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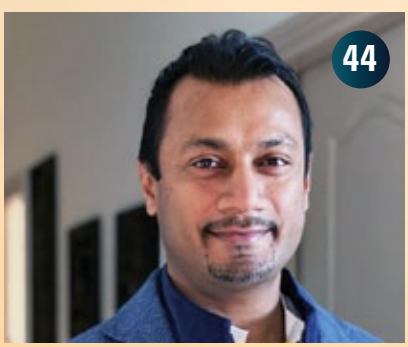

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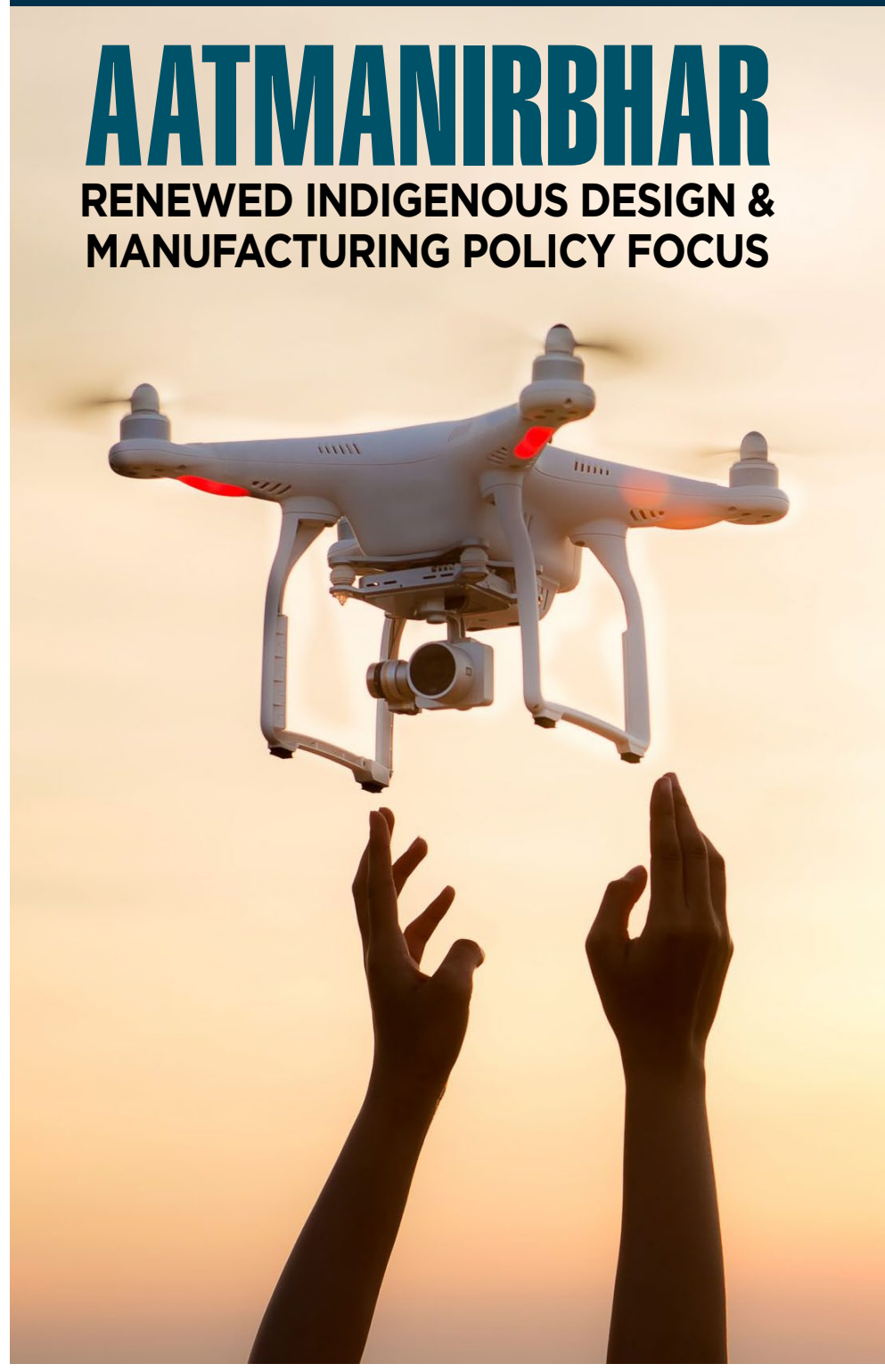

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GAJENDRA
UPADHYAY

[OPENING NOTE]

A Drone's Eye View on Policies to encourage indigenous Design and Manufacturing

We have not seen this kind of enthusiasm in the Indian Telecom Sector in a long time. The Government's focus on indigenous R&D, local manufacturing and creating Intellectual Property (IP) – have all created a very positive buzz across the sector.

We take a 360degree look at efforts in the Telecom, Broadband, 5G, Drones, IOT eco-systems — by our entrepreneurs (both young and old) who are doubling down with renewed vigour to drive Make in India – creating standards, technologies and platforms that work for the country.

In depth review on the Policies by industry experts throw up recommendations to make this even more robust in years to come. Fresh thinking in the licensing regime is needed to open up new markets and bring connectivity to unconnected regions – nearly 25067 villages in India remain unconnected to Voice & Data even today.

On the global stage, for the first time in two years the flagship industry event, Mobile World Congress, MWC 2022 was held in a live, physical setting. We bring a quick roundup of the main takeaways from this.

And just in time for the 21st edition of Voice & Data's annual flagship event Telecom Leadership Forum (TLF), the Nokia Annual Mobile Broadband Index (MBiT) 2022 released statistics that completely validate our themes this year – our esteemed panelists will speak on this in more detail in their Keynotes and Fireside chats on 22nd March.

Among the key findings of the Nokia MBiT survey are:

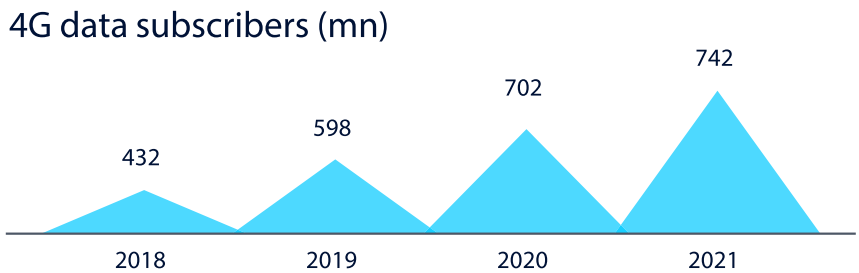
- 30 million 5G devices were shipped in 2021
- Indian Gen Z spends an average of 8 hours per day online.
- 90% of internet users in India now prefer to consume content in their local language – this is our core focus on Multilingual Internet

Together these three points underscore our core theme — From 5G to GenZ – and Multi-Lingual Internet for India.

Other interesting findings include:

The average mobile data consumption has touched 17GB per user per month

- 40 million subscribers were added or upgraded to 4G services in 2021
- 5G will play a big role in making India a $1-trillion digital economy by 2025
- 160 million smartphones were shipped in 2021 (including the 5G devices)
- Mobile broadband subscribers have increased from 345 million to 765 million in the last five years



Source: 1. Nokia Analysis

gajendrau@cybermedia.co.in

Semicon India Programme – Aiming to be Aatmanirbhar in Semiconductors

Spearheaded by the India Semiconductor Mission (ISM) the Semicon Program has seen serious and large players throwing their hats into the ring

BY VOICE&DATA TEAM (WITH INPUTS FROM JOSE JN)

In the mid-1960s California-based Fairchild Semiconductor came up with a proposal to set up a chip manufacturing factory in India. Semiconductor manufacturing was still at a nascent stage but it was clear that it was a product for the future. The proposal from Fairchild did not see light of day due to a slow approval process. Six decades later, after having missed generations of chip designing technology, India has embarked on a multi-billion dollar plan to attract investments into semiconductor production.

On February 19, 2022 the government announced that it had received proposals from five companies in total, 3 for setting up electronic chip manufacturing plants and 2 proposals for setting up display manufacturing plants - for a total investment of Rs. 153000 crore.

The three proposals received for semiconductor fabrication units (called Fabs) includes a joint venture between Anil Agarwal-led Vedanta group and Taiwanese electronics manufacturing giant Hon Hai Precision Industry Co., Ltd, better known as Foxconn; Singapore-based IGSS Ventures, and ISMC, a venture by Abu Dhabi-based Next Orbit Ventures.

The three players have proposed separately to set-up electronic chip manufacturing plants with $13.6 billion investment and have sought support of $ 5.6 billion from the Centre under its Rs 76,000 crore Semiconductor India Programme (see article: Mission for Self Reliance in the Semiconductor Ecosystem – Voice&Data January 2022).

"The applications have been received for setting up 28 nanometer (nm) to 65 nm semiconductor fabs with capacity of approximately 120,000 wafers per month," the government statement said. The government is providing financial support of up to 40 per cent for chips above 28 nm to 45 nm and up to 30 per cent for setting up manufacturing units for 45 nm to 65 nm wafers.

In addition Vedanta and Elest are the two companies that proposed to set up display manufacturing units, also known as Display fabs – used in mobile phones, laptops etc. Besides electronic chip and display plants, four companies – SPEL Semiconductor, HCL, Syrma Technology and Valenkani Electronics – have registered for semiconductor packaging. Ruttonsha International Rectifier has registered for compound semiconductors. Three companies – Terminus Circuits, Trispace Technologies and Curie Microelectronics – have

"India has to become self-reliant – and it is possible by the end of this decade — one of the key factors for that will be the semiconductor fab."

K Krishna Moorthy, CEO & President IESA

submitted applications under the Design Linked Incentive Scheme. The total investment, if these proposals are accepted by the government, is expected to be to the tune of $20.5 billion (Rs 1,53,750 crore).

The Opportunity

At stake is the Indian semiconductor market that stands at $15 billion in 2020 and is estimated to reach $63 billion by 2026. Nearly every device from a microwave to washing machines to cars and mobile phones needs a semiconductor chip inside. Going forward as digital technology permeates machines and industrial tools, the need for microprocessors will only increase.

"Electronics and hence Semiconductors are becoming the new Gold or oil, whichever you wish to look at it. Not only electronics systems like TV and Phones but almost everything that we will use in this decade will be touched by Electronics. IESA (India Electronics and Semiconductor Association) estimates electronics consumption to exceed US $ 300 billion by 2025. About 25-30% of the system cost is the semiconductor value which means approximately US $75-90 billion by 2025.

Today a major part is imported. So if India has to become self-reliant – and it is possible by the end of this decade — one of the key factors for that will be the semiconductor fab. I also need to emphasize the importance of this for strategic sectors like Defence and Space as well," K Krishna Moorthy, CEO & President IESA told Voice&Data.

India has been importing billions of dollars' worth of semiconductors every year which has worsened

Saurabh Gaur, Joint Secretary (Electronics), MeitY

Are you satisfied with the bid response so far. Do share your observations.

Despite aggressive timelines for submission of applications in the Greenfield segment of Semiconductor and Display manufacturing, the scheme has elicited promising response. We have received applications catering to a broad spectrum of technology nodes and investment mobilization prospects. Under Semiconductor Fabs – we have received applications from 3 companies viz., Vedanta in JV with Foxconn; IGSS ventures Pte, Singapore; ISMC for setting up 28 nm to 65 nm Semiconductor Fabs with capacity of approx. 120,000 wafers per month. Similarly, under Display Fabs- Received applications from 2 companies viz., Vedanta and ELEST for setting up Gen 8.6 TFT LCD Display Fab as well as 6th Generation Display FAB for the manufacture of State-of-art AMOLED display panels that are used in the advanced smartphones.

What are the factors in your view that would make this attempt to set up manufacturing facilities in India a success

India's ambition is an 'Electronics' ambition. The government is expeditiously working on curating structured policy support towards making Semiconductor and Display manufacturing strategy a success. With aggressive focus on adopting an 'ecosystem-led' approach, the objective is not only to facilitate final electronics goods manufacturing but also enable domestic viability of components/assemblies manufacturing; distribution, testing and packaging; and designing activities.

"The time is right for India to make its mark on the global Semicon fab map, especially given the short supply of chips and global supply chain disruptions affecting the sector."

Anku Jain, Managing Director, MediaTek India

Bidders

ISMC Analog Fab Pvt. Ltd. is led by Investment Agency M/S Next Orbit Ventures Fund. The technology partner proposed by ISMC is Tower Semiconductor Limited (Israel). ISMC has proposed technology node of 65 nm with roadmap of 45 nm, wafer size of 300 mm and capacity of 40,000 WSPM.

ELEST Private Limited ("ELEST") has been incorporated by the promoters of Rajesh Exports Limited (which is a Global Fortune 500 company) for the purpose of the manufacture of technology products such as AMOLED displays, LED, lithium-ion cells, batteries, and electric vehicles (EV). ELEST has proposed to build a 6th Generation Display FAB for the manufacture of State-of-art AMOLED display panels that are used in the advanced smartphones.

the trade deficit. According to the Observatory of Economic Complexity, in 2019, India imported $3.14B in Semiconductor Devices, becoming the 11th largest importer of Semiconductor Devices in the world. India imports semiconductor primarily from: China ($1.97B), Singapore ($293M), Hong Kong ($221M), Thailand ($137M), and Vietnam ($131M). As a result of this dependence on other countries, India bore the brunt of the recent shortage in chipsets as the Covid-19 pandemic disrupted the global supply chain. Auto players in India, for example, had to scale down some of the high-tech features to counter this shortage.

"The global disruption of supply chains has helped us realise the need for sustainable supply chains in diverse locations. India is poised to be a competitive destination for Semicon manufacture thanks to its enormous potential in terms of talent, locations and favourable government policies. India's government is focused on AatmaNirbharta and one means to achieve this vision is by being self-reliant when it comes to the electronics sector. With this in mind, the government has launched various initiatives which are helping the country grow into a competitive milieu for Semicon manufacture. Considering India's potential in the segment, we expect several multi-national companies to soon tap India as a potential link in the global Semiconductor supply chain," says Anku Jain, Managing Director, MediaTek India

Past Attempts

However, this is not the first time that India has been trying to get a semiconductor manufacturing unit set up in the country. The country has been attempting the building of a semiconductor manufacturing facility since 2006 to no avail. Some analysts doubt the pragmatism of the efforts as the risks are too high and the investment required, too huge. In 2014-15, two groups, one led by Jaiprakash Associates (Jaypee) and the other by Hindustan Semiconductor Manufacturing Corporation (HSMC), had shown interest in building a semiconductor unit in the country but both groups pulled out after they found the project unviable. So will the latest bids from Vedanta-Foxconn and others become successful ?

Pareekh Jain, Founder and Lead Analyst, EIIR Trend told Voice&Data that there are multiple things that has changed since the last time India tried to get investments into semiconductor manufacturing.

"Three things are different now. One is the scale of incentives to the tune of $10 Billion for the semiconductor sector. Second is the growing importance of Indian market which no big global firm can ignore. We have

"Whether it is Governors of US states or Mayors of Chinese provinces all of them fight with each other to ensure they are able to lure the industry in their regions."

Rajeev Khushu, Chairman, Board of Directors, IESA and Director Corporate Affairs and Government Relations of Texas Instruments India

seen some success in mobile production in India because of Indian market and hope semiconductor scheme will also be successful. Third is timing with geopolitics and supply chain disruptions and trend is to have more regional and local production in many sectors including semiconductors. We are seeing initial success and Indian government has already received proposals of $20.5 billion for semiconductor production and more will follow."

According to MediaTek's Anku Jain, the time is right for India to make its mark on the global Semicon fab map, especially given the short supply of chips and global supply chain disruptions affecting the sector. "News reports state that major companies like Apple, Samsung, Dell, HP, Acer and Asus are interested in manufacturing their electronic products in India. If the mega cluster becomes functional, and the government initiatives retain support for the sector, there is no reason why India should not become the preferred sourcing destination for components," Anku Jain told Voice&Data

Agrees Pareekh Jain, who believes that the Indian market will grow faster than the world market because of three reasons: "faster growth in manufacturing, growth of semiconductor components in all products as products are becoming smarter, and also relocation of manufacturing from other countries in all sectors driven by PLI and Aatmanirbhar Bharat. Be it automotive, mobile, electronics, white goods, defence. All will require more and more chips."

Geopolitical Impact

The other major reason for optimism is that many manufacturers are looking to move out of China due to the ongoing geopolitical situation. From the start of the US-China trade war in 2017, supply chains began to shift, and the Covid-19 pandemic has accelerated the push to diversify and incorporate more flexibility in supplier selection.

"India is still a developing economy but this offers us the possibility to adapt and expand faster than developed countries. This is a factor that enables us to perform well on the global platform when it comes to Semiconductor manufacturing. MediaTek India is strongly positive about India's potential and we aim to enable the national Semiconductor ecosystem in every way possible," says Mediatek's Jain.

Challenges Galore

Despite the optimism, everyone acknowledges that it is not going to be a smooth ride especially since other countries like US are miles ahead of India when it comes to offering incentives for manufacturers. Korean major Samsung announced that it would build a new semiconductor manufacturing facility in Taylor, Texas for a $17 billion investment. In September, Intel announced that it will spend $20 billion to build two new chip factories, called fabs, in Chandler, Arizona. Like any other manufacturing sector, fabs will require land, specialized labour specialized machinery. Here the scale of investment is high compared to other manufacturing sectors. Also, fabs require continuous power and water supply which government should take care of. Specialized labor will be a big challenge after investment. "Semicon fab is capital intensive and it is also R&D intensive activity where constant innovation and new technology development needs to happen on a continuous basis. So at the highest level Capital and talent are going to be the challenges. Indian infra also is not fully mature for a 24/7 high technology manufacturing activity like a semiconductor fab. The other challenge could be trained manpower availability in short term, since India today does not a have fab with these levels of complexity," said Moorthy.

Policy Intervention

Experts say that in addition to the incentive scheme announced by the government, the Indian government at the centre and various state governments should come in to help more to overcome the challenges.

"India already has the right environment, which, when combined with strategic resource allocation and government support and initiatives like 'Make in India,' it will surely be a game-changer."

Sanjay Gupta, Vice President, and India Managing Director, NXP India

"Whether it is Governors of US states or Mayors of Chinese provinces all of them fight with each other to ensure they are able to lure the industry in their regions. Chief Ministers of Indian Union have to pick up these skills so that they can woo this industry. Roads ports or airport infrastructure or electricity and water subsidy or skill development will act as catalyst to get global Silicon players into that state," says Rajeev Khushu, Chairman of the Board of Directors at IESA and Director Corporate Affairs, and Government Relations of Texas Instruments India. Many states, for example Karnataka, have already announced incentives even before the Government of India announced the policy in December 2021. The state incentives include subsidy for land, power, clean water availability and ease of getting approvals.

Optimistic Outlook

Overall, the industry is optimistic about having a fabrication unit in the country soon. Vedanta Group, for instance, has earmarked $15 billion to develop its semiconductor manufacturing business over the next 10-15 years. Of this around $7-8 billion will be invested in the first plant proposed to be set up as a joint venture (JV) with Foxconn. Another $3-4 billion will be invested to set up display fab. The company will be manufacturing 28 NM node of chipset. The company will be looking to cater to smartphone makers and consumer electronics segments including laptops and televisions apart from ICTs, defence and some use cases of the automotive sectors. To settle on a location for the facility, Vedanta Group is currently in talks with the Gujarat, Telangana, Maharashtra and Karnataka state governments among others, evaluating incentives and access these regions could provide. The factory is expected to be built and become operational by 2024-25; post that the company will take another six-eight months to ramp up the facility and start production.

The good thing going for India is that it already has world-class design and R&D expertise in semiconductors because Indian engineering service providers provide chip design services to all global customers. Also, almost all semiconductor firms have their R&D centers in India. "First we need big fabs then the ecosystem around them will emerge. As we have seen in auto industry-first OEMs will come and then component and ancillary units will come. A similar trend is being seen in the mobile industry. After OEMs, the focus is on component manufacturing and ancillary industry," said Pareekh Jain.

Currently the global semiconductor market is valued at about $440 billion. The Indian market is $15 billion (3-4 per cent of the global market). In five years the global market is expected to reach $700 billion and India at around $65 billion (about 9-10% of the world market).

While India might not overtake China or Taiwan yet but there is an opportunity to be a significant player – driven by domestic demand, geopolitics and spurt in local and regional demand in neighbouring countries.

"India has several advantages when it comes to the Semicon fab segment. First, the country is home to the largest young workforce in the world, making it easy to access skilled talent. Indians are keen on reskilling and upskilling and they are capable of competing at a global level. India is already home to the R&D bases of several multi-national companies, including MediaTek. This has provided international technology exposure to Indian employees," said Mediatek's Anku Jain.

According to Sanjay Gupta, Vice President, and India Managing Director, NXP India, India already has the right environment, which, when combined with strategic resource allocation and government support and initiatives like 'Make in India,' it will surely be a game-changer. "The semiconductor industry is expected to play a pivotal role in the growth and development strategy of the country. This will also increase the role of start-ups and axillary businesses, creating a multiplier effect towards generating an inclusive and vibrant ecosystem," Gupta said.

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Wooing Electronics Manufacturers, India plays Catch-up

In addition to mobile phones, telecom equipment makers such as Nokia, Ericsson and domestic players such as Tejas and HFCL have also set up factories in the country

BY VOICE&DATA TEAM (WITH INPUTS FROM JOSE JN)

When Finnish mobile phone manufacturer Nokia decided to shut down its Sriperumbudur factory in 2014 due to a dispute with tax authorities, it was widely thought to be the end of India's dreams of becoming an electronics manufacturing hub. Seven years later, Nokia's telecom equipment manufacturing unit in Chennai, set up in 2008, has become one of the largest Nokia-owned manufacturing facilities in the world. The facility with best-in-class infrastructure spread over 140,000 square meters and with a capital investment of over Rs 600 crores, manufactures and ships the complete gamut of telecom products for domestic and global markets, exporting over 50 per cent of manufactured equipment to more than 100 countries. To date, the site has delivered close to 6 million units for global telecom needs. The factory was the first to deploy India's first 'real-world' application of Industry 4.0 including AR/VR, automation, and analytics, to enhance operational efficiency and productivity.

Nokia's story is an example of how India's attempt to become a global manufacturing hub is now starting to see some results. In the mobile phone manufacturing segment, India is now the second-largest manufacturer in the world after China. From just two factories in 2014, India now has over 200 units.

Production has gone up from 6 crore mobile phones in 2014-15 to about 30 crore mobile phones in 2020-21. At its peak in 2011, India produced 155 million handsets, of which it exported 105 million. This was driven to a large extent by Nokia's manufacturing operations in India. Over the years, India's mobile manufacturing sector deteriorated rapidly, producing only 58 million handsets in 2014 while exports were nil. The subsequent closure of the Nokia plant due to tax disputes, and a failure to attract other mobile manufacturers led to this collapse. From 2015 onwards the government has been pushing various schemes and incentives under the Make in India programme. Thanks to these schemes, India is set to manufacture around 1,250 million handsets by 2025.

According to the Ministry of Electronics & Information Technology (MeITY), India aims to become a $400 billion electronics manufacturing industry by 2025. The domestic electronics production in 2014-2015 was $29 billion. It has grown to $70 billion in 2019-2020. Export of electronic goods has also increased from $6.4 billion in 2016-17 to $8.8 billion in 2018-19.

"India's ambition is an 'Electronics' ambition. The government is expeditiously working on curating structured policy support towards making the Semiconductor and Display manufacturing strategy a success (see our SemiCon story in this issue).

With an aggressive focus on adopting an 'ecosystem-led' approach, the objective is not only to facilitate final electronics goods manufacturing but to also enable domestic viability of components/assemblies manufacturing; distribution, testing and packaging; and designing activities," Saurabh Gaur, Joint Secretary, Ministry of Electronics & Information Technology told Voice&Data.

The schemes have also benefited Indian players like Lava which are now catering to the export market as well. Lava's manufacturing facility and repair factory in Noida, Uttar Pradesh is spread over an area of approximately 1,65,000 sq. ft. The manufacturing plants have a capacity of manufacturing 40 million phones per annum. "Government policies like PLI and Rodtep (Remission of Duties and Taxes on Export Products) will help in bridging the cost gap between India and China. There are still a lot of components being manufactured in China. The policies will help in balancing the scales and establishment of the component supply chain in India," said Sanjeev Agarwal Chief Manufacturing Officer, Lava International Ltd.

"Government policies like PLI and Rodtep (Remission of Duties and Taxes on Export Products) will help in bridging the cost gap between India and China."

Sanjeev Agarwal, Chief Manufacturing Officer, Lava International Ltd

In addition to mobile phones, telecom equipment makers such as Nokia, Ericsson and domestic players such as Tejas and HFCL have also set up factories in the country. "We have participated in the government's PLI scheme for the telecom sector and the additional investments that we are making under this scheme will help us scale our Pune facility. We stay committed to India and look forward to the opportunity of helping Indian service providers seamlessly evolve their networks from 4G to 5G" said Nitin Bansal Managing Director, India Head-Networks, Market Area South East Asia, Oceania and India at Ericsson.

"India is a strategic market for us and we have the largest employee workforce located in India across sales, manufacturing , R&D as well as Services. It is worth highlighting that 95 percent of the equipment that we sell to Telcos in India is manufactured here in India. As India prepares to roll out 5G, we are sure that the Indian telecom operators will continue to make fresh investments to scale up their telecom network for deploying a ubiquitous 5G connectivity across the nation. We look forward to the opportunity to enable our customers to seamlessly evolve their networks from 4G to 5G. In line with our vision of making in India for India and the world and aligning with the government's 'Make in India' programme, Ericsson is exporting its 5G radios from its state-of-the-art facility in Pune, Maharashtra to Australia and Southeast Asia" Mr Bansal told Voice&Data.

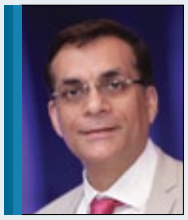
In the case of Nokia, nearly all 4G radios for the domestic market are manufactured locally and Nokia aims to follow the same trend for 5G radios too. "We are also aiming to expand our manufacturing line up to add new products - fixed network OLT and IP optics- in addition to radio products. Upgrading our lines to the need of next-gen telecom products has been one of our key focus areas and we made substantial investments to upgrade the SMT (surface-mount technology) placement capacity up to 16 Billion components/year along with modular robotic automation cells to create capability for future telecom equipment manufacturing," said Amit Marwah, Head of Marketing & Corporate Affairs, Nokia India.

India's quest for self-reliance, Aatmanirbharta is picking up in the Electronics manufacturing sector with the Government announcing a production-linked or PLI incentive to boost domestic manufacturing and attract large investments in mobile phone manufacturing and specified electronic components, including Assembly, Testing, Marking and Packaging (ATMP) units.

The scheme shall extend an incentive of 4% to 6% on incremental sales (over base year) of goods manufactured in India and covered under target segments, to eligible companies, for a period of five (5) years subsequent to the base year as defined. Under the second round of the scheme, incentives of 5% to 3% shall be extended on incremental sales (over base year i.e. 2019-20) of goods manufactured in India and covered under the target segment, to eligible companies, for a period of four (4) years. The government has so far cleared 16 proposals from domestic and international companies entailing investment of Rs 11,000 crore.

"We stay committed to India and look forward to the opportunity of helping Indian service providers seamlessly evolve their networks from 4G to 5G."

Nitin Bansal, Managing Director, India Head-Networks, Market Area South East Asia, Oceania and India at Ericsson



"We made substantial investments to upgrade the SMT placement capacity up to 16 Billion components/year along with modular robotic automation cells to create capability for future telecom equipment manufacturing."

Amit Marwah, Head of Marketing & Corporate Affairs, Nokia India

One of the big impetus for local manufacturing is because the post covid scenario is forcing countries to rethink their sole dependence on China, given the ongoing geopolitical ramifications. On March 3, 2022, Piyush Goyal, Minister of Commerce & Industry, Consumer Affairs, Food and Public Distribution and Textiles, called for increasing India's share in global trade to 10 per cent and taking our share of exports in GDP to about 25%. "These are ambitious targets, but I think doable," Goyal said while addressing a webinar on 'Make in India for the World'.

However, despite an increase in local manufacturing volumes the import bill of India has not come down significantly. China added $7.13 billion to its total contribution to India's electronic trade deficit in 2021. According to data released by the Ministry of Commerce, China's contribution to India's electronic trade deficit has been rising since 2019.

As of November 2021, China contributes 59.11 per cent to the electronic trade deficit compared to 51.88 per cent in 2020. This comes even as India's overall electronic trade deficit hits a three-year high at $44.3 billion.

Pareekh Jain, Founder and Lead Analyst, EIIRTrend told Voice&Data, "Trade deficit is not reduced for three reasons: First, most of the mobile manufacturing in India is assembly. India's manufacturing capabilities account for a 20 per cent value addition in mobile phones, with the remaining 80 per cent being imported in the form of components and then assembled in the country.

This means that the mobile phone is already 80 per cent made by the time Indian manufacturers commence working on it. There is some reduction based on assembly but it is not enough. The second reason is that local demand for smartphones have increased as work from home, online way of working is continuing. Especially in education, virtual classes are continuing. Even people from lower-income are spending on multiple smartphones. Finally, supply issues because of the Covid second wave prevented manufacturers from making full use of it. This should smooth out going forward."

According to Navkendar Singh, Research Director, Client Devices & IPDS, IDC India, "Govt of India has been taking several initiatives to give a fillip to the manufacturing of Electronics in India. While the policy encourages manufacturing of various key components, it still lacks specific steps to attract high-value components like chipset, silicon parts for the longer term etc. India is currently positioned favourably to attract such manufacturers away from China and Vietnam, if some of these policies are done right and in a timely fashion."

Rajesh Tuli, MD of Coral Telecom (CTL) says that though PLI is an excellent scheme giving 6 per cent incentive to foreign-designed products for manufacturing in India may upset the applecart especially if the incentives are given in sectors where domestic products are available. "Big companies already enjoy economies of scale and with incentives, price advantage to this category of players would make them more competitive and it will eradicate the domestic players. It is a double-edged sword that

"It may be a good idea to incentivise 1% of the selling price for every 5% increase in domestic value addition done in India over the base of 40% DVA."

K Krishna Moorthy, CEO & President, IESA

Puneet Agarwal, CoFounder and CEO of VVDN Technologies. Started in 2007 VVDN is a technology innovation company in areas like embedded design services, manufacturing capabilities in 5G, Networking and Wi-Fi, IoT and Cloud

On the success and gaps in the PLI scheme

PLI as a policy has paved way for Indian manufacturing sector to become a global hub. Success can be seen in terms of investment that PLI beneficiary companies have committed. Huge Investments are being pumped in, big plans have been chalked out. Everyone is in sync, the Government, System, investors and industry to make sure whatever is planned is achieved.

It is a good start with manufacturing, but the next level push should be to make sure local design portions becomes part of the manufacturing process.

And this is our core argument. To make India truly Aatmnirbhar, we should encourage a design led manufacturing mindset. The following would enable local design contribution:

- Consider imposing significant structural duties on Finished Goods and Semi-Finished Goods which will disincentivize imports
- Increase localization of manufacturing activities in the components segment – from PCB, Active-Passive components, semiconductor fabs all the way to plastic/sheet metal. This will reduce dependency on imports.
- Incentivize industry to invest in R&D inhouse. Internal development of IP is critical.

On whether PLI is creating a new paradigm in the telecommunciations / electronics sector
PLI is a well-crafted policy to reduce import and focus on exports. For India as a country, the scheme brings a lot of benefits,

- Catalyze the holistic development of Manufacturing Eco-system – PCB Assembly, Product Assembly, Battery Manufacturing as well as Mechanical Manufacturing
- Reduce imports of finished goods
- Employment generation

PLI has motivated organizations to invest in their manufacturing capabilities. Also PLI policy in combination with other schemes like PMA (preferred market access) ensures investments will see good business returns.

Some of the successes and drawbacks of the PLI / DLI scheme

What is the need of Electronics industry to achieve the goal of Design in India, Make in India and make for the World:
Attract Global OEMs to warm up to India's Manufacturing Sector
Global brands to look at Indian manufacturers to fulfil their requirement of products not just for domestic consumption but also for their exports

- Link PLI with R&D
- Link PMA with R&D
- For all devices, source code developed in India thereby making India aatmnirbhar in true sense
  - Create passive component ecosystem in the country
    This will result in price competitiveness
  - Logistics competence needs improvement
    Need to speed up logistics processes to ensure goods hit the ship/plane on time for faster deliveries
  - Importance to Make In India Cloud
    Future of Make in India depends on the cloud - as an integral part of the product development. For security and privacy reasonsfinal electronics goods manufacturing but also enable domestic viability of components/assemblies manufacturing; distribution, testing and packaging; and designing activities.

> The setting up of facilities is a long process with cyclical demand patterns. It might happen that by the time we set everything up as a country we have a glut of capacity supply. Then we will see some consolidation.

needs careful handling because big players will become even more competitive, and the scheme has no riders regarding domestic value addition or development of the downstream industry. PLI scheme awards have focused on large-scale manufacturing with no additional incentive covering domestic design/value addition. Export is also not a prerequisite for disbursal of incentive. Over enthusiasm of PLI scheme to promote manufacturing by large corporations may kill our domestic manufacturers. Global payers have global supply chains and experience has shown that they have not shifted the supply chains to India at all and even the packing materials are imported," Tuli told Voice&Data.

Tuli said that there is a need to incentivise PLI scheme for domestic value addition. "It may be a good idea to incentivise 1% of the selling price for every 5% increase in domestic value addition done in India over the base of 40% DVA. This will motivate domestic companies and build Indian products that will ensure Aatmanirbharta in the long run otherwise PLI companies may wind up in four years and shift location / base to another country offering higher incentives. If ancillary has to develop and downstream industries have to flourish then we must do everything required to incentivise Indian design efforts. The design-led incentive scheme is mandatory to get long-term sustained benefits for the country," Tuli said.

IDC's Navkendar believes that providing monetary incentives alone will not realise the full impact of the PLI scheme. "There should be specific departments or teams , both at centre and states for quick approvals that will reduce time from planning to set up to start of operations. There should also be infra support as well," he said.

According to Indian Cellular and Electronics Association, "For increasing the manufacturing of electronics in line with the targets of NPE 2019, India needs to build large-scale ESDMs (electronic system design and manufacturing), invest in technological upgradation spurred by large global firms, and make a strong push for domestic capacity building. For this, an ecosystem involving both domestic and global firms will need to be nurtured, by providing incentives similar to those developed by other major exporting economies."

The domestic electronics hardware manufacturing sector faces a lack of a level playing field vis-à-vis competing nations. The sector suffers disability of around 8.5% to 11% on account of lack of adequate infrastructure, domestic supply chain and logistics; high cost of finance; inadequate availability of quality power; limited design capabilities and focus on R&D by the industry; and inadequacies in skill development.

But despite these challenges, experts reckon that the vision of National Policy on Electronics 2019 (NPE 2019) to position India as a global hub for ESDM can be achieved. "Time is ripe for this and the next 5 years are going to be important when companies start looking at China + 1 or even full alternate destinations for manufacturing exports. India must leverage this by giving more friendlier policies," said IDC's Navkendar.

According to Nokia's Marwah, the PLI scheme offers a tremendous opportunity for boosting telecom and networking manufacturing in India. "With help from PLI scheme, India's telecom manufacturing sector can leapfrog and take its rightful place as a global manufacturing hub. Further, the government has come up with a consultation paper to address any shortcomings in the telecom PLI and improve its utility and effectiveness," Marwah said.

The government is also mulling a range of financial physical and nonphysical incentives beyond PLI to accelerate networking and telecom equipment manufacturing. In the recent budget, the Government announced that it will allocate around Rs 4000 crore for the PLI to boost 5G design-led manufacturing.

With PLI schemes and favourable investor friendly policies, can India effectively emerge as an alternative electronics manufacturing hub in the region? Ashutosh Sharma, VP and Research Director Forrester told Voice&Data, "With the right set of incentives and significant government push, yes it can. That is what seems to be happening. However, this is a long process with cyclical demand patterns. It might happen that by the time we set everything up as a country we have a glut of capacity supply. Then we may see some consolidation."

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25,067 Villages in India are still without Voice & Data – and Internet

Urgent need to roll out new Universal Service Obligation Fund (USOF) Initiatives

BY RAKESH KUMAR BHATNAGAR

Four percent of Indian villages do not still have any mobile Voice and Data Connectivity. In absolute numbers this translates to 25,067 villages that are not connected to the Internet. To give it a human face – anywhere between 1 to 1.8 million people have no way to access the digital age. This is a shocking Digital Divide by any yardstick.

Licensed Service providers simply do not find it financially viable to provide services in these regions. But that should not be a reason to deny connectivity to every corner of the country.

Efforts to incentivize through the USO fund, have not yielded desired results. Many players including BSNL do not participate in bids for rolling out networks in these areas.

But there is a solution. And it is easy to implement.

Solution

The Government needs to create a new class of network licensees who can set up Private Network Islands (PNI) in unconnected and remote regions. The DoT should support this category from the USOF. Geographical Operations can be limited only to a specific region. PNIs can set up their own networks. Or they can make leasing arrangements with one or more State / Circle level Service Providers. Sharing of Spectrum as well as active and passive elements of the network should also be allowed.

Service Providers, at Circle level, have to be mandated to provide interconnection whenever requested by a PNI.

Private Network Islands – Approach

1. PNI, funded by USOF. DoT awards rights – either directly or through a Tender for a specific area(example a cluster of villages – a subset of a Circle)

2. Mandate existing licensees in the State / Circle to offer Reference Offers to these USO licensees covering:

   a. Shared Spectrum resources for 3 to 5 years period

   b. PNI installs equipment like Wi-Fi, Radio, Satellite and mobile equipment for providing coverage in select clusters

   c. PNI can provide their own Billing and Customer Service facilities.

> The Government needs to create a new class of network licensees who can set up Private Network Islands (PNI) in unconnected and remote regions.

d. Shared Network resources (active and passive) based on a reference offer from existing Circle level licensees with terms approved by TRAI

f. Mandatory Interconnect facilities with operators at State / circle level

so that calls from the cluster can be routed to any part of the world.

g. The funding helps PNI cover CAPEX and OPEX elements

h. PNI will be able to provide better QoS and model works better than MVNOs

i. Dependence on current service providers for Universal Coverage ends

j. The problem of tens of thousands of villages with no coverage presently is solved

k. Model supports small players to directly implement USOF projects using their own equipment independently

Conditions for Support

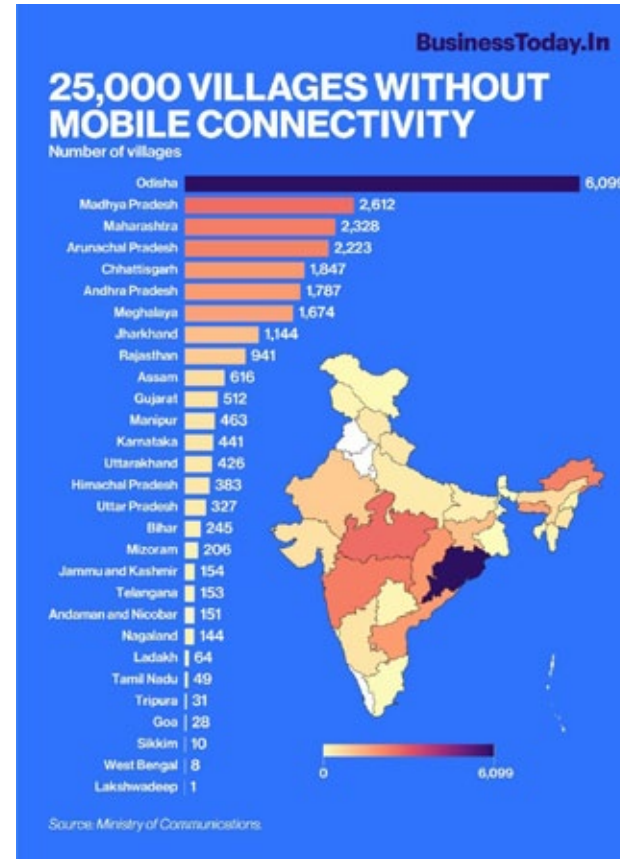
1. The projects should be preferably implemented seeking support of BSNL interconnection facilities

2. Government should mandate BSNL to provide interconnection to PNIs who use only Indian Designed and Developed products and complying to relevant TEC GRs.

3. The product specifications should be finalized for open tender by a committee and TEC should be a member for guidance on relevant GRs.

4. Domestic manufacturers should present solutions and prototypes (with POC) to maximize the participation of Indian industry.

5. USOF Administrator can revive Projects on last mile connectivity (Bharatnet) Projects under PPP Mode using the above methodology



Seven Domestic companies (Lekha Wireless, Saankhya Labs, Nivetti Systems, Resonous, Signal Chip, Sookhta, Aristrome) in mid-2020 had submitted proposals for last mile connectivity under the USOF.

along with ITI. These proposals should be revived under the PPP mode using the above methodology and bring 1 million Indians into the Internet age.

As India celebrates 75 years of Azadi on 15th August 2022, a firm decision to switch on Voice & Data facilities in these unconnected villages should be made – all on Domestically Designed networks – a tribute to AatmaNirbharta and Swadeshi.

Rakesh Kumar Bhatnagar, Director General, VoICE & Retired Advisor (Technology), DoT
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Nitin Bansal
Managing Director, India Head-Networks, Market Area South East Asia, Oceania and India, Ericsson

Ericsson — powering India's 5G future

Ericsson has been an integral part of India's telecommunications journey since 1903. It has been part of all mobile generations from 2G to 4G

The telecom industry is the digital backbone of a nation. This was amply demonstrated during the Pandemic. For activities such as working from home, online education, conducting financial transactions.

According to a recent Ericsson Mobility Report for India, average traffic per smartphone has increased to 18.4GB per month in 2021, up from 16.1GB per month in 2020.

Manufacturing

Ericsson has been an integral part of India's telecommunications journey since 1903. It has been part of all mobile generations from 2G to 4G and now ready for 5G. Ericsson was the first telecom equipment company to start manufacturing in India

> Ericsson's Consumer Lab study predicts at least 40 million smartphone users in India could take up 5G in the first year of 5G.

> Being the first telecom vendor to start manufacturing in India, the additional investments made under the PLI scheme will help us scale up our facilities where we are manufacturing 4G and 5G telecom equipment.

in 1994. Since then, we have been delivering made in India telecom equipment to our partners in the country along with exports to other countries.

Ericsson's state-of-the-art manufacturing facility located in Pune, was set up in 2016 aligned with the Government of India's 'Make in India' vision. We have participated in the government's PLI scheme for the telecom sector through our partner Jabil.

Being the first telecom vendor to start manufacturing in India, the additional investments made under the PLI scheme will help us scale up our Pune facilities where we are currently manufacturing 4G and 5G telecom equipment. The 5G radios produced at our Pune facility are being exported from India at present and will enable us to cater to the domestic market when 5G is introduced in India.

Ericsson has its largest employee workforce located in India working across functions ranging from design, R&D, manufacturing to sales & service, networks, to managed services.

India - a global innovation hub for Ericsson

India is a strategic market for Ericsson and has consistently ranked amongst the top five contributors to Ericsson's global sales. To harness opportunities in technologies such as AI/ ML, Ericsson has setup three Global Artificial Intelligence (AI) Accelerator centers across the globe — one of them is based out of Bengaluru. The innovation center leverages cutting-edge AI and Automation technologies to create data-driven, intelligent, and robust systems for automation, evolution, and growth in the 5G era.

Further, we have set up a 5G lab with Capgemini in Mumbai where the 5G (standalone) Industry Connect solution has been deployed. This collaboration will enable industry innovation, experimentation, and deployment of 5G and Edge technologies for clients across industries.

Mobile technology serves as the connectivity foundation for the digital transformation (DT) of any industry. 5G will enable creation of new revenue streams for operators. It will also unlock next level of growth for the country.

5G is already transforming consumer experiences and kickstarting the 4th Industrial Revolution. India can learn from these experiences. Ericsson's "5G for Business – a 2030 market compass" study, estimates that the global industry digitalization market for service providers could grow up to about $700 billion by 2030.

The projected value of 5G-enabled revenues for Indian service providers is approximately $17 billion in the same period.

5G in India

There is high interest for 5G from Indian consumers. Consumers are willing to pay a premium for 5G plans and premium services bundled with it.

Ericsson's Consumer Lab study states at least 40 million smartphone users in India could take up 5G in the first year of 5G. In fact, Indian users have shown the biggest increase in their intention to upgrade globally. 67% said they want to take up 5G once it is available (up from 53% in 2019). The Nov 2021 edition of Ericsson Mobility Report reveals that 5G will represent around 39 percent of mobile subscriptions in India at the end of 2027, estimated at about 500 million subscriptions.

Powering India's 5G future

In India, we have been working with operator partners as well as the academic community to test and develop various 5G use cases which are relevant in the country. Bharti Airtel and Ericsson demonstrated India's first 5G live network in Hyderabad along with trials in Gurugram and Manesar. This was followed by demonstration of India's first 5G rural trial in Bhaipur Bramanan village on the outskirts of Delhi/NCR. Ericsson also partnered with Vodafone Idea Ltd. (VIL) to showcase the power of 5G to reach healthcare to remote parts of the country. The telco also demonstrated blazing speeds of 4 Gbps in November as part of the trial.

Ericsson will continue to work closely with Indian mobile operators for evolution towards 5G and beyond.

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[INTERVIEW]
NOKIA

Amit Marwah
Head of Marketing and Corporate Affairs,
Nokia India

"We are aiming to expand our manufacturing line up to add new products - fixed network OLT and IP optics"

Nokia is one of the largest manufacturers of telecom equipment in the country and beneficiary of the PLI scheme on account of the sheer scale of its Make in India initiatives.

In a chat with Voice & Data, ***Amit Marwah. Head of Marketing and Corporate Affairs, Nokia India*** *shared his views on the PLI scheme.*

What are the key steps that you think the government has taken to create an enabling framework for local manufacturing — do give a context from your industry and references

One of the most significant measures taken by the government to enable local manufacturing in India is the Production Linked Incentive (PLI) scheme for telecom and networking products. The scheme, announced in the Union Budget 2021-2022 covering 13 key sectors including telecom, promises to transform the domestic telecom manufacturing sector and will play a crucial role in boosting India's export of telecom gear

The scheme is designed to accelerate domestic manufacturing of telecom and networking products by incentivizing incremental investments. With a total outlay of Rs 12,195 crore over five years, the Indian Government has approved 31 companies including Nokia under the PLI scheme.

Nokia is one of the largest investors under the PLI scheme and has already exceeded its target under this scheme for the first year of the program.

Further, while we welcome the government's Indian Semiconductor Mission and other incentive initiatives towards boosting electronics and telecom manufacturing in India, some other measures can be considered to accelerate these initiatives:

- provide targeted incentives for cutting-edge technology components like multi-layer, complex-material PCBs, etc.
- incentivize global component distributors to set-up aggregation facilities in India so that components can be bought in India cheaply
- reduce import duties on silicon components – where there is minimal production in India at present.
- simplify export controls such as DGFT SCOMET, to make exports' approval faster and easier for

Nokia's Chennai plan has won numerous awards like Rajiv Gandhi National Quality Award, the Economics Times-India Manufacturing Excellence Award, FICCI Quality Systems Excellence Awards for Manufacturing.

> Nokia is one of the major investors and producers under the PLI scheme and has already exceeded its target for the first year of the program.

> The Nokia India Chennai manufacturing facility manufactures for both domestic and global markets. Over 50% of manufactured equipment are exported to more than 100 countries. Close to 6 Million units have been shipped globally.

large volume exporters through a separate dedicated channel.

- increase ease-of-business in telecom product certification and approvals which delay time-to-market e.g. TEC MTCTE scheme.

Can you please share some details on Nokia's solutions and projects under this Program

Nokia's facility in Chennai, set up in 2008 is one of the largest Nokia owned manufacturing facility in the world.

The facility with best-in-class infrastructure, spread over 140,000 square meters and with a capital investment over Rs 600 crores, manufactures and ships the complete gamut of telecom products for domestic and global markets, exporting over 50% of manufactured equipment to more than 100 countries.

The site has till date delivered close to 6 Million units for global telecom needs. This factory was the first to deploy India's first 'real-world' application of Industry 4.0 including AR/VR, automation and analytics, to enhance operational efficiency and productivity.

Manufactured items include: 4G/LTE radio, 5G NR (new radio) and 5G massive MiMo products among others. From being the first to manufacture 5G NR in India to producing 5G massive MIMO products, it demonstrates our innovative manufacturing capabilities and our belief in India's skill and talent to produce best-in-class. Nearly all 4G radios for the domestic market are manufactured locally and Nokia aims to follow the same trend for 5G radios.

We are aiming to expand our manufacturing line up to add new products - fixed network OLT and IP optics- in addition to radio products.

Upgrading our lines to the need of next gen telecom products has been one of our key focus areas and we made substantial investments to upgrade the SMT (surface-mount technology) placement capacity up to 16 Billion components/Year along with modular robotic automation cells to create capability for future telecom equipment manufacturing

Our facility has all relevant certifications like TL 9000, ISO 27001, ISO 45001, ISO 14001, EFQM, to meet India's and global requirements.

Is the PLI Scheme truly beneficial for Indian Make in India efforts?

The PLI scheme offers a tremendous opportunity for boosting telecom and networking manufacturing in India. With help from PLI scheme, India's telecom manufacturing sector can leapfrog and take its rightful place as a global manufacturing hub.

Further, the government has come up with a consultation paper to address any shortcomings in the telecom PLI and improve its utility and effectiveness.

The government is also mulling a range of financial physical and non physical incentives beyond PLI to accelerate the networking and telecom equipment manufacturing.

In the recent budget, the Government announced that it will allocate around Rs 4000 crore for the PLI to boost 5G design-led manufacturing. Extending these incentives to multinational telecom vendors / OEMs with strong manufacturing and R&D facilities in India along with reduction in the import duty on telecom components will help make the manufacturing cost competitive and strengthen the overall manufacturing ecosystem in the country.

Further, to reap the full benefits of various initiatives mentioned and attract more investments, focus should be laid on increasing the exports and offering greater market accessibility to players like Nokia.

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- Apeejay School, Pitampura, Delhi
- Apeejay School, Noida, U.P., Near Delhi
- Apeejay International School, Greater Noida, U.P.
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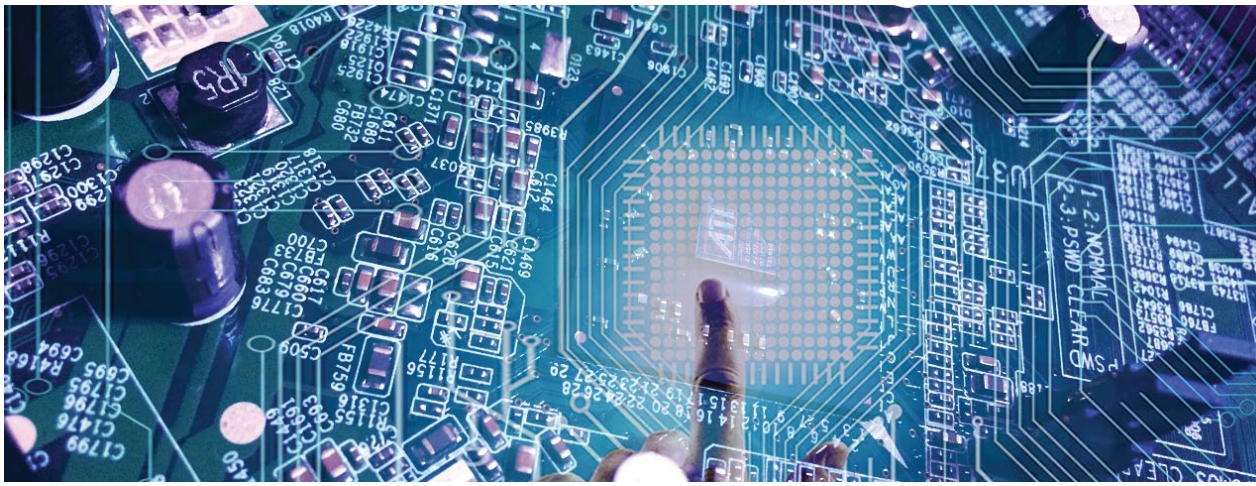
Semiconductor manufacturing – are we staring at a glut down the road?

The union government tried to attract chip manufacturing in the country in the 1980s, in the 1990s and once in 2005-06



BY PROSENJIT DATTA

Will India's ambitious plans for manufacturing silicon chips succeed this time when earlier attempts have failed? The government has received proposals worth $20.5 billion from five companies, including a Vedanta-Foxconn joint venture, for semiconductor and display fabrication units. This was after the government announced a $10 billion programme for the development of a semi-conductor and display ecosystem in India.

These are encouraging signs but it might be too early to start celebrating just yet. So far, none of the big chip fabrication companies have signed up for setting up a plant in the country even though most of them have announced their capital expenditure road map for the next few years. The companies that have given proposals have no or negligible experience in chip manufacturing. Even Foxconn has no real experience in the complex technology required for chip fabrication. Its expertise lies elsewhere.

Then and Now

There are a couple of things going for India this time, which were absent in the past but whether these will be enough remains to be seen. The union government tried to attract chip manufacturing in the country in the 1980s, in the 1990s and once in 2005-06. Each time, companies had shown interest in setting up and, in at least two cases, established chip companies had done detailed project plans but they all came to naught.

The chip industry is broadly divided into those who design chips, those who fabricate chips and those who do both. Chip fabrication is an immensely complex, capital intensive and high technology business. While there are a number of countries that have chip foundries or chip fabs, only three countries have the technology and expertise to fabricate the latest generation, cutting edge chips using the 7 nm and lower chip process.

TSMC in Taiwan and Samsung in South Korea play at this end of the market and Intel in the US is now getting into it in a serious way. Intel had largely abandoned by chip fab business some time ago, but under CEO Patrick Gelsinger, and spurred on by the US government's incentives, it is building capacities again at all ends of the business.

Other chip fabrication companies play largely in older generation of chip technologies that nevertheless have

> To succeed, a company will need to build scale. But because of the global chip shortage, every country in the world has started building new capacities.

a big market. Chips are currently used in everything from consumer electronics to automobiles and their requirement is only going up. China, despite having a lot of chip fab capacity, is not at the cutting edge of the market though it has been trying hard for several years to catch up.

If India had managed to push chip manufacturing in a big way in the 1980s when Rajiv Gandhi tried to bring an electronic revolution in the country, it may just have not been far behind in terms of technology compared to the rest of the world. The semiconductor complex of India set up in Mohali was capable of fabricating chips only a generation or so older than the latest at that time.

But it would have been a hard task even if the industry had taken shape then for India to remain in the cutting edge. Several countries in the EU and Japan once boasted of being at the leading edge of chip manufacturing but have all fallen behind. The latest generation of chips require connecting and packing millions of transistors that cannot even be seen through naked eyes in a tiny piece of wafer, in the correct order. It is an engineering feat that requires the highest level of expertise – something that even countries with a long history of chip manufacturing lack.

Luckily for India, it need not focus on building the latest generation of chip fabrication foundries. It might be better off focusing on older generation chips which are used in automobiles and consumer electronics. This also fits in with its manufacturing thrust.

The one advantage that India has that it didn't have in the 1980s is that there are far more buyers of chips in India today than there were then. This is because our auto and consumer electronics manufacturing industries have evolved and also because each of these products require more chips than ever before.

The second advantage is that there is a global shortage in chips and all countries have realised that some domestic capacity is important to protect their down stream manufacturing interests – and if India plans to become a manufacturing hub in autos or consumer electronics, it needs a secure supply of chips required for these. Finally big domestic business houses are showing the kind of interest they did not exhibit earlier.

Will these be enough to surmount the hurdles? Let us look at the road blocks one by one. The first is the requirements of chip manufacturing – it needs cheap and reliable power, absolutely clean water and a "shake-free" environment. It also generates a lot of pollution. It requires highly specialised workforce that is not available in India at the moment. It also requires its capacities to be pre-booked if it expects to make money. Enormous capital is required – even to set up older generation fabs – and the payback could take four or five years before it breaks even.

To meet these conditions, any Indian manufacturer will have to build captive power and water purification systems and also be in a place that does not see earthquakes or any sort of disturbance. These would increase its costs over competitors in countries that already have better infrastructure. It also needs to convince buyers to book capacities by taking an enormous leap of faith – unless the group is also a big buyer of chips.

The second big issue is that chip manufacturing has evolved into ecosystems with deep, long-term relationships. The ecosystems have developed over several decades and breaking into it is more difficult than most imagine.

Finally there is the issue of capacities. To succeed, a company will need to build scale. But because of the chip shortage, every country in the world has started building new capacities. Most of these capacities will come into operations in two to three years. Given the stage India is in, its capacities – if they come up – will probably come when new plants in other countries have already started producing. And given the number of plants being built, we might end up in a situation where we are faced with a market glut by the time our capacities come on-stream.

The proposals the government has received so far sound promising – but it is not time to uncork the bubbly just yet.

Prosenjit Datta is Former Editor, Business Today and BusinessWorld Magazines
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IoT and Aatmanirbhar

IOT industry is different from pure software startups. A lot of upfront investment is needed for R&D

BY ABHISHEK LATTHE

The Indian IoT market is maturing with large corporates willing to make investments in IoT deployments. It has the potential to become the 3rd largest IoT market globally.

SenseGiz is an Indian IoT (Internet of Things) Startup focused on the Enterprise and Industrial IoT Solutions for Sensor based Condition Monitoring, Security and real time Asset / People tracking applications. Last year, the Indian cricket team (see picture) used its sensors and devices to create a Bio Bubble of safety for players.

Abhishek Latthe, founder & CEO of SenseGiz – a pioneer in enterprise level IoT solutions – shares his thoughts on the Aatmanirbhar and PLI initiatives and how it impacts the IoT industry.

Aatmanirbhar

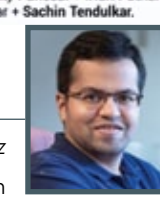
This policy has definitely boosted domestic design and manufacturing in India. We have seen a sea of change compared to 5 years back especially for the ESDM/IoT industry. Now we don't have to rely on overseas vendors or supply chain partners given the robust ecosystem in India.

Has it been good for IoT

IoT Startups need a lot of time initially for R&D, building products and scale. We are different from pure software startups. A lot of upfront investment is needed for R&D. All our design, firmware and software development as well as assembly happens in Belgaum Karnataka. Partnerships/ memberships with various Govt and private bodies like IESA, ESC, MAIT have helped us to be connected to the community. IOT Startups like ours have benefited from state and central policies supporting Startups through subsidies, credits for doing research and exports. We have received marketing assistance to participate in Exhibitions abroad. Tax breaks could help in creating a bigger base of successful IoT product companies.

People Tracking for Cricketers Using SenseGiz

Players wearing SenseGiz FIND devices in the Bio-Bubble: L to R Monty Panesar + Irfan Pathan, Makhaya Ntini, Virender Sehwag, Yuvraj Singh + Team, Monty Panesar + **Sachin Tendulkar.**



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KS Rao
Chief Corporate Officer, STL

"We have evolved from just an optical solution provider to an end to end solution provider for digital networks"

***KSR** has spent his entire career at STL. "For good or bad, I have known only two places in my life – first it was at my parents' and then STL," he says with a chuckle. Since 1993 he has seen the ups and downs of India's Telecommunications Sector as very few in the industry would have.*

Networks have transformed over time to become multimedia platforms. Demand for bandwidth and services have exploded. In the last few years networks metamorphosed from hardware centric to software driven - enabling dozens of applications.

In a freewheeling conversation with Voice & Data, KSR shared insights on the sector, Make in India initiative, BhartNet and STL's own plans in the future.

Given the big focus on local manufacturing, Production Linked Incentives (PLI) and announcements in the Budget for supporting R&D, how do you feel this will benefit the industry and STL.

In the last 6 months to a year, I have seen some concrete efforts being put by the Government to convert intent into action.

It's visible from the recent Union Budget announcements, as well as some previous good reforms spearheaded by the Telecom Minister, whether it's for the development of the 5G ecosystem or the PLI initiatives to increase the use of local technology in the industry. All of these moves are welcome and, in my opinion, will be a game changer for the sector.

> India would require at least 5-6 lakh kilometers of Fiber every year for the next 10 years and STL can help deliver this scale.

This Budget had three distinct areas of focus.

First, there is a strong emphasis on physical infrastructure. For example, in Gati shakti, there is maximum allotment for infrastructure creation in seven different verticals. This is a critical point. Looking ahead, I believe that digital infrastructure should be a primary priority for India in order for it to make the transition to a digital economy. Second, 5G has taken a very important place for the Government's core processes while defining the budget for the next year. Third, there is a renewed emphasis on research and development. Unfortunately, the majority of research in the country currently takes place outside of India. When it comes to new technology domains, research and development becomes crucial. If you're venturing into new territory, you'll need to put a lot of money into research and development. Even 5G is a work in progress. It necessitates significant investments in ecosystem development, products, and solutions. The majority of intellectual property (IP) is not located in India. There is a pressing need to reintroduce this. The USOF's single effort of sponsoring R&D will provide value to our country.

The sum of all these will improve the way industry looks at both investments and taking the business forward.

Of course, for effective implementation of the PLI scheme, the R&D benefits, there needs to be an alignment between all the concerned Ministries and departments.

STL is investing in Open RAN technologies for 5G. We want to simplify the network architecture for virtualization. In fact we have programmable solutions for fiber-to-the-home solutions.

We are focusing on software applications for making 5G enabled IoT (Internet of Things).

This is a big area of focus. Huge investments are required in R&D. India is spending only about 0.7% of GDP in R&D today. This is a very low threshold for new technology development.

It is important to focus on improving this. A long term view is crucial..

Policy environment will matter a lot if we are to achieve these goals. While incentives and benefits are fine, it has to be sustainable. PLI scheme has the promise of bringing about a long term shift but several subjective conditions have to be fulfilled before qualification.

Our dependence on Chinese technology has reduced significantly. India has a great opportunity to leverage that. The Government should walk the extra mile like it did for the software industry 20 years ago like offering tax holidays, and income tax reduction.

For technology investments in 5G R&D the software industry approach is needed. We should follow the approach of a 'patent box'. That means if you are creating an investment in technology that creates a patent, it becomes qualified for a special tax rate, tax holidays etc. India has to grow its intellectual property corpus.

We have knowledge, but unfortunately most of our IP rests outside. That situation has to be changed.

The R&D allocation mentions 5G. Should there be say 30 or 40% of these allocations for other technologies.

If you look at 5G as a technology, what are we trying to achieve in the end? In the new digital world, with the current way of working, there are more and more devices getting connected, more people coming online.

So a very complicated network is evolving. 5G makes it better, 5G makes it easier.

But technology evolution will not occur unless there is a holistic view on infrastructure. Even if you set up 5G towers, if your back haul is not strong, or your rural connectivity is not up to the mark there will remain a digital divide.

Today a large section of the country still does not have access to the Internet. This is where Bharat Net for rural connectivity comes in. The Government has rightly focused on this over the last few years. Even Telcos have a plan to reach rural areas, but in the end all investments are validated by the return on investments.

So the whole spectrum of digital infrastructure needs to be looked at. For rural connectivity, a new model is required whether it is the Government or a wholesale entity investing in a national backbone or a neutral platform like what the UK has done. They created a neutral platform called Open Reach -- which is a fiber

> For rural connectivity, a new model is required. Whether it is the Government or another wholesale entity investing in a national backbone, a neutral platform is needed.

asset for the country. The backhaul fiber is used by all service providers in a non-discriminatory manner.

India has that opportunity too, having made significant progress on Bharat Net. Apart from the public spending, India should look at revitalizing private spending. Telcos need to be spending more money in technology and customer experience rather than paying money for spectrum management or taxes.

Also, there have to be reforms in the ecosystem from a supplier perspective. For example, right of way (ROW) policy is still complicated after all these decades. If you have to deploy a 5G small cell site in cities, it's not an easy task.

One you don't get access, second you don't have power and you don't have fiber at the point. 5G small cells require fiber and power at the same point. Some of the reforms in policies in terms of how we access these cell sites in the last mile would be very important.

So in my view, I think this is not only a PLI and R&D issue, this is about boosting the 5G ecosystem from an implementation perspective.

Recently there was a postponement of the BharatNet tender. STL has been one of the active participants. What are your views on this delay?

From an intended vision of the Honorable Prime Minister and the Government of India, BhartNet is absolutely a great concept because this will serve to address the digital divide. Having said that, I think it has gone through a series of changes and evolutions in the last 5 years. Original thought was just connecting fiber to the village without any end objective. Then it was corrected. It was mapped to bandwidth requirements with throughputs of 10mbps to 100mbps. Even then utilization did not happen. Now we are saying that we need to focus both on infrastructure and utilization. Private sector is required for this. That is where BharatNet PPP has come in.

The whole idea is to make sure rural citizens get a benefit out of this. Creating infrastructure alone does not help. It has to be driven by consumption and creating demand. Why Telcos have not spent enough money in creating bandwidth in rural areas as much as for urban, is because of low yields. People cannot afford to pay for bandwidth there. Bharatnet had to address this.

The recent PPP model expected the bidder to drive the demand while the funding was done by the Government. But serious players did not find this attractive. They are now re-thinking about it.

In my view the government is in a favorable situation to make the right decision. The right model to implement has to be debated. We have examples like OpenReach.

Our recommendation has always been that the government has a significant role in creating a national backbone. Fiber is a key asset. It is a digital highway. Your information highways should be under government control. The only thing is the way it is being implemented. Government agencies do not have competencies to build, manage and maintain such networks. We are recommending that the Government should create a wholesale entity.

For example, India has several fiber assets. Telcos have their own networks. BSNL has 7 lakh km of fiber in the ground. Some are in good condition, some are not in good condition. There is also RailTel, Powergrid etc. Then there is Bharatnet first and second phases – where some investments have happened and networks have been deployed.

If all of this is pooled together as a government asset, it can be made into a wholesale entity, with a key focus on rural connectivity. That is true BharatNet.

Once you do this, the resources allotted by the government (40-50 thousand crores) can be utilized by this company to Invite competent technology partners and players to design and maintain the network.

> We are in the final stages of completing the network for the Indian Navy and this is the largest end to end communication network built by anyone in this country.

Government is the owner of the asset and an investor. BharatNet is a great opportunity, one of the largest assets for the country. There are many international PE funds, ready to invest in fiber for long term returns.

Service level agreements can be laid down for the technology partners. With SLAs, I'm sure a number of services will proliferate. Applications from education, health, agriculture, or e-commerce will flourish. These are not reaching the rural population today because of poor networks.

What would be STL's role in all of this

As a company if you have seen, we have evolved from just an optical solution provider to an end to end solution provider for digital networks. We are both in the wireline and wireless. We are now a technology player with investments in open source solutions, programmable networks etc.

Our role in the BharatNet program would be in 3 phases: First is definitely providing the right inputs for a national program because we have exposure to international markets. We have analysed it, we have provided what ought to be the right model and we have been advocating this very strongly, both in terms of industry platforms, and separately as STL alone. This is one aspect.

Second, if this network has to be built, it needs to be built by very strong and competent technology backed companies. It cannot be just a manpower contract. Because this network has to be built for the next 50 years. STL is ideal for designing the network, building the network and managing the network. That is what we've been doing for BharatNet in some States as well as in large defence networks. We also do networks of Telcos. That is our role.

Third is that a network becomes a service. Private participation beyond just involving in designing, building and managing. Some private parties may want to invest together with the Government. This is the PPP model. This is similar to what happened in Highways. The Government had land and invited private parties to provide services. They discovered the costs together. Government can invest the bulk of the capital and the rest can be by the private party. Against the share of the private party, there can be a set of obligations or SLAs to fulfill. And they manage it for the next few years. In this model, the Capex is discovered through a process. I think we will be interested to see this model in BharatNet.

How many miles of fiber does STL already have in the ground under management and under construction right now.

We would have built close to 1 lakh kilometers of fiber network in the country so farfor Telcos, Government, and other entities in the last 10 odd years. Now we are moving in the direction of building this large-scale digital infrastructure in India and across the world.

India would require at least 5-6 lakh kilometers of Fiber every year for the next 10 years and STL can help deliver this scale.

Underground implementation of fiber is still a difficult task. Apart from ROW there are viability challenges. But if 5-6 lakh kilometers have to be built over next ten years, we can scale up our capabilities and capacities for that.. We are present in almostin all States across the country and very well positioned in both design and deployment.

The Indian Navy had placed an order on STL a few years ago. Is this still a work in progress or now ready?

This is now in the final stages of commissioning and hand over. This network, I would say, is the largest end to end communication network that has been built by anybody across such a large geographical spread.

We are very proud of that. We are deploying this across 33 locations, building data centers, adding network equipment, transmission, adding applications and connecting their local area management. In the next couple of months we will be handing it over to the Indian Navy.

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Aatmanirbhar R&D – Allocation from Universal Service Obligation Fund (USOF)

The Union Budget 2022-23 has earmarked 5% of annual collections from the Universal Service Obligation Fund towards promotion of R&D

BY RAKESH KUMAR BHATNAGAR

The Indian telecom industry broadly comprises of Telecom Service Providers, Telecom Equipment manufacturers and passive infrastructure providers. Telecom Equipment manufacturers can be further classified into Consumer devices (handsets, Customer Premises Equipment) and Network equipment manufacturers and suppliers.

While telecom services and passive infrastructure sectors have grown rapidly over the last two decades, telecom equipment manufacturing has been slow despite many schemes – like Modified Special Incentive Package Scheme (MSIPS) with capital expenditure subsidy, Duty Differentials - Tax and Tariff concessions, Preferential Market Access, Merchandise Exports from India Scheme (MEIS) & Service Exports from India Scheme (SEIS) and electronic manufacturing cluster schemes.

There hasn't been a big focus on R&D in the past. This will be critical as most of the future technologies like Artificial Intelligence (AI), Internet of Things (IoT), 5G and Data Analytics require robust local R&D and manufacturing support.

Funds for R&D

The Union Budget 2022-23 has earmarked 5% of annual collections from the Universal Service Obligation Fund towards promotion of R&D and commercialization of technologies. Today approximately 60,000 crores are lying in the USO Fund, which translates to a starting

> Promotion of Design Development and Pilot Projects can be led by the centre for development of Telematics (CDOT) in the role of a consortium player.

corpus of Rs 3000 crores that is available for indigenous R&D immediately. Going forward, with nearly Rs 6000 crores collected yearly, this would translate to an additional Rs. 300 Crore + added to this corpus – and available for R&D.

A High-Level Committee consisting of experts from Indian telecom industry and academia has already been constituted (see table USO COMMITTEE notification) by the Government. Recommendations on detailed modalities for the R&D Funding by using 5% of USO Fund ought to be available with the Government by end of March 2022.

R&D efforts of the Fund should emphasise on technology development which will leads to commercialization. It should be industry-led and focus on deployment / implementation. This will help local design and intellectual property (IP) creation.

Eligibility

Towards supporting domestic design and development, only MCA registered companies whose global headquarters are in India should be eligible for this R&D fund. As in the PLI scheme, the applicant (Indian entity) must have more than 50% shareholding. In addition, we must support startups, who can bring out the best innovations and whose products can be successfully commercialized. The applicant can form a consortium with other Indian companies or with HEIs (higher educational institutions) or any other Indian Govt. entities (PSU, Govt Labs etc.) depending on their requirements.

Promotion of Design Development and Pilot Projects can be led by the centre for development of Telematics (CDOT) in the role of a consortium player. R&D funding should cover up to 75% of expenditures on manpower, purchase of test equipment and software tools, prototype creation, testing and certification, and production of demonstration units for field trials.

Technology

Radio Access Network (RAN) and Core network design development using software stacks from ground up or a licensed or open-source stack require tremendous engineering efforts. Developing, integrating these stacks with other components and hardening the software stacks to make them carrier grade is one of the biggest gaps in the sector. It requires large investments. A staggered investment/ funding for design of 5G products at various stages of technology readiness levels is needed.

Incentives to Service Providers on deployment of domestic designed 5G solutions should be created. Fiscal incentives in the Digital Communication Policy of 2018, can be included for 5G auctions. This will be a huge help for companies / startups that have built 5G products and wait for market access opportunity.

The R&D Fund should also focus on:

- How to speed up R&D which is already in progress to reach intermediate goals towards market reach through Research Gap Analysis
- How to engage and Fund the right mix of start-ups/ academia/ industry/ sectors
- How to engage PSU/ academia as a hub of viable development regionally, technically, domain wise, sector wise
- How to retain talent pool in priority research areas [Talent Retention]
- What explicit strategies can be adopted to alleviate the risk that government projects suffer from time/ decision delays
- How to establish the success-failure assessment criteria. And to accept failures as a learning and not as an end.

Telecom Product Focus Areas

The USOF R&D should support indigenous product development in latest telecom technology areas that have high strategic/ security implications and with highest commercial impact (reduction of imports and increase exports).

R&D Fund in the first year should support at least 30-40% of product lines other than 5G/ 6G technologies. Enterprise communications Media gateways, Switches, Routers, CPEs constitute also deserve focused R&D Funding attention. This is important for a balanced growth in all areas.

As the present objective is AatmaNirbharta, our focus should be industry led projects. Consortium based end to end solutions need encouragement. Funding should be only to projects that can assure time bound deliverables. As Fund is not restricted to just one year, annual targets can be different for different years.

R&D support could support the following products initially though other upcoming Technology solutions could be added in subsequent years.

1. 4G/5G- LTE
   a. 4G and 5G Radio Access Network (RAN)
   b. 4G and 5G Core

2. Optical Transmission
   a. Dense Wavelength Division Multiplexing (DWDM), Optical Transport Network (OTN)
   b. Packet Transport

3. Fiber Access FTTX - (GPON, XGS-PON, NG-PON2)
   a. OLT
   b. ONT

4. Ethernet Switches, Enterprise Communication Media gateways

5. Routers

6. High-capacity Radios (Millimeter wave)

7. Satellite supported solutions

Mode of Operation

USOF R&D Fund should seek to leverage and amplify private sector investments by adopting a 1:1 Matching Grant model. USOF R&D Fund could reimburse up to 50% of the approved project expenses incurred by awardee.

Monitoring and Disbursement

USOF R&D Fund should be ideally run in a "mission mode" with an independently empowered Board, chaired by PSA and members should be from Department of Telecommunications (DoT), NSA Office, MEITY, NITI and independent experts from academia. An independent Project Monitoring Agency (PMA) should be appointed, in collaboration with industry associations like VOICE.

USOF R&D Fund should remove the limitations of existing government R&D Funding schemes.

a. The Funds should cover manpower costs (salary, travel) since these contribute to most costs in today's commercialization efforts in the telecom sector.

b. Go/ No-Go decisions should be communicated to applicants in a reasonable period of time (30-60 days, since new product development cycles are shrinking and are often less than 12 months).

c. Fund disbursements for approved product/project should happen in a time-bound fashion and should be linked to specific project milestones.

Participation in Global Standardization bodies

All IPR created as part of the USOF R&D Fund project to be registered at the Indian Patent Office and should be owned by the awardee. All R&D Funded by this effort should be done in India which will create jobs.

Adequate resources should also be dedicated for India's participation in global standards bodies such as ITU, 3GPP, IEEE etc. so that we can drive future standards that have relevance for India, rather than being a follower.

Since any new telecom product development may require access to background IPR, Government of India must support to secure such background IPR for the Indian industry on fair, reasonable and non-discriminatory (FRAND) license terms. Indian government can also provide patents and licenses for new products and services to private firms, assuring them of substantial profits for the development of their own products. Increasing such funding will yield expeditious results higher productivity, and greater innovation.

Accelerating Adoption in India (Preference to Make in India)

The industry led by homegrown telecom equipment makers have been seeking incentives to facilitate local R&D to undertake design-led manufacturing, enabling them to become competitive worldwide.

The new initiatives taken by Govt are great steps in creating indigenous products, however the important aspect of this value chain is market access. A portion of the USOF R&D FUND should be allocated for "anchor" or pilot deployments to overcome the entry barrier faced by local product companies who are developing innovative products. Products created from the USOF R&D Fund should be given preference for procurement in Telecom, Defense, Railways, Power and all Make-in-India programs. Restrictive tender eligibility conditions such as multiple

TABLE
Statement showing the balance of Universal Access Levy (UAL) amount available as potential fund under USO as on 31.01.2022

Financial Year	UAL collections(Booked figures as per DOT A/cs)	Funds disbursed	Balance
2002-03	1653.61	300.00	1353.61
2003-04	2143.22	200.00	3296.83
2004-05	3457.73	1314.59	5439.97
2005-06	3215.13	1766.85	6888.25
2006-07	3940.73	1500.00	9328.98
2007-08	5405.80	1290.00	13444.78
2008-09	5515.14	8548.64	10411.28
2009-10	5778.00	2400.00	13789.28
2010-11	6114.56	3100.00	16803.84
2011-12	6723.57	1687.96	21839.45
2012-13	6735.47	625.00	27949.92
2013-14	7896.39	2163.45	33682.86
2014-15	7537.88	2086.98	39133.76
2015-16	9835.70	3100.00	45869.46
2016-17	9763.87	7227.03	48406.30
2017-18	7019.22	6998.76	48426.76
2018-19	6911.50	4788.22	50550.04
2019-20	7961.51	2926.00	55585.55
2020-21	9471.23	7200.00	57856.78
2021-22	6237.71	3463.58	60630.91
Total	123317.97	62687.06	60630.91

Potentially available fund - Rs. 60630.91cr.
Courtesy: *https://usof.gov.in/usof-cms/usof-fund-status-table.jsp*

bidder requirements should not apply for procuring products commercialized using USOF R&D FUND.

Private telcos should get buyers incentives, as recommended by DOT/ TRAI, to use these local products.

Export Promotion:

Government of India should actively promote export of USOF R&D FUND products as part of its G2G grant-in-aid and line-of-credit schemes for developing countries in Africa, CIS, Asia and Latin America. A dedicated export promotion effort should be set up to support USOF R&D FUND awardees in their international branding and market development activities such as participating in global trade shows (both physical and virtual), market research and business development.

Conclusions

India might have missed the bus at the time of introduction of GSM technology, but the new push towards AatmaNirbharta and the Budget support for Funding Indian R&D has given a renewed hope. Domestic manufacturing will create Global leaders from India.

Rakesh Kumar Bhatnagar, Director General, VoICE & Retired Advisor (Technology), DoT
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Sanjay Nayak
MD & CEO, Tejas Networks

"PLI scheme can be further strengthened by eliminating caps on R&D investments"

Tejas is one of the early entrants in the domestic manufacturing sphere. In a quick chat with Voice&Data, ***Sanjay Nayak, MD & CEO Tejas Networks*** *shares his views on making in India and Aatmanirbhar. Excerpts.*

What is Tejas' current status in manufacturing from India in terms of products and equipment covered under the PLI scheme?

Tejas is among the pioneers of Make In India for the last 20 years. We do all our R&D as well as manufacturing in India. Every product that we manufacture is covered under the PLI scheme for telecom and networking products.

What are your views on the Make in India / Aatmanirbhar Policies?

Over the last few years, we have seen a strong intent by the Government to take a holistic approach to becoming truly Aatmanirbhar in the strategically important telecom sector. Policies such as PMI (Preference to Make in India), PLI for Telecom and Networking and recent new policies — such as Design-led manufacturing for 5G, use of 5% of USO funds for R&D and most recently the PLI scheme for semiconductor fabs — are welcome steps. The emphasis now is clearly on promoting indigenous R&D and design-led manufacturing so that the country has full control on hardware (system design, chips and components) as well as software, and there can be a higher amount of domestic value-addition.

In the implementation of these policies, some fine tuning is needed to make them more effective and aligned to industry's needs.

What has the Tejas performance been like in the past few years in both the domestic and export markets?

2021 was a good year for Tejas and we ended the calendar year with the largest order book in our company's history. In India, we were selected as a GPON equipment supplier for multiple regional and pan-India FTTX rollouts. Besides FTTX, we were selected by Airtel to supply our state-of-the-art multi-terabit OTN/DWDM products for their Metro capacity expansion for 5G.

The company continued to be a preferred telecom equipment vendor in India's critical infrastructure sector and won multiple contracts in the power sector, railways, smart and safe city tenders.

We continued to execute on our strategy to grow international business and register new business wins in Africa, South East Asia and the Americas.

We are also excited about our association with Tata Sons, that acquired a majority stake in Tejas Networks through their subsidiary Panatone Finvest. This is expected to give us global brand recognition, a solid balance sheet and access to large customers worldwide. We hope that with this strategic move, we can significantly accelerate our efforts to build a world-class top-tier global telecom OEM from India.

You mentioned about improvements in the PLI. What would be your suggestions.

The current PLI scheme can be further strengthened by eliminating caps on R&D investments and on manpower costs. Manpower costs used for capital R&D investments must be given full credit. Similarly the PMI policy should be strictly enforced for all turnkey projects. If any domestic products are available in the country, these must be preferred over imported products. For strategic projects in defence, railways, power, homeland security etc., we must explicitly focus on promoting indigenous equipment and avoid setting technical tender conditions which disqualify Indian products.

To promote design-led manufacturing and domestic value-addition (and in turn R&D), a higher PLI incentive should be given when both design and manufacturing are done in India.

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NEC Corporation India: Revolutionizing India's Connectivity through cutting-edge innovations

A silent crusader working behind the scene, for seven decades, this Fortune 500 Japanese tech giant is building last mile connectivity with its telecommunications solutions

A fascinating analogy

"Nanakorobi yaoki" a Japanese proverb that means even if you fall seven times, you get up eight times. This aptly applies to businesses that weather many storms with persistence and never give up.

"We've persevered to stay at the forefront of breakthrough technologies over the last several decades," says Aalok Kumar, President and CEO, NEC Corporation India. For the last 122 years, Global tech leader, NEC has stayed ahead of the technology curve in Information, Communication, and Digital Technology with projected revenues of $30 billion.

NEC is among the world's pioneers in sectors such as biometrics, Artificial Intelligence (AI), Data analytics, face & iris recognition. Gartner Magic Quadrant ranked NEC as a Visionary in 5G Network Infrastructure. IDC Marketscape Worldwide Artificial Intelligence Services ranked it as a Major Player.

NEC's motto of "Better Products, Better Services," has been at the core of the digitisation roadmap in India over the last 70 years. And this is spread over many sectors, including telecommunications, transportation, logistics, public safety, smart cities, aviation, manufacturing, AI etc.

NEC India

Since 1950's NEC India has overcome challenges – geographical, execution and environmental – to make technology mainstream. But retaining the highest standards of quality. NEC realized early on that telecommunications and connectivity lie at the heart of a digital revolution. Over the decades NEC has become the backbone of India's telecom service providers, powering the internet in our lives. NEC believes 5G, Open RAN or ORAN technology and optic fibre cable networks can accelerate the digital revolution.

Aalok Kumar, President and CEO, NEC Corporation India

Currently, a 5G ORAN leader NEC is working closely with telecom service providers, and government bodies to create high capacity backhaul capabilities for 5G. NEC microwave backhaul and its PASOLINK series is the leader in this category. It is now building the internet of the future and exploring the possibility of commercially deploying ORAN technology for 5G networks by replicating global success stories.

"NEC's 'India Go Big' initiative aptly defines the unique scale of growth that India offers. "Through this we intend to more than double our talent pool, from 6000 to 14000, and thereby attract the finest brains. We are building solutions for the most complex social challenges that shape India," says Kumar

> In the last 70 years NEC's technology has been an integral part of the digitization roadmap of multiple sectors in India – including telecommunications, transportation, logistics, public safety, smart cities, aviation, AI, manufacturing.

As part of this initiative, NEC led the world's first 5G commercial implementation for Rakuten in Japan from India. It deployed BSS/OSS, 5G R.U. and 5G core solutions for its fully virtualized cloud-native network. In addition, NEC is partnering with Rakuten to promote ORAN worldwide and developing containerized standalone 5G core network to be utilized in Rakuten Mobile's fully virtualized cloud-native 5G network.

Recently, NEC added 18 more RUs to its portfolio to serve customers across varied bands and configurations. With the launch of 5G xHaul Transformation Services NEC plans to support CSPs to revolutionize transport networks for 5G.

Alongside Rakuten, NEC has added many new customers to its open network footprint. For instance, NEC will be the key supplier to Deutsche Telekom's O-RAN Town project, and will participate in Telefónica's trials in its key markets of Spain, UK, Germany and Brazil. NEC's collaboration with long-standing Open RAN operators such as NTT DOCOMO, Vodafone, and Altiostar has also deepened.

Additionally, NEC is exploring possibilities with micro 5G platforms where closed-loop private networks can unlock better IoT applications on improved data corridors driving unprecedented innovation in smart cities, manufacturing, transportation, and logistics.

Digital Transformation (DX)

Aalok Kumar, President, and CEO NEC India – took charge amidst the Covid-19 pandemic. Fast-tracking adoption of digital technology, helping partners, customers and authorities manage challenges thrown up by the pandemic, is among his key goals.

"Not only did the pandemic force us to transform ourselves but it demanded a change in mindset amongst our clients and guide them through their Digital Transformation (DX) journey. Reeling under the pandemic the DX adopters multiplied. They wanted to digitise their businesses fast but did not have a strategy. We recalibrated our teams. Democratised innovation and kept the customer at the center of our efforts," explain Aalok Kumar.

Building on this further in areas like AI, big data, biometrics, logistics, contactless solutions, NEC aligned teams to help both government and businesses successfully navigate repercussions of the pandemic. The IT and network technology leader is building a robust digital infrastructure to achieve significant improvements in productivity, efficiency, and competitiveness.

Digital Economy

Backed by a growth strategy centered on three pillars, namely, leveraging NEC's strong delivery capabilities, bringing about digital transformation in governance, and driving growth through innovation, NEC is committed to making digital technology mainstream in the country. Reinforcing this message, Kumar says, "We have a dedicated R&D center and a Global Development Center (GDC) in India that is focused on creating innovative solutions to solve some of the most complex social challenges globally as well as in India. Many turnkey global projects of NEC Japan are powered by NEC India's GDC team, and it intends to leverage India's skill and ability to fuel its global expansion plans. NEC has more than 49,000 patents to its credit, and it is exploring localization and deployment of many in India."

NEC India deploys its technology in three ways:

- Digital foundation or building the digital backbone in the country such as Submarine and mobile network connectivity
- Improving Processes & last mile connectivity in sectors including Logistics, Transportation, Aviation and Smart city through solutions like Track & Trace, Vehicle planning and scheduling, BRT systems, city surveillance and touchless boarding etc.
- Helping Decision Making through Integrated Command and Control Center, Video Analytics, Automated immigration etc. powered by AI.

NEC has charted three major priorities for India:

- Creating Global Centers of Excellence (COE's) in India across multiple domains.

> NEC led the world's first 5G commercial implementation for Rakuten in Japan from India, where it deployed BSS/OSS, 5G R.U. and 5G core solutions for its fully virtualized cloud-native network.

- Strengthening the R&D lab in Bangalore – one of 8 in the world – with more investments in newer areas.
- Creating more products and solutions in India leveraging Japan's technical know-how to deliver "Made in Japan" quality solutions out of India.

Strengthening India's e-Governance

In August 2020 amidst the challenges of the first wave of Covid-19, NEC India completed a significant infrastructure project on time – the Chennai-Andaman (CANI) 2,314 km long (100Gb/s) undersea optical fiber cable project. It was inaugurated by the Honorable Prime Minister Shri Narendra Modi on August 2020. It enables implementation of e-Governance initiatives, e-commerce, virtual education and boosts tourism in the island, generating employment for the inhabitants. It is a significant milestone in NEC's journey of partnering with the Government of India to realize its vision of a truly connected India.

The successful project win of the prestigious Kochi-Lakshadweep Submarine project is another notable business milestone that exemplifies NEC's focused investment in guiding India to a digital future.

Making 5G a Reality in India

NEC's first open RAN laboratory was inaugurated in December 2020 in Chennai as a part of the company's initiative: "In India, For India and From India For Global". The new facility complements operations of NEC's CoE in the U.K. and is testing innovative O-RAN technology to be offered to the world. As India gears up for 5G, this lab facility can support the establishment and execution of customer-specific 5G system integration cases. Additionally, NEC has more than 25 years of experience in mobile packet core with proven performance in tier-1 carriers' commercial networks.

"India has close to 800 million internet users – one of the largest on the planet. So I believe, digitalization should be the new religion for businesses and companies must definitely widen their footprint in embracing digital technologies. At NEC India, we are geared up to help governments and businesses through improved connectivity with the roll-out of 5G so that India could adopt digital in the truest sense," says Kumar.

The networking giant announced the set up of iPASOLINK EX Advanced Dual, NEC's outdoor, integrated, ultra-compact microwave radio supporting 70-80 GHz band communication (E-band), in India. It strategically works with India's top telecom operators to make 5G a reality.

Calibrating the Future of Technology

One of NEC's key value propositions has been to add to the sense of reliability that Japanese brands evoke with their unfailing technological solutions and quality assurance, whether in hardware or software. The NEC vision powers the ability to create an ambience for creating more productive solutions in India by leveraging Japanese technical know-how.

"We have taken an aggressive stance to drive cultural change in the organization and inculcate a participative mindset. Our teams have showcased a visible shift from just crowdsourcing to crowd evaluating innovative ideas and this has raised the innovation quotient of our India team at par with global standards. We are non-judgemental when our teams lose and quick to reward their small wins," says Aalok Kumar.

As part of its efforts to build sustainable technology ecosystems, NEC plans to reduce environmental impact in its business activities and target reducing CO2 emissions to effectively zero by 2050. NEC's efforts have been recognized for leadership in corporate sustainability by the global non-profit CDP listing it on its prestigious "A-List" three years in a row.

NEC has one of the highest employee engagement rates in the industry, leading to happier and committed employees. Employees focus on meaningful work. There is an absence of entitlement and an open workplace without silos. NEC India is charting a paradigm shift. Adding newer dimensions to workplace culture transformation.

NEC has always sought to resolve real-life problems through cutting-edge technology. NEC India is geared up to revolutionize India's telecommunications industry.

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Several jobs will be created due to demand spurred by new tech.
- Richard Lobo, executive vice president, & head HR, Infosys

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Design led Incentive (DLI) to Build Domestic 5G Ecosystem

The Design incentive for the new scheme could be extended to domestic companies, startups and MSMEs engaged in 5G design

BY RAKESH KUMAR BHATNAGAR

India might have missed the bus at the time of introduction of GSM technology, but the Hon'ble Prime Minister has tried to give a new push towards AatmaNirbharta. Announcements made in the Union Budget of 2022-23 include funding support for Indian R&D through 5% of USOF collections and a Design Linked Incentive (DLI) Scheme for 5G.

It is a very positive step for developing indigenous 5G technologies. DLI will give an impetus to creation of domestic designs, and downstream industry. Backward integration will lead to increase of domestic value addition.

For an effective DLI which will boost R&D some Salient features should be incorporated:

- **Capital expenditure on Manpower should be considered as part of R&D expenditure (not allowed presently).**
  Development of 5G products indigenously will require huge investments in manpower. Software development is the most important component of design & development. So far product development from the scratch i.e. R&D, development has had low support. The expenses made in manpower in line with Indian accounting standards for non-tangible capital expenditure must be considered as part of expenditure.

- **Expenditure incurred on Research and Development (R&D) should not have any cap for investment in R&D.**
  As per the current scheme the R&D expenditure is capped at 15%. The companies who don't plan on indigenous product development and would be only doing assembly/ manufacturing in India which is not more than 10% overall value addition in the equipment cost will have an advantage over companies who are into R&D – and creating IPRs in India. Together with manufacturing. Hence cap of 15% on R&D expenses & investments must be removed.

- **The overall incentive given which as on date is 4 – 6 % on the incremental sales from the base year irrespective of percentage of value addition being done in India in the overall product.**
  DLI should offer incremental incentive on progressive increase of domestic value addition on sales of 5G products as follows
  - 1% additional incentive if value addition is 40% or above,
  - 2% if 45% or above,
  - 3% if 50% or above,
  - 4% if 55% or above,
  - 5% if 60% or above,

Another option could be to make this independent of Production Linked Incentive Scheme.

- The Design incentive for the new scheme could be extended to domestic companies, startups and MSMEs engaged in 5G design development activity. Following could be the eligibility of the companies getting qualified:

  - Domestic companies need to be defined as those which are owned by resident Indian citizens as defined in the FDI Policy Circular of 2017 or extant norms. A company is considered as 'Owned' by resident Indian citizens if more than 50% of the capital in it is beneficially owned by resident Indian citizens and/ or Indian companies, which are ultimately owned and controlled by resident Indian citizens.

  - MSMEs need to be defined as per the Gazette Notification by Ministry of Micro, Small and Medium Enterprises, dated 1st June 2020 or extant norms.

  - Startups can be defined as per the DPIIT notification dated 19th February 2019 or extant norms.

  - The approved applicants that claim incentives under the scheme could retain their domestic

> RAN and Core network design development using software stacks grounds up or getting started with a licensed or open-source stack are available options for 5G.

status (i.e. more than 50% of the capital in it is beneficially owned by resident Indian citizens and/ or Indian companies, which are ultimately owned and controlled by resident Indian citizens) for a period of three years after claiming incentives under the scheme.

- R&D expenses should include expenditure related to manpower salaries, purchase of test equipment and software tools, prototype creation, testing and certification, and production of demonstration units for field trials.
- The following products must be covered under 5G Scheme would be:

S. No.	Technology	Products covered
1	Core	5G Core
2	5G Transport	PTN, IP/MPLS, cell site router, Ethernet switches, GPON/25GPON/XGSPON/NG-PON2, OTN & DWDM (100G and beyond), UBR
3	5G RAN	gNodeB (BBU and Radios)
4	CPE	IOT, UE IOT M2M & Device Ecosystem for 5G
5	5G use cases	Applications & software
5	IMS & Backhaul solutions	used for 5G deployments
6.	R&D Tools & Test Bed support facilities	

- Reimbursement of up to 50% of the eligible expenditure subject to a ceiling of ₹ 500 Crore per application might be provided as fiscal support to the approved applicants who are engaged in 5G R&D, technology development and designs.
- The expenses made in manpower and capitalized in line with Indian accounting standards for non-tangible capital expenditure must be considered as part of expenditure.
- An R&D fund set up recommended should enable a systematic approach wherein the producers, i.e., the R&D ecosystem bidders come out with proposals that meet the requirements of service providers/ consumer and other standards compliance expectations. Multiple players should be allowed to collaborate and come together with a consortium-based proposals indicating investment required, timeline and deliverables. The proponent should propose the % investment that they would do and the % investment that they need to enable them to undertake the work. Govt. funding should be available towards this which could be as high as 75%.
- The applicants should be made to submit their proposals for development of 5G design solutions under the scheme with proven designs which must be demonstrated in an operational environment and ready for volume production and commercial use.
- All costs from the date of application (even for existing product development) should be reimbursed 50% for applicants who have already started the development.
- RAN and Core network design development using software stacks grounds up or getting started with a licensed or open-source stack are available options for 5G. There is tremendous engineering effort involved in developing, integrating stacks with other components, and hardening the software stacks to make it carrier grade. This is one of the key gap area Indian companies will be required to address which requires large investment. A staggered investment/ funding for supporting design of 5G products at various stages of technology readiness levels.
- Incentives to Service Providers on deployment of locally designed 5G solutions under this scheme should be announced. There will be companies who have built 5G products but wait for market access. Incentive option already part of Digital Communication Policy 2018, can be used as one of the conditions for 5G auction.

Domestic Design Led 5G manufacturing stakeholders (working closely with Government) can lead to true AatmaNirbharta in the Telecom Sector.

Rakesh Kumar Bhatnagar is supporting AatmaNirbharta in Telecom sector as Director General VoICE (Voice of Indian Communication Technology Enterprises)

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Ecosystem to encourage Domestic Designed Private 5G Networks

5Mhz of 5G spectrum could be reserved for setting up Private Mobile Networks for campuses, remote locations or disaster management

BY RAJESH TULI

Private Mobile Networks can be a game changer. They can be deployed in campuses, mining, defense, remote locations, refineries, disaster management and inbuilding solutions.

The global mobile equipment market is dominated by a few players with strong influence on operators. An exclusive space for domestic players needs to be carved out. To groom and nurture this, an ecosystem for trial, testing and commercial deployment of indigenous designs with no dependence on operators needs to be created. In the past, Indian companies had developed GSM based private networks – but were unable to get traction.

This was recognized and provisions made in the national frequency allocation plan (NFAP). There is a need to simplify the implementation of these provisions by re-inducting Footnotes 50 & 55 of NFAP 2011.

Effectively this would mean, reserving 5Mhz of 5G spectrum for setting up Private Mobile Networks. And using systems that are designed in India – where technology and IPR resides in India. These solutions should be free to build on all generations of GSM technology. Excessive focus on Blue Ocean technology may kill commercial interest of entrepreneurs who may prefer adoption of 3G or 4G technology initially.

NFAP

NFAP 2000 (India notes 49 & 50) had provided for 30 MHz (in the bands 1880 - 1900 Mhz & 1900–1910 MHz) for indigenously developed technologies.

NFAP 2008 diluted it by allowing spectrum band 1900–1910 Mhz paired with 1980 - 1990 Mhz for Cellular operation but clause for indigenous technologies was dropped in India notes 54.

NFAP 2011 (Footnotes 50 & 55) earmarked small chunks of GSM band frequency for setting up private / captive networks based on indigenously developed technology. These provisions were made, on forceful requests by three Indian design companies.

Enabling Framework to create an Eco system for design

For many reasons, it is extremely challenging to expect implementation of new designs in the core networks of operators, hence a need to provide an enabling environment for new Indian designs without the legacy shackles.

Technology learning curve will have to be gradual and leapfrogging to 5G or 6G may not be practical unless entrepreneurs have experienced earlier generations of mobile networks.

Apart from technology stabilization, entry cost for 3G & 4G solutions may be much lower as 'open source" products are available which may be commercially more viable for several applications in campuses. Government must encourage both approaches.

Applications / Use Cases

- Setting up of private GSM networks in private campuses as stand-alone networks like the Office PBX will act as "Fixed Mobile Convergence" platforms. Offices, Hotels, Hospitals Offshore drilling rigs and institutions where staff is moving around a campus need such solutions. It will provide enhanced convenience of mobility while being fully integrated with an office PBX with features like "unified communication", Conference etc.

- Private operators can set up mobile telephony services in Villages or inside a campus, backhauled on PSTN / GSM / VoIP, on lines of erstwhile DID Franchises for PSTN networks.

- Greenfield deployments in inaccessible rural areas where small networks could be managed by local youth. This will create job opportunities and absorption of mobile communication technology in India. These solutions can also be temporary deployments in a

> Excessive focus on Blue Ocean technology may kill commercial interest of entrepreneurs who may prefer adoption of 3G or 4G technology initially.

games village or a holiday camp etc.

- Disaster management to cater to emergency services and rapid deployment of GSM network.

- Where the existing networks are destroyed by a natural calamity – hurricane or earthquake. It can be quickly set up. A reliable communication network can be used by all agencies working on the site viz. NGOs / Red Cross / Paramilitary / Fire Dept / Railways etc. Security Agencies can use it for emergencies.

- Ships / Islands or Forest areas. Quick deployment of networks with satellite / UHF / VHF or back haul when the ship is on high seas. When the ship is docked it could be connected to a local Telco under roaming agreements.

- Construction and Mining sites: Far flung remote areas with no existing networks.

- Defense services – GSM networks can be deployed with interface for PSTN, E&M. Vehicle mounted PBX for Defense forces.

- In building solutions to extend the coverage of the Public network such that same spectrum band is used over & over again thereby de congesting the spectrum available for city wide service.

- Create private 5G /6G networks for IOT & M2M applications for control, monitoring, management and fault forecasting in hotels, plants, Ships or any large infrastructure.

Advantages:

- Indian companies encouraged to develop and design mobile technologies. "National Security" concerns for Defense and paramilitary Organizations reduced. Once Indian design products succeed in small private environments, they will graduate to provide GSM network solutions for countrywide deployments.

- Technology absorption and employment creation: "Private Telecom Franchisees" or "DID operators", who were retailing wire-line telephony services are closing down. They were instrumental in telephony penetration. Mobile telephony has no similar role. Private mobile networks will offer them a new opportunity to retail mobile and fixed line telephony services in private campus.

- Decongestion of spectrum allotted for outdoor coverage: Calls made from within the office will flow through the office PBX thereby reducing the load on the macro city network. Calls that go outside the office will still go through the Telco network connected to the office. This envisages minimal conflict with the Telecom service provider's revenues.

Indian Design Companies that have worked in this space

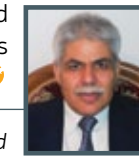
Well known design companies in this field are part of VoICE. They are open for consortium based implementation. Technology is available with IITs, PSUs, C-DoT and many private sector players. Many pieces are available in the Open source that can be integrated with provide solutions. Several test labs are available for domestic entrepreneurs to plug and play their applications.

Next Steps

De-license spectrum of upto 2, 3 & 5 MHz within the GSM band (900, 1800 & 2100) for use within a private campus. "Private Mobile networks" based on 3G, 4G, 5G or 6G technologies to be allowed if they are manufactured and designed in India.

All independent private networks to freely interconnect with any operator like Office PBX is connected. Regulatory requirements should be minimal – as required for setting up a PABX, Cordless phone or Wi Fi hotspot.

Owner of the campus would be allowed usage, with power restricted to coverage within the confines of the owner's premises. Coverage would be so restricted that it behaves more like a GSM PBX and does not compete with city-wide services provided by Telecom service providers.



Rajesh Tuli, MD, Coral Telecom Ltd

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5G Radio Interface (5Gi) Standard – Made in India and ready for the World

The primary intent of 5Gi is supporting enhanced coverage to bridge the rural-urban digital divide in 5G deployments

BY T.S. RAMU AND RAKESH KUMAR BHATNAGAR

5Gi is one of the Radio Interface Technologies (RITs) proposed by TSDSI (Telecom Standards Development Society India) and approved by ITU as a candidate technology for 5G. This has already been accepted by 3GPP also for being part of its international standards.

ITU approved 3 Radio Interface Technologies (RITs) in Nov 2020 as the candidate RITs that meet all the performance requirements for 5G as outlined in IMT-2020 requirements. The five deployment scenarios outlined by ITU are.

5Gi – Radio Interface Technologies

- 3GPP RIT - defines the specification for 5G NR (New Radio) operating at FR1 and FR2 spectrum in 3GPP release 15 and beyond. This specification provides all details related to NR. This set of specification is applicable to gNB.
- 3GPP SRIT - defines a set of specifications for LTE (E-UTRA, Evolved Universal Terrestrial Radio Access) and NR (new radio) operating at FR1 (LTE + NR) and FR2 (NR) spectrum in 3GPP release 15 and beyond. This set of specifications are applicable to both ng-eNB and gNB.
- 5Gi defines the specification for 5G NR to support a use case to extend the inter-site distance of base stations that will benefit rural broadband. This specification applies to gNB operating at FR1 and FR2 spectrum. While ITU has approved this specification, the configuration required to activate this interface is made optional in 3GPP. However, the feature can be activated with minimal changes in the User Equipment (UE) and gNB. The feature can be activated at gNB with a software upgrade.

5Gi introduces a new waveform to boost power and achieve a coverage distance of 12 Km reducing requirement for number of sites in rural areas.

Key technical features of the 5Gi are

- Introduction of a new waveform that supports pi/2 BPSK modulation with spectrum shaping at the UE side transmitter.
- Corresponding receiver side algorithms at gNB side is expected to enhance the cell edge performance by 3 dB (2 times).
- The new waveform offers enhanced performance on the peak to average power ratio (PAPR). In addition, the waveform is very resilient to non-linearities that offer reduced EVM (error vector magnitude) even when the Power amplifier is driven to saturation.
- The new waveform enhances uplink throughput almost by double at cell edge.
- The UE transmitter is required to use DFT-s-OFDM in addition to supporting CP-OFDM

a. Indoor Hotspot – enhanced Mobile Broadband (eMBB),
b. Dense Urban – eMBB,
c. Rural – eMBB,
d. Urban Macro – Ultra Reliable Low Latency Communication (URLLC) and
e. Urban Macro – massive Machine Type Communication (mMTC)

The key focus of 5Gi is to support Rural Communications in a cost-effective manner. 5Gi considers a low mobility use case for rural communication to extend coverage distance between sites and this reduces deployment costs substantially.

5Gi introduces a new waveform to boost power in the Uplink channel by 3dB. Pi by 2 BPSK waveform can achieve a coverage distance of 12 Km (under Line-of-Sight condition) with an average UE (User Equipment) power of 23 dBm (max power of 26 dBm) and offers a 100kbps throughput at the cell edge. This throughput is good enough for making a video call from the cell boundary.

The power boost can be applied to higher order modulation schemes to extend the range, if we don't violate the average power level of 23dBm for the specified device category. When 5Gi configuration is used, the UE and the gNB need to support an additional modulation scheme called Pi by 2 BPSK that enables extending the range of the base station or the inter-site distance of the base stations.

Key driver for 5Gi waveform

The primary intent of 5Gi is supporting enhanced coverage to bridge the rural-urban digital divide in 5G deployments. In the Indian context this enables connectivity in villages through towers located at gram panchayats in a cost-effective manner. The standard has received support from several countries as it addresses regional needs of 5G deployment.

5Gi has the potential of reducing capex and opex for rural broadband networks – thereby solving the last mile connectivity.

Having made a start with this standard, the industry has to drive its wider adoption. Prototypes have to be built to demonstrate its effectiveness.

Key features of 5Gi and challenging in adoption

Cellular network range is limited by the power output of cell phones or UEs. Any effort towards improving the coverage must focus on UE side transmitter and Base station side receiver.

> In the Indian context this enables connectivity in villages through towers located at gram panchayats in a cost-effective manner.

From a technology perspective 5Gi is an important extension and has the potential for enabling large cell deployments. Adoption requires changes on both the infrastructure side as well as User Equipment (UE) side. Teams from 5G test bed have demonstrated the performance in simulation as well as in the laboratory tests with RF.

Challenges for 5Gi adoption

a. It is possible to make changes required on base station side to demonstrate 5Gi but there is a challenge in getting the 5Gi support from UE/device side.

b. The device side requires a few changes including a simple filter implementation. Chipset makers like Mediatek, Apple, Qualcomm need to support this effort. IIT-Madras is holding discussions with Mediatek.

c. Global OEMs are resisting as 5Gi implementation is likely to enable Indian institutes like IITM / IITH / TSDSI to join the elite club where they will need to cross license their IPRs for using 5Gi IPRs of IITM/IITH in return.

d. 3GPP, which is driven by OEMs, appears reluctant to enable a few reserved bit fields (called non-critical extensions) for enabling interoperability and co-existence of 5G and 5Gi devices on the same network.

e. Independently IITM has come out with a list of modifications to 5G procedures to implement 5Gi with minimum changes. However, this requires demonstration on the ground. Hence, a campus trial using 5Gi UEs (User Equipment) is needed to attract confidence of operators.

f. Once 5Gi is made a mandatory standard in India, 3GPP would be compelled to embrace 5Gi. In recently concluded 3GPP meetings, OEMs appeared reluctant to include it as part of the program plan for release 18.

For incentivising adoption of 5Gi DoT could offer benefits to OEMS on the Infrastructure and UE side, who make 5Gi changes.

Incentivising 5Gi adoption

An R&D fund for building 5Gi prototypes is one way. Multiple consortiums led by large government or private companies can be tasked with the responsibility of building Base stations and User Side equipment.

Each consortium to identify partners with technology ownership and start integrating the solution on both UE and BTS. The UE side consortium preferably be led by an integrator with past experience in building chips. Funding should be released to respective consortia based on the Technology Readiness Level (TRL) achieved. To ensure competition and better success rate at least 2 groups each should be considered for UE and BTS.

Each consortium should conduct campus or pilot trials and demonstrate interworking with standard 5G equipment and 5Gi mode interworking among other consortium prototypes. For Base Station side, participation in 5G network roll outs can be offered as a reward. Successful UE side consortium should be ensured with further funding to build the chipset.

Spectrum strategy to promote 5Gi adoption

DoT should consider reserving NR band 71 in the range of 663-698 MHz for rural broadband networks that implement 5Gi. This is a premium frequency band that can give large coverage. With 5Gi, the range can be extended further. This can be a strategy for promoting 5Gi independently.

There is a golden opportunity for DoT to bind the scattered Indian 5G telecom companies to a common objective of prototyping 5Gi technology. This will pave the way for Indian Industry to lead global telecom market.

T.S. Ramu, Founder Director, Lekha Wireless Solutions

Rakesh Kumar Bhatnagar, Retired Advisor (Technology), DoT & Director General, VoICE along with other team members

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How Indian Drone industry is becoming Aatmanirbhar

The Central Government announced a ban on the import of drones with some exceptions for R&D, education and defence

BY VIKRAM SINGH

India – a global Drone Hub

A decade ago, India was no country for drones. Now we are targeting to become a global drone hub by 2030. A paradigm shift has occurred with some recent policy decisions. The government first liberalized regulations with the Drone Rules 2021, approved the PLI scheme for drone components in India and scrapped the requirement for a drone pilot license.

The Union Budget FY 2022-23 refers to multiple use cases of drones and opportunities for startups to provide drone-as-a-service in agriculture, defence, logistics, healthcare and e-commerce. Now, with the recent ban on the import of drones, the government aims to catalyze the production and use of indigenous drones.

The Essence of Drone Import Ban

The Central Government announced a ban on the import of drones with some exceptions for R&D, education and defence. However, this blanket ban on private drones does not extend to the import of drone components.

The ban on import of Completely Built-Up (CBU), Completely Knocked Down (CKD) and Semi Knocked Down (SKD) drones are imposed in a bid to boost the 'Make In India' initiative and discourage imports from China's top drone maker, SZ DJI Technology Co. Since most of the world's leading drone makers are Chinese companies, this is effectively aimed at keeping away Chinese drones from hovering in the country.

Keeping foreign drones out of Indian skies provides an impetus to local manufacturing and technology providers to ramp up their production of indigenous drones. As a result, the country's nascent drone industry will grow. According to recent estimates, the domestic drone market is forecasted to reach $1.81 billion by 2026. With relaxed rules, production linked incentives (PLI) and import bans, we can become an alternative for countries dependent on Chinese imports.

Indian UAV imports account for around 20% of the global UAV imports. By banning drone imports, India will not only reduce these high percentages but could also start exporting UAVs itself in the coming future. Earlier, drones in the nano category and those operating below 50ft did not require any import clearance or license.

Imports of UAVs were in the restricted category and required clearance and an import license. Under the new policy, the import of CBU, CKD and SKD has been completely prohibited, with a few exceptions (for education, R&D etc). The liberalised policy will boost production of domestic drones and spur adoption in multiple sectors.

The Flight of India's Drone Industry

Indian drone industry is poised to go global. Incentives and liberalized regulations, are encouraging startups to enter the industry. For example, in January 2022, the single window Digital Sky Platform was launched. The drone pilot licensing requirement has been scrapped by the Ministry of Civil Aviation (MoCA). A drone pilot certificate issued by a DGCA-approved school is sufficient for commercial drones.

All of these have given an impetus and the drone space has gained momentum. Deployment of drones in the pandemic for surveillance, logistics, agriculture and healthcare was a further boost.

> The Drone PLI scheme, Drone Rules 2021 and drone import ban together will create a strong value chain for local players. This will span the hardware, manufacturing, software and service delivery segments. It will also incentivize foreign manufacturers to produce in India.

Projected Numbers

The Indian UAV market is poised to grow at a CAGR of 18% during 2017-2023 in revenue. Drone manufacturing companies in India currently have a collective turnover of ₹ 80 crores. MoCA forecasts this to grow to ₹ 12000 - 15000 crores by 2027.

Drone Applications

The use of drones has expanded beyond photography and agriculture into a wide array of applications such as drone delivery of essentials, healthcare, land surveys, cinematography, agriculture & mining, construction, railways and national highway mapping. Drone Logistics and Air Taxis will be a reality soon. Drone corridors are being developed to help timely delivery of life-saving drugs, vaccines and organs for transplant.

TechEagle (a startup that pioneered drone deliveries), is conducting beyond visual line of sight (BVLOS) flights for delivering medicines, blood, vaccines, food etc. BVLOS is opening up and entirely new spectrum for Drone applications. We are also building an On-Demand Drone Logistics Airline to supply parcels ranging (blood, vaccine, medicines, etc.), e-commerce, hyperlocal (Grocery etc.), Maritime and Defence. TechEagle has already executed medicine delivery projects for central and state governments (see BOX).

Drone Technology

UAV drones are equipped with cutting-edge technology like cameras, lidars (for sensing obstacles), GPS, sensors, parachutes.

They are controlled by cutting edge Autpilot technology and monitored by pilots with the help of ground control stations. Job opportunities for pilots are growing. Today there are 5,000 pilots, including recreational and commercial pilots. The new regulations allow drone pilots to be certified by DGCA approved schools.

Types & Size

Drones are of various sizes and can be classified depending on their use. Predator drones, primarily deployed by the military, are armed, long-endurance, medium-altitude and multi-mission UAVs.

Vertical Take-Off and Landing (VTOL) drones can take-off, hover and land vertically and provide great flexibility. Another popular type of drone used for surveillance and aerial photography is the multi-rotor drone. They can be further classified depending on the number of rotors on the platform, such as tricopter, quadcopter, hexacopter and octocopter.

Ideal for long-distance operations like mapping and surveillance, another type of drone is a fixed-wing drone. They require runway or catapult launchers and net for take-off and landing. Similar in design to helicopters, single rotor drones are another type of drone.

Hybrid VTOL combines the benefits of fixed-wing models and rotor models, resulting in long ranges and high speed. TechEagle operates state of the art Hybrid VTOL aircrafts for delivery up to 100km at a speed of 120km/h.

Global Drone Industry

The global drone industry started to take off sometime in 2016 as multiple new applications became possible. The world market is projected to reach $41 billion by 2026 at a CAGR of 23.8% (source). China, USA and Israel currently dominate the global drone market but India, Japan, Australia and several European countries have also started foraying into the sector. Drones are being used to deliver vaccines, medicines and blood in India, Ghana, and USA. In Ireland, drones are being used to deliver beverages, groceries, pizza, mapping infrastructure, etc.

New Horizons

The Drone PLI scheme, Drone Rules 2021 and drone import ban together will create a strong value chain for local players. This will span the hardware, manufacturing, software and service delivery segments.

It will also incentivize foreign manufacturers to produce in India. Massive employment opportunities will be generated in this sector.

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Improvement Suggestions for Public Procurement

Tenders must insist on domestic specifications and standards. Line ministries should ensure compliance. Frivolous specifications or functional requirements to circumvent the system should be plugged

BY RAJESH TULI & RAKESH KUMAR BHATNAGAR

Aatma Nirbharta in Indian Telecom sector requires an agile design and manufacturing ecosystem in the country. This in turn needs entrepreneurs and start-ups to succeed and be profitable - which requires a market pull for their products.

While Public Procurement (Make in India) Policy, (PPP MII) is an excellent policy the overarching policy framework needs to be strengthened to help start-ups in initial deployment of their products. Such domestic grooming would be a precursor for global aspirations and largescale commercialization.

Government e-Market place (GeM) is an excellent market initiative which can be leveraged for PPP MII. GeM can be leveraged for demand forecasting and consolidation. Government has taken a laudable initiative to encourage procurement of domestic products in public procurement but considering the far-reaching impact and importance of this policy, ground level implementation needs to be improved.

Improvements

Here are some suggestions from the industry for improvement:

1. **Issue paper on Frequently Asked Questions (FAQ)** for smooth implementation & interpretation of the policy in the desired spirit. FAQ has been suggested by the industry and reviewed at DOT. It is pending to be published on the website. FAQ should be based on decisions, viewpoints and judgments taken in grievance redressal committee meetings at DOT / DPIIT such that it acts as a compendium of various judgments. It should act as a guiding spirit for any future deviation from the policy consequently minimizing disputes. This paper must bring clarity on the following
   - Applicability of policy on Turnkey projects (big Govt buy) that includes large amount of civil work: It must be insisted upon System Integrators & EPC contractors that at least items, where nodal ministry has confirmed that capacity and competence exist in the country, must be purchased from domestic manufacturers.
   - It needs to be clarified that Imported hardware with peripheral services of software configuration design and layout work cannot be shown as domestic value addition to circumvent the policy. Similarly Profit, AMC, Installation cannot not be part of domestic value addition.
   - Policy circumvention in the name of up-gradation or additional licensees for old systems (even for 10–15-year-old equipment) must be addressed considering spirit of the policy.
   - Circumvention of policy in the garb of Inter-operability with old proprietary products.
2. **Grievance re-addressal meetings** need to be held by each nodal ministry as an extended arm of the standing committee of DPIIT empowered to decide on Policy related grievances. This would facilitate nodal ministry to encourage manufacturers of products covered by the nodal ministry and would also sensitize stakeholders to ensure corrective actions that prevents domestic manufacturers to sell products to large Government buyers.
3. As in the 2017 policy of DOT, Insist on compliance to TEC specifications in all tenders for Telecom products. Similarly, all products should be covered through domestic specifications. Tenders must insist on domestic specifications and standards. Line ministries should ensure compliance. This is important because frivolous specifications or functional requirements are generally inserted to circumvent the system. Customers may get domestic specifications framed or revised after public consultation which provides time to the industry to adapt & update. Such proactive mechanism will safeguard against Indian industry being put in "chasing mode" for every tender.
4. **Enhance the list of items to include all items manufactured locally.** There is a list of 94 items in

> Public Procurement (Make in India) Policy, (PPP MII) is an excellent policy that has the single handed potential to resurrect the domestic manufacturing industry.

Telecom that were submitted by VoICE (See LIST) and proposed for inclusion in the next update of DoT's Public Procurement Notification. These lists should be made by each ministry and insisted upon for procurement from Indian manufacturers in public procurement.

5. Myth that 60% domestic VA is not possible must be broken since balance sheets of most big companies will show raw material consumption in manufacturing process is less than 50% of the sale value. They operate at more than 50% Gross contribution otherwise they wouldn't even meet their expenses. If total raw material for them is 50%, then active components and ICs cannot be more than 25% of the sale price so the myth that domestic VA cannot be 60% till semiconductor fabs are set up need to be busted in the mind of decision makers.

6. **Domestic Value Addition (VA) should be enhanced from the VA percentage specified in 2017 policy of DOT.** Sufficient manufacturers were meeting those criterion & competing for the tenders. As a community we cannot make retrograde claims on VA percentage. Telecom products are security sensitive unlike consumer electronics. Design and IPR components must be given higher weightage. Design is the basis to ensure absorption of technology in the country and downstream ecosystems.

7. **Portals like GEM should be diligent on VA percentage declarations.** GEM, can help consolidate demand and facilitate procurements from one central platform. Scrutiny of documents and submissions of each manufacturer can be validated at a central location rather than each department of the Government repeating the same activity which duplicates national resources. Common anomalies observed in GeM portal are as follows:
   - They allow imported products showing 21% VA without proper verification. Profits or installation or AMC could be shown as Domestic value addition. Many of the imported products are declared as Class I by the bidders.
   - Tenders insist on all products from one OEM. Indian SMEs may not have all the subsystems required for a project hence are left out.
   - None of the procuring agency follow a protocol to get waiver from Standing committee or Secretary Coordination as per DPIIT guidelines to get Make in India policy exemption. Many of the PAC RFP/tenders are there on GEM wherein foreign Make and models has been sought even if equivalent domestic products are available. GEM should not allow publishing of such a products even if overall Value Addition is met.

8. **Enlarge the scope of the policy to Include**
   - State Governments purchases.
   - Purchases by Telecom operators.
   - World bank funded projects at least for 3a products
   - Indian projects undertaken in other countries against LOC or Grant in Aid.

9. Implementation agencies responsible for ensuring policy compliance should be given more teeth to ensure punitive action against defaulters — both buyers and sellers — making wrong declarations. Situations exist where buyers ignored the directions of the standing committee meeting responsible for implementation of PPP MII order.

10. **Enforcement and surveillance of Govt Initiatives like MTCTE and Trusted Sources at ground level**
    - MTCTE phase 1 and phase 2 has been implemented for more than a year. Now phase 3 and phase 4 have been announced. Still, many products for which MTCTE is not available or kept in abeyance are being imported, implemented by TSP/ISP or traders. There are companies who have spent lot of effort, time, and money to get their equipment certified. MTCTE surveillance at ground level should be enforced.
    - Trusted Source is a good initiative by Govt of India to ensure only secure products are being implemented by Indian networks as soon as the agency starts giving clearances for the source/products, enforcement is critical.

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Unlocking the Benefits of AI in the Construction Sector

Some of the most innovative use-cases and the deep-learning algorithms driving them, are being developed by Indian companies

BY VIKSHUT MUNDKUR

An economy in its own right, the construction industry contributes massively to the Indian economy. Currently, it makes up for 9% of national GDP, employs about 51 million people and attracted 13% of all FDI inflows in FY21. The importance of this sector is expected to get even more in the years to come. As per reliable projections, the Real Estate industry in India is expected to reach $1 Trillion by 2030 and contribute 13% to India's GDP

Needless to say, this sector is huge and its operations are so complex that issues like lack of coordination, frequent re-works, inefficient monitoring and flawed estimations are considered commonplace. Adding to the woes is the fact that the construction sector has been slow in adopting technology.

Application of AI in construction is scaling rapidly and could potentially be a $4.5 Billion global market by 2026.

Technology

Firstly, the increasing project complexity and an ever-growing demand to complete projects faster, cheaper and with fewer reworks is forcing the construction executives to look at better ways of getting things done. These days, the executive team of a construction project, namely the project management consultancies (PMC), and their sub-contractors are proactively seeking technology solutions to streamline their workflow, monitor progress, reduce rework and waste. Secondly, the leadership team among the real estate developers and their financiers want an accurate and reliable solution to evaluate project feasibility, estimation, and reporting solution.

And lastly, the recent developments in the technology landscape – especially in computer vision, natural language processing (NLP), machine learning, cloud computing, drone-tech and Internet-of-Things (IoT) have opened up new real-world possibilities. Construction-

> Real estate and construction companies are steadily adopting visual-intelligence platforms for remote management of their projects. Many of these solutions are built on AI technologies and by Indian companies.

tech companies are finding innovative ways to unlock use-cases that seemed impossible earlier.

Known challenges in the industry

- Constant revision/updates to the plan
- Diverse set of parties (contractors, developers, banks, unit owners)
- Non-transparent reporting – heavy reliance on hand written notes, reports, emails and spreadsheets
- Sub-optimal and generic tools for project planning and monitoring
- Low adoption of technology by ground staff
- Lack of visual evidence and tech-backed insights for decision making

These three factors, have in fact created a niche ecosystem of forward-looking construction executives and innovative construction-tech companies. A promising endeavour of this ecosystem is to unlock the benefits of AI. And this niche is fast becoming mainstream.

The value of artificial intelligence (AI) in the construction market is expected to reach $ 4.51 Billion by 2026 according to 'Reports and Data'.

Manifestation of AI in construction technology

An integral part of most AI applications is the concept of machine learning (ML). ML (at a very high level) are computer algorithms that learn and improve through experience. Engineers train the algorithm to make sense of architectural drawings, site plans, building components, quality traits and Building Information Modelling (BIM) files.

Algorithms are trained to understand construction collaterals as close to a human eye as possible. Then applied to solving problems.

The common applications of AI in the construction sector include,

- Work-site surveying
- Insights for architectural designs
- Visualizations (3D modelling) of the site
- Resource estimation & allocation
- Workflow streamlining/Task scheduling

INTERVIEW: VIKSHUT MUNDKUR ON AATMANIRBHAR

How is the localisation of technology emerging – in hardware (drones), AI & platforms

Hardware – With the ongoing trade sanctions and electronic-chip shortage, most companies are favouring the 'plus one' strategy of creating alternate supply chains to mitigate their risks. But this transition will not be easy – to build entire alternate ecosystems that can live up to the quality, price, availability and service standards.

AI and platforms – By nature, AI and SaaS solutions transcend geographical borders and also work on a different equilibrium. The companies who are more receptive to on-ground realities and challenges (most likely, the regional and local companies), and are willing to co-create the solution with their clients have a distinct advantage.

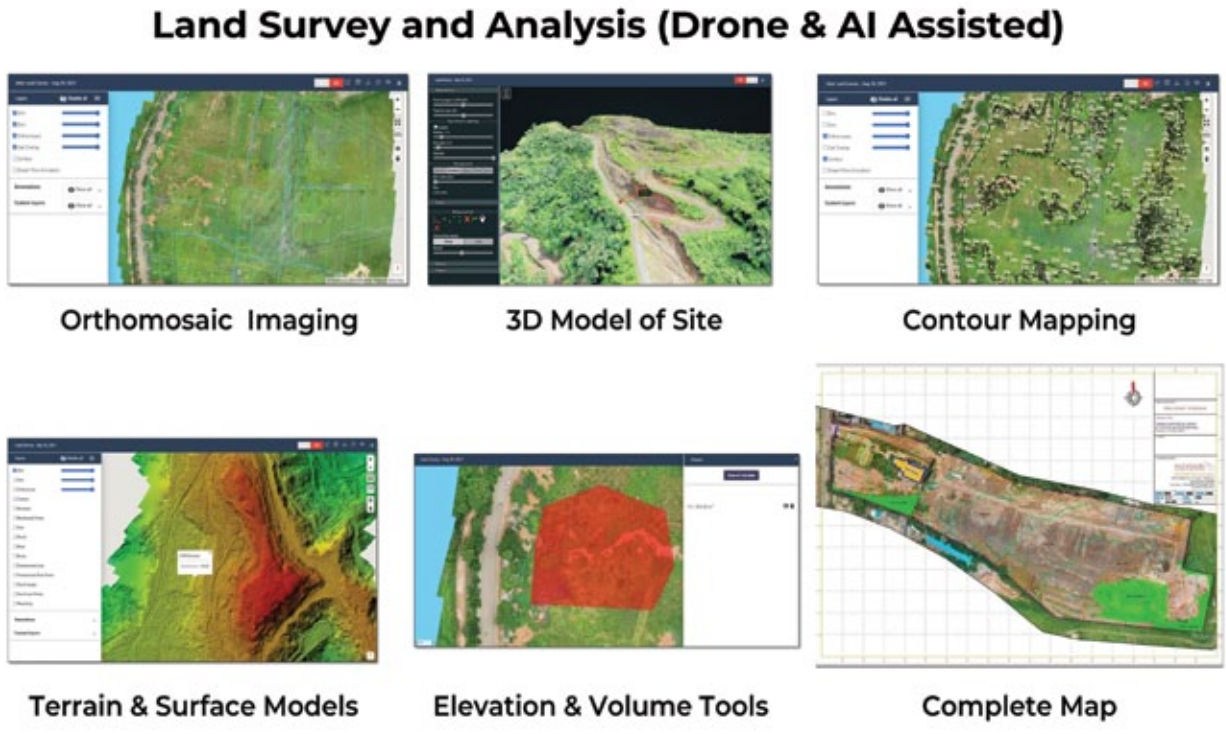
How has HUVIAiR benefitted from the localisation

HUVIAiR CONSTRA is built as a SaaS platform that can benefit construction and real estate companies anywhere. But, a regional team and hands-on involvement with our client's projects certainly helps build trust and goodwill.

What would you think are the benefits and drawbacks of localisation

On ground, 'localization' translates to multiple companies attempting to solve similar problem statements within the same market. This is good as it unearths multiple and innovative ways of accomplishing a task and building a healthy competition.

Also, localization benefits all stakeholders of an ecosystem – industry-academia research, innovative designs, jobs for qualified technicians, factories, raw material suppliers, new curriculum for students.



- Remote construction monitoring
- Detailed inspection of work-site details
- Detecting deviations from the plan
- Early warning of faulty construction
- Quality Checks (QC)
- Snag management
- Safety monitoring

AI for Land Surveying – A deep dive

Before any construction starts the first step is to identify a suitable parcel of land, study it and create a feasibility analysis. Traditionally, a team of surveyors visit the site and carry out inspections. This is key to collection of accurate data. But, despite best efforts, certain human errors occasionally creep in requiring revisits and rework. With AI these challenges are overcome.

A drone equipped with a high-resolution camera (the "eye") captures images of a building's exterior. A 360-degree camera captures every construction detail of the interiors. This is the raw data necessary for the ML, deep-learning engine. AI then weaves its magic!

Computer vision (CV) is a branch of AI that enables computers to derive meaningful information from digital images, videos, and other visual inputs. It enables algorithms to make recommendations and call out anomalies and derive actionable insights.

How drone-assisted land surveying & AI-assisted analysis looks like,

- Drone-based land surveys can be conducted in one-third the time of traditional means
- Costs 1/3rd the price of traditional approach
- Capture 6+ layers of topographical data in one flight
- Captures the natural and man-made structures in the land parcel
- CV can visualize your land in 2D & 3D
- Avoid the cost and time of commuting

Major developers are trying-out (and depending on) visual-intelligence platforms to monitor their projects spread across geographies from their desks (laptops) or even on mobile apps. They generate, automated progress reports, undertake virtual interior walkthroughs and exterior monitoring, using 360-degree cameras and drones operated by on-site crew.

These are early days but the future of Construction-Tech is promising.

Vikshut Mundkur is CEO – HUVIAiR Technologies. On a mission to unlock the power of AI for large scale construction projects

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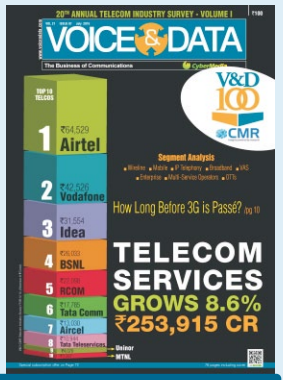

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Anand Bhaskar
Managing Director, Service Providers,
Cisco India & SAARC

"We are redefining the economics of mass-scale networking – Cisco"

BY PRATIMA H

*In this interview with **Pratima H, Anand Bhaskar, Managing Director, Service Providers - Cisco India & SAARC** explains why, where and how much are new forces helping, and being helped by, networking technology. From SASE, SDN to NFV to open platform controllers and IBN, he helps us interpret everything under the sun, and inside the pipe. Slide in.*

How is the network aspect shaping up after what enterprises went through during the pandemic? How is Cisco gearing up for these new realities?

The past 19 months have seen massive changes in the enterprise networks. Businesses and governments around the globe have been forced to quickly pivot to accommodate the work-from-home population, which led to an unforeseen strain of all manner on networking technologies, causing bandwidth and security concerns. Today, data can be stored anywhere, in any environment. It's spread across on-premises and offsite locations, public and private clouds, pure and hybrid installations. Networks have gotten more complex, and management is more siloed. At the same time, IT organizations are expected to maintain everything flawlessly, delivering high availability across the globally distributed infrastructure with disparate toolsets. As organizations go deeper into the digital-first world, they need to simplify enterprise networks and ramp up network security for better efficiency.

At Cisco, we are committed to using technology to empower a workforce and transform workspaces. Our collaboration portfolio, Webex, can provide simple, smart, and secure hybrid work experiences from anywhere. On the other hand, the explosion of bandwidth demands puts significant stress on network capacity, forcing organizations to deploy SD-WAN and secure access server edge (SASE), as it enables networks to access cloud workloads and SaaS applications securely.

> The current internet infrastructure is not meant to handle applications such as VR/AR, AI, 5G, quantum computing, and more.

With the depth and breadth of our hardware, software, silicon, and optics solutions, we believe that we have all that is needed to help companies adopt modern application architectures, shift to hybrid work and hybrid cloud, and help secure their enterprise over any network, anywhere users work.

AI, SASE, low-code automation and edge computing are changing the game of network infrastructure in a big way. How has that affected the company's portfolio and market strategy?

Trends such as globalization, digital transformation, resilience, and sustainability shape the requirements for a new kind of network. The next 3-years are a defining period for Communication Service Providers (SPs) due to the growing need for connectivity, exacerbated by the pandemic, and technology shifts like 5G, WiFi 6, edge, and cloud-native architectures.

At Cisco, we are focusing on six key areas that are going to be critical to our future success and core to our technology strategy over the next three years: build secure & agile networks, help our customers optimize their application experience, define and deliver the future of work, architecture to build the Internet of the future, end to end security and deliver capabilities at the edge, as workloads & apps move closer to where data is created.

Any specific examples?

We are redefining the economics of mass-scale networking to improve costs and outcomes for Telecom Service Providers and Webscale providers to provide a high-performance, efficient, and trustworthy Internet across a more inclusive world. At the same time, we are helping customers define a migration path to 5G & WiFi 6 and address opportunities in Private Enterprise Networks, exploiting our leadership in Mobility and Enterprise wireless technologies and Open RAN. Additionally, more Edge use cases continue to emerge as applications and workloads become increasingly distributed, which is also changing how we connect, secure, and develop applications.

What is your approach in helping service providers accelerate enterprises on digital turning-points?

In the blink of an eye, the world realized how critical the Internet is to our daily lives. Video conferences replaced physical meetings, virtual events replaced get-togethers, and children began distance learning. The network traffic levels that were predicted to reach in two years arrived almost overnight, as earlier peak usage hours are now typical for most of the day. Our service provider customers and partners have been doing a great job managing the spikes in network traffic and balancing the shift in 'peak' online hours accordingly. They have been the backbone during the pandemic, as they ensured critical connectivity for humanity to function.

Today, service providers have a unique opportunity to play a critical role in the recovery from the COVID-19 crisis; network connectivity may prove to be the bedrock in supporting our society, diminishing the pandemic's negative impact by allowing us to stay in touch with the world and our communities.

As enterprises become more distributed and amp up virtualization of their processes and workflow, they will increasingly become a significant market for telecom service providers. Enterprises that constitute a quarter of telecom service providers' revenue will be a major contributor over the next few years. According to Gartner, by 2023, over 60 per cent of enterprises will deem networking as core to their digital strategies, up from less than 20 per cent today. Unlike last year, companies are not only enabling work from home but also converting their employees' homes into enterprise-grade, secure workplace environments to emerge as future-ready organizations. Therefore, a service provider has a much larger and significant role play in this hybrid world; they have the ability to help people connect, access, and collaborate in a seamless and secure manner.

At Cisco, we are engaged in 360-degree partnerships with all leading service providers to help prepare their networks for 5G by enabling an open, intelligent and secure network platform, enhancing their go-to-market strategies, and ensuring greater returns on their 5G investments.

Is Cisco aiming for a strong sweet spot in offering an end-to-end stack in areas that were initially perceived as a threat to its core business model - like NFV, SDN, Conferencing, etc.?

In the last few years, the telecom industry has altered drastically amid changing technology landscape, innovative service delivery models, evolving consumer behaviour, and regulatory requirements from various regulatory agencies. Innovations in the area of Software-Defined Networking (SDN) and Intent-based networking

> Investments are needed in three key components – spectrum, sites, and fiberization on mid/low-band spectrums, which would stand between $18 billion and $30 billion for pan-India coverage.

(IBN), virtualization and programmability, and open platform controllers are making automation a reality in networks today. Automation, AI, multi-cloud networking, wireless, and network security will power the biggest wave of network transformation seen in decades.

Cisco Network Functions Virtualization Infrastructure (NFVI) introduces services faster, delivers a high-quality user experience, and can scale on demand even to unpredictable traffic models. It also reduces the TCO by 40 per cent, as the single-pane-of-glass management software module simplifies the management and operation of all components.

We have already been working with leading communication service providers and web-scale companies, including Airtel, Vodafone Idea, Google Cloud, Jio and Rakuten Mobile, and more to design the building blocks for the 'Internet for the Future.' Globally, we have committed $5 billion in funding to help build 5G networks over the next three years to support our customers in accelerating their 5G deployments.

How crucial is the intersection between chip development and networking as we move towards a new form of IT estate?

Building networks to grow and extend the Internet to more areas has been challenging for network operators. The current internet infrastructure is not meant to handle applications such as VR/AR, AI, 5G, quantum computing, and more. By rethinking silicon design entirely, we can deliver industry-leading performance today and create a "fast lane" to the future. Our programmable chipset, called Silicon One, is built for high-performance networking for future 5G applications. Additionally, today, Cisco is helping to further simplify the constructs of the Internet with its Routed Optical Networking solution aimed at collapsing IP and Optical networks

How significant is 5G core for the industry?

Long ago, data ran over voice networks – dial-up modems over telephone lines. At higher speeds, the economics inverted, and VoIP ran over data networks. The 5G era will be marked by a similar transformation of monumental significance. IP services will no longer primarily run over optical networks. Instead, optical services will join the rest of legacy services and primarily run over IP networks.

The advent of 5G opens a new world of possibilities for every industry. The benefits are spread across industries that are on the cusp of their digital journeys, such as Healthcare, Manufacturing, Education, Automobile, Smart Cities, BFSI, etc. These networks play a crucial role in providing a competent platform to support the widespread adoption of critical communications services and driving the digitization agenda. Undoubtedly, 5G will push us into a world of interconnected networks, devices, and applications.

What challenges and inflection points does it bring?

One of the biggest challenges is that a comprehensive, secure and efficient 5G infrastructure requires investments in fiber, network densification, and specialized base stations, which equates to significant CapEx investments for telecom players. Investments are needed in three key components – spectrum, sites, and fiberization on mid/low-band spectrums, which would stand between $18 billion and $30 billion for pan-India coverage. It will also need spectrum across low, mid, and high s ranges to ensure maximum coverage and enable a plethora of use cases.

At Cisco, through innovation in cloud-based packet core, seamless business-to-service provider network connections, automation advances, and trusted secure infrastructure, the road to a profitable mobile network has never been clearer. We're also working across providers, enterprises, and industries around the world to help them understand how they can deliver those 5G capabilities to private networks as simply as possible as that means agile, controllable, and secure networks.

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Our Digital Economy depends on robust Data Centers (DC)

DE-CIX, is the world's largest Internet Exchange in Frankfurt (Germany) with 11 terabits per second of data throughput. DE-CIX India is a carrier neutral Internet Exchange Interconnecting Internet Service Providers (ISPs), Content Delivery Networks (CDNs), Over The Top (OTT) players, DNS root servers, Telco and Social Media Networks

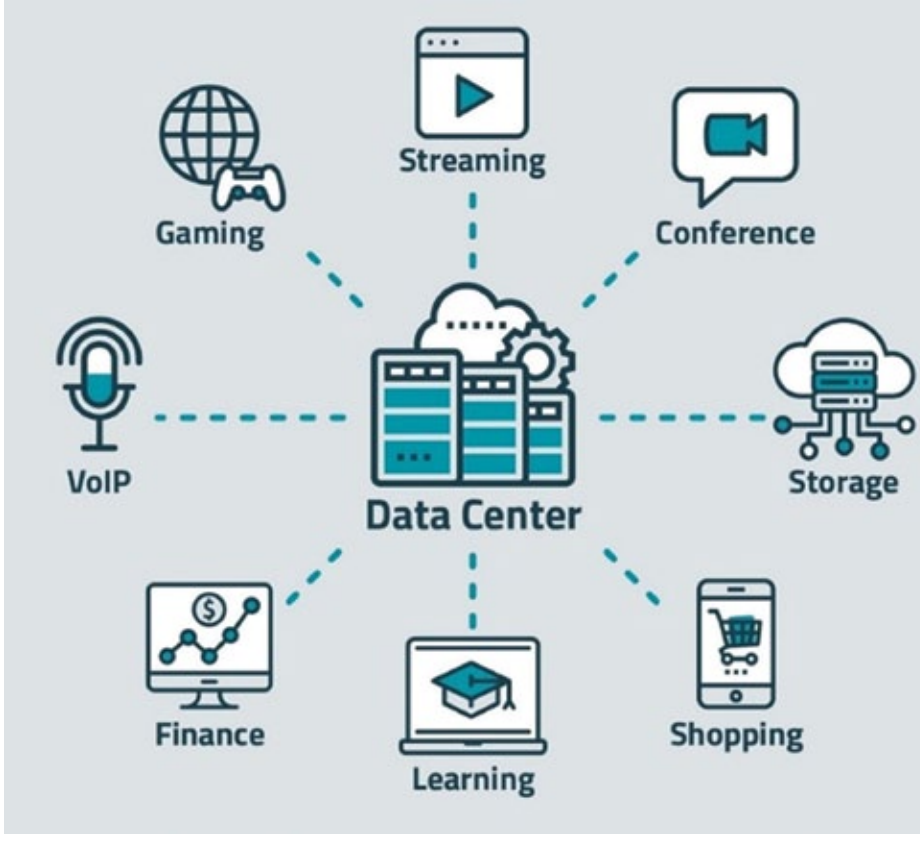
BY SUDHIR KUNDER

Data has become the lifeblood of today's global digital economy, everything from retail to manufacturing to infrastructure and transportation is powered by data. And data centres comprise a critical foundation. As Enterprises expand their product range and scale, data centres have become a critical part of organisational infrastructure. Internet of Things (IoT) and cloud storage, e-commerce applications have only increased the need for data storage and retrieval in a secure manner.

Digital will become an essential aspect in economic recovery. In the Hospitality Industry, for example, you see empty restaurants but online delivery services booming.

Does Aatmanirbhar initiative impact the DC business

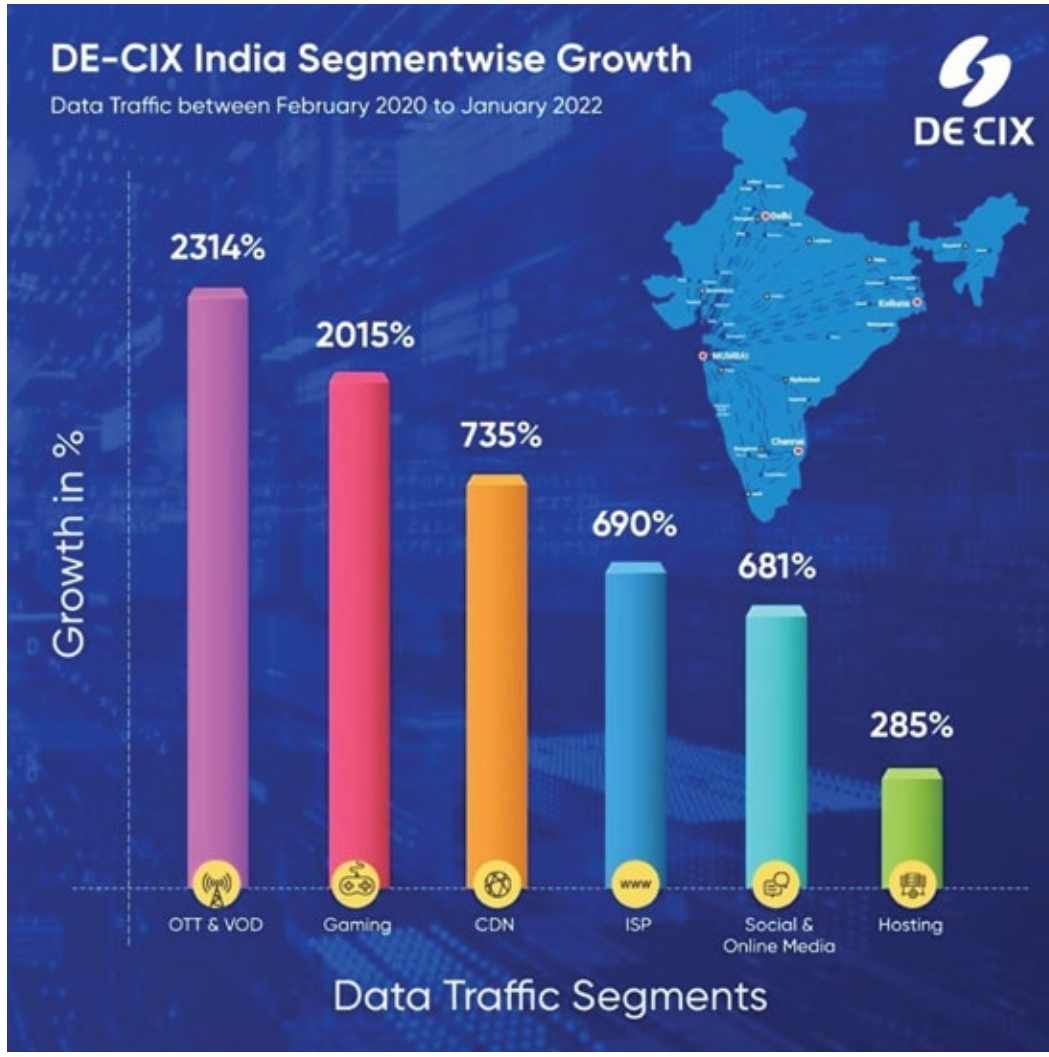
In the Budget 2022 the Government has accorded infrastructure status to Data Centers. Essentially recognising it as a core part of the economy, much like power or telecom networks. This is a huge incentive and will provide impetus for Digitalization of our country. Further the reduction in the License Fees for ISPs is another great step. New entrepreneurs will be encouraged and more digitalization will increase the demand for Data Centres, Internet Exchanges and Cloud Exchanges.



Traffic at DE-CIX DCs

Data traffic and demand for bandwidth are both increasing. In the last two years, we have seen a massive explosion in consumption across all categories. From February 2020 to January 2022, OTT and Video on Demand services grew by 2,314%, and Gaming grew by 2,015%. Similarly, ISP traffic increased by 690%, while traffic from Content Delivery Networks increased by 735%.

Guidelines to ensure Interconnected Data Centres (IDC) is the need of the hour. The overall pie is so large that this will only help all participants.



The traffic on CDN has grown by 735%. Data traffic on Social Media and Online has grown by 681%, and Hosting has grown by 285% over the same period.

DC viability and growth

We need enabling policies from the Government to support cooperation amongst stakeholders, encourage development of IXs along with fiscal incentives and remove roadblocks like ROW for Infra-builders. This will be in the ultimate interest of Digital India and every Internet user in the country. Guidelines to ensure Interconnected Data Centres (IDC) is the need of the hour. The overall pie is so large that this will only help all participants.

A growth-based model should be acceptable to everyone – interconnection should be on terms that meet all technical and security requirements. Non-traditional members such as government networks, research networks, and education networks should be part of such Interconnected Data Centres and local carriers and content providers should also connect. With appropriate incentives this ecosystem can reach all corners of the country.

Sudhir Kunder, Country Director, DE-CIX India
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MOBILE WORLD CONGRES 2022 GLIMPSES

With more than 60,000 attendees though well short of the 100,000+ figures in the pre-pandemic era, Mobile World Congress, Barcelona (MWC) 2022 finally happened as a live event. It was refreshing for the industry to reconnect face to face.

We take a quick look at the cornucopia of technical delights that greeted visitors.

Mobile Phones

The consumer space was dominated by the latest in user devices. Although none revolutionary there were some notable announcements.

Apple won the award for the best Smartphone, fighting off competition from Samsung, Google, and guess what, itself. Lenovo debuted its Legion Y90 gaming phone.

Huawei revealed its MateBook Paper, which is an e-book reader and a notebook in one.

Sikur One, a new security-focused business smartphone, was launched by Brazilian company Multilaser.

Oppo showcased a breakthrough in fast charging technology. It can fully power a battery in 15 minutes without causing lasting damage.

Open RAN

Vodafone, a key proponent of Open RAN said they would use the technology in 30% of their masts (around 30,000 sites) across Europe by 2030 with rural areas being the first to benefit. When the roll-out reaches cities, the equipment from any existing 5G masts being replaced would be reused elsewhere to reduce wastage.

O2 / Telefónica Germany and NEC Corporation announced their collaboration in launching the first Open and virtual RAN architecture-based small cells in Munich, Germany.

O2 / Telefónica Germany and NEC Corporation announced their collaboration in launching the first Open and virtual RAN architecture-based small cells in Munich, Germany.

Closer home, STL, together with ASOCS and VMWare, announced the launch of their end-to-end 5G Enterprise solution based on Open RAN, to address the growing demand for private 5G enterprise connectivity for campus, industrial and venue applications.

The poster-boy of Open RAN, Rakuten Mobile, added former Chairman of FCC, Ajit Pai, to its board and made a slew of announcements with key players like Cisco and Nokia that aim to make its offering, Rakuten Symphony, the next best invention since sliced bread. Rakuten also ended up winning the "Best Network Software Breakthrough" GLOMO awards at the MWC 22.

As far as the new kids on the block go, AccelerComm, was presented with the Best Digital Tech Breakthrough Award for Companies with Under $10 Million Annual Global Revenue Award at the 2022 Global Mobile (GLOMO) Awards. The company's award-winning 5G Physical Layer IP For Open RAN is a carrier-grade solution that increases spectral efficiency and reduces latency in an Open RAN 5G communications system.

Saankhya Labs showcased their wireless communication products and solutions, including ORAN 7.2x compliant single-band and dual-band 5G remote radio units (RU), RAN-Wiser Hardware hosting the Distributed Unit (DU) software, Broadcast Radio Head (BRH), Android Mobile Phone (MarkOne model) with built-in digital broadcast receiver SoC Prithvi 3.0 and a Satellite communication terminal – Navdoot 2-way MSS terminal for real-time tracking and 2-way communication with fishing vessels in the deep sea. The diversity in the product range is simply quite outstanding for this Indian semiconductor solutions company.

Private Networks

Accenture and TIM Brasil showcased their 5G Quality Inspection Use Case in Stellantis Automotive Pole in Goiana, Brazil. Stellantis is using 5G and video analytics to capture images of a vehicle's movement along the production line — with low latency and high data threshold of 5G networks, the real-time transmission allows for immediate quality inspection.

Cisco talked about their private 5G offering which integrates with existing enterprise systems and WiFi, operates as-a-service on a pay-per-use basis, and supports Open RAN principles. The service allows operators and IT vendors to design, integrate, and deploy private networks with an initial focus on manufacturing, warehouse logistics, hospitality, energy and utilities, mining, and education.

Qualcomm said it was developing a chip-to-cloud solution that will be paired with Microsoft Azure. To speed the deployments of private 5G networks, Qualcomm and Microsoft are building pre-validated, private connectivity architectures. The solution will boost industrial IoT, other enterprise applications, and also 5G-connected PCs.

Samsung announced that they have been selected by NTT East, to jointly expand the private 5G network business in Japan, helping to support the buildout of secure dedicated networks for various enterprises. Samsung also won awards for their virtualized Radio Access Network solution.

JMA Wireless launched a Multi-Operator Owned Network (MOON™), which allows Enterprises and Carriers to operate Multiple Independent Networks on a single Software-based infrastructure, reducing the time-to-market to hours (as claimed by them).

HPE launched its private 5G solution pre-integrated with radio access capabilities from several vendors, to allow a rapid and flexible rollout.

China Unicom Beijing and Huawei were recognized for their 5G Capital project, which involves the two parties jointly promoting 5G development, building 5G gigabit networks in Beijing, and fully utilizing 5G to create value for industries and society. The partnership includes several aspects of a smart city.

As part of the GLOMO shortlist for 5G Industry partnership, China Mobile was nominated for its private 5G network for Hunan Valin Xiangtan Iron and Steel (XISC) in China (one of the world's largest steelmakers) significantly increasing the productivity levels in its plants following the deployment.

> Cisco talked about their private 5G offering which integrates with existing enterprise systems and WiFi, operates as-a-service on a pay-per-use basis, and supports Open RAN principles.

XISC says that its detection of steel surface defects improved from 90% to 95%. Its output per employee rose from 920 tons of steel per year to 1380 tons and reduced its production costs by 10%. Overall it saw a 30% increase in production efficiency due to the 5G/edge network and saved CNY100 million (USD15 million) per year.

The Smart Port Solution — implemented by Tianjin Port, Huawei, and China Mobile — won the Best Mobile Innovation for Connected Economy. The solution at Tianjin Port delivers —a new intelligent system that connects port operations, automates transportation and increases efficiency, while saving costs and energy. The Smart Port Solution uses intelligent twins, autonomous driving, 5G, cloud computing, and IoT.

AT&T is field-testing new 5G small cell radios that can hide on top of streetlamp posts. The new radios were born out of a partnership between AT&T, mobile technology manufacturer Ericsson, and urban solutions provider Ubicquia. These new low & mid-band 5G radios can be deployed within 15 minutes on streetlamps with no long wires and big, bulky boxes.

Vodafone announced a Digital Asset Broker trial, which allows devices to communicate with each other to pay for services. For example, electric cars paying for charging, cars automatically finding and paying for parking spaces, rental cars automatically billing for pay-as-you-go use, and home energy smart meters settling bills by direct debit.

Green Networks

Nokia continued its focus on green networks. Their Liquid Cooling portfolio reduces energy consumption by up to 90 percent and base station CO2 emissions by 80 percent compared to traditional active air-cooling systems. Nokia's CEO, Pekka Lundmark emphasized the need for a tight interconnection between electricity and telco networks.

Fujitsu announced it will launch new vRAN technology that the company claims could slash base station emissions by 50%, in addition to offering end users a higher quality of service. The innovation makes use of artificial intelligence to optimize computing resources, thereby enabling a high level of performance with low power consumption.

HCL Technologies (HCL) announced the launch of two 5G applications to help reduce energy consumption across 4G and 5G infrastructure. By analyzing traffic patterns, the energy-saving application identifies where network infrastructure can be temporarily powered down during off-peak times, such as at night, without impacting quality.

Connectivity

Orange said it will switch off its 2G and 3G networks in Europe by the end of 2030, paving the way for spectrum refarming to boost more advanced and efficient 4G and 5G services.

Ericsson demonstrated Dynamic Radio Resource Partitioning (DRP) that would ensure configured spectrum resource sharing among 6 mobile network operators (MNOs) using Malaysia's Digital Nasional Berhad (DNB) wholesale 5G network.

Metaverse & football

Lamanauskas of Envision Associates compared the Metaverse with historical suggestions in the past about video calling being a killer app for 3G networks. Now video calling is here, but it didn't arrive with 3G, and there is a very different set of players from the early days.

SK Telecom gave a glimpse of their Metaverse platform "Ifland" which is SKT's metaverse platform and rapidly gaining popularity in Korea. Upon entering the company's booth, visitors were greeted by Ifland avatars that appeared on a large LED screen located at the center of the booth. Visitors could experience 'Metaverse Gallery', where they could enjoy guided tours of digital art galleries, as well as 'Metaverse K-pop Concert'. On the sidelines of the MWC 2022, Meta announced a partnership with Telefónica as a part of which the two companies will establish a Metaverse Innovation Hub in Madrid.

FC Barcelona President Joan Laporta revealed that the club wants to create its own cryptocurrency, and regards blockchain as a key tool for the creation of compelling services for the club's 300 million fans around the world.

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C-DOT's participation in the Mobile World Congress (MWC22) held at Barcelona, Spain

Centre for Development of Telematics (C-DOT), the premier Telecom R&D centre of the Government of India participated in the Mobile World Congress, 2022 held at Barcelona, Spain from 28th Feb to 3rd March, 2022.

Its booth in the India Pavilionshowcasedits work on 4G LTE, 5G, DWDM, Quantum Communications, Network Elements – Routers & Switches, Early Warning Platform for Disaster Management, Standardised M2M/IoT framework, etc.

The India pavilion was inaugurated by Dr. P.D. Vaghela, Chairman,Telecom Regulatory Authority of India (TRAI) and Dinesh Patnaik, Indian Ambassador to Spain in the presence of Smt. Meenakshi Gupta, Member TRAI, Arun Gupta, Director General, Telecom Equipment and Services Export Promotion Council (TEPC) and Dr.Rajkumar Upadhyay, Executive Director & Chairman, Project Board, C-DOT.

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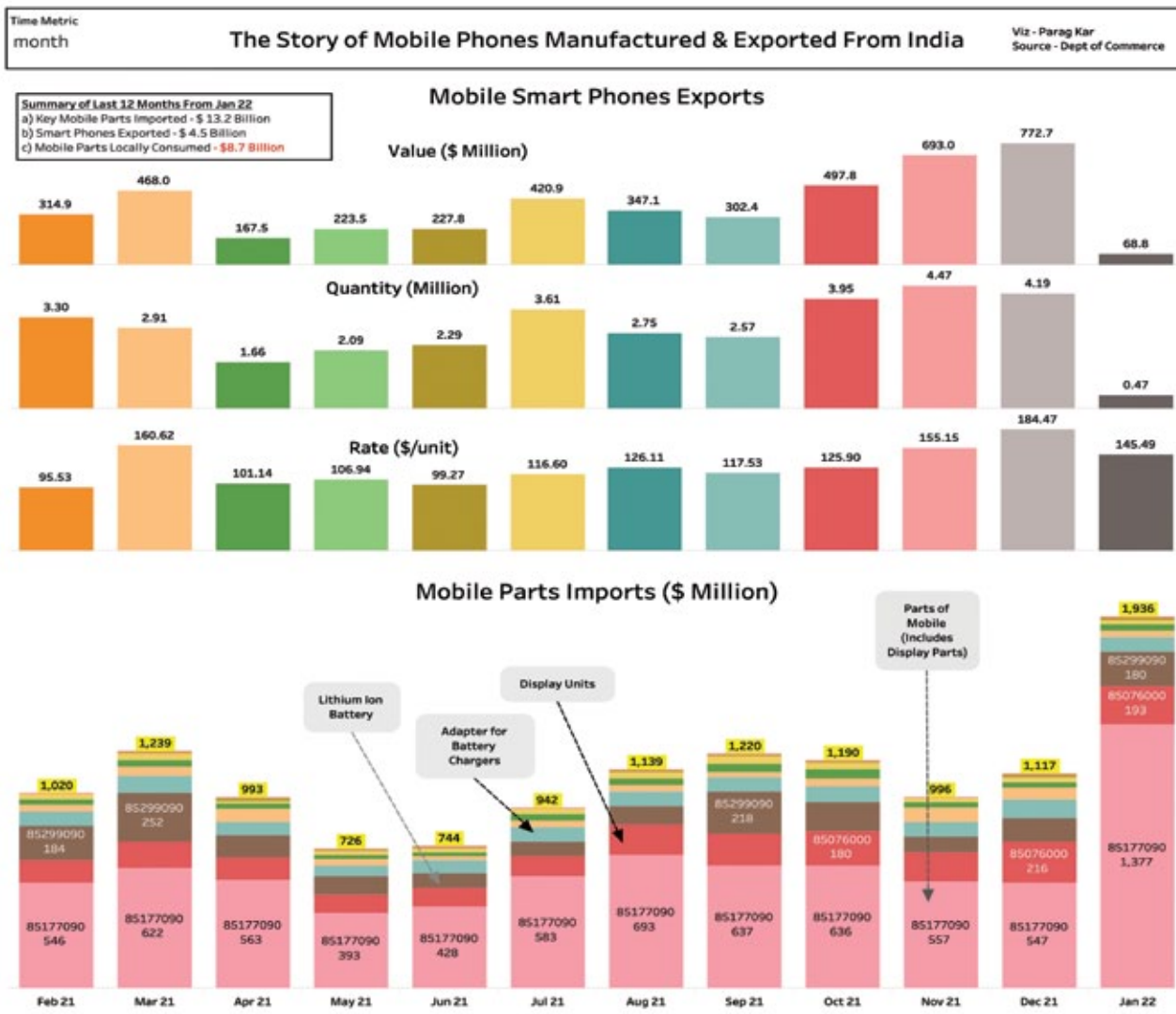
Smart phones – Parts Imported and Full mobiles exported

How is the Indian smart phone component imports stack up against the fully assembled Smart Phone Exports

Here is a quick graphical look at data compiled by industry expert Parag Kar using publicly available information from Department of Commerce and various other sources.

In January 2022, 470,000 smart phones were exported for a total Value of $ 68.8 mn. In the same month, the value of Mobile Parts Imported (including battery, display units, adapters and other components) stood at $1.93 bn (approximately Rs 15000 crores)

Imports of mobile parts in December 2021 stood at $1.117 billion. Exports in Dec. 2021 were at approx. $773 million with 4.19 million smart phones exported at an average price of $184.4. In January 2022, the average price of mobile phones exported dropped to $145.5.



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