India’s Digital Public Infrastructure

For Prelims: G20 presidency, Digital Public Infrastructure (DPI), sustainable development, Aadhaar, UPI, Data Empowerment and Protection Architecture (DEPA), Ayushman Bharat Digital Mission, CoWIN platform, cyberattacks, ransomware, state-sponsored hacking

For Mains: Challenges and Mitigation of India’s Digital Public Infrastructure (DPI).

Source: IE

Why in News?

During its **G20 presidency**, India advanced **Digital Public Infrastructure (DPI)** as a pivotal tool for fostering inclusive and **sustainable development** through technological innovation.

- The defining features of **DPI (openness, interoperability, and scalability)** highlight its significance not merely as a technological framework but as an essential enabler for **enhancing public and private service delivery.**

What is Digital Public Infrastructure (DPI)?

- **About:**
- **DPI** refers to the foundational digital systems and services provided by the public sector to support and enhance the functioning of a digital economy and society.
    - **Digital Identity Systems:** Platforms for verifying and managing individuals' identities online**, such as Aadhaar**.
    - **Digital Payment Systems:** Infrastructure that supports secure financial transactions, including **digital wallets, payment gateways,** and banking platforms.
    - **Public Digital Services:** Online services provided by the government, such as **e-governance portals, public health information, and digital education platforms.**
    - **Data Infrastructure:** Systems for storing, managing, and sharing data securely, ensuring data sovereignty and privacy, **such as Digilocker.**
    - **Cybersecurity Frameworks:** Measures and protocols to protect digital assets and personal information from cyber threats. For examle, **Information Security Management System (ISMS)**,
    - **Broadband and Connectivity:** Infrastructure ensuring widespread and equitable access to high-speed internet across regions.
- **It can be broadly categorised into two groups.**
    - **Foundational DPIs:** The initiatives are designed to **establish resilient digital frameworks,** encompassing the realms of digital identity systems, payment infrastructures, and data exchange platforms.
        - Such as **Aadhaar, UPI and Data Empowerment and Protection Architecture (DEPA).**
    - **Sectoral DPIs:** These **provide specialised services** tailored to the needs of specific

sectors.
    - Such as **the Ayushman Bharat Digital Mission.**
- **Impact of DPIs:**
    - Aadhaar-based authentication was used to facilitate the administration of over 2.2 billion Covid-19 vaccines under **the CoWIN platform.**
    - Over **1.3 billion Aadhaar enrolments and over 10 billion UPI transactions monthly** DPIs have had a transformative impact.
    - G**overnance** has improved in areas such as **credit, e-commerce, education, health, and urban governance.**

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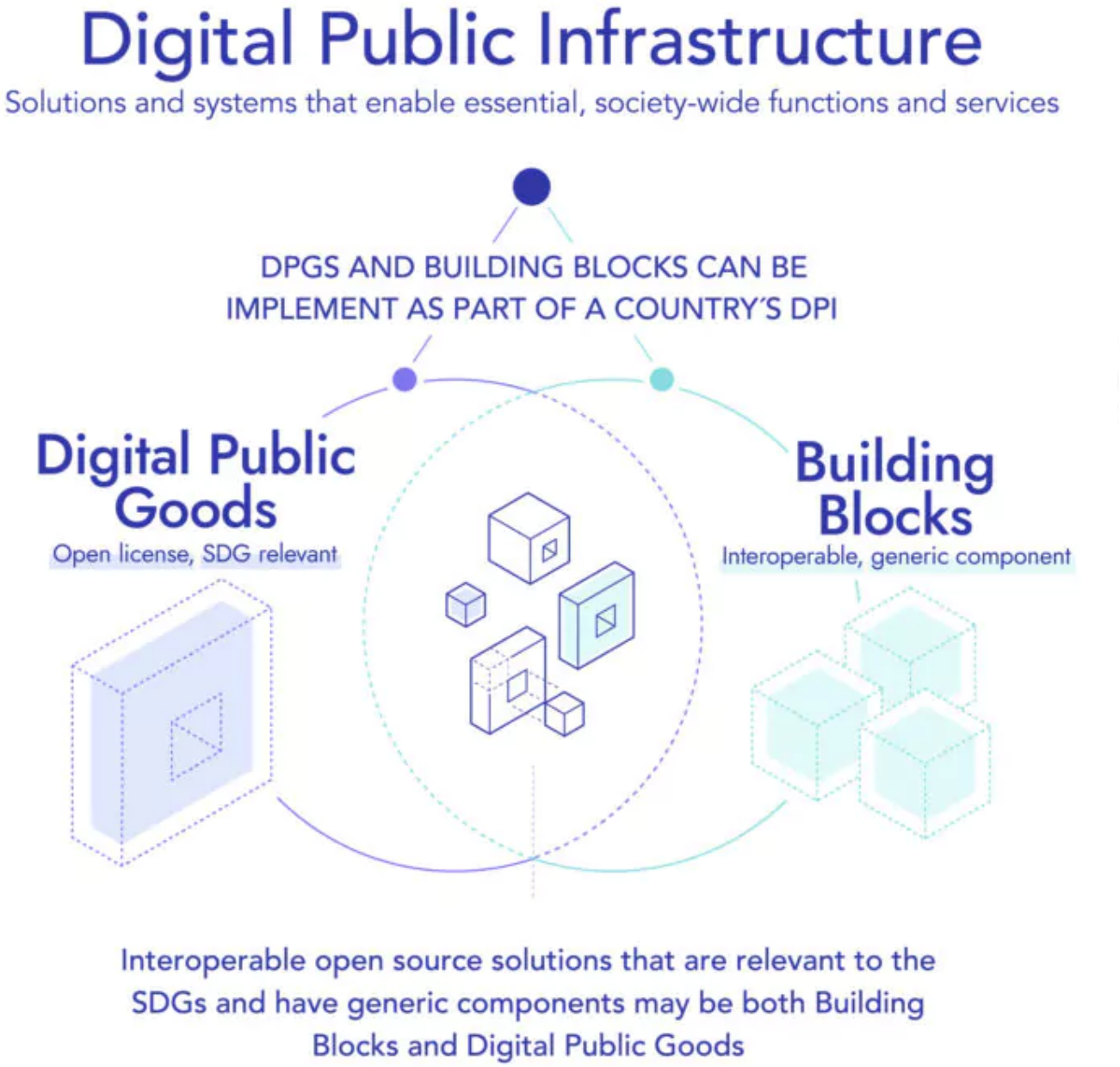

Note

Observations of **the National Association of Software and Service Companies (Nasscom)**

about **DPI**.

- Digital public infrastructure could help **India become a USD 8 trillion economy by 2030**.
- The economic value added by DPI could increase to between **2.9% and 4.2% of Gross Domestic Product (GDP)** by 2030, from 0.9% in 2022.
- The **Ayushman Bharat Digital Mission (ABDM),** envisioned to strengthen India's digital health infrastructure, is expected to significantly contribute to the rise in value.
- The **Open Network for Digital Commerce (ONDC)**, an open e-commerce platform established by the Department for Promotion of Industry and Internal Trade, is anticipated to significantly enhance retail spending.

What are the Challenges Related to India's DPI?

- **Data Privacy and Security Concerns: The extensive collection and use of personal data by DPIs raise significant concerns regarding data privacy, security, and the potential misuse of sensitive information.**
- **Digital Divide:** Despite India's rapid digital advancement there is still **limited access** to **digital infrastructure,** including internet connectivity, smartphones, and digital literacy.
    - As of 2024, India's **internet penetration rate** is expected to be **52%**, which means that more than half of the country's 1.4 billion people have internet access.
- **Regulatory Gaps and Fragmentation: The evolving nature of digital technologies necessitates dynamic and coherent regulatory frameworks.**
    - Existing regulatory mechanisms are **inadequate for addressing emerging issues such as platform monopolies**, data monopolisation, and cross-border data flows.
    - **For example,** the **Reserve Bank of India**'s mandate for storing payment data locally has led to compliance complexities for international payment providers.
- **Cybersecurity Threats: The increased reliance on digital infrastructure exposes India to a growing range of cybersecurity threats, including** cyberattacks**,** ransomware**, and** state-sponsored hacking**. Strengthening the resilience of critical DPIs against such threats is essential for safeguarding national security.**
    - As of 2021, **Maharashtra** was the most targeted state in India — facing **42%** of all **ransomware attacks.**
- **Monopolization of Digital Infrastructure: The risk of** monopolistic practices **poses challenges such as profit erosion of smaller private entities due to their inability to upgrade themselves.**
    - For example, **the National Payments Corporation of India (NPCI)** operates most of the instant payment systems.
- **Sustainability of Digital Infrastructure: Maintaining the long-term sustainability of DPIs in terms of financial viability, technical upkeep, and scalability is a persistent challenge requiring continuous innovation and investment.**

What Steps can be Taken to Increase the Resilience of India's DPI?

- **Strengthening Data Protection and Privacy Frameworks: Implementing a comprehensive and robust data protection law is crucial to safeguard citizens' data and ensure privacy.**
    - This should include **stringent norms for data collection, storage, and usage**, along with clear guidelines on consent, accountability, and recourse mechanisms for data breaches.
- **Bridging the Digital Divide: Expanding digital infrastructure is essential to ensure equitable access. This requires initiatives focused on improving digital literacy, enabling all sections of society to participate in the digital economy.**
- **Developing Adaptive Regulatory Mechanisms:** Establishing dynamic and forward-looking regulatory frameworks is critical to address emerging challenges such as platform monopolies, data monopolisation, and cross-border data governance.
    - These frameworks must be flexible enough to adapt to the rapid evolution of digital

technologies and markets.

- **Enhancing Cybersecurity Measures: Regular audits, simulations, and real-time monitoring should be institutionalised to mitigate cyber risks.**
- **Fostering Public-Private Partnerships (PPPs):** Encouraging collaboration between the government and private sector is essential to leverage technical know-how, innovation, and resources.
    - PPPs can accelerate the deployment of digital infrastructure, foster innovation, and address challenges in scaling up digital services.
- **Need for Soft Law: While rigid legal frameworks may hinder DPI growth, soft law instruments promoting best practices (data encryption, access restrictions) could safeguard public interest.**
    - Segregating aspects of DPIs under statutory, contractual, and soft law frameworks can help manage both innovation and regulation effectively.

What are the Key Developments in India's Digital Public Infrastructure?

- Unified Payments Interface (UPI)
- Aadhaar Ecosystem
- Open Network for Digital Commerce (ONDC)
- Account Aggregator Framework
- Ayushman Bharat Digital Mission
- eSanjeevani
- Digital India BHASHINI
- Digital Rupee
- Government e-Marketplace (GeM)

Conclusion

India’s G20 presidency showcased the transformative potential of **DPI as a key driver of inclusive and sustainable development.** To further strengthen DPI resilience, India must adopt robust data protection frameworks, bridge the digital divide, develop adaptive regulations, and ensure the long-term sustainability of its digital infrastructure through continuous innovation and public-private partnerships.

Drishti Mains Question:

Q. Critically examine the role of Digital Public Infrastructure (DPI) in improving governance and service delivery in India.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q. Which of the following is/are the aim/aims of “Digital India” Plan of the Government of India? (2018)

1. Formation of India’s own Internet companies like China did.
2. Establish a policy framework to encourage overseas multinational corporations that collect Big Data to build their large data centres within our national geographical boundaries.
3. Connect many of our villages to the Internet and bring Wi-Fi to many of our schools, public places and major tourist centres.

Select the correct answer using the code given below:

(a) 1 and 2 only

(b) 3 only

(c) 2 and 3 only

(d) 1, 2 and 3

Ans: (b)

Mains

Q. “The emergence of the Fourth Industrial Revolution (Digital Revolution) has initiated e-Governance as an integral part of government”. Discuss. **(2020)**