Funding Indian Product Development Research Development, Test Labs & Certification

Contents

1. Scan of global approach to R&D in IoT and other emerging technology areas

[This section is reproduced from a IETF Position Paper]

1.1 Europe's IoT Policy

A set of supporting policy actions have been adopted by the European Commission to accelerate the take-up of IoT and to unleash its potential in Europe for the benefit of European citizens and businesses.

1.1.1 Alliance for Internet of Things Innovation (AIOTI) 2015:

The Alliance for Internet of Things Innovation (AIOTI) was launched in 2015 by the European Commission to support the creation of an innovative and industry driven European IoT ecosystem. The European Commission is working closely with AIOTI and all IoT stakeholders and actors towards the establishment of a competitive European IoT market and the creation of new business models. Currently, the AIOTI is the largest European IoT Association. AIOTI activities are carried out through Working Groups, which focus on well-defined areas of development. These include horizontal areas: R&D eco-systems, policy, standards and distributed ledger technologies, as well as vertical, cross-disciplinary activities focused on key IoT issues.

In August 2018, AIOTI has published recommendations for the future IoT research priorities under Horizon Europe and Digital Europe programmes 2021-2027. This work continued with priorities for the new political cycle in the EU (2019-2024) and Strategic Foresight Through Digital Leadership: IoT and Edge Computing Convergence. For more information, please click here

The European Commission has also published a staff working document 'Advancing the Internet of Things in Europe' in 2016. This document is part of the 'Digitising European Industry' initiative and specifies the EU's IoT vision, based on 3 strands:
a thriving IoT ecosystem;
a human-centred IoT approach;
a single market for IoT.

For a better understanding of the ecosystem, the Cluster Study (2019) has investigated the landscape of physical and virtual clusters. These includes clusters of enterprises, research organisations and academia working on the

innovation, development and market deployment of IoT technologies and applications.

A potential obstacle for the achievement of a single market for IoT has to do with issues linked to the capacity to handle a large diversity and very large volumes of connected devices, and the need to securely identify them and be able to discover them so that they can be plugged into IoT systems. In this context it is important to promote an interoperable IoT numbering space for a universal object identification that transcends geographical limits. It is also important to promote an open system for object identification and authentication. Some aspects of numbering are already addressed in the 2016 review of the EU's telecoms rules.

The 'European strategy for data' contributes to the creation of a European single market for IoT. This strategy proposes policy and legal solutions concerning the free flow of data across national borders in the EU, and liability issues in complex environments such as the IoT one. Liability is crucial to enhancing legal certainty around IoT products and services. To provide a first mapping of liability challenges that occur in the context of emerging digital technologies, including IoT, the European Commission published a staff working document on liability for emerging digital technologies.

1.1.2 IoT research & development and innovation: Government Initiatives

A wide range of R&D and application projects in Europe have been set up in different application fields. Communication between these projects is an essential requirement for a competitive industry and for a secure, safe and privacy preserving deployment of IoT in Europe.

1.1.3 Horizon 2020:

For the period 2014-2020 under Horizon 2020, the European research and innovation programme, the EU will have invested almost €500 million in Internet of Things-related research, innovation and deployment.

1.1.4 IoT European Platform Initiative (IoT-EPI) 2016:

In order to support IoT research and innovation (R&I), Europe promotes the idea of open and easy accessible IoT platforms. In 2016 the 'IoT European Platform Initiative (IoT-EPI)' was launched to build a vibrant and sustainable IoT-ecosystem in Europe, maximising the opportunities for platform development, interoperability and information sharing. Seven leading research and innovation projects: Inter-IoT, BIG IoT, AGILE, symbIoTe, TagItSmart!, VICINITY and bIoTope. make their technology accessible to 3rd parties. In addition, strong support & funding structure (open calls, workshops) fosters further collaboration. Learn more about IoT-EPI.

1.1.5 IoT European Large-Scale Pilots Programme:

The European Commission also supports the IoT European Large-Scale Pilots Programme includes the innovation consortia that are collaborating to foster the deployment of IoT solutions in Europe through integration of advanced IoT technologies across the value chain, demonstration of multiple IoT applications at scale and in a usage context, and as close as possible to operational conditions. For more information, please [click here](#)

1.1.6 European Research Cluster on the Internet of Things (IERC):

The aim of European Research Cluster on the Internet of Things is to address the large potential for IoT-based capabilities in Europe and to coordinate the convergence of ongoing activities. IERC will facilitate the knowledge sharing at the global level and will encourage and exchange best practice and new business models that are emerging in different parts of the world. In this way, measures accompanying research and innovation efforts are considered to assess the impact of the Internet of Things at global and industrial level, as well as at the organisational level. For more information, please [click here](#)

1.1.7 IoT European Security and Privacy Projects (IoT ESP):

The aim of this cluster is to share experiences on approaches and tools for risk assessment and threat analysis in IoT domain from cluster's project members perspective and based on that contribute to standards, offering a joint position of the group of IoT security related and practical oriented projects, co-founded by EU. For more information, please [click here](#)

1.2 Artificial Intelligence (AI):

Artificial intelligence (AI) is a wide-ranging tool that enables people to rethink how we integrate information, analyze data, and use the resulting insights to improve decision making—and already it is transforming every walk of life.

Artificial intelligence (AI) holds great economic, social, medical, security, and environmental promise. AI systems can help people acquire new skills and training, democratize services, design and deliver faster production times and quicker iteration cycles, reduce energy usage, provide real-time environmental monitoring for pollution and air quality, enhance cybersecurity defenses, boost national output, reduce healthcare inefficiencies, create new kinds of enjoyable experiences and interactions for people, and improve real-time translation services to connect people around the world. For all of these reasons and many more researchers are thrilled with the potential uses of AI systems to help manage some of the world's hardest problems and improve countless lives.

In order to realize this potential, many countries and organizations around the world are approaching the benefits and risks of AI. This paper highlights a global landscape of national and international AI Policies/strategies.

1.2.1 Artificial Intelligence Policy[1]: European Union

Europe has a robust AI industry and countries within the EU have continued to emphasize the importance of joining forces and showing a unified "European AI Alliance". The AI Alliance acts as a multi-stakeholder forum engaged in a broad and open discussion of all aspects of AI development and its impact on the economy and society.

In March 2018, the European Commission established a High-Level Expert Group to gather expert input and develop guidelines for AI ethics, which were built upon a statement by the European Group on Ethics in Science and New Technologies.

In the first year after its creation, the AI HLEG delivered on the following:

1. Ethics Guidelines on Artificial Intelligence: The Guidelines put forward a human-centric approach on AI and list 7 key requirements that AI systems should meet in order to be trustworthy. These requirements will go through a piloting process expected to conclude with the presentation of a revised document in early 2020.

2. Policy and Investment Recommendations: Building on its first deliverable, the group has put forward 33 recommendations that can guide Trustworthy AI towards sustainability, growth and competitiveness, as well as inclusion – while empowering, benefiting and protecting human beings. The recommendations will help the Commission and Member States to update their joint coordinated plan on AI at the end of 2019. This is expected to play a key role in building the future of Artificial Intelligence in Europe.

By singing up to AI Alliance, Members can interact with the experts of The High Level Expert Group on AI (HLEG-AI) and can offer input and feedback to HLEG-AI.

One component of the "European AI Alliance" is the Digital Single Market strategy, which was adopted in May 2015 to enhance digital opportunities for people and businesses throughout Europe. On June 6, 2018, the European Commission proposed an updated Digital Europe program with the investment of €9.2 billion to align the next long-term EU budget 2021-2027 with increasing digital challenges. €2.5 billion of this is planned to help spread AI across the European economy and society and to build on the European approach on AI[2] presented on April 25, 2018.

Given the strategic importance of the AI and the support shown by the European countries signing the declaration of cooperation during the Digital Day 2018. On

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1 https://ec.europa.eu/digital-single-market/en/artificial-intelligence

2 https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence

10 April 2018, 25 European countries signed a [Declaration of cooperation on Artificial Intelligence](). It builds further on the achievements and investments of the European research and business community in AI.

On 19 February 2020, the European Commission published a [White Paper]() aiming to foster a European ecosystem of excellence and trust in AI and a [Report on the safety and liability aspects of AI]().

In May 2018, [The General Data Protection Regulation]() (GDPR) – a wide-ranging regulation intended to strengthen and unify data protection for all individuals within the EU – went into effect. GDPR was approved by the EU Parliament on April 14, 2016 and replaces the Data Protection Directive 95/46/EC. It extends the scope of the EU data protection law to all foreign companies processing data of EU residents. GDPR implicates AI for several reasons including that it requires a certain amount of explainability, which can be challenging with "black box" AI systems.

1.2.2 Artificial Intelligence Policy[3]: United States

2019 was a monumental year for artificial intelligence (AI) policy in the United States. The federal government took several important steps that prioritized AI development and deployment and positioned the United States to strengthen its global AI leadership, beginning with issue of an [Executive Order]() launching the [American AI Initiative]() on February 11, 2019. The Executive Order explained that the Federal Government plays an important role not only in facilitating AI R&D, but also in promoting trust, training people for a changing workforce, and protecting national interests, security, and values. And while the Executive Order emphasizes American leadership in AI, it is stressed that this requires enhancing collaboration with foreign partners and allies.

The American AI Initiative is guided by five principles, which include (in summarized form), the following: 1. Driving technological breakthroughs, 2. Driving the development of appropriate technical standards, 3. Training workers with the skills to develop and apply AI technologies, 4. Protecting American values including civil liberties and privacy and fostering public trust and confidence in AI technologies, 5. Protecting US technological advantage in AI, while promoting an international environment that supports innovation.

In May 2019, the United States has also joined dozens of other countries in adopting the [OECD AI Recommendation](), the first intergovernmental standard for AI, which includes five complementary values-based principles and five recommendations to governments. The US also joined the G20 countries in supporting the [G20 AI Principles](), which are drawn from the OECD Recommendation. In September 2019, the US Chamber of Commerce released [Principles on Artificial Intelligence](), which also endorse the OECD Recommendation and include a call for US businesses to abide by international standards.

On March 19, 2019, the US federal government has also launched [AI.gov]() to make it easier to access all of the governmental AI initiatives currently underway. The site is

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3 https://futureoflife.org/ai-policy-united-states/

the best single resource from which to gain a better understanding of US AI strategy. As of February 2020, there is also extensive information, data, and graphics about AI policy in the US available at the [OECD AI Policy Observatory](#).

For more information please [click here](#)

1.2.3 Artificial Intelligence Policy: Singapore

In November 2019, Singapore launched a [National AI Strategy](#)[4]. The strategy identifies five national AI projects including transport and logistics, smart cities and estates, healthcare, education, and safety and security. These projects are intended to address key challenges that will help ensure Singaporeans experience successful and sustainable AI innovation and adoption. The national strategy calls for support from the private and public sectors, as well as international partners. One part of the strategy is a [Model AI Governance Framework](#).

In May 2017, Singapore has also established a national program called [AI Singapore](#) to harness AI throughout the country. The program was set up by the government to invest up to S$150m in AI over the next 5 years. The objectives of AI singapore are to use AI to address major challenges that affect society and industry, to invest in deep capabilities to catch the next wave of scientific innovation, and to broaden adoption and use of AI and machine learning within industry. It focuses on three key industry sectors: finance, city management solutions, and healthcare. Two more recent programs [launched](#) by AI Singapore include AI for Everyone (AI4E) and AI for Industry (AI4I). These programs help showcase the utility of AI advances to a wider range of Singaporeans and to industry professionals.

For more information, please [click here](#)

1.3 Blockchain:

Blockchain is a system of recording information in a way that makes it difficult or impossible to change, hack, or cheat the system.

A blockchain is essentially a digital ledger of transactions that is duplicated and distributed across the entire network of computer systems on the blockchain. Each block in the chain contains a number of transactions, and every time a new transaction occurs on the blockchain, a record of that transaction is added to every participant's ledger. The decentralised database managed by multiple participants is known as Distributed Ledger Technology (DLT).

Below is the list of few policy initiatives which have been announced by EU and Singapore.

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4 https://www.smartnation.gov.sg/why-Smart-Nation/NationalAIStrategy

1.3.1 EU Blockchain Strategy[5]

The European Commission's strategy is designed to meet these goals. It wants to support a 'gold standard' for blockchain technology in Europe that embraces European values and ideals in its legal and regulatory framework.The most significant elements of the EC's blockchain strategy include:

Developing joint visions and initiatives through a European Blockchain Partnership harnessing national blockchain efforts into a pan-European approach.
Building a pan-European government services blockchain: the EBP commits the European public sector to play a trailblazing role in blockchain by building its own blockchain backbone infrastructure for corporation across borders- the European Blockchain Services Infrastructure (EBSI)
Promote legal certainty: The European Commission is proposing a comprehensive pro-innovation legal framework in the area of digital assets and smart contracts.
Increasing funding for blockchain innovation: the EU provides funding of blockchain research and innovation both in the form of grants and by supporting investment in startups.
Supporting interoperability and standards: the EC believes strongly in the importance of standards in promoting blockchain technology and looks to engage with all relevant bodies globally.
Supporting blockchain skills development: the EC supports initiatives focused on blockchain education in order to ensure the high level skills that are needed are available.
Interacting with the community: the EC interacts with the private sectors, academia and the blockchain community primarily through bodies like the European Union Blockchain Observatory and Forum, the **International Association of Trusted Blockchain Applications (INATBA).**

For more information please click here

1.3.2 EU Blockchain Observatory and Forum 2018

In February 2018, the European Commission has launched the EU Blockchain Observatory and Forum, to accelerate blockchain innovation and the development of the blockchain ecosystem within the EU and so help cement Europe's position as a global leader in this transformative new technology.

The EU Observatory will:

- Map key existing initiatives in Europe and beyond;
- Monitor developments, analyse trends and address emerging issues;
- Become a knowledge hub on blockchain;
- Promote European actors and reinforce European engagement with multiple stakeholders;

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5 https://digital-strategy.ec.europa.eu/en/policies/blockchain-strategy

- Represent a major communication opportunity for Europe to set out its vision and ambition on the international scene;
- Inspire common actions based on specific use-cases of European interest.

It has established following two Working Groups (WGs) to identify and research existing blockchain initiatives throughout the EU and beyond:

- The **Blockchain Policy and Framework Conditions Working Group** will look at cross-technology and cross-industry issues to define the policy, legal and regulatory conditions needed to promote the regulatory and legal predictability necessary for larger-scale deployment of blockchain applications.
- The **Use Cases and Transition Scenarios Working Group** will focus on the most promising transformative blockchain use cases with an emphasis on public sector applications such as identity and government services, health care, energy and environmental reporting.

For more information, please click here

1.3.3 European Blockchain Partnership 2018

In April 2018, 21 Member States and Norway agreed to sign a Declaration creating the **European Blockchain Partnership (EBP)** and cooperate in the establishment of a **European Blockchain Services Infrastructure (EBSI)** that will support the delivery of cross-border digital public services, with the highest standards of security and privacy. Since then, eight more countries have joined the Partnership, bringing the total number of signatories to 30.

In December 2019, the European Commission also started an open market consultation in preparation of the **European Blockchain Pre-Commercial Procurement** that is looking for novel, improved blockchain solutions for the future evolution of the European Blockchain Service Infrastructure. Interested market parties are invited to participate in the open market consultation activities.

For more information about EBP, please click here, for EBSI please click here and for the European Blockchain PCP, please click here

1.3.4 Singapore Blockchain Innovation Programme 2020

A S$12 million Singapore Blockchain Innovation Programme (SBIP)[6] was launched in December 2020 with a mandate to further strengthen Singapore's blockchain ecosystem. SBIP facilitates the adoption of blockchain systems for real-world applications through **3 key strategies**:
- Engaging local companies
- Growing Singapore's blockchain community
- Researching on next-generation blockchain

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6 https://sbip.sg/

The Singapore Blockchain Innovation Programme will engage close to 75 companies including multinational corporations, large enterprises and info-communications technology companies, to conceptualise 17 blockchain-related projects within the next three years in sectors such as trade and logistics. For more information, please [click here](#)

2. Government initiatives for a resurgent India

1.4   5G/ IoT/ Digital Initiatives and Roadmap of the Indian Government

The Indian Government has taken bold measures to develop the local ecosystem, some of which are shown in the figure below:

New Processes →	*Ease of Doing Business* *GST* *De-monetization*
New Sectors →	*Major FDI reforms and inflows*
New Approach →	*Make in India* *Digital India* *Skill India*
New Infrastructure →	*Key Infrastructure and Urbanization*
New Innovation and R&D →	*India – Design & Innovation* *Start Up India* *Intellectual Property Rights*
New Mind-set →	*From red tape to red carpet*

The Indian Express wrote about the NDCP 2018 describing it as:

The National Digital Communications Policy-2018 (NDCP) has been formulated to facilitate India's effective participation in the global digital economy. The policy aims to ensure digital sovereignty. The key features of the policy are as below:

- Provide universal broadband connectivity at 50 Mbps to every citizen.

- Provide 1 Gbps connectivity to all Gram Panchayats by 2020 and 10 Gbps by 2022.

- Ensure connectivity to all uncovered areas.

- Attract investments of USD 100 billion in the Digital Communications Sector.

- Train one million manpower for building New Age Skill.

- Expand IoT ecosystem to 5 billion connected devices.

- Establish a comprehensive data protection regime for digital communications that safeguards the privacy, autonomy and choice of individuals.

- Facilitate India's effective participation in the global digital economy.

- Enforce accountability through appropriate institutional mechanisms to assure citizens of safe and secure digital communications infrastructure and services.

> One of its objectives is to ensure connectivity to all uncovered areas and attract investments of $100 billion in the Digital Communications Sector. Besides this, one million manpower will be trained for building New Age Skill. It also aims at expanding IoT ecosystem to 5 billion connected devices. The IoT is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity. This enables these things to connect, collect and exchange data, creating opportunities for more direct integration of the physical world into computer-based systems. IoT results in efficiency improvements, economic benefits, and reduced human exertions.
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1.5 DoT's IoT/ M2M Roadmap

The Department of Telecommunications has published an IoT/ M2M Roadmap in 2015, identifying several key facets of the agenda:

1. To facilitate M2M communication standards including encryption, quality, security and privacy standards from Indian Perspective and to recognize such standards for India.

2. To release national M2M Numbering Plan

3. To address M2M Quality of Service aspects.

4. To address M2M specific Roaming requirements.

5. To formulate M2M Service Provider (MSP) registration process.

6. To issue guidelines for M2M specific KYC, SIM Transfer, International roaming etc.

7. Formation of APEX body involving all concerned stake holders.

8. To address M2M specific spectrum requirements.

9. To define frequency bands for PLC communication for various Industry verticals

10. Finalization of M2M Product Certification process and responsibility centers.

11. Facilitating M2M Pilot projects.

12. Measures for M2M Capacity building.

13. To establish Center of Innovation for M2M.

14. To assist M2M entrepreneurs to develop and commercialize Indian products by making available requisite funding (pre-venture and venture capital), management and mentoring support.

15. Inclusion of M2M devices in PMA Policy.

16. To take up matters with relevant ministries to boost M2M products and services.

17. Define procedures for energy rating of M2M devices and implementation of same.

18. To evolve suitable guidelines of EMF radiation of M2M devices based on research and studies by relevant bodies.

Indian Research and Development are critical to enabling many of the agenda identified above.

1.6   Indian IoT/ M2M Market place

The IoT market is set to exceed the human connections by the turn of this decade, an estimate from research agency is shown below:
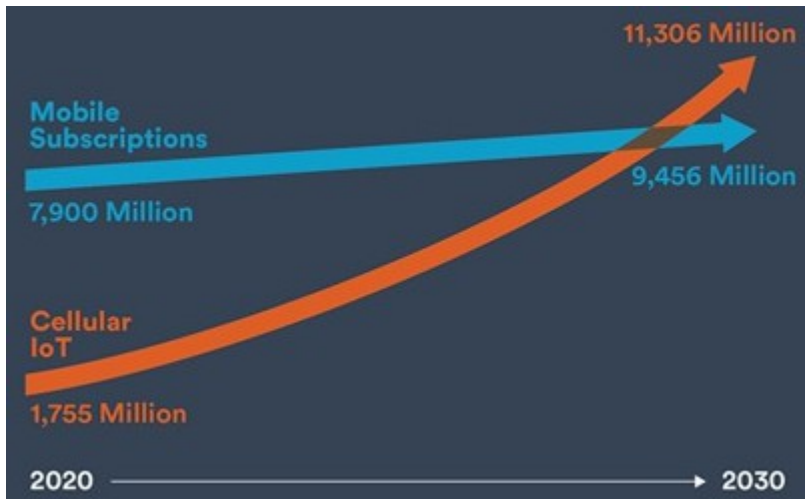
According to Research and Markets "Indian IoT market is expected to witness a significant growth with the CAGR of approximately 21.9% during the forecast period of 2019-25. Indian IoT market is segmented on the basis of infrastructure, vertical and application. Based on the infrastructure, the market is segmented into platform, mobile networks and access technologies, cloud solutions/storage and processing, analytics and security. Based on the vertical, the market is segmented into automotive, aerospace, transportation, energy, healthcare, e-governance, BFSI, hospitality, entertainment, retail, home, industrial, manufacturing, railways, marine and defense. Further, based on the infrastructure, the market is segmented into consumer (smart home, smart wearable) and Industrial (smart cities, smart grid, IoT, IIoT, IoT connected cars, IoT connected healthcare, Drones, etc.).

1.7   Role of the Government

Government policy, procurement and spending is likely to play a huge role in how the IoT ecosystem in India readies and shapes up. The government policy in the following barriers can liberate the challenges and enable a fast growth of the local IoT ecosystem

Registration and recognition of M2M Service Providers for the orderly proliferation of secure and quality services

      a.   IoT is a new developing ecosystem, standards based quality, security and safety of services is paramount for the rapid adoption

      b.   DoT has taken the pioneering step of adopting the oneM2M standards as national standards

      c.   DoT had released the draft policy for registration of IoT/ M2M Service Providers in July 2016, which is still pending

    d. The absence of proper registration and provisioning of the rights to rollout services is a significant barrier to investment and standards based services development. The policy for registration of IoT/ M2M Service Providers should be notified immediately

Incentive on R&D

    e. The government must provide incentive to Registered M2M Service Providers to invest in Key Areas of national interest
- e.i. National Trust Centre Systems
- e.ii. Cellular-V2X systems
- e.iii. Financial Systems
- e.iv. IoT solutions for Smart Grid and AMI
- e.v. Mobile data Security and Privacy
- e.vi. SIM Card Operating Systems
- e.vii. Manufacturing of IoT devices such as telematics, metering, road safety
- e.viii. Rural and Remote connectivity
- e.ix. Financial Services

    f. All the Key Areas should be notified and covered under Preferred Market Access (PMA)

    g. Research in all the Key Area services must be allowed to be covered under CSR spending

Preferred Market Access

    h. Preferred market access must be provided to all Key Areas

    i. Only such products which have more than 70% Indian R&D and more than 60% local value should qualify for PMA Products

Private Networks and IoT Spectrum

    j. The Government must allow the registered IoT / M2M SP to offer private networks in the IoT use cases

    k. Certain critical sectors such as Mining, Remote Area Management, Metering, Cellular V2X must be allowed for IoT/ M2M SP

    l. Spectrum must be made available at very reasonable rates for micro local area IoT network deployment

Local Standards and Certification

    m. TEC Standards must be developed including in areas where TEC endorses global standards or where TSDSI transposes global standards

    n. TEC should invest massively in engaging the local ecosystem for development of Test Processes and Test tools

    o. All the Certification required for Indian IoT services must be locally handled by TEC accredited labs in India, including SAS Certification

3. Incentivizing Indian R&D

The Working Group for the 12th Plan in Telecom sector had proposed to create following funds for promoting R&D and Manufacturing of Telecom Equipment during the 12th Five Year Plan period:

Telecom Manufacturing Promotion Fund (TMPF)	Rs 10,000 crore
Telecom Entrepreneurship Promotion Fund (TEPF)	Rs 2,500 crore
Telecom Research Development Fund (TRDF)	Rs 5,000 crore
Total Fund requirement	Rs 17,500 crore

A MULTI-PRONGED APPROACH was proposed for CRITICAL CHALLENGES FACED BY DOMESTIC TELECOM INDUSTRY addressing INNOVATION, INCUBATION AND GLOBAL SCALE OPERATIONS

INNOVATE

- R&D and Product development
- Creation of IPR and patents
- Soft Loans & Grants (exceptional cases)
- Common testing and standardization

INCUBATE

- Startup/Risk Financing
- Incubation Centers, Accelerators and Innovation labs
- Strengthen telecom entrepreneurship leadership and engineering capability

GLOBAL SCALE

- Low interest, long-term funding for Indian Products
- Subsidies/incentives to overcome disabilities
- Promote success in India and also globally

1.8 TELECOM PRODUCT FUNDs: HIGH-LEVEL OBJECTIVES

The objective of the Telecom Product Fund is to establish a corpus to promote indigenous R & D, IPR creation, entrepreneurship, manufacturing, commercialization and deployment of state-of-the-art telecom products and services during the 12th Five Year Plan period.

In order to realize this vision, the Telecom Product Fund will be divided into three distinct schemes, namely, the
  i)   Telecom R&D Fund (TRDF),
  ii)   Telecom Entrepreneurship Development Fund (TEDF) and
  iii)   Telecom Manufacturing Promotion Fund (TMPF).
The implementation of these three schemes will be harmonized to incentivize indigenous development of telecom products and meet the end-to-end funding requirements of telecom R&D starting from the ideation stage to incubation and commercial growth stages.

The key objectives of the "Telecom R&D Fund" are the following:

    a.i.   To fund commercially viable product development with current/future market potential by Indian telecom companies and R&D labs including early-stage prototype development in high-potential areas such as VLSI chip design, embedded software for telecom gear and secure elements, equipment's, terminals (including mobile and tablets) and customer premise equipment,

    a.ii. To fund projects with a clear focus towards development of products/services, including those which may have potential for generation of patents/IPRs, possible inclusion in international standards. This will also include funding acquisition of patents and IPRs at a country level.

    a.iii. To create common testing and Innovation Lab facilities in public/public-private partnership (PPP) mode.

The key objectives of the "Telecom Entrepreneurship Development Fund" are the following:

    a.iv. Establish a conducive and world-class ecosystem for transforming innovative ideas to products and services for telecom start-ups

    a.v.   Build new and leverage the existing incubation infrastructure (physical and technical) in India to provide world-class support to innovators and entrepreneurs to build global companies that are based in India.

    a.vi. Leverage the human resources and expertise existing in research/academic institutes in India to create a pipeline of entrepreneurial leadership and telecom engineering talent

    a.vii. Accelerate Research and Spin-off technologies being developed by innovators into viable enterprises

    a.viii. Attract the best brains in the country to collaboratively work towards solving problems of mass applications and creating indigenous solutions for areas of strategic importance such as space, energy, internal security and defence.

The key objectives of the "Telecom Manufacturing Promotion Fund" are the following:

    a.ix. Stimulate and promote the complete value chain of domestic telecom equipment covering R&D, design, IPR creation, testing and manufacturing of telecom equipment in the country. This shall also cover components and software that is required as a part of telecom equipment.

    a.x.   Provides incentives and financing support to create a large and healthy ecosystem of globally competitive Indian telecom equipment companies, by removing fiscal and other impediments that are coming in the way of commercial success of Indian telecom products in India as well as internationally.

    a.xi. Achieve increased self-reliance in telecom products (including handsets/tablets and customer access equipment), reduce imports and address national security concerns. Achieve NTP-2012 target of meeting 60% of Indian telecom sector demand with domestic value addition of 45% by 2017, and 80% of the Indian telecom sector demand with domestic value addition of 65% by 2020.

    a.xii. Provide a thrust for exporting telecom products from India and make India a global hub for telecom equipment.

1.9   Forms of Funding

Telecom Product Funds may be disbursed in the following modes:

Soft Loans: These will be soft-secured loans at concessional interest rates that will be given to Indian Telecom Companies for developing Indian Products. The collaterals will be in the form of physical assets and IPR generated, which can be taken over by the government in case of default.

 Interest Subsidies: In the telecom sector, large sums of working capital will be required, at competitive rates, by Indian Telecom Companies for their internal use and for providing long-term financing to customers (telecom operators). For such large requirements, the fund size will not be adequate and therefore these funds may be used to provide interest subsidy, while the actual lending will come from commercial banks.

 Equity: In the case of SMEs or telecom startups supported by TEDF, funds will be treated as an investment in the venture. Other variants of equity instruments such as convertible debentures may also be considered. All the investments will be as per guidelines issued by the Securities & Exchange Board of India (SEBI) from time-to-time. The typical investment horizon would be 5-8 years although lower periods would also be considered.

Soft Loans/ Grants (in exceptional cases): R&D institutes and labs, telecom incubators, societies and section 25 companies with telecom research and development focus could be provided Soft Loans/ Grants (in exceptional cases) for purchase of tools and equipment once the project proposal is approved.

Post-performance Reimbursement: Indian Telecom Companies will be eligible for full or partial reimbursement of costs under various expense categories specified in the TRDF and TMPF funds.

Exclusivity of loans: The organisations seeking loans under any of these schemes should not be getting benefits from any other scheme of the government for the same purpose.

1.10   Target Beneficiaries

The following attributes will make the companies beneficiaries of the Telecom Product Fund

incorporated in India with
More than 50% equity owned by Indian Citizens or Indian entities
the board constituted by majority of Indian Residents
CEO/CFO/CTO being resident Indian citizens and
global headquarters in India

Together with any one registration described below:

IoT/ M2M Service Providers registered with DoT
Start-Up registration up to three years before date of application of Funds
DSIR approved R&D house
Start-up registered with incubators of IITs/ BITS, Pilani/ IISC/ RECs

Small and Medium Enterprises and other new startup ventures in the telecom sector with a focus on R&D and in the development of "Indian Products" will have a preference.

1.11 Product Criteria

The Research must have an exclusive focus on telecom and digital products in the Key Areas listed below or as approved by DoT, DST or MEITY.

The design and IPR (except for patents that have been licensed and off-the-shelf components) should be exclusively owned by the Indian Telecom Company and revenues of global sales and commercial benefits of the Indian Product must accrue to Indian Telecom Company.

The product should meet the minimum Domestic Value Addition norms specified by DoT for that specific product

The design of the product, including hardware details and software source code, should be resident in India and be available for inspection by any agency designated by DSIR/ DoT/TPFGC council.

The product should be governed by the export control laws of India

1.12 Developing Indian **R&D in** Key Areas

- IoT/ M2M Domain Applications and Devices
- 5G Domain Applications
- Telecom Products and Infrastructure
- Industrial IoT and Industry 4.0
- Roots-of-trust, Certificate and Cybersecurity Infrastructure
- Test and Certification Infra
- Quantum Technology
- AI Applications
- Blockchain Applications

4. Funding Model

The funding model is substantially as per the **12th Five Year Plan period** and described below.

A Telecom Product Fund corpus of Rs 17,500 crores will be created as below:
- Telecom R&D Fund of Rs 5000 crores
- Telecom Entrepreneurship Development Fund of Rs 2,500 crores
- Telecom Manufacturing Promotion Fund of Rs 10,000 crores

The TRDF fund of Rs 5000 Cr shall be allocated as follows:
The broad objectives of the fund (disbursed generally as soft loans or grants in exceptional cases), is proposed as follows:
- 75% for product development that includes early stage prototyping and commercialization
- 20% for generation of product IPRs/patents/standards
- 5% for common facilities

It is estimated that around 57% of the funds will be disbursed as loans that will return to the corpus and 43% of the funds will be distributed generally as soft loans with grants in exceptional cases through post-performance incentives for creation of software or capital assets created as a result of the project activities supported by the funds.
Income generated will be ploughed back into the fund every year

The TEDF fund of Rs 2500 Cr shall be allocated as follows:
Proposed allocation of funds (disbursed as equity/incentives/ loans):
- 25% as Angel/Seed Funds to Incubators
- 45% as Early Stage Venture Fund
- 30% as Capacity Building Fund

It is estimated that around 75% of the funds will be used as equity investments, 15% will be disbursed as post-performance incentives, and 10% will be used for loans that will return to the corpus
Income generated will be ploughed back into the fund every year

The TMPF fund of Rs 10,000 Cr shall be allocated as follows:
90% of the funds will be disbursed as post-performance incentives and interest subvention subsidies, while the remaining 10% will be made available as soft loans that will return to the corpus Proposed allocation of funds will be under the following schemes:
- 8% as Initial Deployment Incentive for Indian Products
- 12% as Incentives for Export and Marketing Promotions
- 10% as incentives to Indian Operators to Buy Indian Products
- 10% as Soft Loans to Indian Telecom Companies
- 30% as Interest Subsidies for Working Capital Loans
- 30% as Interest Subsidies on Vendor Financing

Income generated will be ploughed back into the fund every year.

KEY INITIATIVES UNDER TRDF

TRDF fund will catalyze indigenous telecom product development through a thrust on IPR, R&D and Standardization activities. The key initiatives for which funds will be allocated are:
1. **FUNDS FOR PRODUCT DEVELOPMENT (75% AMOUNTING TO RS 3750 CRORES)**

The fund will support early stage prototyping and commercialization of products with majority Indian IPR and maximum value addition in India

Soft Loans/ Grants (in exceptional cases) will be given to R&D Institutes/Sec 25 companies and societies/Indian Telecom Companies limited to the purchase of tools and development equipment

Soft Secured Loans at 3% interest to Indian Telecom Companies for up to 50% of the project costs; grants can be given in exceptional cases (50% costs to be borne by company)

The fund will also support Indian Telecom Companies working in the area of strategic or national importance and developing Indian products that have long term commercial viability. 20% of the Product Development corpus will be dedicated for this purpose. Funding may be provided up to Rs 25 crores per company in the form of equity or soft loans.

2. **FUNDS FOR PATENTS/IPR/STANDARDIZATION ACTIVITIES (20% AMOUNTING TO RS 1000 CRORES)**

The fund will support creation of product patents and country-level acquisition of patent pools (that can be licensed to Indian Telecom Companies at 1% purchase value)

Soft loans/ Grants (in exceptional cases) will be given to Universities/R&D Labs/Sec 25 companies/societies for approved projects; Soft secured loans can be provided at 3% to Indian Telecom Companies for IPR creation

Indian Telecom Companies can apply for reimbursement of actual patent filing/maintenance fees

3. **FUNDS FOR COMMON TESTING AND LAB FACILITIES (5% AMOUNTING RS 250 CRORES)**

The fund will be available for setting up common testing labs at national level in public/ public-private partnership mode and in incubators as Shared Infrastructure at regional level in public-private partnership model

Soft Loans/ Grants in exception cases will be available only for purchase of equipment and tools required for the labs and not for civil infrastructure, and other operations cost. Operational cost of running and maintaining the facility will be borne by the industry/incubator through suitable fees levied for the services.

KEY INITIATIVES UNDER TEDF

The vision of the TEDF fund is to build 1000 innovative and successful startup enterprises focused on providing telecom solutions for India within the next 5 years. The key initiatives to realize this vision for which funds will be allocated are:

CAPACITY & ECOSYSTEM BUILDING FUND (30% AMOUNTING TO RS 750 CRORES)

The fund will support creation of a world-class entrepreneurial development ecosystem at telecom startup incubation centers with an aim to create and support new generation telecom entrepreneurs and support from idea to IPO Stage of the startup. Each incubator is expected to support 100 to 1000 startups over a period of five years.

The fund will support upto 10 incubators for capacity building with each incubator receiving 10Cr to 100Cr as post-performance incentives or in the form of equity investments

The fund can be utilized by the incubators for

Creating Hard Infrastructure such as Innovation Labs, Purchase of Telecom Equipment for R&D, High End Video Conference/ Telepresence Rooms

Provide Soft Infrastructure Services to the startups such as Computers, Laptops, High End Servers, Work Stations etc

Provide support Infrastructure Services such as Accounting, Audit and Financial Services Cell, IPR Cell, Legal Services Cell, Business Operations Cell and Venture Capital Cell.

Creation of Knowledge Hubs to develop and conduct entrepreneurship training programmes, business management, and telecom technical/engineering training courses at the incubators

Incubation Centers, which have reached a sizeable operational scale, can also utilize the funds for Setting up of Global Telecom Accelerator Programmes to guide the mature startups move to market commercialization globally

ANGEL/SEED FUNDS TO INCUBATORS (25% AMOUNTING TO RS 625 CRORES)

The fund will be employed to support up to 10 incubators, with each incubator receiving in the range of Rs 10 crores to Rs 100 crores.

The incubator, recognized by Department of Science and Technology or Department of Electronics & Information Technology, can be in a university or in private sector. It should have prior experience in incubating telecom startups and should have a line-up of telecom start-ups before applying for funding support.

Each incubator can make an investment ranging from Rs 2.5 lacs to 2.5 crores per startup in the form of equity or soft loan with grants being considered in exceptional cases.

EARLY STAGE VENTURE FUND (45% AMOUNTING TO RS 1125 CRORES)

The fund aims to support telecom startups who are in the pre-commercialization, pilot trial and go-to-market stages of their products

The fund will create up to 10 daughter funds in a PPP mode with reputed VC/PE firms, with Rs 50 to 200 crores allocated per fund

The VC partner for a daughter fund will be expected to raise 1x – 2.5x funds from private/other sources to qualify.

KEY INITIATIVES UNDER TMPF

TMPF fund will promote successful commercialization and scaling-up of Indian Products at global levels, by removing fiscal handicaps, providing incentives and assuring long-term funding. The key initiatives for which funds will be allocated are:

INITIAL DEPLOYMENT INCENTIVE (8% AMOUNTING TO RS 800 CRORES)

An "Initial Deployment Incentive" of 30% of the sale value will be provided to Indian Product companies for initial sales of each Indian Product family, subject to a maximum initial threshold sales level.

The threshold sales level will be different based on the specific product family and will be decided by TMPF committee. Any Indian Telecom Company can claim such a benefit only once, for each major technology/product family.

This incentive shall be in the form of reimbursement, which shall be payable after successful sales of the product, based on the certified information provided by the company.

INCENTIVES FOR EXPORT/MARKETING PROMOTION (12% AMOUNTING TO RS 1200 CRORES)

TMPF will reimburse 50% of the total cost (including travel on economy class, reasonable stay, exhibition fees and other marketing expenses) to Indian Telecom Companies participating in relevant international trade shows (for their products), subject to a maximum of Rs 25 Lacs per company per event.

TMPF will fund up to 12 industry/TEPC events per year, for targeted trade promotion events in specific countries, where Indian Telecom Companies will showcase their products and technologies to CXO and key decision makers of operators in that country. Cost of such events will be borne upto 75% by TMPF. The total reimbursements shall be subject to a maximum of Rs 75 Lacs per event.

Sales/marketing costs incurred by companies for international sales/marketing efforts (including cost of manpower/ office) will be reimbursed at 50% of actual, subject to a maximum of Rs 5 Cr per company per year. Any company interested in availing this incentive, should submit their sales/marketing proposal to TMPF committee every year, so that the same can be evaluated and approved a-priori.

Marketing/branding expenses incurred by Indian Telecom Companies for webinars/advertising in online/print media/social media as well as costs incurred by Indian Telecom Companies for international market research, market reports/white papers will be reimbursed at 50% of the costs, subject to a maximum of Rs 50 Lacs per company per year.

INCENTIVES TO INDIAN OPERATORS FOR BUYING INDIAN PRODUCTS (10% AMOUNTING TO RS 1000 CRORES)

The fund will incentivize Indian Telecom Service providers to buy Indian Products by rewarding those operators who spend a significant portion of their annual capex on Indian Products and help grow the domestic telecom ecosystem.

Operators shall be eligible to get an incentive from TMPF, equal to 5% of the value of the Indian Products that they buy during the financial year, subject to them purchasing at least 50%of their total annual procurement in that product category from domestic product suppliers. If they don't fulfill the value addition for that product category as required, they will not be eligible to get this incentive.

The incentive shall be reimbursed after the end of each fiscal year based on certified information provided by the operator on the amount of Indian Products that they have actually purchased.

SOFT LOANS TO INDIAN PRODUCT COMPANIES (10% AMOUNTING TO RS 1000 CRORES)

Soft loans at 3% interest rate will be given to Indian Product companies for specific product development/commercialization activities including purchase/rental of test/capital equipment, prototypes, testing/compliance/certification fees, NRE expenses, customer trials/demos and associated manpower costs.

Upto 50% of the actual Project Cost shall be eligible for soft loans. Such loan shall be disbursed in parts after matching spending by the company and subject to meeting of pre-defined project milestones.

The loan shall be returnable in six equal half -yearly installments in the third, fourth and fifth years after disbursement, following a two-year moratorium to accommodate product commercialization time. Physical assets purchased from this loan shall be usable as collaterals and there shall be no requirement for any additional collateral elements.

INTEREST SUBSIDY FOR WORKING CAPITAL (30% AMOUNTING TO RS 3000 CRORES)

High working capital costs in India contribute to a large portion of the fiscal handicap that Indian Telecom Product companies face against their global competitors. TMPF will provide interest subsidy to Indian Telecom Companies so as to ensure that their effective working capital rates are competitive when compared to what other global telecom companies get in their countries.

While the actual working capital loan will be disbursed by commercial banks, TMPF will provide the working capital subsidy, in the form of reimbursement equaling the PLR charged by the bank for such loan.

INTEREST SUBSIDY FOR VENDOR FINANCING (30% AMOUNTING TO RS 3000 CRORES)

The fund will support Indian Product Companies to offer long-term financing, at competitive interest rates to telecom operators, in-line with what is offered by international competitors with support from their country's banks.

While the actual loan will be disbursed by commercial/EXIM banks, TMPF will provide the interest subsidy, in the form of reimbursement equaling the PLR charged by the bank for such loan.

To the extent possible, TMPF will work with banks in India to enable such long-term credit to Indian Product companies to extend credit facilities to their customers. Such financing will be for a period of up to 5 years, with initial moratorium on payments for a period of up to 3 years.