 villages) on account of rehabilitation, new-settlements, withdrawal of services by existing operators, etc. In addition, 6,279 villages having only 2G or 3G connectivity shall be upgraded to 4G under this project. The project was approved in July 2022 with a total cost of ₹263.16 billion. This project signifies a major step towards achieving universal connectivity of mobile broadband.

(iii) <u>Comprehensive Telecom Development Project (CTDP) for Islands</u>: CTDP for islands, approved in November 2014, aims to provide mobile connectivity to Andaman and Nicobar Islands and Lakshadweep via submarine optical fibre cable and bandwidth augmentation to islands.

(a) **Submarine OFC connectivity from Chennai to Andaman and Nicobar Islands (CANI):** Started in July 2018, the project aims to connect Chennai with Port Blair and other islands of Andaman and Nicobar Islands through 2313 km long submarine optical fibre cable (OFC) with a total cost of the project being ₹12.24 billion. The project was completed in late 2020 with a present bandwidth utilization of 75.715 Gbps.

(b) **Submarine OFC connectivity from Kerala to Lakshadweep Islands (KLI):** Started in January 2022, the project aims to connect Kochi and Lakshadweep Islands through submarine optical fibre cable (OFC) with a total financial cost of about ₹10.72 billion.

(c) **4G based mobile services in ANI:** Started in March 2021, the project aims to provide 4G mobile services in identified 85 uncovered villages with 82 towers and 42 towers for providing 4G mobile services to bridge the gaps in mobile connectivity along uncovered national highways with a total cost of ₹1.29 billion.

(d) **Augmentation of Bandwidth in ANI**: Started in December 2015, the project aims to augment satellite bandwidth from 2 Gbps to 4 Gbps in ANI with a CAPEX of ₹3.639 billion. Out of augmentation of 2 Gbps (2 Gbps to 4 Gbps), up to 1 Gbps bandwidth is reserved for USOF schemes in ANI including provision of mobile services in identified uncovered villages in ANI. The project has been successfully completed in September 2021.

(e) **Augmentation of Bandwidth in Lakshadweep Islands**: Started in March 2017, the project aims to augment satellite bandwidth from 318 Mbps to 1.71 Gbps in Lakshadweep islands with a CAPEX of ₹2.826 billion. The augmentation of bandwidth has been successfully implemented in August 2021.

(iv) Left Wing Extremism (LWE) Affected Areas: This project aims to connect all rural and far-flung villages in the LWE areas ensuring proper delivery of citizen services and empower security forces. The project is developed in two phases:

(a) **LWE Phase I**: The provision of mobile services (2G based) in 2199 locations in left wing extremism (LWE) affected areas. It was approved in September 2014. The project involves installation of mobile towers in 1836 sites and the maintenance of 363 existing towers in these areas. Later, provisioning of mobile services for additional 156 sites were approved. Out of 2355 sites approved for the Phase I of the project, 2343 are functional. In July 2022[66]
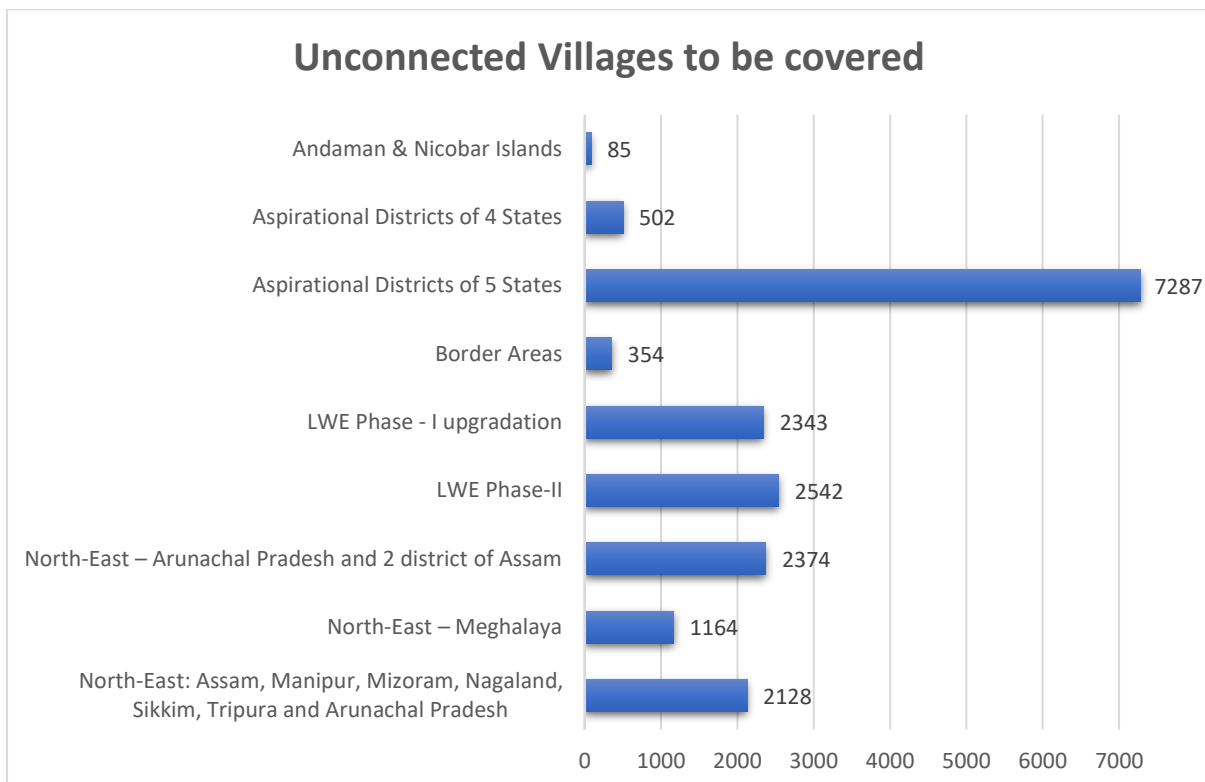
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[66] https://pib.gov.in/PressReleasePage.aspx?PRID=1820512

upgrading the 2,343 LWE Phase I sites from 2G to 4G mobile services at an estimated cost of ₹18.85 billion[67] was approved.

(b) **LWE Phase II**: The Phase II of this project deals with provision of 4G based mobile services at 2542 tower locations in 10 states in India. This project started in September 2021. As of July 2023, 608 sites have been covered by installing 583 mobile towers and associated infrastructure in Andhra Pradesh, Telangana, Jharkhand, Maharashtra, Chhattisgarh, Madhya Pradesh, and Odisha[68].

(v) The graph below summarises the projects undertaken from USOF along with the number of unconnected villages that will be connected.

Graph 13: *The number of villages to be covered through ongoing USOF projects (Source: USOF website)*

Unconnected Villages to be covered

Category	Villages
Andaman & Nicobar Islands	85
Aspirational Districts of 4 States	502
Aspirational Districts of 5 States	7287
Border Areas	354
LWE Phase - I upgradation	2343
LWE Phase-II	2542
North-East – Arunachal Pradesh and 2 district of Assam	2374
North-East – Meghalaya	1164
North-East: Assam, Manipur, Mizoram, Nagaland, Sikkim, Tripura and Arunachal Pradesh	2128

Source: USOF website

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[67] https://pib.gov.in/PressReleasePage.aspx?PRID=1820512
[68] https://usof.gov.in/en/left-wing-extremism-lwe-phase-ii

BharatNet[69] Project:

3.22 BharatNet, formerly known as National Optical Fibre Network (NOFN), a flagship Project of the Government of India, aimed to connect all Gram Panchayats and Villages in the country by high-speed broadband connectivity using Optical Fibre Cable. BharatNet was approved in 2011, to provide broadband connectivity at the Gram Panchayat (GP) level. The infrastructure set up by BharatNet is intended to be used by all the service providers on non-discriminatory and transparent manner for the provisioning of broadband and other services to the people in villages and to various Government or private institutions/industries operating in remote or rural areas.

3.23 Phase-I of the project was completed in December 2017 with connectivity to over 100 thousand GPs. Government reviewed progress of the BharatNet Project and involved eight states namely Maharashtra, Gujarat, Chhattisgarh, Jharkhand, Odisha, Andhra Pradesh, Telangana and Tamil Nadu in its implementation under the state-led Model.

3.24 Phase-II of the project launched in 2017 aimed to connect around 0.142 million GPs excluding Block Headquarters (BHQs). Out of 0.142 million GPs, 5,161 GP were to be connected over satellite media. In August 2020, scope of BharatNet Project was enhanced to connect all villages in the country through fibre along with GPs.

3.25 In November 2022, for the facilitation of a wider utilization of infrastructure laid under BharatNet, Government has merged functions of BBNL with BSNL.

3.26 Further, to leverage the BharatNet network to provide Fiber-to-the-Home (FTTH) connections in rural areas, the BharatNet Udyami scheme

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[69] https://bbnl.nic.in/index.aspx

has been undertaken by the Government. A pilot proposal by BSNL for 100 thousand FTTH connections using BharatNet through BharatNet Udyamies (BNUs) was approved with a financial subsidy of ₹890 million from the USOF for both Internet Leased Line (ILL) and capital incentives. BNUs work as Revenue Sharing Partner with BSNL for providing FTTH using BharatNet. By the first week of January 2023, 100,000 connections were already provided under the pilot. The pilot has now been extended to provide 500,000 FTTH connections using BNUs by December 2023. This scheme is facilitating the opening up of new employment avenues in rural areas while improving the connectivity of rural areas.

3.27 The status[70,71] of BharatNet as on 31 April 2023 is as follows:
   (a) 1,91,069 GPs Made Service Ready (On fibre & satellite)
   (b) 6,28,949 Km of OFC laid,
   (c) 6,402/104,664 Active Wi-Fi hotspots, and
   (d) 63177.85 Km dark fibre leased.

3.28 The scope of BharatNet Project is to connect all villages and GPs through OFC. In order to promote the utilisation of the infrastructure created under BharatNet, the Government proposed to provide two Wi-Fi hotspots in each GP. Under Phase-I of the project implementation, one of the Wi-Fi hotspot was converted into provisioning of fibre based connectivity (FTTH) to five village institutions for one-year and it was expected to get it regularised subsequently by the respective State Governments.

3.29 In order to promote effective utilisation of infrastructure created under BharatNet, there may be a requirement for:
   (a) Availability of enabling IT based devices at the village institution level,

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[70] http://www.bbnl.nic.in/BharatNet.pdf
[71] http://www.bbnl.nic.in/usage2.pdf

(b) Establishing a cohesive funding mechanism for the cost of connectivity for the village institutions,

(c) Provisioning of last mile connectivity from nearest Point of Presence (PoP) to village institution premises in the project,

(d) Establishing O&M process for backhaul and last mile connectivity, and

(e) Developing a model for commercialisation of the assets in the BharatNet project for a long period.

State Government initiatives for provision of better connectivity:

3.30 Several State/ UT Governments have also taken initiatives in India to enhance connectivity and bridge the digital divide. These include:

(a) schemes to establish state-wide large area networks that aim to connect government offices at various levels,

(b) broadband network projects aimed at providing high-speed internet connectivity to households, businesses, and government offices,

(c) fibre optic network projects to create reliable intranet connections for government institutions and provide free internet to economically backward households, and

(d) projects leveraging optical fibre to connect rural areas and provide affordable and high-speed broadband connectivity to households, government institutions, and private enterprises.

These initiatives collectively strive to improve connectivity and access to digital services in the respective states.

Satellite Based Internet/Broadband Connectivity:

3.31 Satellite internet is one of the feasible options to provide broadband connectivity in remote areas where optical fibre connectivity is either not feasible or not cost effective, due to difficult terrains and accessibility issues. Such options have emerged due to advancement in satellite technologies wherein High Throughput Satellite (HTS) systems

with multi cluster beams can provide bandwidth in Gbps over a given cluster coverage. In India, Service Providers are working to provide broadband internet services through High Throughput Satellite (HTS), and Low or Medium Earth Orbit (LEO/MEOs) satellites. Satellite based Broadband Services through HTS (GSAT-11 & GSAT-19) have also been provisioned through USOF Schemes under BharatNet Projects. A satellite internet connection uses bandwidth on a satellite to provide high-speed, low latency internet to the users.

3.32   Geo-stationary satellites, which provide internet with low data rates of up to few Kbps are suitable only for low bit rate usage such as Machine-to-Machine communications, which do not need real time communications. However, new multi-bands, multi-beams High Throughput Satellite (HTS) technology has allowed the satellite to provide high-data rates. The ISRO's satellites (Geosynchronous) GSAT-11[72], GSAT-19[73] and GSAT-29[74] aim to provide telecommunication services with high bandwidth. GSAT-11 has national coverage with multi beams having total bandwidth of 16 Gbps[75]. Internet through Geo-stationary satellite usually has higher latency (delay) during its communications. The satellite internet is also more expensive than OFC or mobile internet. But it has advantage to reach at places where laying of optical fibre or point to point radio links are not possible. Efforts are being made to connect unconnected villages/ areas through satellite system at affordable costs to the end users even through subsidies, if any.

Initiatives by TRAI for satellite-based connectivity:

3.33   TRAI has been advocating an 'Open-sky policy' for over 15 years and made recommendations on "Accelerating Growth of Internet and Broadband penetration" in April 2004 to adopt an Open Sky policy for

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[72] https://www.isro.gov.in/GSAT_11.html?timeline=timeline
[73] https://www.isro.gov.in/GSAT_19.html
[74] https://www.isro.gov.in/GSAT_29.html
[75] https://www.isro.gov.in/2018press2.html

VSAT operators, allowing them to work directly with any international satellite. This recommendation was reiterated in the recommendations on "Delivering broadband quickly: What do we need to do?" in April 2015.

3.34   In August 2021, TRAI released its recommendations to the government on **"Licensing Framework for Satellite-based connectivity for Low Bit Rate Applications"**, in which, TRAI recommended amending the scope of service authorizations in Unified Licence (UL) to incorporate satellite-based low-bit-rate connectivity for Internet of Things (IoT) devices. It also recommended eliminating NOCC charges for the use of the space segment and including all administrative, operational, and testing costs in spectrum charges. Further it also recommended implementing a single-window online portal with inter-departmental linkages for parallel processing of applications and information.

3.35   In November 2022, TRAI released its recommendations to the government on **"Licensing Framework for Establishing and Operating Satellite Earth Station Gateway (SESG)"** in which, TRAI recommended for a separate SESG License under the Section 4 of Indian Telegraph Act 1885 that will not be a part of the Unified License (UL). TRAI suggested that the SESG licensee may be permitted to establish, maintain, and work SESGs anywhere within the territory of India for all types of satellite systems. Further, the SESG licensee may provide satellite-based resources to other satellite communication telecom service providers. This recommendation of TRAI will allow the cost of satellite communication to be more affordable due to the sharing of gateways for satellite communication.

3.36   Another approach for ensuring universal coverage in the country is to deploy satellite backhaul in fringe areas of the network, especially in the remote areas where fibre or tower connectivity is not feasible or economically viable. Satellite-based backhaul solution is provided through VSAT Hub connecting to the base station and services can be

deployed rapidly. This was recommended by TRAI for connectivity in remote and far-flung areas like Sikkim (October 2022), Himachal Pradesh (December 2022) and Ladakh (April 2023).

3.37 TRAI has also issued a Consultation Paper on "Assignment of Spectrum for Space-based Communication Service", in April 2023 to deliberate issues related to assignment of spectrum for various space-based services.

3.38 TRAI released *suo-moto* recommendations on "Ease of Doing Business (EoDB) in Telecom and Broadcasting Sector" in May 2023 after studying the existing process of taking approvals and recommended measure to simplify the processes including satellite communication.

Collaborative Approach among Service Providers:

3.39 It is observed that fibre connectivity to the rural and remote areas is broadly dependent on the government-initiated projects. Further, some of the service providers have also laid optical fibre cable under their network roll-out plans in remote and rural areas. These OF Cables may have spare capacities which can be leveraged for providing digital connectivity to village and other institutions/households/individuals living in such areas. However, this requires a collaborative approach between the service providers and Government agency(ies) to optimise the utilisation of the infrastructure created through the Government-initiated projects or by the service providers, to provide connectivity to unserved areas.

3.40 Similarly, possibility of usage of the towers and other wireless infrastructure including satellite-based connectivity created/being created by service providers or under Government-aided projects through USOF also needs to be looked into. Such collaborative efforts are essential for gainful utilisation of the assets created by various agencies in quick roll-out of various services in areas having difficult

terrain such as Uttarakhand, Himachal Pradesh, Sikkim, North-East and also in far-flung and rural areas.

International Practices for Improving Digital Connectivity:

USA, Rural Digital Opportunity Fund[76,77]:

3.41 In USA, of many measures taken, the Rural Digital Opportunity Fund (RDOF) is one of the most important steps taken by the FCC in 2019 to bring about digital inclusion in the rural areas. RDOF broadband initiative is the single largest distribution of Universal Service Fund (USF) made available to communications service providers in USA, which will provide $20.4 billion in funding over a ten-year period to support the construction of broadband networks in rural communities across the country in two phases.

UK, Universal Service Obligation (USO) for Broadband[78]:

3.42 According to OFCOM, as of 2021, around 123,000 premises (mostly in remote, rural areas) do not have access to a broadband connection with decent quality. Thus, as a "safety net" to deliver decent broadband connections to these premises at affordable rates, the Universal Service Obligation (USO) for broadband came into force in 2018 through the legislation, "Electronic Communications (Universal Service) (Broadband) Order 2018". The UK has defined[79] a decent connection as one that can deliver 10 Mbps download speed and 1 Mbps upload speed along with a data usage capability of at least 100 GB per month. OFCOM has defined an affordable connection as one that costs less than £45 per month. The USO for broadband provides a legal right to request a decent broadband connection, up to a cost threshold of £3,400 per premises. The people of UK are eligible to avail the USO scheme if:

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[76] https://www.usac.org/high-cost/funds/rural-digital-opportunity-fund/
[77] https://rdof.com/rdof
[78] https://commonslibrary.parliament.uk/research-briefings/cbp-8146/
[79] The Electronic Communications (Universal Service) (Broadband) Order 2018

(a)   They do not have access to a decent broadband connection by any technology including wireless connections such as mobile broadband; or

(b)   The only service available that can provide the minimum criteria costs more than £45 per month; and

(c)   The property is not due to be connected by a publicly funded roll-out scheme within 12 months; and

(d)   The connection will cost no more than £3,400 per premises to build (or the customer has chosen to pay the excess above that amount).

The USO is technology neutral, and the service can be provided to the eligible citizens through any technology possible including mobile broadband if the minimum technical standards stated above are met. In practice, however, most connections under the USO are likely to use full-fibre or fibre-to-the-cabinet technology.

Better Connectivity Plan for Regional and Rural Australia[80]:

3.43   The Better Connectivity Plan for Regional and Rural Australia, part of the Australian Government's telecommunications agenda 2022-23, is a five-year plan with a total funding of $656 million. It aims to enhance mobile and broadband connectivity in rural and regional areas. The plan includes:

(a) $400 million to improve mobile coverage on regional roads, enhance coverage in underserved communities, and strengthen communication services and public safety facilities,

(b) $200 million for two additional rounds of the Regional Connectivity Program to invest in digital connectivity infrastructure projects,

(c) $30 million for on-farm connectivity to support farmers in utilizing connected machinery and sensor technology,

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[80] https://www.infrastructure.gov.au/media-communications-arts/better-connectivity-plan-regional-and-rural-australia

(d) $20 million for an independent audit of mobile coverage to identify black spots and guide investment priorities,

(e) $6 million to boost funding for the Regional Tech Hub, providing advice and support on digital connectivity options to regional consumers.

Canada, CRTC – Broadband Fund[81]:

3.44 The Canadian Radio-television and Telecommunication Commission (CRTC) has established the Broadband Fund 2018[82] to help provide all Canadians with access to broadband internet and mobile wireless services especially those that live in underserved areas (i.e., that do not have broadband internet access and mobile wireless services that meet the Universal Service Objective). Canada aims to get 95% of Canadians connected by 2026 and 100% by 2030[83]. During its first five years of operation, the Fund will award up to $750 million to projects that help achieve this goal. To provide the people with access to the internet, the CRTC has set up a Universal Service Objective and has established several criteria to measure the success of the objective:

(a) Canadian residential and business fixed broadband internet access service subscribers should be able to access speeds of at least 50 Mbps download and 10 Mbps upload, and to subscribe to a service offering with an unlimited data allowance; and

(b) The latest generally deployed mobile wireless technology (currently LTE) should be available not only in Canadian homes and businesses, but on as many major transportation roads as possible in Canada.

The funding comes directly from contributions made by large Canadian telecommunications service providers whose total annual Canadian revenues amount to at least $10 million. The Broadband Fund is providing funds for various types of projects including transport

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[81] https://crtc.gc.ca/eng/internet/fnds.htm
[82] Telecom Regulatory Policy CRTC 2018-377
[83] https://ised-isde.canada.ca/site/high-speed-internet-canada/en/canadas-connectivity-strategy/high-speed-access-all-canadas-connectivity-strategy

projects, access projects, mobile wireless projects, and satellite dependent community project.

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Issues for consultation

Q.4 **Apart from efforts made by the Government through various Projects for provisioning of broadband connectivity under NDCP 2018 and NBM 2019 and other schemes, what additional measures are required to fulfill the objectives of universal connectivity in India?**

Q.5 **Whether connecting GPs/villages/village institutions through BharatNet has helped in improving digital connectivity in an effective manner? If not, what additional measures are required to ensure universal connectivity across all GPs/villages/village institutions in an efficient and time bound manner?**

Q.6 **Will the schemes supported by USOF other than BharatNet suffice the need of universal connectivity in the country? If not, what additional measures or changes in strategy are required to ensure universal connectivity to all unconnected areas? Please provide your answer with suitable justification.**

Q.7 **What steps should be taken to encourage service providers for effective utilisation of the BharatNet infrastructure in provisioning of connectivity to institutions/households/individuals?**

Q.8 **Is there any need to take steps to make satellite internet a viable option for providing connectivity to remote/ inaccessible areas? If yes, please provide your answer with suitable justification. If not, what are the other alternatives for provision of connectivity in these areas?**

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> **Q.9** **What measures are required for adopting a collaborative approach to utilise Digital Connectivity Infrastructure created by the service providers or through government-aided schemes to extend connectivity to the people in unserved areas? Please provide your answer with suitable justification.**
>
> **Q.10** **Please suggest the best practices being followed internationally that can be adopted in the country to provide universal connectivity to all individuals, households, and communities?**

B. Digital Affordability

Background

3.45 The fact that despite coverage around the world being at approximately 95%[84], about 2.7 billion people are still offline, is showing that the challenge of digital inclusion is critical. The nations around the world are deliberating to address the issue in addition to priority on achieving universal connectivity. India is also placed similarly where on one side only 7% of villages are pending to be connected with mobile broadband network, and on the other side 61% of people are not using the mobile internet. Thus, in addition to bridging the coverage gap, the issue of usage gap should also be addressed.

3.46 The internet/ broadband internet can be accessed by the users through various digital devices, but smartphones are common device because mobile broadband is cheaper in India. As per GSMA, smartphone adoption in India was 73% in 2021, which is expected to reach 84% by

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[84] https://www.gsma.com/r/wp-content/uploads/2022/10/The-State-of-Mobile-Internet-Connectivity-Report-2022.pdf

2025[85]. However, still there are some sections of the society, who cannot afford smartphones. The easy access of smartphones with affordable broadband connectivity could be a significant step in the journey towards digital inclusion in the country.

3.47   In India[86] in 2022, the cost of cheapest internet-enabled smartphone was 35.91% of average monthly income (₹4999). The cost of cheapest internet-enabled smartphone averages to 26% of the average monthly income across the globe. This figure is below 5% in developed countries such as USA and in Europe. In Low Income Countries, this figure exceeds 70%[87]. In India, although the cost of the cheapest internet enabled smartphone is not as unaffordable as compared to Low Income Countries, but efforts are required to make it more affordable and reach the levels of developed countries.

3.48   Further, the cost specified above is for a non-5G smartphone, and the costs for 5G-enabled smartphones is considerably higher than 35.91% of average monthly income, thereby adversely impacting affordability further in case of 5G smartphones. It is worth noting that in the light of 5G roll-out as well as new applications and use cases based on emerging technology, 5G smartphones and 5G mobile broadband connection are becoming essential for the users to fully participate in the digital economy.

3.49   The overall retail price of a smartphone comprises many factors. First is the manufacturing cost, which includes the expenses for hardware components, assembly, and manufacturing. The second is investments made by stakeholders for research, development, marketing, and branding. The third encompasses hidden costs such as warehouse

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[85] https://www.gsma.com/mobileeconomy/wp-content/uploads/2022/07/GSMA_APAC_ME_2022_R_Web_Final.pdf
[86] https://a4ai.org/research/device-pricing-2022/
[87] https://www.broadbandcommission.org/wp-content/uploads/dlm_uploads/2022/09/Strategies-Towards-Universal-Smartphone-Access-Report-.pdf

storage, transport, and delivery to the seller. And final is taxes on the device and its components as applicable in the country.

3.50 The major benefit of encouraging adoption of smartphone is making available various citizen centric services at their doorstep. India is the fastest growing application market in the world and is ranked first in terms of app downloads[88]. Presently, more than 300+ government mobile apps are operating and supporting delivery of various citizen services such as information dissemination, direct benefit transfers, education, healthcare[89], etc. As per the report on 'Contribution of Smartphones to Digital Governance in India[90]' by ICEA and KPMG India released in 2020, smartphones and e-services can be leveraged by the Government to unlock 80% improvement in efficiency and eight times reduction in the processing time. However, to bring every citizen in the digital ecosystem to reap full benefits of digitalisation, it is essential that the availability of smartphones at affordable costs is made available.

Device Affordability in India

Government Initiatives to promote Local Manufacturing

3.51 The Government of India has undertaken various initiatives for promoting indigenous manufacturing of electronic equipment and digital devices. These initiatives, which are discussed below will help in making smartphones and digital devices more affordable:

i. National Policy on Electronics (NPE), 2019[91]: The National Policy on Electronics approved by the Government of India on 25th February 2019 promotes domestic manufacturing and export of electronic devices including smartphones, laptops, and tablets. It envisions

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[88] https://icea.org.in/blog/wp-content/uploads/2022/06/ICEA-Digital-Governance-in-India-Report-2020.pdf
[89] https://icea.org.in/blog/wp-content/uploads/2020/07/Press-Release-ICEA-KPMG-Report_09072020_Contribution-of-Smartphones-to-Digital-Governance-in-Ind....pdf
[90] https://icea.org.in/blog/wp-content/uploads/2022/06/ICEA-Digital-Governance-in-India-Report-2020.pdf
[91]
https://www.meity.gov.in/writereaddata/files/Notification_NPE2019_dated25.02.2019.pdf

placing India as a global hub for electronics manufacturing and export. It aims at producing 1 billion mobile handsets by 2025 and to achieve a turnover of $400 billion while providing incentives and support for significantly enhancing the availability of skilled manpower, including re-skilling in the sector.

ii. Production Linked Incentive (PLI) Scheme for Large Scale Electronics Manufacturing[92]: The PLI scheme for Large Scale Electronics Manufacturing notified on 01 April 2020, shall provide financial incentive to boost domestic electronics manufacturing and attract large investments. The Scheme shall extend an incentive of 4% to 6% to eligible companies on incremental sales (over base year i.e., 2019-20) of manufactured goods including mobile phones (Invoice Value INR 15,000 and above) and specified electronic components for a period of five years after the base year.

iii. Production Linked Incentive (PLI) scheme for Promoting Telecom & Networking Products Manufacturing in India[93]: With the objective to boost domestic manufacturing, investments and export in the telecom and networking products, PLI Scheme was notified on 24th February 2021. The scheme has a total financial outlay of ₹12,195 Crore and the MSME category has a financial allocation of ₹1000 Crore. The support under the Scheme shall be provided for a period of five years.

iv. The applicable incentive percentage[94] for MSMEs will be 7% for Year 1 & Year 2, 6% for Year 3, 5% for Year 4 and 4% for Year 5 on eligible sales over the base year. For category other than MSME, the applicable incentive percentage will be 6% for Year 1 & 2, 5% for Year 3 & 4 and 4% for Year 5 on eligible sales over the base year. The incentive will be given subject to annual investment targets having been met. Further, there is an additional incentive of 1% over and above the applicable rates of incentive for products qualified under Design led

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[92] https://www.meity.gov.in/esdm/pli
[93] https://dot.gov.in/pli-scheme
[94] https://dot.gov.in/sites/default/files/2021_02_25%20PLI%20IP_0.pdf

Manufacturing as per the amendment made to the PLI scheme in June 2022.

v. Production Linked Incentive (PLI) Scheme for IT Hardware[95]: The PLI scheme for IT Hardware, announced on 3rd March 2021, proposes a financial incentive to boost domestic manufacturing and attract large investments in the value chain. The Scheme extends an incentive of 4% to 2%/1% on net incremental sales (over base year) of goods manufactured in India and covered under the target segment, to eligible companies, for a period of four years. The Target Segment under PLI are laptops, tablets, all-in-one PCs and servers.

vi. Further on 23rd May 2023, the PLI Scheme 2.0 for IT Hardware[96] was notified. This scheme extends an average incentive of around 5% on net incremental sales (over base year) of goods manufactured in India and covered under the target segment, to eligible companies, for a period of six years. The PLI Scheme 2.0 for IT Hardware also added Ultra Small Form Factor (USFF) in the target segment along with the target segment of the original scheme.

vii. Design Linked Incentive (DLI) Scheme[97]: The DLI scheme by MeitY, notified on 21st December 2021, aims to help offset the disabilities in the domestic industry involved in semiconductor design and strengthen the semiconductor chip design ecosystem in the country. The scheme extends financial incentives as well as design infrastructure support across various stages of development and deployment of semiconductor designs for Integrated Circuits, Chipsets, System on Chips, Systems and IP Cores, and semiconductor linked designs over a period of five years.

viii. The Broadband Commission's report on "Strategies Towards Universal Smartphone Access," released in September 2022, highlights the

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[95] https://www.meity.gov.in/esdm/pliithw
[96] https://www.meity.gov.in/esdm/production-linked-incentive-scheme-pli-20-it-hardware
[97] https://chips-dli.gov.in/DLI/HomePage

potential of promoting local manufacturing to increase smartphone adoption on a smaller scale in some countries. However as per the report, they lack evidence of increasing smartphone adoption at scale. As such, it is imperative to measure the impact of efforts that focus on local manufacturing on digital affordability and whether any additional efforts may be required to improve digital affordability of smartphones and other digital devices.

Smartphone Financing for Improving Affordability:

3.52   One of the initiatives that can be undertaken to improve device affordability is through smartphone financing. Smartphone financing is the process of converting the upfront cost of smartphones into instalment payments. Smartphone financing usually involves affordable loans with flexible payments to ensure the availability of 4G and 5G devices as well as device locking mechanisms to reduce the risks of bad debt and theft of the devices. In India, many smartphone companies are already offering device financing schemes to customers allowing them to pay for the purchased smartphone in instalments.

Development of a market for second-hand smartphones:

3.53   To increase the affordability of smartphones, the concept of circular economy can be applied by emphasizing the repair and reuse of existing mobile phones. GSMA[98] has suggested to resell pre-owned handsets at a discount as sellers would receive money to dispose of their old phone and increase their buying power to upgrade to a new phone and buyers can buy good-quality pre-owned phones at lower prices as compared to new phones. Although most platforms trading pre-owned smartphones perform various activities such as data erasure and resetting to factory settings on the smartphone[99], still considerable portion of the smartphone owners are concerned about

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[98] https://www.gsma.com/mobilefordevelopment/resources/making-internet-enabled-phones-more-affordable-in-low-and-middle-income-countries/
[99] https://icea.org.in/blog/wp-content/uploads/2022/02/ICEA-IDC-Re-commerce-Report.pdf

data privacy issues in selling their used smartphones. This needs to be looked into while suggesting any framework/model on this aspect.

3.54   Also, according to ICEA report, Smartphone Re-commerce: India Market Opportunity[100], the average price for a second-hand/refurbished smartphone is ₹6,913 and the average price for a new smartphone is ₹13,943, showing that the price for a second-hand smartphone is as low as half of a new smartphone. These numbers show the potential price-reduction of smartphones and an option for increasing the device affordability in the country.

State-Government Schemes for Digital Affordability:

3.55   In recent years, some of the States Governments in India have taken initiatives to provide free devices or providing subsidies for an internet connection to the students from economically weaker sections of the society. These initiatives aim to bridge the digital divide and facilitate online learning. These initiatives mainly include:

(a)   Subsidies provided to the beneficiaries when purchasing a smartphone or opting for an internet connection, and

(b)   distribution of free laptops, tablets and smartphones to students that qualify certain criteria preset by the state governments.

The impact assessments of such schemes are not readily available. Further, such schemes alone may not be sufficient to bridge the gap between those with and without access to the devices. A holistic approach is necessary to ensure the digital affordability.

Connection Affordability in India:

3.56   Due to near universal mobile broadband coverage in the country (93% villages covered), majority of internet users are relying on smartphones and mobile broadband services to access the internet. As the prices of

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[100] https://icea.org.in/blog/wp-content/uploads/2022/02/ICEA-IDC-Re-commerce-Report.pdf

mobile broadband services in India are lower than the targets discussed above; device affordability, particularly the smartphone remains the focus area for digital inclusion.

3.57 Broadband Commission has set targets for making broadband affordable to everyone stipulating that entry-level broadband services should be less than 2% of monthly gross national income (GNI) per capita[101]. In India, the prices for entry-level broadband services are 1.1% monthly GNI per capita for mobile broadband and 3.32% monthly GNI per capita for fixed broadband. The low prices for mobile broadband entry-level plans point out that in India, the prices for internet connections are lower than the target set by Broadband Commission. However, for fixed broadband, the same is more than the target set.

3.58 To promote broadband services through wireline, TRAI, through its Recommendations on "Roadmap to Promote Broadband Connectivity and Enhanced Broadband Speed" dated 31 August 2021 has recommended exemption in the license fees on the revenue earned on the provisioning of fixed-line broadband services. The relevant paragraphs of the recommendations are reproduced below for reference:

"The Authority recommends that:

(i) *Under the prevailing licensing framework, Internet Service and Access Service licensees are authorized to provide fixed-line broadband services to individual customers. Therefore, to accelerate the growth of fixed-line broadband services in the country, these categories of licensees should be eligible for incentives.*

(vi) *For an eligible Access Service licensee in any LSA, who is providing the fixed-line broadband services under the Access Service license/ authorisation, license fee exemption should be given on the 'Revenue from Wireline Subscribers' booked under "Particular 1 (A)" of the Format*

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[101] https://www.broadbandcommission.org/advocacy-targets/2-affordability/

of "Statement of Revenue and License Fee" specified for Access Service Providers.

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(vii) *For an eligible Internet Service licensee in any LSA, license fee exemption should be given on the 'Revenue from Services' booked under "Particular 1" of the Format of "Statement of Revenue and License Fee" specified for Internet Service Providers.*

[Para 6.83]"

3.59 Further, TRAI in the aforesaid recommendations, has also recommended a pilot project based on DBT model for rural fixed line subscribers. The relevant paragraphs of the recommendations are reproduced below for reference:

(ii) *"To evaluate practicability of Direct Benefit Transfer (DBT) for accelerating growth of fixed-line broadband services, a pilot DBT scheme for prospective fixed-line broadband subscribers 256 should be launched at places in rural areas where adequate fixed-line broadband capacity is available but there is lack of demand for fixed-line broadband.*

(iii) *For the pilot scheme the Government should consider reimbursing 50% of the monthly fixed-line broadband subscription charges, subject to not more than Rs. 200 per month per subscriber, to each rural fixed-line broadband subscriber through DBT platform.*

(iv) *After ascertaining the practicability of the pilot DBT project in accelerating the growth of fixed-line broadband services; specifics of the DBT scheme like eligibility criteria for beneficiaries, reimbursement amount, period of the scheme etc. should be worked out subsequently.*

[Para 6.108]"

Use of e-Rupi to facilitate various schemes for Digital Affordability:

3.60　Many initiatives focused towards providing affordable services and devices to the beneficiaries rely on DBT and other financial services, where it is used to reimburse the spending of the beneficiary after the beneficiary has availed the services. An alternate option could be the use of latest fintech models such as e-RUPI vouchers.

3.61　e-Rupi is a voucher-based system that allows cashless transactions via SMS or QR code. It ensures that payments are made only for intended purposes like healthcare and subsidies on purchase of smartphone/ internet connection while minimizing leakages and reaching the intended beneficiaries.

International Practices for improving Digital Affordability

United States of America, FCC - Emergency Connectivity Fund (ECF)[102]:

3.62　The ECF is a $7.171 billion programme to help schools and libraries support remote learning for students. The program provides funding to schools and libraries for the reasonable costs of eligible equipment and services that can be provided to students, teachers, and library patrons who lack connected devices and/or lack broadband access during the pandemic. The equipment and services covered by the programme are laptop and tablet computers, Wi-Fi hotspots, modems, routers, etc. The programme provides a maximum reimbursement of $400 for each laptop or tablet and $250 for Wi-Fi hotpots to the beneficiaries. For the reimbursement for any other equipment and broadband services, the FCC and Universal Service Administrative Company (USAC) will review costs to ensure they are reasonable.

United States of America, FCC - Affordable Connectivity Program[103]:

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[102] https://www.fcc.gov/emergency-connectivity-fund
[103] https://www.fcc.gov/acp

3.63 The Affordable Connectivity Program aims to help ensure that households can afford the broadband they need for work, school, healthcare and more. The benefit provides a discount of up to $30 per month toward internet service for eligible households and up to $75 per month for households on qualifying tribal lands. Eligible households can also receive a one-time discount of up to $100 to purchase a laptop, desktop computer, or tablet from participating providers if they contribute more than $10 and less than $50 toward the purchase price. The Affordable Connectivity Program is limited to one monthly service discount and one device discount per household. Households with income at or below 200% of the Federal Poverty Guidelines are eligible for this scheme.

Singapore, The Data for All Initiative[104]:

3.64 The Data for All initiative, in support of the Digital for Life movement, enables all segments of society to access digital connectivity through the partnership and support of Private-Public-People (3P) partners. This seeks to mobilise support from the community to supply around 30,000 children, young adults, and elderly members of low-income families, as well as people with disabilities and their caregivers, with mobile data worth more than SG$3 million ($2.1 million)[105].

Malaysia, Jaringan Prihatin Programme[106]:

3.65 The Malaysian government rolled out a subsidy programme in 2021 for the Bottom 40 economic group (B40) with affordable access to smartphones through telecom service providers by providing the eligible individuals a smartphone bundled with a data plan to stay connected during lockdown periods. This programme was funded through fund allocation by the government as well as additional

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[104] https://www.imda.gov.sg/digitalforlife/Data-for-All
[105] https://www.imda.gov.sg/news-and-events/Media-Room/Media-Releases/2022/Community-steps-up-to-help-singaporeans-embrace-digital-to-enrich-their-lives-at-the-inaugural-digital-for-life-festival#_ftn1
[106] https://belanjawan2021.treasury.gov.my/manfaat/index.php/en/jaringanprihatin-en

benefits by the telecom service providers, with a total value being RM 3.5 billion. The data plans and device packages offered are jointly subsidised by the government and the telcos participating in this programme. After the implementation of this scheme, the smartphone market grew by 10.6% in 2021 with over 12 million devices sold[107].

Argentina, Plan Mobile Internet Access[108,109]:

3.66   In 2016, Argentina launched a national programme to provide asset financing for eight million individuals to move from 2G feature phones to 4G enabled smartphones. Individuals could purchase these smartphones on a 12-month installment plan provided by the government with a potential investment of 80 billion pesos. Various international and domestic practices stated above emphasize the need to focus on smartphone adoption and internet penetration with the aim to increase affordability and digital inclusion. The schemes could be in the form of measures like smartphone financing, providing subsidy on purchase of mobile devices, internet plans, internet connecting devices, etc.

3.67   Device prices are generally determined by the market conditions and demand for the products. Also, different features required by different users of digital technologies impacts the prices of digital devices. A cross-sector collaboration among the stakeholders such as the device manufacturers, software and app developing companies, the consumers, and the Government should provide ways to resolve the issue of a lack of availability of digital devices.

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[107] Propped by Government Subsidies, Malaysia's Smartphone Market Grew by 10.6% in 2021; IDC Expects Flat Growth in 2022 | TelecomTV
[108] https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2018/08/Accelerating-affordable-smartphone-ownership-in-emerging-markets-2017_we.pdf
[109] https://www.lanacion.com.ar/economia/mauricio-macri-lanzo-un-plan-para-comprar-celulares-con-4g-en-12-cuotas-por-2200-pesos-nid1919658/

Issues for consultation

Q.11   Whether various measures taken by the Government such as focussing on local manufacturing are sufficient to bring down the prices of smartphones in India? If not, what additional measures are required to be taken to make it more affordable? Please explain your answer with suitable justification.

Q.12   Whether market for second-hand smartphones is a viable strategy for increasing the affordability of smartphones to the people? Please indicate the opportunities and challenges that may arise due to this strategy.

Q.13   Whether schemes undertaken by various States for distribution of smartphones and laptops to students and support for the connectivity are effective mechanisms to increase Digital Affordability in the country? If yes, what are the measurable parameters to assess the effectiveness of such schemes? If not, what could be the alternative policy interventions/ schemes with measurable outcomes that can support affordability of the devices? Please support your answers with suitable information.

Q.14   Is there any need for policy interventions to increase Digital Affordability (digital devices and digital connectivity) among specific sections of society, for example, women, students, farmers, fishermen, the economically weak, etc.? Please respond with suitable justification.

> **Q.15** **What measures should be taken to make digital devices and digital connectivity affordable to the citizens for empowering them to maximize the benefits of an inclusive digital society? Please provide your answer with best practices being followed internationally in this regard.**

C. Digital Literacy

Background

3.68   In the 20th century, literacy was defined as the ability to read and write. Now, the literacy is defined as "the ability to understand and communicate information however presented[110]." The definition of Digital Literacy has been extended further and "is the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital devices and networked technologies for participation in economic and social life[111]." It includes competencies that are variously referred to as computer literacy, ICT literacy, information literacy, and media literacy.

Classification of Digital Skills

3.69   Digital literacy is usually measured by the number of people having digital skills in a country. The higher the number of people possessing digital skills in a country, the higher is the digital literacy of that country. As per the ITU framework, digital skills are divided into three

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[110]

https://www.researchgate.net/publication/224079617_How_Can_We_Teach_Computational_Literacy_to_All_Levels_of_Students

[111]

https://unevoc.unesco.org/home/TVETipedia+Glossary/show=term/term=Digital+literacy

categories, viz., Basic digital skills, Intermediate digital skills, and Advanced digital skills.

a) Basic digital skills are the foundational skills that are required for performing the most basic of tasks on the internet using digital technologies. The foundational knowledge is about hardware and software of the devices along with basic online operations like using search engine, email, word processing, online transactions, etc. Basic skills are a must to have for anyone to be able to use the internet and other digital technologies effectively.

b) Intermediate and advanced digital skills allow a user to use the internet and other digital technologies in more meaningful and effective ways. Intermediate skills usually consist of professional use of business software and data management, while Advanced skills consist of data analysis, software development and high-level computing competences in the range of emerging technologies such as Artificial Intelligence and Machine Learning[112].

c) Basic skills can be learned by anyone with knowledge of digital technologies. Intermediate digital skills require the ability to critically evaluate technology or create new content. Advanced digital skills are acquired through advanced formal education. There are many certification courses available online that offer the knowledge and skills about programming, web/app development, AI/ML, etc. People with more advanced digital skills can take advantage of the opportunities available through the many ongoing advancements in digital technologies, platforms, and devices. The intermediate and advanced digital skills also open opportunities for the millions of jobs in the country.

3.70 Similar to ITU, many other frameworks for digital skill levels have been developed by various other leading organisations. Some of these

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[112] https://www.itu.int/hub/2022/04/digital-skills-insights-digital-transformation/

include digital literacy frameworks by the OECD which divides ICT skills as ICT generic skills, ICT specialist skills and ICT complementary skills, and the EU's DigComp 2.1 Digital Skills Framework[113], which divides the digital skills into Digital user skills, Digital specialist skills and Digital entrepreneurship skills.

Digital Literacy and Digital Skills in India

3.71 The importance of digital literacy and digital skills is promoted through various efforts put in by individuals, organizations, and nations at the regional, national, and international levels. Every country is trying to enhance digital literacy for its citizens with the aim to increase work efficiency, bridge the digital divide and make them more participative in digital economy. For India with its vast and extremely diverse demography, providing digital literacy is a major challenge. Lack of digital literacy and awareness among the various segments of the society specially those marginalised, living at remote and rural places or economically weak or women is one of the major areas which needs to be investigated on priority to address the digital divide among the citizens.

3.72 As per the 75th round of the National Sample Survey (NSS)[114], 25% of the men can use the internet while only 14.9% of the women are able to use the internet highlighting the gender gap in terms of the basic digital literacy in the country. At the same time, the rural-urban gap is also present in terms of the digital literacy with 37.1% of the urban population being able to use the internet while this number in the rural areas is only at 13%.

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[113] https://publications.jrc.ec.europa.eu/repository/handle/JRC106281

[114] https://www.mospi.gov.in/documents/213904/301563//KI_Education_75th_Final1602590967945.pdf/4d0dcdc4-a8f0-0795-df06-be25f2b3a6f7

Digital Literacy Initiatives in India

3.73   In India, most important scheme for digital literacy is the Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA).

PMGDISHA:

3.74   PMGDISHA was approved by the government in February 2017 aiming to cover 6 crore Indians, one member from every eligible household, across all Gram Panchayats in States/UTs and make them digitally literate. The objective of the scheme is to empower the citizens in rural areas by training them to operate computer or digital access devices (like tablets, smartphones, etc.), send and receive e-mails, browse the internet, access Government services, search information, etc. and hence enable them to use the Information Technology to actively participate in the process of nation-building[115]. This is the world's largest digital literacy program with a target of 60 million.

3.75   The target age group of PMGDISHA is 14-60 years with a preference to SC, ST, Below Poverty Line (BPL), minorities, women and differently abled persons and priority to non-smartphone users, Antyodaya households, college dropouts, participants of the adult literacy mission, etc. PMGDISHA has a course duration of 20 hours, and the learning module is as follows:

   i.   Introduction to Digital Devices,

  ii.   Operating Digital Devices,

 iii.   Introduction to the Internet,

  iv.   Communications using the Internet, and

   v.   Application of the Internet (includes Citizen centric services and use of mobiles for undertaking cashless transactions).

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[115] https://www.pmgdisha.in/wp-content/uploads/2018/09/PMGDISHA-booklet_July_print.pdf

vi.   As of April 2023, PMGDISHA had a total of around 6.89 crore enrolled candidates and 5.94 crore trained candidates, out of which around 4.43 crore candidates have been certified.

3.76   Some of the other programmes that envisage to teach digital skills to the people of India are as follows:

i. **Digital Skilling Programme**

Digital Skilling Programme, launched in June 2022 focuses on skilling, reskilling and upskilling students via internships, apprenticeships, and employment to 1 crore students in the emerging technologies.

ii. **FutureSkills**

NASSCOM FutureSkills, launched in February 2022, is an online B2B skilling platform intended as an industry driven learning ecosystem. FutureSkills aims to reskill 2 million professionals and potential employees & students in the industry over a period of 5 years. It focuses on 155+ skills spanning across 70+ job roles on 10 emerging technologies namely Artificial Intelligence, Blockchain, Big Data Analytics, Cloud Computing, Cyber Security, Internet of Things, Mobile Tech, Robotic Process Automation, Virtual Reality, and 3D.

iii.   **National Digital Literacy Mission (NDLM)** and **Digital Saksharta Abhiyan (DISHA)**[116,117]

These two schemes were formulated to impart IT training to 52.5 lakh persons, including Anganwadi and ASHA workers and authorized ration dealers in all the States/UTs across the country so that the non-IT literate citizens are trained to become IT literate to enable them to participate in the democratic and developmental process actively and effectively and also enhance their livelihood.

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[116] https://nielit.gov.in/ajmer/content/national-digital-literacy-mission
[117] https://pib.gov.in/PressReleseDetail.aspx?PRID=1506002

The target for NDLM was to train 10 lakh candidates which was achieved in June 2016 and the target for DISHA was 42.5 lakh candidates which was achieved in December 2016. Under these two schemes, a total of 53.67 lakh beneficiaries were certified.

3.77 **Toolkits for Digital Literacy**

To address the challenges arising out due to lack of digital skills in general and also gender gap, GSMA has developed multiple toolkits and training guides to address the skill barrier present among unconnected people around the world. Some of the toolkits are as follows:

i. **Mobile Technical Literacy Toolkit and Adaptation Framework**[118]: Released in 2015 as a part of the Connected Women programme of GSMA, the toolkit provides users training on some of the basic functions of a mobile handset such as an introduction to mobile phones, SMS, mobile money, and bill payments over mobile phones. The adaptation framework document provides a framework for delivering mobile literacy training workshops for women.

ii. **Mobile Internet Skills Training Toolkit (MISTT)**[119]: MISTT is a set of free resources to teach people the basic skills they need to access and use mobile internet. It uses a 'train the trainer' approach and consists of short lessons in a PDF format that can be easily adapted to local needs and languages. The training presented in this toolkit target people with little or no mobile internet skills. It aims to teach those who want to learn what the mobile internet is and how to communicate and search online. This toolkit introduces using the mobile internet on an entry-level smartphone. Although this framework guides the overall

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[118] https://www.gsma.com/mobilefordevelopment/resources/mobile-technical-literacy-toolkit-2/
[119] https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2021/10/GSMA-Mobile-Internet-Skills-Training-Toolkit-2020-English.pdf

flow of this toolkit, it has been designed so that each training session can be held stand alone. This allows the trainer to choose which sessions to use depending on what is relevant to their target audience.

3.78 Such toolkits already available in the market can be utilised to impart digital literacy to the people in the country. These toolkits offer comprehensive and user-friendly resources that cover various aspects of digital literacy, such as basic computer operations, internet usage, online safety, and digital payments. By leveraging these toolkits, community organisations, government agencies, and non-profit organisations can conduct training sessions and workshops in rural areas.

Involvement of Stakeholders in the Skilling Process

3.79 To improve the digital skills levels of people in rural areas, it is necessary that stakeholders such as government agencies, academia, private sector enterprises, etc. should get involved in the skilling process. The stakeholders can be engaged in a variety of ways, such as, forming a coalition/ council for uniting organizations' efforts across sectors and industries or a task force for a time-limited development of a specific skilling strategy or programme. Another way of engaging stakeholders is to create digital skill forums that will create communities of people in a region to learn specific digital skills and will act to incentivize people for learning more digital skills by granting awards.

3.80 Coalitions and councils are effective in organizing and sustaining stakeholders throughout the skilling process, taking on tasks such as policy review, monitoring technological developments, and identifying new partners. Task forces focus on specific goals, developing strategies or programs as models for collaboration. Engaging stakeholders helps identify digital skills gaps and prioritize areas for improvement, ensuring the relevance and effectiveness of skilling programmes

Mass Literacy through Digital Technologies

3.81   Digital literacy and education can be provided to large groups of people through the usage of emerging technologies. With the increasing prevalence of digital technologies and the internet, many organizations and governments are looking for solutions to use these tools to provide access to education and literacy resources to the people who might not otherwise have access to them. Some examples of how digital technologies can be used to promote mass literacy include:

(a)   **Online courses and tutorials**: Online courses and tutorials are one of the most popular ways to provide access to education and literacy resources through digital technologies. These courses and tutorials can be accessed from anywhere with an internet connection and can cover a wide range of topics related to literacy.

(b)   **Mobile learning**: Mobile learning, or M-learning, is another popular method for promoting literacy through digital technologies. M-learning involves the use of mobile devices like smartphones and tablets to access educational materials and resources and there are many apps available for M-learning. M-learning is particularly useful for individuals who might not have access to traditional educational resources or who have limited time to dedicate to learning.

3.82   While mass literacy through digital technologies can be an effective tool for promoting digital literacy and in turn, increase the usage of digital technologies (especially the internet), there are various challenges such as the ability of the beneficiaries to use the internet and the lack of broadband connection which need to be addressed.

International Practices for improving digital literacy

UK, Digital Skills Council:

3.83   The government of UK has set up a Digital Skills Council[120,] which provide a focal point for the liaison between government and industry to address the digital skills shortage and quality deficit in the UK. The Council membership spans industry, the public sector and academia, and benefits from a broad range of background and expertise to help drive industry-led action. The Council is expected to address the country's current and future demand of digital skills. The objectives of the Council are:

a) To promote routes into digital careers and opportunities for the labour market to re-skill and up-skill to meet current and future employer needs,

b) To increase awareness of resources that enable pathways into digital and digitally enabled jobs for workers in non-digital roles, and

c) To promote mechanisms to provide increasingly diverse access to digital roles and digitally enabled roles.

UK, Local Digital Skills Partnership Programme[121]:

3.84   With support from the Department for Digital, Culture, Media & Sport (DCMS), UK, Local Digital Skills Partnership Programme, brings together employers, regional academia, and local public sector and training providers to develop targeted digital skills programmes. Local Digital Skills Partnership Programmes are designed to help build regional capacity to improve digital skills capability at all levels, bringing together and connecting partners from the public, private and third sectors to upskill the current workforce, advance digital

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[120] https://www.gov.uk/government/groups/digital-skills-council
[121] https://www.gov.uk/guidance/digital-skills-partnership

inclusion, and raise awareness of the importance of digital skills regionally.

EU's Digital Skills and Jobs Coalition Initiative[122]:

3.85   Digital Skills and Jobs Coalition (DSJC) is an initiative to bring together Member States, companies, social partners, non-profit organisations, and education providers to address the lack of digital skills in Europe. The targets of Coalition are the following:

(c)   Digital skills for all: developing digital skills to enable all citizens to be active in our digital society.

(d)   Digital skills for the labour force: developing digital skills for the digital economy, upskilling and reskilling workers and jobseekers, and actions on career advice and guidance.

(e)   Digital skills for ICT professionals: developing high level digital skills for ICT professionals in all industry sectors.

(f)   Digital skills in education: transforming teaching and learning of digital skills in a lifelong learning perspective, including the training of teachers.

Mexico, Recrea Jalisco platform:

3.86   This platform is a collaboration between the state government of Jalisco, Thinckers and Udemy. It is based on the DigComp framework developed by the EU and the goal of this platform is to improve the digital skills of high school and undergraduate students and teachers in the State of Jalisco, Mexico. The programme works on four levels:

a)   Diagnose public school teachers and students in digital competences using DigComp framework.

b)   Design and personalize learning paths for training teachers and students.

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[122] https://digital-skills-jobs.europa.eu/en/about/digital-skills-and-jobs-coalition

c) Certify teachers and students that reach the required levels of the DigComp framework.

d) Create digital education ecosystems.

As of 2021, the initiative has supported the skills development of 4,100 teachers and thousands of students located in 12 geographic zones in Jalisco. Some 2,346 teachers have levelled up their competencies from basic or mid-level to more advanced levels.

Qatar, TASMU Smart Qatar Programme[123]:

3.87   In 2017, the Ministry of Communications and Information Technology, Qatar, launched the TASMU Smart Qatar program with the vision of harnessing the power of technology and innovation to deliver digital solutions to the public and fuel Qatar's digital transformation into a smart nation by 2030 as per the National Vision 2030[124]. Under this programme, various initiatives were undertaken by the government of Qatar including initiatives for improving digital skills in the country. Some of the important initiatives for improving digital literacy levels in Qatar are as follows:

a) Common Digital Skills Framework: This initiative has set a national standard for digital and digital enabling skills that individuals within Qatar's workforce need to obtain. It covers more than 100 individual skills across 15 skill categories and provide a holistic view on the skill development of Qatar.

b) TASMU Centre of Excellence: The TASMU Centre of Excellence aims to become the training institution accessible to all employees in Qatar and to ensure digital skilling for all Qatari citizens and to decrease the digital skills gap in the Qatari labour market. The target audiences have been identified in two

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[123] https://www.tasmu.gov.qa/
[124] https://www.gco.gov.qa/en/about-qatar/national-vision2030/

different dimensions: civil servants versus non-civil servants, and ICT professionals versus non-ICT professionals.

France, Pix - Cultivez vos compétences numériques:

3.88 Pix is an online platform developed to assess and certify its users in various digital competencies. The platform is based on EU's DigComp. Pix contains 5 areas, 16 skills and 6 competency levels (with two levels each for Novice, Independent and Advanced) with 2 more levels (Expert) to be added in the future. The 5 competency areas included in Pix are:

a) Information and data
b) Communication and collaboration
c) Content creation
d) Protection and security
e) Digital environment

Pix allows its users to assess their digital skills based on a test on the platform and provides them with a digital skills profile containing targeted recommendations for future learning. Users can also choose to be certified by taking a specialised test under strict examination conditions. As of February 2023, Pix has certified well over 2 million individuals.

"G20 New Delhi Leaders' Declaration": New Delhi, India, 9-10 September 2023

3.89 As mentioned in the para 1.30 of this document, the **"G20 New Delhi Leaders' Declaration"** also highlighted importance of the Gender Equality and Empowering all Women and Girls. The relevant portions of the declarations related to this consultation process are captured below:

3.90 **On Enhancing Economic and Social Empowerment:** Women-led development and meaningful participation as decision makers for contributing as active participants in all spheres of society, across all sectors and at all levels of the economy. For doing so the declaration

emphasised to ensure equal access to affordable, inclusive, equitable, safe and quality education from early childhood through higher education to lifelong learning and support the greater enrolment, participation and leadership of all women and girls, including those with disabilities, in STEM fields and in emerging digital technologies.

3.91 **Bridging the Gender Digital Divide**

Para 65 of the declarations illustrates the commitment of G-20 nations to halve the digital gender gap by 2030. To this end, the nations *will:*

i. Address gender norms and barriers to accessibility, affordability, adoption, and usage of digital technologies.

ii. Promote regulatory policy frameworks that enable all women and girls to actively participate in the formulation and implementation of national digital strategies, including enhancing digital literacy and skills.

iii. Identify and eliminate all potential risks that women and girls encounter from increased digitalization, including all forms of online and offline abuse, by encouraging the adoption of safety-by-design approaches in digital tools and technologies.

iv. Promote and implement gender-responsive policies to create an enabling, inclusive, and non-discriminatory digital economy for women-led and -owned businesses, including MSMEs.

v. Encourage and support initiatives by identifying, funding, and accelerating proven solutions, thereby improving women's livelihoods and income security.

vi. Welcome initiatives to support women empowerment in the digital economy.

D. Digital Public Infrastructure driving Digital Inclusion

3.92 A robust and reliable digital connectivity infrastructure with ubiquitous and meaningful presence creates an enabling environment

for development of Digital Public Infrastructure (DPI) : a shared digital platforms and services that enable citizens to access public goods and services, fostering transparency, efficiency, and inclusivity in service delivery[125]. The DPI is a modern approach that addresses diversity and choice, encourages innovation and competition, and ensures openness and sovereignty.

3.93   The three essential flows that are enabled by DPI are as follows:

   i.   The flow of information through a digital identification system to establish their unique identity in the digital space. (Ex. Aadhaar)

   ii.   The transfer of personal information through a consent-based data sharing system, enabling citizens to have greater control over their data and unlocking the full potential of DPIs. (Ex. Data Empowerment and Protection Architecture (DEPA))

   iii. The flow of money through a real-time fast payment system, facilitating secure and efficient digital transactions. (Ex. UPI)

3.94   **India Stack:** India Stack is the collection of DPIs that comprises of a trinity of transformative digital initiatives - Aadhaar, Unified Payments Interface (UPI), and the Data Empowerment and Protection Architecture (DEPA)[126]. These initiatives aim to "unlock the economic primitives of identity, data, and payments at population scale and to establish a level playing field for members of a digital ecosystem[127]." Aadhaar, the world's largest digital identity platform, has provided a massive boost to financial inclusion in India. It has significantly increased bank account ownership, bridging the gap between the rich and the poor, and between men and women. The Aadhaar Payments Bridge (APB) has played a crucial role in actualising the Direct Benefits Transfer (DBT) Scheme, eliminating leakages in welfare delivery and

[125] https://blogs.worldbank.org/digital-development/how-digital-public-infrastructure-supports-empowerment-inclusion-and-resilience
[126] https://indiastack.org/index.html
[127] State of India's Digital Economy Report, ICRIER

leading to overall savings of INR 2 trillion. Furthermore, Aadhaar's e-KYC feature has reduced verification costs from INR 500 – 700 per person to just INR 3, driving cost savings for customer acquisition[128].

3.95 **Unified Payments Interface (UPI):** UPI is India's real-time interoperable payments system, witnessing unprecedented growth, particularly for peer-to-peer (P2P) transactions. Over time, UPI has introduced features like UPI123Pay and UPILite to enhance inclusivity, although gender divides in its usage persist[129]. The ongoing debate about maintaining the merchant discount rate (MDR) at zero has raised concerns about the financial viability of all ecosystem stakeholders, as government subsidies are inadequate to cover expenses incurred. According to the World Bank, more than 80 million adults in India made their first digital merchant payment after the start of the pandemic[130]. India recorded approximately 300 million Indians using UPI, making it the second-largest digital payment system globally after China[131].

3.96 **Open Network for Digital Commerce (ONDC):** ONDC is a network that enables location-aware, local digital commerce stores across industries to be discovered and engaged by any network-enabled applications[132]. The initiative aims to promote e-commerce and support startups in India. Considering the benefits that it may bring to the MSME sector, ONDC has been discussed in detail in Chapter 4.

3.97 **Ayushman Bharat Digital Mission (ABDM)**[133]: The Ayushman Bharat Digital Mission (ABDM) aims to develop the backbone necessary to support the integrated digital health infrastructure of the country and

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[128] State of India's Digital Economy Report, ICRIER
[129] Ibid
[130] https://www.worldbank.org/en/news/press-release/2022/06/29/covid-19-drives-global-surge-in-use-of-digital-payments
[131] https://static.pib.gov.in/WriteReadData/specificdocs/documents/2022/nov/doc20221116125801.pdf
[132] https://www.medianama.com/wp-content/uploads/2022/03/ONDCStrategyPaper.pdf
[133] https://abdm.gov.in/abdm

bridge the existing gap amongst different stakeholders of healthcare ecosystem through digital highways. Its objectives include establishing digital health systems, registries for clinical establishments and professionals, promoting open standards, and developing personal health records. ABDM also aims to focus on national health service portability, clinical decision support systems, health data analytics, and enhancing healthcare governance and quality. Existing digital infrastructure in India, including Aadhaar, UPI, and widespread internet and mobile phone access, forms a robust foundation for ABDM implementation. During the first two months of the pandemic, 80 per cent of the 50 million users of telemedicine in India were first-time users[134.] As of August 2023, ABDM has registered a total of 438.9 million Ayushman Bharat Health Accounts (ABHA) and has linked 288.7 million electronic health records[135.]

3.98 **eSanjeevani**[136] is the National Telemedicine Service of India, established by the Ministry of Health and Family Welfare (MoHFW), is the largest primary healthcare telemedicine implementation globally. It has served 114 million patients across 115,000 Health & Wellness Centres through 15,700+ hubs and 1,100+ online OPDs. Aligned with the Digital India programme and Ayushman Bharat Scheme, eSanjeevani brings digital health services to rural areas through two modes: eSanjeevaniAB-HWC for assisted teleconsultations and eSanjeevaniOPD for home-based healthcare access.

3.99 **Covid-19 Vaccine Intelligence Network (CO-WIN)**[137:] COWIN is A tech-based platform facilitating the planning, implementation, monitoring, and evaluation of Covid-19 vaccination in India. Co-WIN is a dynamic and equitable vaccination platform that ensures accessibility for all with multilingual registration modes, unbiased distribution through a centralized data source, adaptive architecture

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[134] https://www.practo.com/company/insights/practo_insights_report.pdf
[135] https://dashboard.abdm.gov.in/abdm/
[136] https://esanjeevani.mohfw.gov.in/#/about
[137] https://www.cowin.gov.in/

for a vast population, and data-driven public health policy formation. As of August 2023, COWIN has administered a total of 2.2 billion vaccination doses with a total of 1.11 billion registrations.

Role of DPIs in Driving Digital Inclusion

3.100 India has achieved considerable success in creating DPIs that have seen wide adoption. The World Bank also indicates that Aadhaar is the world's largest digital identity platform, which is facilitating financial inclusion through the Jan Dhan-Aadhaar-Mobile (JAM) trinity. The JAM trinity has played a pivotal role in transparent direct benefit transfers of welfare subsidies to bank accounts of the underserved. UPI has empowered users to conveniently transfer money from one bank account to another in real-time. These DPIs have not only promoted financial inclusion but also digital inclusion for citizens from less privileged socio-economic backgrounds and have empowered small businesses to improve access to healthcare.

3.101 To further improve the Indian DPI ecosystem and promote digital inclusions, lessons can be learnt from past experiences and global developments. Adopting a user-centric design approach is crucial, prioritizing all users' needs to reduce technology-related risks and avoid exacerbating inequalities. This may involve implementing compatible protocols for feature phones, assisted-tech models, and Interactive Voice Response Systems to cater to consumers with limited smartphone access or low digital literacy. Embedding inclusion as a core policy objective within the regulatory framework of DPIs is essential. Proactively prioritizing inclusion from the outset can create an ecosystem that benefits every individual, fostering a more equitable and accessible digital economy. Tailored use cases of the DPI may help to address the needs of underserved segments of society.

Digital Public Infrastructure enabling Device-less Participation

3.102 In order to extend the benefits of the digitalisation to the persons with no digital connectivity and without any devices, the Government through private partnerships has established digital infrastructure wherein one can access the internet as well as e-governance and financial services. Some of these common digital infrastructures are mentioned below:

i. **CSC Wi-Fi Choupal**[138]: CSC Wi-Fi Choupal is an initiative that provides Wi-Fi services at Common Service Centres in rural areas, bridging the digital divide. This initiative empowers rural communities by providing shared connectivity, enabling them to access essential digital services without individual device ownership.

ii. **Digital Kiosks and e-Governance Services**: DPI facilitates the establishment of digital kiosks in remote areas, enabling citizens to engage in digital transactions, access government schemes, and avail other essential services. Digital kiosks act as intermediaries, empowering citizens who may not possess personal digital devices to participate actively in the digital economy.

iii. **Digital Literacy Programmes**: DPI initiatives include digital literacy programmes such as PMGDISHA to empower citizens with basic digital skills, enabling confident and independent engagement with digital platforms.

Indian DPIs and various other initiatives mentioned above are enabling the people of the country that do not have access to the internet due to either lack of affordability or lack of literacy, to take part in the digital economy through the established public infrastructure.

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[138] https://www.wifichoupal.in/

E. Emerging Technology driving Digital Inclusion

3.103 Emerging technologies can play a crucial role in promoting digital inclusion by addressing barriers in connectivity, affordability, and literacy/skills. Across sectors such as education, healthcare, employment, finance, transportation, culture, and agriculture, these technologies enable immersive learning experiences, remote healthcare access, remote work opportunities, financial inclusion, efficient transportation, cultural participation, and sustainable farming practices. By harnessing these technologies, governments, organizations, and communities can ensure that everyone has equal access and opportunities in the digital revolution, leaving no one behind.

3.104 The 5G technology and use cases dependent on such technology may be leveraged in bridging digital divide. With its significantly faster speeds, lower latency, and increased capacity, 5G can provide reliable and high-speed internet access to underserved areas and remote regions. This improved connectivity can bridge the gap by enabling access to digital services, online education, telemedicine, and remote work opportunities. 5G can also support the Internet of Things (IoT) devices, enabling innovative solutions for sectors like agriculture, transportation, and smart cities. By expanding connectivity and enhancing digital capabilities, 5G with its very low latency, vastly

improved bandwidth and large machine-type communications are expected to have significant positive impact on the digital transformation of businesses by boosting their capabilities through adoption of technologies like AI, IoT, robotics, etc[139].

3.105 Further, 5G Fixed Wireless Access (FWA) may be a cost-effective alternative for providing broadband access to unserved regions. Ericsson has reported 5G FWA extended-range millimetre-wave (mmWave) to be a solution for the provision of connectivity in remote areas where the relative cost of installing fibre can be cost prohibitive[140]. 5G trials have demonstrated the power of 5G FWA by enabling access to high-speed broadband in rural areas[141]. Also, Qualcomm predicts that 5G FWA can allow nearly 180 million people in the country to access high-speed internet at home for the first time within the next 10 years[142].

3.106 The confluence of computing power and big data are enabling development of AI applications and solutions which can handle increasingly complex problems, many of which are helping to bridge the digital divide and create an inclusive society. Some of the examples are listed below:

(i)   AI-powered technologies have the potential to foster accessibility and inclusivity, particularly for individuals with disabilities or limited physical mobility. These technologies enable voice commands, gesture recognition, and other interfaces that make digital platforms more accessible to a diverse range of people.

(ii)   In the realm of education and training, AI can revolutionize learning experiences by creating personalized programs and

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[139] https://assets.kpmg.com/content/dam/kpmg/in/pdf/2022/09/5g-driving-next-growth-wave-digital-india-imc.pdf
[140] https://www.ericsson.com/en/blog/6/2023/bridging-the-digital-divide-with-fwa
[141] https://assets.kpmg.com/content/dam/kpmg/in/pdf/2022/09/5g-driving-next-growth-wave-digital-india-imc.pdf
[142] https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/5G-and-the-Digital-Divide.pdf

facilitating remote education opportunities for underserved communities. AI-powered platforms adapt to individual needs, enhancing accessibility and engagement in the educational process. Moreover, AI can bridge the information gap by providing relevant and localized information to underserved communities. Through AI-powered chatbots and virtual assistants, individuals without easy access to essential services can obtain information on healthcare, education, employment, and other crucial resources.

(iii)   AI can also be used to provide healthcare services to those in rural areas, helping to reduce the time and cost associated with accessing healthcare.

(iv)   AI can help expand internet access and connectivity in underserved areas. By optimizing network infrastructure deployment and management, AI algorithms can ensure efficient coverage and connectivity in remote or economically disadvantaged regions[143]. Additionally, AI can facilitate the deployment of innovative connectivity solutions like satellite internet, mesh networks, and low-cost wireless technologies, enabling digital connectivity to the unserved and underserved regions.

(v)   In addition, AI can be used to improve access to financial services by providing financial advice and services to those who would otherwise not have access to them.

3.107 Further, in its Recommendations on *"Leveraging Artificial Intelligence and Big Data in Telecommunication Sector"* dated 20 July 2023, TRAI recommended the following:

(i) *"In view of above, the Authority recommends that DoT should collaborate with MeitY and Ministry of Education to form a committee drawing members from these two ministries, Ministry of Skill Development, All India Council for Technical Education (AICTE) and*

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[143] https://www.ericsson.com/en/ai/ran

Industry. The committee should study and recommend following aspects related to Artificial Intelligence from time to time:

(a)   Assessment of current availability and future requirements of AI/ML professionals and skilled manpower in the country and suggest various technical programs for increasing the availability of such professionals and skilled manpower as per assessed future requirements and also for reskilling the existing workforce for facilitating them to AI based opportunities.

(b)   Mechanism for industry/Academia collaboration in designing and upgrading AI related curriculum to meet the required skillsets.

(c)   Mechanism to take up collaborative research projects and to open up opportunities for internship and training in industry..

(Para 3.86)

(ii)   The Authority recommends that DoT should take up with All India Council for Technical Education (AICTE) for mandating a course on Ethical Use of AI to students in all technical institutes. DoT should also take up with Ministry of Education for introducing such courses/ modules in other non-technical institutes and schools as well.

(Para 3.87)

Authority recommends that DoT through its apex institute National Telecommunications Institute for Policy Research, Innovations & Training (NTIPRIT) should develop courses for Government employees on Ethical Use of AI as well as on Basic Concepts of AI at the earliest. These courses should be made available on iGOT Platform under Mission KarmaYogi. DoT should also take up with Department of Personnel and Training (DoPT) for mandating these courses for all Government employees as part of their training program.

(Para 3.88)"

F. Indicators and Dashboard for monitoring Digital Inclusion Efforts

3.108 The document released by ITU and UN titled "Achieving universal and meaningful digital connectivity Setting a baseline and targets for 2030" provides a framework for universal and meaningful digital connectivity in the world along with a baseline and targets to measure digital inclusion across various indicators in different enablers of digital inclusion.

Indicators for Digital Connectivity

3.109 The focus of Digital Connectivity is to ensure availability of coverage throughout the geographic area of a country. However, UN has pointed out that apart from ensuring the availability of coverage in terms of geography, there is also the need for provision of connectivity to the places where people connect to the internet. Thus, it may be argued that there is a need to provide connectivity to individuals, homes, communities (includes community centres and schools) and businesses to ensure meaningful connectivity in the country.

3.110 To provide meaningful digital connectivity not only to individuals, but also to communities (like schools), businesses and households, there should be necessary infrastructure for the digital connectivity, availability and access of digital devices like smartphones and broadband connections at affordable costs to the people, especially those in lower income group in the society, and availability of adequate digital skills to exploit the features of the various applications operating through these devices.

3.111 For digital connectivity, the indicators specified by the UN are:

(a)   Percentage of population covered by a mobile network, by technology, total and by urban/rural,

(b)   Median upload and download speeds for both mobile and fixed broadband,

(c)   Percentage of individuals using the internet, total and by gender, age and urban/rural,

(d)   Percentage of households with access to the internet, total and by urban/rural,

(e)   Percentage of schools with internet access, by education level,

(f)   Percentage of businesses using the internet, total and by size of businesses,

(g)   Active mobile broadband subscriptions per 100 inhabitants, and

(h)   Fixed broadband subscriptions per 100 inhabitants.

3.112 The indicators represent the availability and usage of internet in the country. The measurements can be calculated percolated further state-wise and district-wise to undertake suitable measures by the governments for digital inclusion of different levels.

3.113 The UN has also set universality targets to be achieved by 2030 for some of the above indicators to ensure the quality of connectivity. For the indicators, which are dependent on market forces and cannot be measured very accurately without direct surveys, clear targets have

not been set. The indicators for which targets have been specified by the UN are listed below:

(a)   Percentage of individuals using the Internet: 100% population aged 15+ with unity gender parity,

(b)   Households with Internet access: 100% households,

(c)   Schools connected to the Internet: 100% schools,

(d)   Businesses using the Internet: 100% businesses

(e)   Fixed-broadband speed target: >10 Mbps for all subscriptions,

(f)   School download speed targets: 20 Mbps per school and 50 Kbps per student, and

(g)   Mobile Network Coverage: universal coverage (100%) for the technology that currently (2022) has at least a coverage of 40%.

3.114   The targets specify universality of connectivity for both fixed and mobile broadband connectivity ensuring that even if one form of connectivity is suffering from technical issues, the other form of access may be used by the consumers. The document mentions that the universality targets are to be interpreted loosely with the target being considered met or nearly met if the value is 95% or higher. The targets set for speed measurement can help to ensure that the quality of connectivity provided to the people is high enough.

Indicators for Digital Affordability

3.115   The indicators specified by the UN for affordability and availability of digital devices and internet connections are:

(a)   Price of an entry-level mobile broadband subscription as a percentage of gross national income (GNI) per capita,

(b)   Price of a next-level mobile broadband subscription as a percentage of GNI per capita,

(c)   Price of an entry-level fixed broadband subscription as a percentage of GNI per capita,

(d)   Smartphone affordability,

(e)   Affordability of other Internet-enabled devices like tablets, computers, and laptops,

(f)   Percentage of households with a computer, total, and by urban/rural location,

(g)   Percentage of individuals owning a mobile phone, total, by gender, by geography, and by type of mobile phone,

(h)   Proportion of individuals using a computer,

(i)   Proportion of individuals using a mobile cellular telephone, by type of cellular phone,

3.116   Along with the above indicators, the UN has also stated targets for some of the above indicators to improve digital affordability to be achieved by 2030. The targets for Digital Affordability are:

(a)   Entry-level mobile broadband subscription price in terms of % of monthly GNI per capita: <2% GNI per capita of the overall population as well as <2% GNI per capita of the bottom 40% of population.

(b)   Entry-level fixed broadband subscription price in terms of % of monthly GNI per capita: <2% GNI per capita of the overall population as well as <2% GNI per capita of the bottom 40% of population.

(c)   Individuals owning a mobile phone as % of the population: 100% individuals aged 15+ with gender parity of 1.

3.117   The targets for affordability of the connectivity are defined in such a way so as to ensure that broadband subscription prices are affordable by everyone, including those with weaker financial power. Considering that 2% monthly GNI per capita is the affordable price declared by the Broadband Commission[144], in countries with a large income disparity, such prices may remain unaffordable for individuals at the bottom of the income distribution. Thus, India, with diverse economic conditions

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[144] https://www.broadbandcommission.org/advocacy-targets/2-affordability/

may require targets of the prices for entry-level broadband subscriptions (both fixed and mobile) less than 2% monthly GNI per capita.

3.118 The above indicators measure both the affordability and usage of devices along with the affordability of internet connections. The trends of measured values can represent the impact of the digital inclusion efforts towards digital affordability. It can be observed that the UN has not set any target for smartphone affordability and other internet-enabled devices like tablets, laptops, etc.

3.119 Another important target indicated in the UN document is Gender Parity, which is calculated as the ratio of the female population meeting a certain criterion to the male population meeting the same criterion. A score of 1 represents no gender divide, while a score above 1 indicates a higher value for females and a score below 1 signifies a higher value for males. To meet gender parity targets, a ratio between 0.98 and 1.02 is considered acceptable.

Indicators for Digital Literacy

3.120 The indicator to measure the level of digital skills adopted by the framework is the percentage of individuals with ICT skills, total and by gender. The framework has also set some targets for digital skill levels of the people:

(a) Ensure at least 70% of the population aged 15+ to have basic digital skills, and

(b) At least 50% population aged 15+ to have intermediate digital skills.

Both the targets are set with target of unity gender parity specifying the ratio of women having specific level of digital skills to men having the same level of digital skills.

Dashboard for universal and meaningful connectivity

3.121 In the UN document, ITU intends to establish and maintain an interactive country dashboard to track universal and meaningful connectivity. Such a dashboard may also be established at the national level. A dashboard for monitoring digital inclusion efforts and outcomes at the district and state levels in India may help policymakers, and stakeholders to understand the progress being made and identify areas where additional resources and efforts are required.

3.122 A dashboard for measuring the progress of digital inclusion would offer the following benefits to the country:

a) Measure progress: The dashboard sets targets for various indicators and measures the outcome of inclusion efforts, helping policymakers identify areas of progress and resource needs.

b) Identify gaps: It highlights areas with low access or literacy, enabling targeted resource allocation to address specific gaps.

c) Track performance: By assessing the effectiveness of initiatives, policymakers can refine existing programs or develop new ones to address specific needs.

d) Encourage Accountability: The dashboard promotes transparency, motivating stakeholders to act in areas where progress is lacking.

Issues for consultation

Q.19 **What should be key performance indicators to measure, monitor and track the progress of the key factors of digital inclusion in the country mentioned below?**

   a) Digital Connectivity

   b) Digital Affordability

   c) Digital Literacy

Q.20 **What measures should be taken to provide high-speed broadband connectivity to schools in the country, especially in states with low number of schools having internet connectivity?**

Q.21 **How effective is a dashboard as a measure for evaluating and tracking the progress made in respect of the various indicators of the three key areas of digital inclusion? What are the critical parameters and at what level (i.e., at state or district or towns/cities or block or Gram Panchayat levels), such parameters should be captured in the dashboard?**

Q.22 **Who should be responsible to evaluate and track the progress of digital inclusion including development and management of the dashboard?**

CHAPTER 4 - DIGITAL INCLUSION FOR MSMES

Overview of the Indian MSME sector

4.1 The Micro, Small and Medium Enterprises (MSME) sector is important for the economy, as it contributes significantly to innovation, economic growth and provide employment to over 110 million people[145].

4.2 In India, the MSME sector is defined based on the size of investment in plant and machinery or equipment. The definition of MSMEs, as revised in 2020, states that enterprises with an investment of up to ₹1 crore and turnover of up to ₹5 crore are considered micro-enterprises. Small enterprises are those, which have investment of up to ₹10 crore and a turnover of up to ₹50 crore. Similarly, medium enterprises are those, which have investment of up to ₹50 crore and a turnover of up to ₹250 crore.

4.3 The Ministry of MSME formulates policies for the overall growth of the sector while the Office of Development Commissioner MSME implements these policies. The Ministry of MSME has implemented various schemes for providing financial assistance, skill development, infrastructure development, marketing assistance, technology upgradation, etc. to MSMEs. The Micro, Small and Medium Enterprises Development Act, 2006 (MSMED Act, 2006) contains various facilitative provisions for the promotion and development of the MSME sector. Small Industries Development Bank of India (SIDBI) is the financial Institution for supporting the financing and development of MSMEs.

4.4 The Ministry of MSMEs has launched the Udyam Portal in 2020 as an online system for registering MSMEs. The portal is fully online and does not require any documentation and is intended as a step towards Ease of Doing Business for MSMEs. As of March 2023, a total of 16.37 million

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[145] https://www.pib.gov.in/PressReleasePage.aspx?PRID=1744032

MSMEs have been registered on the portal. Most of these registered enterprises have been classified as micro-enterprises (15.81 million enterprises). Remaining 0.45 million enterprises are classified as small enterprises and only 40,670 are medium enterprises.

4.5   Out of the 16.37 million registered MSMEs, over 96.7% of the MSMEs are micro-enterprises and small (2.7%) and medium (0.25%) enterprises are very low as compared to micro-enterprises. Majority of the registered micro-enterprises (over 80%) are proprietary units with this number being considerably lower for small (over 50%) and medium enterprises (nearly 20%). Many medium enterprises are private limited companies (46.5%).

4.6   The Google-KPMG 2017 report[146] has described a digital pyramid based on the sophistication and investment by Small and Medium Enterprises (SMEs) in digital technologies. It focuses on the usage of digital technologies by SMEs for information and communication, marketing, and commerce. Based on the pyramid, Indian SMEs are broadly categorised into four tiers:

   a.   Offline: SMEs that have no internet connectivity, may or may not have a computer and do not use social media for business purposes.

   b.   Connected: SMEs that use the internet for general information gathering and communication but do not use the internet (social media, online listings, e-commerce) for business purposes.

   c.   Enabled: SMEs that have their own website or use social media for business or maintain a corporate email id to engage and understand their customer base.

   d.   Engaged: SMEs that use digital technology actively to enable business online by either selling to e-commerce websites or advertising online or listing on third-party portals.

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[146] https://assets.kpmg.com/content/dam/kpmg/in/pdf/2017/01/Impact-of-internet-and-digitisation.pdf

4.7   As per the analysis done in the Google-KPMG report, well over 68% of SMEs in India are in Offline tier, 15% in Connected, 15% in Enabled and only 2% are in the Engaged tier of the digital pyramid introduced in the report. Considering that for the analysis of digital technology usage by businesses, the report does not consider micro-enterprises that face more significant constraints for infrastructure and capital, the number of micro-enterprises in the Offline tier would be even higher than small and medium enterprises.

4.8   Based on a survey[147] conducted by CRISIL in November 2020 on 566 micro and small enterprises, it is seen that the number of businesses engaging with digital technologies have increased after the Covid-19 pandemic. The survey reports that over 47% micro-enterprises and 53% small enterprises have adopted online platforms for digital selling. This shows that while the number of businesses utilising digital technologies for their business operations have grown significantly over the years, there is some scope for improvement, especially for the micro-enterprises considering that over 96% of MSMEs are micro-enterprises.

4.9   Further, 66.3 per cent of MSME owners show a preference for conducting transactions through mobile banking, whereas the remaining 33.7 per cent opt not to. Similarly, among MSME employees, 35.6 per cent prefer mobile banking, while 52.7 per cent favour physically visiting the bank for their transactions.

4.10   To encourage the MSMEs in Offline tier to move towards Connected, Enabled and Engaged tiers, and increase their usage of digital technologies, it is important to develop use cases for the MSMEs on emerging technologies. As an example, one of the important use cases for MSMEs could be digital marketing through the usage of social media to improve the reach of their businesses among the customers. The development of use cases for MSMEs and other informal economic units

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[147] https://www.crisil.com/en/home/our-analysis/reports/2020/12/tilt-among-micro-and-small-enterprises-to-digital-channels-for-sales.html

will incentivise them to increase the usage of digital technologies and improve the digitalisation of the MSME sector in India.

4.11 Some of the emerging technologies that could be useful through the development of use cases for MSMEs are mentioned below:

    i. E-commerce
    ii. Process automation
    iii. Data-driven optimization through AI and ML
    iv. Internet of Things (IoT)
    v. Automated workflows and Automation of production processes
    vi. Digital sales and service channels
    vii. Warehouse automation and predictive logistics
    viii. Building information modelling for construction businesses
    ix. Digitalisation of content for businesses in the media sector
    x. Industry 4.0

4.12 Industry 4.0, also known as the fourth industrial revolution, is characterized by the integration of advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI), big data analytics, robotics, and additive manufacturing into the manufacturing process. These technologies with appropriate adoption and integration can help MSMEs tremendously in increasing their revenues and decreasing costs. Industry 4.0 enables MSMEs to enhance their manufacturing capabilities, increase efficiency, productivity, and quality of products/services, and compete globally through the usage of cutting-edge technologies. For example, IoT sensors can be used to monitor equipment and optimize production processes, while AI can be used to analyse data and identify opportunities for improvement. Robotics can be used to automate repetitive tasks, while additive manufacturing can enable the production of complex parts on demand.

4.13   Additionally, by leveraging e-commerce and digital marketing, MSMEs can reach to wider audience and compete on a global scale. MSMEs can also use data analytics to gain insights into customer behaviour and preferences and tailor their products and services accordingly. The emerging technologies presents an opportunity for MSMEs to upgrade their businesses and be able to contribute significantly more towards the country's economy. However, considering the fact that huge number of MSMEs are in the Offline/Connected/Enabled tier and only 2% are in Engaged tier, the risk of MSMEs and informal sector losing their market to the big industries cannot be ruled out. There may be a requirement of Government intervention in formulating a national strategy to ensure that MSMEs have access to connectivity, devices, literacy and use cases of emerging technologies.

4.14   The factors limiting the MSMEs to use the emerging technologies and upgrade their businesses are the resources and finance for implementing and maintaining these technologies, which generally are high and unaffordable to most MSMEs. Further, many MSMEs may lack the technical skills needed to successfully adopt and integrate emerging technologies into their operations. This can make it difficult for them to identify the right technologies to adopt, develop the necessary skills to operate and integrate them into their existing processes.[148]

Benefits of Digitalisation for MSMEs

4.15   Broadband has a proven track record in enabling the emergence of MSMEs, stimulating job creation, driving operational and business efficiencies that accrue from enterprises' use of cloud computing and facilitating changes and improvements in work practices. Accordingly, National Broadband Mission[149] aims to provide availability of high-

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[148] https://www.tandfonline.com/doi/full/10.1080/0951192X.2022.2128217

[149] https://dot.gov.in/sites/default/files/National%20Broadband%20Mission%20-%20Booklet_0.pdf?download=1

speed broadband internet infrastructure capable of delivering up to 50 Mbps in a phased manner at par with those of emerging and developed countries. This will enable the interactions between Government, businesses and citizens become more digital-based with high-speed connectivity. Some of the benefits of digitalisation for MSMEs are listed below:

a) **Improved efficiency**: Digitalisation enables MSMEs to automate various business processes such as accounting, inventory management, and customer relationship management. By automating these processes, MSMEs can reduce the manual effort required and improve the overall efficiency of their operations. This also reduces errors and saves time, allowing MSMEs to focus on other aspects of their business.

b) **Cost savings**: Digitalisation can lead to significant cost savings for MSMEs. By automating processes and reducing the need for manual labour, MSMEs can reduce their operating costs. Additionally, digitalisation can help in reducing the need for physical infrastructure such as office space, storage facilities, and communication systems. This can result in significant savings in rent, utilities, and other related expenses.

c) **Increased reach**: Digitalisation enables MSMEs to reach a larger audience through various online platforms such as social media, e-commerce websites, and mobile apps. This provides MSMEs with an opportunity to expand their customer base and increase sales. Additionally, digitalisation can help in reaching customers in remote areas, thereby expanding the market reach of the business. As per the KPMG-Google report 2017 on digitalisation of SMEs in India, digital engagement can help SMEs to grow beyond the boundaries of local market and penetrate the state, national and international level markets.

d) **Better customer engagement**: Digitalisation enables MSMEs to engage with customers in a more personalized and effective manner through various channels such as social media, email, and chatbots. This helps in improving customer satisfaction and loyalty. By engaging with customers in real-time, MSMEs can also address customer issues more quickly and efficiently giving better quality of service.

e) **Improved data management**: Digitalisation helps MSMEs in storing and managing data more efficiently. This makes it easier to access and analyse data, which in turn helps in making better business decisions. With digitalisation, MSMEs can also collect data on customer behaviour and preferences, which can be used to improve their products and services.

f) **Access to finance**: Digitalisation enables MSMEs to access finance more easily through various digital lending platforms such as online marketplaces and peer-to-peer lending platforms. This provides MSMEs with an opportunity to secure funding at lower interest rates and on more favourable terms. Furthermore, digital payments through UPI and other mediums can be utilized, which have become a necessity for any business to remain competitive in the market. Therefore, digitalised MSMEs can have a distinct advantage as compared to Offline MSMEs.

g) **Increased competitiveness**: Digitalisation can help MSMEs in improving their competitiveness by enabling them to adopt new technologies and innovate faster. This helps in staying ahead of the competition and responding to changing market dynamics more effectively. With digitalisation, MSMEs can also improve their marketing strategies, reach more customers, and offer better customer experiences. As per Survey conducted by ICRIER, around 80 per cent of the firms surveyed reported an increase in the volume of sales and

turnover, while close to 70 per cent reported an increase in profits after integrating with e-commerce platforms[150].

Challenges faced by MSMEs

4.16   Despite the significant contribution of the MSME sector to the Indian economy, it faces several challenges, including access to finance, adoption of new technology, reaching markets, availability of connectivity infrastructure and information etc. Surveys conducted to measure the impact of the pandemic on businesses have shown that small businesses faced greater financial constraints[151,152]. Further, the disruption caused by the COVID-19 pandemic had troubled MSMEs causing productivity and output losses. During this period, GDP decreased from 30.5% (2019-20) to 26.83% (2020-21). Further, the MSME sector's share of All India exports decreased from 49.35% (2019-20) to 45.03% (2020-21) and 42.67% (2021-22).[153] However, during the pandemic, the use of digital technologies had been key to the survival of MSMEs[154].

4.17   It has been observed that MSMEs which use digital technologies in their business operations prefer to use smartphones, which helps them to connect to the internet for business. Some of the MSMEs also use mobile hotspots, Wi-Fi Routers, etc. for internet connectivity and many of them use WhatsApp for business purposes. The major problem encountered by MSMEs in connectivity is poor affordability of internet.

4.18   The availability of reliable fibre connectivity in rural and remote areas is important for all MSMEs, otherwise they are forced to rely on mobile broadband connectivity for their operational needs. Further, even if the fibre is available at nearby places, cost of extension of last mile

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[150] https://icrier.org/pdf/MSMEs_Go_Digital.pdf
[151] https://www.adb.org/sites/default/files/publication/817261/ewp-667-digital-divide-decoded.pdf
[152] https://openknowledge.worldbank.org/handle/10986/34626?locale-attribute=fr
[153] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1884734
[154] https://icrier.org/pdf/MSMEs_Go_Digital.pdf

connectivity (LMC) to MSME premises can also become a prohibitive factor in the access of reliable connectivity.

4.19   The affordability of devices operating on new and emerging technologies (such as 5G enabled smartphones) are important for small businesses of MSME sector and informal economic units like grocery shops owners. Also, development of use cases for these groups based on emerging technologies are important as it could help in digitalising their operations. One example of the use cases could be smart marketing, which could help in reaching potential customers. Such use cases for farmers, fishermen, MSMEs and other informal economic units may encourage them to increase the usage of digital technologies and motivate them to digitalise their businesses. However, such segments of the society may need support for affording the smart devices for exploiting the full benefits of these use cases.

4.20   Access of online platforms and selling products through these platforms would benefit MSMEs for their expansion and business growth. However, establishing a website and e-commerce platform may not be affordable for many MSMEs. Most of the MSMEs who are using the online e-commerce platforms are selling their products offline as well. The report on "*MSME Go Digital – Leveraging Technology to Sustain during the Covid-19 Crisis*"[155] points out that one of the hurdles stopping MSME from onboarding the e-commerce platforms is foregoing of the advantage of GST threshold exemption (₹ 40 lakh) if they sell their products online using these platforms. Further, building trust with online consumers, fulfilling orders, and managing logistics are some of the challenges that the MSMEs would experience in selling their products through online platforms.

4.21   For successful selling of products through online, cataloguing of products is crucial on e-commerce platforms. MSMEs often encounter difficulties in providing accurate product descriptions, including high-

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[155] https://icrier.org/pdf/MSMEs_Go_Digital.pdf

resolution images, for their products[156]. This challenge is particularly pronounced for artisans who sell handcrafted goods through online platforms. These MSMEs require additional support to effectively market and promote their products on e-commerce platforms. Additionally, smaller enterprises, especially micro and small units, lack budgetary resources to invest in promotional campaigns. As a result, their competitive position in relation to larger enterprises on e-commerce platforms is affected.

4.22   MSMEs often face a significant challenge when it comes to digital skills. Many MSME owners and employees lack the necessary knowledge and expertise to fully leverage digital technologies in their business operations[157,158]. Furthermore, skill gap also prevents managers and workers to identify the digital solutions they need, and to adapt business models and processes[159]. To stay competitive in the digital era, MSMEs require intermediate digital skills that enable them to use professional software and other platforms for their businesses[160]. These skills will enable them to embrace digitalization and harness its potential benefits. The efforts must be made to increase the digital literacy levels of MSMEs. This can be achieved through targeted training programs, workshops, and resources that focus on imparting essential digital skills. By investing in digital literacy initiatives, MSMEs can be empowered to embrace technology, enhance their productivity, expand their market reach, and ultimately thrive in the digital economy.

Leveraging ONDC for MSME digitalisation

4.23   Open Network for Digital Commerce (ONDC), based upon the open-source methodology, is an initiative aiming at promoting open networks

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[156] https://icrier.org/pdf/MSMEs_Go_Digital.pdf
[157] https://www.unescap.org/sites/default/d8files/event-documents/MSMEs%20and%20the%20Digital%20Economy.pdf
[158] https://connectivity.asean.org/wp-content/uploads/2018/11/Study-on-MSME-Participation-in-the-Digital-Economy-in-ASEAN.pdf
[159] https://www.oecd.org/industry/smes/PH-SME-Digitalisation-final.pdf
[160] https://academy.itu.int/itu-d/projects-activities/research-publications/digital-skills-toolkit

for all aspects of exchange of goods and services over digital or electronic networks[161]. ONDC aims to go beyond the current platform-centric digital commerce model where the buyer and seller must use the same platform or application to be digitally visible and do a business transaction. ONDC offers an interoperable, unbundled and decentralised approach to enable economic growth by helping buyers and sellers overcome the challenges to digital commerce[162].

4.24   ONDC aims to:

     i. Expand digital commerce as a channel for all transactions between consumers and providers.

     ii. Include all providers of products and services for both B2C and B2B commerce.

     iii. Build multiple rails to the buyer (through different buyer apps) to connect supply and demand.

     iv. Unlock innovations across the ecosystem by making it inclusive.

4.25   Digital commerce is only 7 per cent of the total retail market, with 165 million users[163]. ONDC has the potential to create new opportunities to curb digital monopolies and support MSMEs in their digitalisation by enabling them to use digital commerce for their business operations. Furthermore, ONDC[164] with its wider reach, uniformity in approach in digital transactions as well as high data security due to its decentralised structure can help promote digital inclusion by increasing the usage of digital commerce in the country. As of August 2023, ONDC is live in 275 cities, with more than 47,000 sellers on the network[165]. ONDC is committed to creating a fair and

[161] https://pib.gov.in/Pressreleaseshare.aspx?PRID=1814143
[162] Democratising Digital commerce in India, An open network for inclusive, competitive marketplaces, May 2023
[163] Democratising Digital commerce in India, An open network for inclusive, competitive marketplaces, May 2023
[164] https://www.ey.com/en_in/technology/how-ondc-can-democratize-e-commerce
[165] https://ondc.org/

competitive environment for e-commerce operators while expanding digital market opportunities for Micro, Small, and Medium Enterprises (MSMEs) and small traders in the nation.

Initiatives undertaken in India for MSMEs

4.26   On 24th December 2021, TRAI wrote a letter to the Ministry of MSME regarding adoption of emerging technologies like 5G, Industry 4.0 coupled with Internet of Things (IoT), Industrial IoT, Artificial Intelligence, AR/VR, Machine Learning, Data Analytics, etc. as well as development of use cases based on emerging technologies for the Indian MSME sector. The suggestions offered by Authority in the letter are as follows:

i.   Ministry of MSME to conduct a study on the acceptance and adoption of industrial automation and digital technologies by the MSME sector, considering constraints faced, digital literacy, skills, and access to online markets. Based on the findings, appropriate schemes, including interest subvention scheme, for upgradation of plant and machinery, may be required to be devised to facilitate the micro, small and medium enterprises to overcome various constraints and move towards industrial automation. [This suggestion has been included in the 5G recommendations mentioned in the para 4.34 below.]

ii.   A special dedicated permanent 'Digital Cell' may be established in the Ministry with dedicated technical manpower to formulate the use of digital technologies like 5G, IoT, M2M, AI, Analytics etc. and development of relevant and affordable use cases in industrial automation involving MSMEs, start-up companies, entrepreneurs, application providers, etc.

4.27   On effective use of 5G technology for MSMEs, TRAI in its recommendations on *'Auction of Spectrum in frequency bands*

identified for IMT/5G' dated 11th April 2022 has recommended to the Government on the following:

"6.72 The Authority recommends that:

a. 5G-dedicated Inter-Ministerial Working Group (IMWG), under the Chairmanship of Member (Technology), DoT should be formed comprising Ministry of Electronics and Information Technology, Department for Promotion of Industry and Internal Trade, Ministry of Information and Broadcasting, Department of Space, Ministry of Finance, Ministry of Education, Department of Science & Technology, Ministry of Micro, Small and Medium Enterprises (MSME) and Niti Ayog as members, which should be represented by JS Level officers.

b. The IMWG may co-opt officers from other concerned Ministry(ies) / Department(s) as per requirement.

c. The concerned Ministries/Departments shall establish a special dedicated Digital Cell, headed by the JS Level officer nominated as member in IMWG, with dedicated technical manpower to formulate the use of digital technologies like 5G, IoT, M2M, AI etc. and development of relevant and affordable use cases involving start-up companies, entrepreneurs, application providers etc. The scope of the Digital Cell shall include, but not limited to, involving the relevant stakeholders in discussions, framing and monitoring short-term (annual), medium-term (5-year), and long-term (10-year) plans with quantitative targets in respect of sector specific 5G use cases, providing platform and promoting 5G use cases. The Digital Cell may also need to focus on issues relating to digital literacy, connectivity and affordable user devices for their sector.

d. The Ministries/Departments should take up short-term (annual), medium-term (5-year), and long-term (10-year) plans with quantitative targets in respect of sector specific 5G use cases and the same can be considered by IMWG for consistent and coordinated development of use

cases and start-up ecosystems to align issues such as connectivity, privacy, data security etc. in the country.

e. The participating members of IMWG should be responsible for outlining strategies, defining targets, and budgetary provisions for achieving defined targets for their respective Ministries / Departments.

f. The IMWG should conduct periodic meetings and discussions, at least once in 3 months, in which progress achieved will be reviewed and outline path for achieving planned objectives will be framed.

g. The IMWG should present consolidated status/proposals to the Department of Telecommunications (DoT) being nodal Ministry, on a regular basis.

h. The progress of digital transformation and implementation of 5G use cases in various verticals should also be monitored and documented by IMWG and be submitted to DoT for perusal and appropriate decision.

[Para 5.77]

6.73 The Authority recommends that DoT should take up the matter with Ministry of Micro, Small and Medium Enterprises (MSME) to carry out a study to find out the actual details about the level of acceptance and adoption of 5G based industrial automation and digital technologies by the MSME sector in the country as compared to other industries. Based on the learning from such study, appropriate schemes, including interest subvention scheme, for upgradation of plant and machinery, may be devised to facilitate the micro, small and medium enterprises to overcome various constraints and move towards industrial automation. In this regard, budgetary provisions (if required), may be created by the Ministry of MSME. [Para 5.78]"

4.28 The Ministry of MSME has also undertaken several initiatives facilitating digitisation of MSMEs in India. These are mentioned below:

(i) **Udyam Registration Portal**: The Udyam Registration Portal is a platform for MSMEs launched in June 2020 by the Ministry to register their businesses and access various government schemes, financial support, and resources. The registration process is simple and can be completed online within a few minutes. The portal also provides a unique identification number (Udyam Registration Number) to each registered MSME, which can be used for availing of various government schemes and benefits.

(ii) **MSME Sambandh**: MSME Sambandh is a public procurement portal that aims to facilitate the procurement of goods and services from MSMEs by Central Public Sector Enterprises (CPSEs). The platform enables MSMEs to access new business opportunities and track their procurement orders. The portal allows MSMEs to track the status of their applications for schemes such as the Credit Guarantee Fund Scheme, the Prime Minister's Employment Generation Programme, and others. The portal also provides information about the eligibility criteria, application process, and other details of these schemes.

(iii) **MSME Sampark**: MSME Sampark is a digital platform connecting job seekers with recruiters in the MSME sector. The platform helps MSMEs find skilled personnel for their businesses, while also providing job opportunities for individuals.

(iv) **Micro and Small Enterprises Cluster Development Programme (MSE-CDP)[166]:** Micro and Small Enterprises Cluster Development Programme (MSE-CDP), which is an initiative of Ministry of MSME, aims to promote competitiveness and growth of micro and small enterprises by facilitating the development of clusters of industries in various sectors. The programme is implemented through the National Small Industries Corporation (NSIC) and aims to provide a range of support services to MSMEs in these clusters.

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[166] https://msme.gov.in/sites/default/files/MSMEANNUALREPORT2022-23ENGLISH.pdf

4.29   A cluster is a group of enterprises located within an identifiable and as far as practicable, contiguous area and producing same/similar products/services. The essential characteristics of enterprises in a cluster are:

  a. Similarity or complementarity in the methods of production, quality control and testing, energy consumption, pollution control, etc.
  b. Similar level of technology and marketing strategies/practices.
  c. Channels for communication among the members of the cluster
  d. Common challenges and opportunities.

The objective of the scheme is:
  a. To support the sustainability and growth of MSEs by addressing common issues such as improvement of technology, skills & quality, market access, etc.
  b. To create/upgrade infrastructural facilities in the new/ existing Industrial Areas/Clusters of MSEs.
  c. To set up Common Facility Centres (for testing, training, raw material depot, effluent treatment, complementing production processes, etc).
  d. Promotion of green & sustainable manufacturing technology for the clusters.

As of April 2022, MSE-CDP has approved a total of 510 Common Facility Centres and Infrastructure Development Projects and 288 have been completed.

CHAMPIONS Scheme:

4.30   The CHAMPIONS (Creation and Harmonious Application of Modern Processes for Increasing the Output and National Strength) scheme is

an initiative launched by the Ministry of MSMEs to support and promote the growth of MSMEs in the country. The main objective of the CHAMPIONS scheme is to provide a single platform for MSMEs to access various support services, such as finance, technology, marketing, and skill development. The scheme aims to promote the use of modern technologies and processes in MSMEs and provide them with the necessary guidance and support to enhance their productivity and competitiveness.

4.31 The CHAMPIONS portal provides a platform for MSMEs to submit their grievances and seek redressal from various government agencies. The portal also provides information on various schemes and programmes launched by the government for the benefit of MSMEs, such as the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE), the Prime Minister's Employment Generation Programme (PMEGP), and the National Manufacturing Competitiveness Programme (NMCP).

4.32 The CHAMPIONS scheme also provides hand-holding support to MSMEs in the form of mentoring, training, and skill development programmes. The scheme also facilitates market linkages for MSMEs by providing them with access to information on market trends and opportunities, as well as by organizing buyer-seller meets and exhibitions.

4.33 Nature of Assistance:

   a. Finance: The scheme aids MSMEs in accessing finance from various sources such as banks and non-banking financial institutions.
   b. Technology: The scheme facilitates the adoption of modern technologies by MSMEs through various programmes such as technology upgradation and modernization.
   c. Marketing: The scheme helps MSMEs in accessing domestic and international markets by providing them with information

on market trends and opportunities, as well as by organizing buyer-seller meets and exhibitions.

d. Skill development: The scheme provides training and skill development programmes to MSMEs to enhance their productivity and competitiveness.

4.34 Digital MSME programme, under the MSME Champions Scheme, aims to encourage MSMEs to adopt Information and Communication Technology (ICT) tools and applications. The program offers subsidies for cloud computing services, awareness programs, and capacity building. This scheme was approved by the government in October 2022 and is yet to be launched.

Government e-Marketplace (GeM)[167]

4.35 The Government e-Marketplace (GeM) serves as a comprehensive platform for streamlining the online procurement process of commonly used goods and services by various government departments, organizations, and public sector units (PSUs). GeM's primary objectives are to promote transparency, efficiency, and speed in public procurement. It offers a range of tools such as e-bidding, reverse e-auction, and demand aggregation to empower government users in obtaining the maximum value for their investments. By leveraging GeM, government entities can optimize their procurement practices and ensure optimal utilization of resources.

4.36 GeM offers significant benefits to MSMEs by providing access to government contracts, simplifying the procurement process, promoting transparency, ensuring fair competition, facilitating prompt payments, expanding market opportunities, generating cost savings, and enhancing credibility. MSMEs can leverage GeM to grow their business, reach a wider customer base, improve cash flow, and gain a competitive

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[167] https://gem.gov.in/aboutus

edge in government procurement. Further, GeM has set a mandatory procurement goal of 25 per cent from MSMEs and a sub target procurement of 4 per cent goods and services from MSME entrepreneurs within SC/ ST communities, by all government departments and public sector enterprises (PSE)[168]. As of November 2022[169], the GeM portal has facilitated 12.28 million orders, amounting to ₹3349.33 billion (equivalent to US$ 40.97 billion), sourced from 5.44 million registered sellers and service providers, catering to 62,247 buyer organizations.

MSME Global Mart[170]

4.37   The National Small Industries Corporation (NSIC) has introduced the MSME Global Mart platform to support the expansion of MSMEs. This platform serves as a hub for small business entrepreneurs, offering them a broader market for exporting and importing their products. Initially designed to enhance trade between India and other developing nations, the Global MSME Mart is a comprehensive digital platform equipped with all the necessary features to enable businesses to establish their presence in the global market.

4.38   MSME Global Mart is Business-to-Business (B2B) web portal, which helps MSMEs in Market access through online presence by showcasing their products and services. Portal acts as a facilitator by connecting Buyers and Suppliers together for up scaling their business.

International Practices for Digitisation of MSMEs

Germany - Mittelstand 4.0 Competence Centres[171]

4.39   The German government established a network of more than 25 Mittelstand 4.0 Competence Centres that provide SMEs with practical

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[168] https://gem.gov.in/gem-exclusive
[169] https://www.ibef.org/industry/msme
[170] https://msmemart.com/
[171] https://www.bmwk.de/Redaktion/DE/Dossier/mittelstanddigitalisieren.html

support, training, and assistance in adopting digital technologies. The centres focus on areas such as e-commerce, IT security, and digital production. The service offer consists of three main parts information, qualification and support and is performed by five consortium partners of the project. In 2021, the Competence Centres reached around 93,000 SMEs and organised workshops, information events and demonstrations implementing custom digitisation projects.

Singapore - SMEs Go Digital Programme[172]

4.40   Singapore's Infocomm Media Development Authority (IMDA) launched the SMEs Go Digital programme in 2017 to help SMEs adopt digital technologies, build digital capabilities, and participate in the digital economy. More than 80,000 SMEs have adopted digital solutions from the programme. The program provides digital solutions, consultancy services, and training. It offers six programmes for SMEs:

      a) Chief Technology Officer-as-a-service
      b) Industry Digital Plans
      c) Start Digital
      d) Grow Digital
      e) Advanced Digital Solutions
      f) Pre-Approved Solutions

United Kingdom - Help to Grow[173]

4.41   In 2021, the UK government announced the initiative Help to Grow to help SMEs recover from the COVID-19 pandemic by adopting digital technologies and providing management training to boost productivity and innovation. This initiative comprises two schemes and the UK government has announced a total of £520 million in funding for the initiative.

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[172] https://www.imda.gov.sg/How-We-Can-Help/smes-go-digital
[173] https://www.techuk.org/resource/chancellor-announces-520-million-help-to-grow-scheme-with-a-focus-on-digital-adoption-for-uk-smes.html

a) Help to Grow: Digital – To provide SMEs with discounted software and expert advice on how to best utilise it. This component of the program is designed to help SMEs improve their digital capabilities, which can help them to increase efficiency, reduce costs, and reach new customers. The program offers a free online platform that provides SMEs with access to a range of resources, including training modules, expert advice, and discounts on digital tools and software. SMEs may also be eligible to obtain vouchers offering 50% off the purchase of productivity-enhancing software, up to a total of £5,000 each. Through Help to Grow: Digital, the Department for Business, Energy, and Industrial Strategy (BEIS) intends to support up to 100,000 businesses over the next three years.[174]

b) Help to Grow: Management – To offer MBA style management training to SMEs with the aim of increasing innovation and boosting growth. Through the Help to Grow: Management scheme, BEIS aims to support 30,000 SMEs to digitally transform their business model during the four-year lifetime of the scheme.

Australia - Small Business Digital Champions Project[175]

4.42   The Australian government launched the Small Business Digital Champions Project, providing 100 small businesses with digital transformation assistance, including hardware, software, and digital skills training worth $20,000. Deloitte has been engaged as the Digital Transformation Provider to manage the project. The project aims to create a network of digital champions to inspire and support other small businesses in their digital journey.

4.43   Thus, to increase the usage of digital technologies in the country and to develop India into a digital powerhouse, there need is felt to identify gaps in the digitisation of MSMEs and enable them to exploit the

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[174] https://www.gov.uk/government/publications/uks-digital-strategy/uk-digital-strategy
[175] https://smallbusinessassociation.com.au/staging/digital-champions/

benefits of having universal and meaningful connectivity. One of the most critical gaps would be the lack of usage of the internet among MSMEs. The lack of broadband internet access, digital devices like smartphones, and relevant digital skills, hinders MSMEs digitalise their operations to conduct business online. Providing them with fixed/mobile broadband access and the skills to use the internet would help in their development by a large margin.

Issues for consultation

Q.23 **What efforts are required to provide reliable digital connectivity to MSMEs at affordable costs to empower them through new technologies for effective participation in the digital economic activities?**

Q.24 **Whether the schemes of fibre connectivity in villages and rural areas such as BharatNet can be leveraged to provide the digital connectivity to MSMEs at affordable costs? If yes, please suggest the steps to be taken to extend such connectivity?**

Q.25 **How DPIs can be used to allow the marginalised communities and MSMEs to access new technologies?**

Q.26 **What efforts can be made to increase awareness and digital literacy levels, especially in 5G, Big Data and AI/ ML, to the business owners and employees of the MSMEs? What kind of framework is needed in this regard? Please provide your answers with suitable justification.**

CHAPTER 5 - SUMMARY OF ISSUES FOR CONSULTATION

5.1 The summary of the issues for consultation are given as below:

Status of Digital Inclusion

Q.1 **What should be the definition of Digital Inclusion? What all parameters should it include to highlight disparities across different segments of society to have a realistic assessment from a policy perspective? Please provide your answer with suitable justification.**

Q.2 **Do you agree that the indices mentioned above and developed by various international organisations for assessment adequately represent the status of Digital Inclusion in the country? What other indices and factors need to be considered to identify the gaps in Digital Inclusion in the country?**

Q.3 **Are Digital Connectivity, Digital Affordability and Digital Literacy the main factors responsible for Digital Inclusion in the country? Do you agree that by addressing these, Digital Inclusion can be achieved in the country? If not, please suggest any other factors responsible for Digital Divide that need to be addressed to ensure Digital Inclusion?**

Digital Connectivity

Q.4 **Apart from efforts made by the Government through various Projects for provisioning of broadband connectivity under NDCP 2018 and NBM 2019 and other schemes, what additional measures are required to fulfil the objectives of universal connectivity in India?**

Q.5 **Whether connecting GPs/villages/village institutions through BharatNet has helped in improving digital connectivity in an effective manner? If not, what additional measures are required**

to ensure universal connectivity across all GPs/villages/village institutions in an efficient and time bound manner?

Q.6   Will the schemes supported by USOF other than BharatNet suffice the need of universal connectivity in the country? If not, what additional measures or changes in strategy are required to ensure universal connectivity to all unconnected areas? Please provide your answer with suitable justification.

Q.7   What steps should be taken to encourage service providers for effective utilisation of the BharatNet infrastructure in provisioning of connectivity to Institutions/households/individuals?

Q.8   Is there any need to take steps to make satellite internet a viable option for providing connectivity to remote/ inaccessible areas? If yes, please provide your answer with suitable justification. If not, what are the other alternatives for provision of connectivity in these areas?

Q.9   What measures are required for adopting a collaborative approach to utilise Digital Connectivity Infrastructure created by the service providers or through government-aided schemes to extend connectivity to the people in unserved areas? Please provide your answer with suitable justification.

Q.10   Please suggest the best practices being followed internationally that can be adopted in the country to provide universal connectivity to all individuals, households, and communities?

Digital Affordability

Q.11   Whether various measures taken by the Government such as focusing on local manufacturing are sufficient to bring down the prices of smartphones in India? If not, what additional measures

are required to be taken to make it more affordable? Please explain your answer with suitable justification.

Q.12   Whether market for second-hand smartphones is a viable strategy for increasing the affordability of smartphones to the people? Please indicate the opportunities and challenges that may arise due to this strategy.

Q.13   Whether schemes undertaken by various states for distribution of smartphones and laptops to students and support for the connectivity are effective mechanisms to increase Digital Affordability in the country? If yes, what are the measurable parameters to assess the effectiveness of such schemes? If not, what could be the alternative policy interventions/ schemes with measurable outcomes that can support affordability of the devices? Please support your answers with suitable information.

Q.14   Is there any need for policy interventions to increase Digital Affordability (digital devices and digital connectivity) among specific sections of society, for example, women, students, farmers, fishermen, economically weak, etc.? Please respond with suitable justification.

Q.15   What measures should be taken to make digital devices and digital connectivity affordable to the citizens for empowering them to maximize the benefits of an inclusive digital society? Please provide your answer with best practices being followed internationally in this regard.

Digital Literacy

Q.16   What measures should be taken to engage the industry and academia in promoting Digital Literacy in India? Please provide your answers with suitable justification.

Q.17 How can the digital literacy toolkits developed by multiple industry players already available in the market be utilised to improve digital literacy levels in the country, especially for the rural citizens of the country?

Q.18 Please suggest the best practices followed internationally that can be adopted in the country to promote mass digital literacy for different segments of society.

Digital Public Infrastructure

Q.19 What steps should be taken to monitor the impact of DPIs on underserved and vulnerable segments of the society? Kindly indicate the key parameters that need to be monitored to assess such impact and actions required to promote adoption citizen centric services by these segments of the society.

Emerging Technology driving Digital Inclusion

Q.20 How can emerging technology be leveraged to enhance the digital literacy programmes of the Government? Please give your input with reasons. Best practices being followed by other countries and private sector may also be referred to.

Q.21 What steps should be taken to ensure that AI and new technologies do not result into further digital divide and every section of the society has access to the new technologies and resultant economic opportunities?

Indicators and Dashboard for monitoring Digital Inclusion

Q.22 What should be key performance indicators to measure, monitor and track the progress of the key factors of digital inclusion in the country mentioned below?
   a) **Digital Connectivity**
   b) **Digital Affordability**
   c) **Digital Literacy**

Q.23 What measures should be taken to provide high-speed broadband connectivity to schools in the country, especially in states with low number of schools having internet connectivity?

Q.24 How effective is a dashboard as a measure for evaluating and tracking the progress made in respect of the various indicators of the three key areas of digital inclusion? What are the critical parameters and at what level (i.e., at state or district or towns/cities or block or Gram Panchayat levels), such parameters should be captured in the dashboard?

Q.25 Who should be responsible to evaluate and track the progress of digital inclusion including development and management of the dashboard?

Digital Inclusion for MSMEs

Q.26 What efforts are required to provide reliable digital connectivity to MSMEs at affordable costs to empower them through new technologies for effective participation in the digital economic activities?

Q.27 Whether the schemes of fibre connectivity in villages and rural areas such as BharatNet can be leveraged to provide the digital connectivity to MSMEs at affordable costs? If yes, please suggest the steps to be taken to extend such connectivity?

Q.28 How DPIs can be used to allow the marginalised communities and MSMEs to access new technologies?

Q.29 What efforts can be made to increase awareness and digital literacy levels, especially in 5G, Big Data and AI/ ML, to the business owners and employees of the MSMEs? What kind of framework is needed in this regard? Please provide your answers with suitable justification.

Q.30 Stakeholders may also suggest any other measures not covered in the consultation document to improve Digital Inclusion in the country with suitable justification.

LIST OF ACRONYMS

S. No.	Acronyms	Description
1.	A4AI	Alliance for Affordable Internet
2.	AGR	Adjusted Gross Revenue
3.	AI	Artificial Intelligence
4.	APB	Aadhaar Payments Bridge
5.	AR	Augmented Reality
6.	ASHA	Accredited Social Health Activist
7.	BBNL	Bharat Broadband Networks Limited
8.	BEIS	Department for Business, Energy and Industrial Strategy
9.	BHQ	Block Headquarters
10.	BNUs	BharatNet Udyamies
11.	BPL	Below Poverty Line
12.	BRI	Broadband Readiness Index
13.	BSNL	Bharat Sanchar Nigam Limited
14.	BTS	Mobile Base Transceiver Stations
15.	CANI	Chennai to Andaman and Nicobar Islands
16.	CAPEX	Capital Expenditure
17.	C-DAC	Centre for Development of Advanced Computing
18.	CDNs	Content Delivery Networks
19.	CDPDA	Common Ducts and Posts Development Agency
20.	CGTMSE	Credit Guarantee Fund Trust for Micro and Small Enterprises
21.	CHAMPIONS	Creation and Harmonious Application of Modern Processes for Increasing the Output and National Strength
22.	CPSEs	Central Public Sector Enterprises
23.	CPSU	Central Public Sector Undertakings

S. No.	Acronyms	Description
24.	CRISIL	Credit Rating Information Services of India Limited
25.	CRTC	Canadian Radio-television and Telecommunication Commission
26.	CSCs	Common Service Centres
27.	CTDP	Comprehensive Telecom Development Plan
28.	CWSN	Children With Special Needs
29.	DBT	Direct Benefit Transfer
30.	DCI	Digital Connectivity Infrastructure
31.	DCMS	Department for Digital, Culture, Media & Sport
32.	DCs	Data Centres
33.	DEPA	Data Empowerment and Protection Architecture
34.	DHQ	District Headquarters
35.	DISHA	Digital Saksharta Abhiyan
36.	DLI	Design Linked Incentive
37.	DoPT	Department of Personnel and Training
38.	DoT	Department of Telecom
39.	DPI	Digital Public Infrastructure
40.	DSJC	Digital Skills and Jobs Coalition
41.	ECF	Emergency Connectivity Fund
42.	e-KYC	Electronic Know Your Customer
43.	EU	European Union
44.	FCC	Federal Communications Commission
45.	FWA	Fixed Wireless Access
46.	GBBN	Goa Broadband Network
47.	GDP	Gross Domestic Product
48.	GeM	Government e-Marketplace
49.	GIS	Geographic Information System
50.	GMPCS	Global Mobile Personal Communication by Satellite

S. No.	Acronyms	Description
51.	GNI	Gross National Income
52.	GP	Gram Panchayat
53.	GSAT	Geosynchronous Satellite
54.	GSMA	Groupe Speciale Mobile Association
55.	GVA	Gross Value Added
56.	HTS	High Throughput Satellite
57.	ICEA	India Cellular & Electronics Association
58.	ICRIER	Indian Council for Research on International Economic Relations
59.	ICT	Information Communication Technologies
60.	iGOT	Integrated Government Online training
61.	ILL	Internet Leased Line
62.	IMDA	Infocomm Media Development Authority
63.	IMT	International Mobile Telecommunications
64.	IMWG	Inter-Ministerial Working Group
65.	IoT	Internet of Things
66.	ITU	International Telecommunications Union
67.	IXPs	Internet eXchange Point
68.	JAM Trinity	Jan Dhan-Aadhaar-Mobile Trinity
69.	K-FON	Kerala Fibre Optic Network
70.	KLI	Kerala to Lakshadweep Islands
71.	LEO	Low Earth Orbit
72.	LMC	Last Mile Connectivity
73.	LMICs	Low-Middle Income Countries
74.	LMS	Learning Management System
75.	LSAs	Licensed Service Areas
76.	LTE	Long Term Evolution
77.	LWE	Left Wing Extremism
78.	M2M	Machine-to-Machine
79.	MBA	Master of Business Administration
80.	MBBL	Model Building Bye-Laws

S. No.	Acronyms	Description
81.	MCI	Mobile Connectivity Index
82.	MeitY	Ministry of Electronics and IT
83.	MEO	Medium Earth Orbit
84.	MISTT	Mobile Internet Skills Training Toolkit
85.	ML	Machine Learning
86.	MoHFW	Ministry of Health and Family Welfare
87.	MSE-CDP	Micro and Small Enterprises Cluster Development Programme
88.	MSMEs	Micro, Small and Medium Enterprises
89.	NASSCOM	National Association of Software and Service Companies
90.	NBC	National Building Code
91.	NBM	National Broadband Mission
92.	NBP	National Broadband Plan
93.	NDCP	National Digital Communications Policy
94.	NDLM	National Digital Literacy Mission
95.	NFHS	National Family Health Survey
96.	NGSO	Non-Geostationary Orbit
97.	NMCP	National Manufacturing Competitiveness Programme
98.	NOCC	Network Operations Control Center
99.	NOFN	National Optical Fibre Network
100.	NPCI	National Payment Corporation of India
101.	NPE	National Policy on Electronics
102.	NRI	Network Readiness Index
103.	NSIC	National Small Industries Corporation
104.	NSS	National Sample Survey
105.	NTIPRIT	National Telecommunications Institute for Policy Research, Innovations & Training
106.	O&M	Operations and Maintenance

S. No.	Acronyms	Description
107.	OECD	Organization of Economic Co-operation and Development
108.	OFC	Optical Fibre Cable
109.	OFCOM	Office of Communications
110.	ONDC	Open Network for Digital Commerce
111.	PGCIL	Power Grid Corporation of India Limited
112.	PLI	Production Linked Incentive
113.	PMEGP	Prime Minister's Employment Generation Programme
114.	PMGDISHA	Pradhan Mantri Gramin Digital Saksharta Abhiyan
115.	PMJDY	Prime Minister Jan Dhan Yojana
116.	PMO	Prime Minister's Office
117.	PM-WANI	Prime Minister's Wi-Fi Access Network Interface
118.	PwD	Persons with Disability
119.	RDOF	Rural Digital Opportunity Fund
120.	RoW	Right of Way
121.	SDGs	Sustainable Development Goals
122.	SEC	Specified Electronic Components
123.	SESG	Satellite Earth Station Gateway
124.	SIDBI	Small Industries Development Bank of India
125.	SME	Small and Medium Enterprises
126.	SNDGO	Smart Nation and Digital Government Office
127.	STEM	Science, technology, engineering, and mathematics
128.	SWAN	State Wide Area Network
129.	TRAI	Telecom Regulatory Authority of India
130.	TSPs	Telecom Service Providers
131.	UAS	Universal Access and Service

S. No.	Acronyms	Description
132.	UDISE+	Unified District Information System for Education Plus
133.	UE	User Equipment
134.	UL	Unified License
135.	UN	United Nations
136.	UPI	Unified Payment Interface
137.	USA	United States of America
138.	USAC	Universal Service Administrative Company
139.	USAF	Universal Service and Access Funds
140.	USFF	Ultra Small Form Factor
141.	USOF	Universal Service Obligation Fund
142.	USSD	Unstructured Supplementary Service Data
143.	UT	Union territory
144.	VAT	Value Added Tax
145.	VHTS	Very High Throughput Satellite
146.	VR	Virtual Reality
147.	VSAT	Very Small Aperture Terminal