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airtel — SPRINTING AHEAD WITH OpenRAN
NEW PARADIGM FOR 5G NETWORKS IN INDIA

Airtel is creating a multi-vendor platform for the radio access network, RAN, and testing solutions at its Manesar lab from a pool of technology partners

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[OPENING NOTE]

5G NETWORKS WILL BRING IN NEW INFRASTRUCTURE AND SERVICE PARADIGMS

With the impending launch of 5G networks, an entirely new eco-system has started taking shape in the telecommunications industry. New network standards and new ways of deploying infrastructure (like small cell street furniture) are beginning to create new paradigms. AI and open source are now playing a larger role in all aspects.

Innovation using open standards in the radio access network or RAN is probably the biggest disruption in the last 20 years. Open RAN allows mobile operators to choose equipment from multiple vendors instead of being tied to one end to end supplier. It leads to savings in costs and allows new services to be deployed using Cloud infrastructure or commercial off the shelf (COTS) hardware.

Open source software communities pitch in to solve problems faster and make deployment of services easier. New opportunities are emerging for startups and SMEs that can bring a disruption with new thinking.

Our cover story takes a look at this phenomenon with a specific focus on how Airtel — with over 25 years of experience in redefining this industry — is planning to deploy OpenRAN for its 5G network. This is a glimpse into the future of next generation mobile networks globally as some of the largest mobile brands are planning to migrate to Open Standard — Deutsche Telekom, Vodafone, Telefonica, Orange and Docomo, the path breaker Rakuten Mobile have all committed to OpenRAN.

Interestingly, while mobile technology progresses from 4G to 5G and soon to 6G, a significant number (hundreds of millions) of Indian mobile users continue to rely on the feature phone. They are happy with the services of 2G networks that serve their communications needs quite well.

To ensure financial and digital inclusion of this large segment, the Reserve Bank of India recently rolled out its UPI - 123Pay feature for mobile payments using the UPI stack - without requiring a smart phone. TRAI followed up by removing all consumer tariffs for the USSD based banking services which have been operational for nearly a decade without much success (another great read in this edition).

5G roll outs will also witness another emerging phenomenon — deployment of small cells in public spaces. While there are a host of regulatory and safety issues that require to be resolved or addressed, the utility value of these small cells is high. Small cells serve as an extension of the main network to deliver high speed data and Internet access to customers in urban spaces. They also become tools to gather large volumes of data from the environment.

These are low-powered base stations mounted on public infrastructure (also called street furniture). Like electricity poles, billboards, traffic lights, bus shelters, sidewalk bins etc. Small cells provide coverage only over very short distances and are therefore installed in a hyper dense manner, meaning a very large number of them in a small area.

These cells can help aggregate and transport data from other sensors and Internet of Things (IoT) devices that are part of smart city infrastructure -- located under the ground for sensing water levels or monitoring traffic from under the road or even measuring electricity usage on street lights. Such data is transferred to command centers for processing and extracting intelligence on live city parameters of traffic movement, ccTV footage of crowds etc.

Data Prices: According to TRAI's latest performance Indicators report for the quarter ending December 2021, the average monthly data consumed per customer in India is 15GB, at a cost of Rs 9.91 per GB.

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NEW PARADIGM FOR 5G NETWORKS IN INDIA

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BY GAJENDRA UPADHYAY, WITH INPUTS FROM JOSUN N, V&D TEAM

NEW PARADIGM
Nearly 20 years after it first disrupted the telecom network space in 2004, Bharti Airtel is set to adopt a new open radio access network (RAN) model that could once again be a game-changer in this space.

Back then Airtel was the first telecom operator to deploy networks on a managed services model at a time when other operators were buying and owning all the 2G network gear at huge cost. Now, Airtel is embarking on deploying a radio access network (RAN) based on open sources technology to roll out 5G services later this year.

While the managed services model allowed telecom operators to bring down the cost of rolling out telecom networks drastically, the open radio access network or OpenRAN (ORAN in short) will not only bring down the capital expenditure required to set up 5G networks but also allow operators to break the shackles of being dependant on proprietary network suppliers.

About 60-70 percent of the cost to build mobile telecom networks comes from buying Radio Access Network (RAN) equipment, including base stations, radio antennae, and receivers. These are mostly based on proprietary software and hardware (integrated together) supplied as an end-to-end solution by one of the few large equipment giants of the world. ORAN attempts to make core network equipment vendor-neutral with the disaggregation of hardware and software functions built on general-purpose processors.

This avoids vendor lock-in and minimizes payment of royalty towards Standard Essential Patents.

"We are working towards creating the best in class experience for our customers with minimum cost to bring value to our shareholders," Randeep Sekhon Chief Technology Officer (CTO) at Airtel told Voice & Data in an exclusive overview of the next generation infrastructure plans.

"5G deployments in Airtel network would require radio network in new spectrum bands, wider coverage using heterogeneous frequency layers and deployment of our solutions at the edge for applications such as Enterprise 4.0," he added. "ORAN would help us in multiple ways

> Airtel is spearheading the O-RAN Alliance initiative in India to build 5G solutions. Partnerships with Tata Group, Qualcomm, Intel, Mavenir and Altiostar are already work in progress.

> "The wider choice of vendors for key RAN elements and the use of general-purpose hardware in the RAN can positively impact the capital outlay of service providers."
>
> **Abhishek Shukla,** Head – Telco, Media and Entertainment Sales India & South Asia, Red Hat

to meet this objective, especially in 5G deployments. It provides us with a wider ecosystem of partners to work with. We can choose best of the breed products at lowest cost," he further explained.

COST OPTIMISATION

Experts suggest that deploying an open sourced network will help Airtel reduce network costs significantly. Building 5G networks require large capital expenditures. Buying 5G Spectrum will be one major part. The Telecom Regulatory Authority of India (TRAI) on 11th of April, 2022, gave its recommendations for auction of 5G spectrum to the Government. The recommendations set a base price of Rs 31,700 crores for 100 Mhz of spectrum for 20 years, in the popular mid-band or the 3.5 Ghz band for a pan India license. This is just the reserve price. It is possible, but unlikely, that the industry will bid much higher. Then there is the mmWave Spectrum band in the 24.25 – 28.5 GHz range. Parts of this band overlap with the Satellite service providers spectrum demands. The TRAI has set a reserve price of Rs 7,000 crores for 1000 Mhz of the mmWave spectrum pan India.

The second part of the 5G network investment will be on infrastructure. The RAN component comprises anywhere upto 60% of the infrastructure costs. Any reduction here would bring in huge savings. This also holds the key for managing the end user prices of 5G services.

ORAN solutions can drive down costs by upto 50%, according to Sanjay Bakaya, Country Head - India & Regional Vice President, India & South Asia at Mavenir, which has implemented OpenRAN based 5G networks across the world and is working with Indian operators to test the integration and service delivery aspects of ORAN.

Abhishek Shukla, Head – Telco, Media and Entertainment Sales India & South Asia at Red Hat, which has a Cloud Native OpenRAN Solution also agrees on the cost aspect. "The wider choice of vendors for key RAN elements and the use of general-purpose hardware in the RAN can positively impact the capital outlay of service providers," he says. Red Hat is also testing its solutions with Airtel.

"To scale the network at affordable cost and bring delight to customer experience will be important for 5G services," says Sandeep Gupta, Executive Vice President and Chief Architect Network at Airtel, who is leading the ORAN evaluations. Sandeep is building a roadmap to induct cutting edge solutions into the Airtel network. This plays a very significant part in the operator's 5G roll out since Airtel's mobile network (being one of the first networks in 1994) is witness to the evolution of mobile technology in India over the last 28 years.

It is host to multiple generations of mobile technology and many layers of frequency bands which were allocated for 2G, 3G, 4G and now soon for 5G services. Airtel's 3G network is no longer active. "We have shut down the 3G technology stack in our network," says Sandeep, as the network migrated entirely to 4G / LTE services.

But Airtel still continues to support and provide services to a large segment of highly price sensitive users on its 2G network. "Our feature phone subscribers continue using the 2G layer," says Sandeep.

Airtel's 5G solutions include Smart Factory, Smart Healthcare with Apollo Hospitals, Digital Twin, AR/VR based use cases, Connected Work-force and manufacturing use cases. These use cases will be conducted at end-user locations and also at Bharti Airtel's advanced 5G lab in Manesar, Gurgaon

ACCESS SERVICE PROVIDER-WISE MARKET SHARES IN TERM OF WIRELESS SUBSCRIBERS AS ON 28TH FEBRUARY, 2022 – TRAI
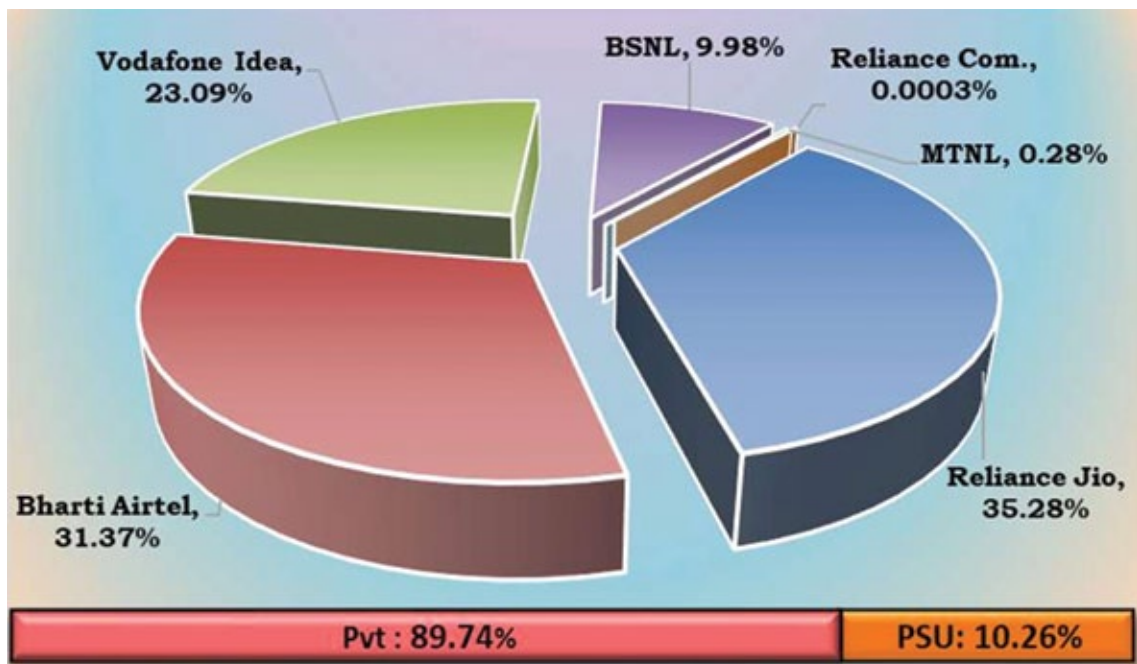
This section of Indian mobile users prefer not to use smartphones as they see limited value. Their primary requirement for using mobiles is to make voice calls and send a few text messages. Migrating this segment to feature rich data services in the future will unlock value, but this is a cost conscious base. Which is another reason for operators to explore lower network costs for future generations of new technologies.

LEVERAGING PARTNERSHIPS

The central theme of Airtel's network strategy in the past has been partnerships with industry leaders.

Akhil Gupta, Vice Chairman of Bharti Enterprises speaking at the recently concluded Voice & Data Telecom Leaders Forum (TLF) event had explained this philosophy eloquently during a fireside conversation: "Airtel has never been a disrupter. But we respond to the market due to our firm belief that in this world you must partner with specialists in any particular area. We have never had a vendor-client relationship. It is always a partnership. We have even extended this to our competitors. While we compete on the front end, we can collaborate on the backend." This was probably a reference to Jio, Airtel's most fierce competitor, with whom Airtel has signed an agreement for use of spectrum in the 800 Mhz band in Andhra Pradesh, Delhi and Mumbai circles. This has helped Jio to expand its Spectrum footprint by 56% to

1732 Mhz, with the highest amount of sub-Ghz spectrum (that is the 800 – 900 Mhz bands)

This philosophy is set to extend into its 5G radio network infrastructure as the Government prepares to auction 5G spectrum. "With 5G around the corner and the evolving roadmap for 6G, radio networks are moving to higher spectrum bands like sub-6 GHz (essentially the popular 3.5 Ghz to 5 Ghz range) & mmWave bands (the Frequency range between 25 to 40 Ghz)," says Randeep Sekhon.

Higher spectrum bands require a larger number of towers and Base Stations to set up radio units as the 5G frequencies have specific propagation and coverage requirements. The groundwork to prepare for this has been an ongoing exercise at Airtel over the last two years.

In FY 2021, Airtel had an installed base of nearly 216,901 mobile network towers (Annual report), with nearly 606,783 base stations (each of which in turn host many radio units, on average 3 per base station). Airtel installed another 22,492 mobile network towers across 22 telecom circles during the year.

These towers will be a crucial part of its 5G infrastructure. RAN equipment, which process wireless signals to and from a customer device (phone) before

Extracts from integrated Annual Report 2020-2021, Reliance Industries (RIL)

Qualcomm Technologies, Inc. and Jio, along with its wholly owned subsidiary Radisys Corporation, announced expanded efforts to develop open and interoperable interface compliant architecture-based 5G solutions with a virtualised RAN. This work is intended to fast-track the development and roll-out of indigenous 5G network infrastructure and services in India.

SPECTRUM

Jio has also signed a definitive agreement with Bharti Airtel Limited, for trading of right-to-use spectrum in the 800 MHz band in Andhra Pradesh, Delhi and Mumbai circles.

Post the spectrum auction and the trading agreement with Bharti Airtel Limited, Jio has expanded its spectrum footprint by 56% to 1,732 MHz. It now has the highest amount of sub-GHz spectrum with 2X10 MHz contiguous spectrum in 18 out of the 22 circles.

It also has at least 2X10 MHz in 1,800 MHz band and 40 MHz in 2,300 MHz band in each of the 22 circles.

With the enhanced contiguous spectrum footprint and pan-India infrastructure, Jio has increased network capacity to serve both its existing and potential subscribers. The acquired spectrum, with an average life of 15.5 years, can also be utilised for transition to 5G services at an appropriate time in places where Jio has developed its own 5G stack.

Reportedly this 5G stack is based on OpenRAN standards. It is understood that Jio has already tested in-house-built 5G radios integrated with 5G core in 2021.

It plans to leverage the companies that have India-based manufacturing. Some of the companies that could potentially be part of the Jio 5G ecosystem include SignalChip, Saankhya Labs, Tejas Networks, Sterlite Technologies and VVDN Technologies. Radisys (acquired by Jio) and Qualcomm are already part of this ecosystem.

routing them to the network core (mostly routers and switches) will reside on these towers. The job of the core network is to route calls to the final destination (the nearest tower / RAN) of the receiving device / phone of the customer.

ORAN

Open radio access networks will allow Airtel to deepen its current partnership model. The key to unlocking value will be the Radio Network – which constitutes a bulk of the network cost.

In the traditional monolithic model, operators with fully functional 4G networks – like Airtel and Jio in India – will remain locked in to their existing equipment providers. This is true for all networks globally too. The proprietary and tightly integrated software and hardware in the RAN have proven difficult to separate and create an open market.

"As a result there has been limited innovation in the RAN," says Parag Naik, co-founder and CEO of Saankhya Labs which has recently been bought by the Tata

> Operationally, Airtel is using these trials as an opportunity to create and validate site engineering of OPENRAN solutions and the way it is going to be deployed on existing towers.

WHAT IS OPENRAN

It is a global industry initiative to bring greater choice into the Mobile Operator eco-system.

So far, in the last 30 odd years since 2G networks rolled out, the network equipment and infrastructure for building wireless networks have been dominated by a few very large conglomerates (Nokia, Ericsson, Huawei, Samsung etc). This has often created a bottleneck for innovations.

The United Kingdom's telecom regulator OFCOM has used an interesting analogy. "Open RAN has been compared to Lego, since it allows suppliers to build and improve their networks using different bits of technology, which can be used together in the same way that Lego bricks can be joined together. It allows operators to 'mix and match' different elements to build their networks, instead of only using components provided by a single supplier," says Ofcom on its website.

Airtel's Spectrum snapshot* (Unpaired)

55 MHz
Spectrum in 800 MHz Band

285.60 MHz
Spectrum in 900 MHz Band

370 MHz
Spectrum in 2100 MHz Band

606.50 MHz
Spectrum in 1800 MHz Band

790 MHz
Spectrum in 2300 MHz Band
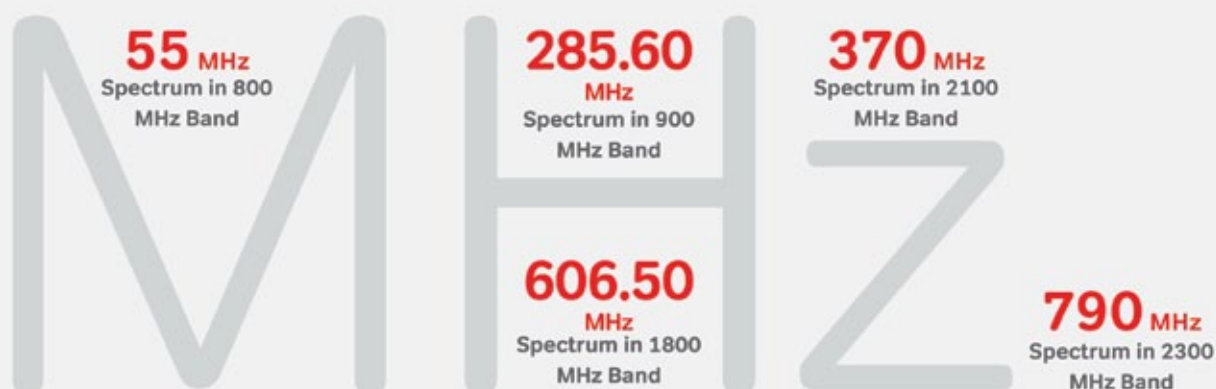
*Note:

1) Includes all spectrum acquired in 2021 auction and excludes spectrum due for expiry in September, 2021.

2) In April 2021, Airtel announced an agreement with another Telecom Service Provider to transfer the 'Right to Use' of its 800 MHz spectrum in Andhra Pradesh (7.50 MHz), Delhi (2.50 MHz) and Mumbai (5.00 MHz) on unpaired terms which is subject to statutory approvals as on the date of this report.

owned Tejas Networks. Saankhya has been developing indigenous RAN solutions for long and is a key votary for OpenRAN.

Parag sees 5G as the turning point for RAN platforms that are made in India. "It is our opportunity to get into the mobile network, which was a hegemony thus far," he says. This is where ORAN will be a disruptor. It is now a global movement initiated by some of the world's largest operators to unbundle the radio network, bring in open source technologies and infuse competition and innovation in the eco-system.

For example, Vodafone, one of the largest mobile network operators in the world, is also one of the biggest supporters of OpenRAN. Traditional RAN solutions generally require telecommunications operators to work with a single supplier across an entire mobile site. The aim

of OpenRAN is to widen the pool of suppliers, and not just for 5G. Vodafone in India has also deployed OpenRAN for its 4G networks.

Indian mobile operators are experiencing these disadvantages too. Being locked in to a single supplier prevents them from achieving the most important goal – lowering prices. India offers the world's cheapest data prices on 4G networks. But this cannot continue if 5G networks prove prohibitively expensive to set up.

"OpenRAN will enable telecom service providers to diversify their supply chains, achieve interoperability and agility, and reduce capex and opex significantly," says Hardeep Saini, Senior Director, Engineering, Qualcomm India, which provides solutions to original equipment manufacturers, OEMs.

United Kingdom Government encourages R&D in OpenRAN technologies

Even the United Kingdom Government has now stepped into the fray to accelerate the development and deployment of OpenRAN. This is part of its overall "5G Supply Chain Diversification Strategy".

A £250 million funding programme has been set up to encourage research and development in Open Networks.

A recent Policy Paper published on 29th April 2022, on gov.uk, notes: "Telecoms networks are essential infrastructure for modern society. Yet the number of vendors providing the key components of that infrastructure has diminished dramatically over the last few years, to the point where the most critical infrastructure of modern UK networks is being built out using only two vendors. Increasing vendor diversity for telecommunications networks is an essential goal for the UK and other governments internationally, to enhance security, resilience, innovation and competition in critical national infrastructure."

Vodafone Idea (Vi), in India, has deployed Open RAN solutions from Mavenir at multiple sites for supporting 4G services, since Dec 2019. They are committed to Open RAN and plan to extend the deployment of TDD and Massive MIMO sites across multiple cities in India. They have partnered with many Open RAN ecosystem vendors to develop solutions for India's traffic requirements and build a 4G+ network by advancing the deployment of 5G technologies.

REVENUE PROJECTIONS FOR OPEN RAN GLOBALLY

Revenue forecast for RAN and Open RAN

[Bar chart showing US$ Billion revenue forecast by year 2021–2030, with Traditional RAN (blue) and Open vRAN (orange) stacked bars. Y-axis ranges from 0 to 60 US$ Billion. X-axis labeled YEAR.]

Source: ABI Research ■ Traditional RAN ■ Open vRAN
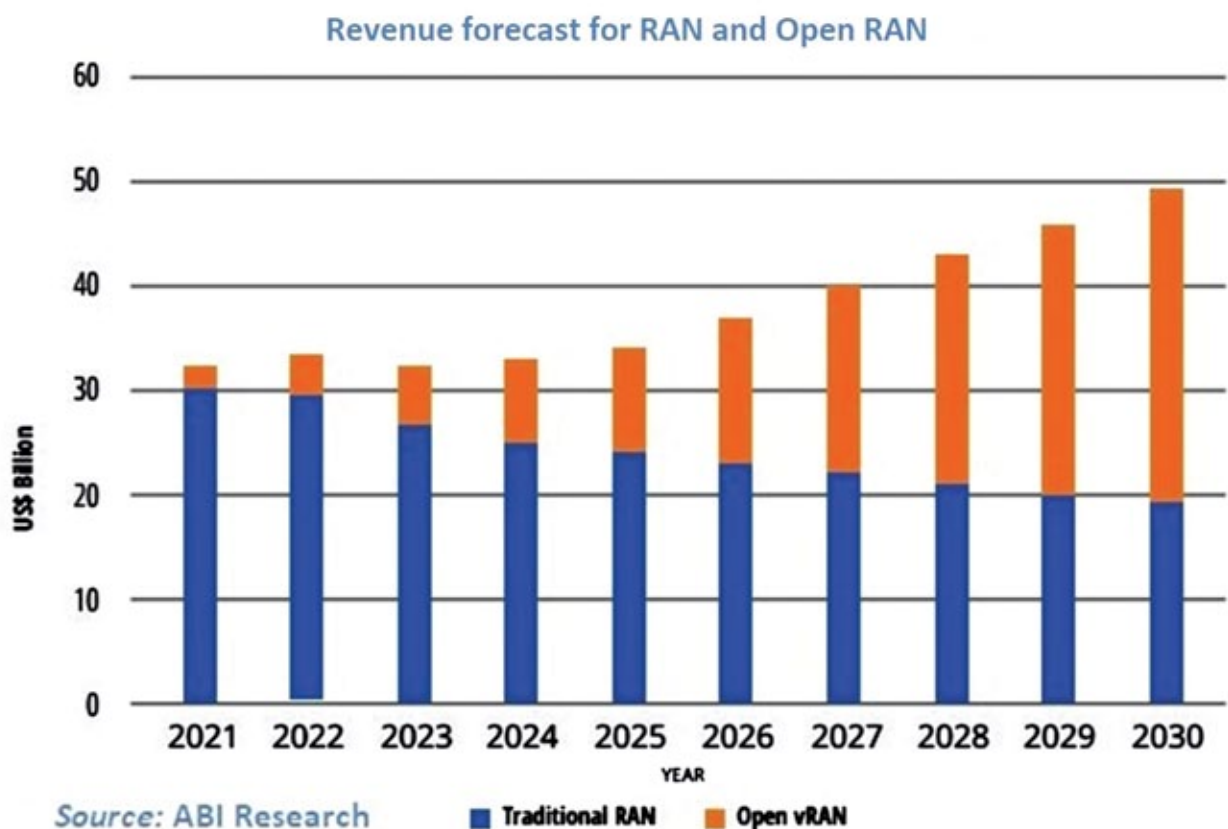
OpenRAN makes it easier to customize the mobile network architecture as hardware and software are disaggregated and different suppliers can co-exist.

For Airtel, overcoming lock-in, expanding its pool of suppliers and lowering costs are the key objectives.

"OpenRAN will help improve network optimisation and derive maximum spectral efficiency for mobile service providers," says Parag Naik. "Even if a new vendor brings a 0.1% improvement in certain parameters of the radio unit, it can multiply the benefits across the entire network," he explains. For example, a small reduction in power consumption could reflect across lakhs of sites as each site hosts upto 9 radio units. The economics quickly adds up over the months and years.

This is possible for innovators in the OpenRAN eco-system because the ORAN initiative standardizes Radio network architecture. It opens up interfaces on hardware, software, management and applications.

The ORAN Alliance specifies certain RAN interfaces that work on top of 3GPP Standards in order to achieve interoperability among different vendors. For example, the open X2 interface enables non stand alone or NSA 5G networks (like Airtel's) to introduce the 5G new radio or NR base stations (called gNBs) independently of the vendor that is currently providing 4G LTE base stations (called the eNBs).

Using Kubernetes platform like Red Hat OpenShift for RAN architecture and design, operators can take advantage of more secure, simple, scalable, and flexible deployments which will help to lower capital and operating expenses, by delivering better performance in a smaller footprint with greater network security. – Abhishek Shukla, Red Hat.

> "OpenRAN will help improve network optimisation and derive maximum spectral efficiency for mobile service providers"
>
> **Parag Naik,** CEO and Co-Founder Saankhya Labs

Similarly, the open Xn interface allows new (StandAlone) operators to choose and implement gNBs (for 5G) from different vendors.

"Airtel has been a founding member of the ORAN Alliance since 2018," says Randeep Sekhon.

"Since then, we have been leading efforts in building the ORAN community and solutions which will also be deployed in our 5G rollouts." This reduces dependency on the monolithic, tightly integrated radio network. It helps open up innovation.

It is a disruption of the traditional mobile network architecture. It has parallels to what happened in the computer industry in the early 90s. Open software standards based on Unix revolutionised the entire eco-system of Operating Systems and Applications. Software and hardware were separated. The decades that followed saw a massive surge in innovation and collaboration.

What components make up a RAN?

RAN comprises of antennas and base stations. The antennas cover a specific region, depending on their capacity. Silicon chips in both the core mobile network and the user equipment provide RAN functionality.

1. **Antennas** convert electrical signals into radio waves.

2. **Radios** transform digital information into signals that can be sent wirelessly and ensure that transmissions are in the correct frequency bands at the right power levels.

3. **Baseband units (BBUs)** provide a set of signal processing functions that make wireless communication possible. Traditional baseband uses custom electronics combined with multiple lines of code to enable wireless communication, typically using the licensed radio spectrum. BBU processing detects errors, secures the wireless signal and ensures that wireless resources are used effectively.
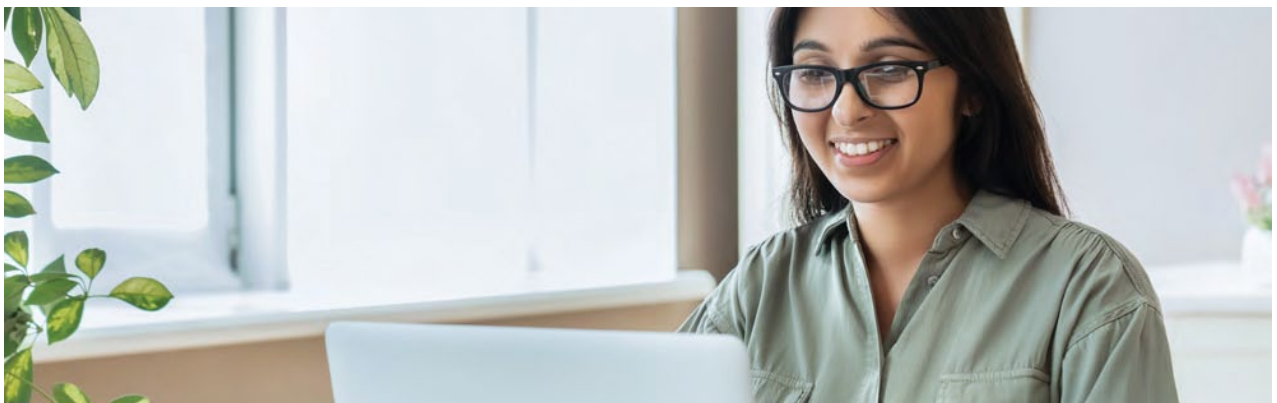
O-RAN

Airtel hosted India's First O-RAN ALLIANCE Plugfest, offering a great opportunity to Indian organisations with innovative hardware, software and services capabilities to build a 'Make in India - O-RAN solution' - for Indian and global markets.

O-RAN Alliance aims to achieve this in 5G. In India the Alliance has signed a Memorandum of Understanding with the Telecommunications Standards Development Society, India (TSDSI) for cooperation, open interfaces and building an OpenRAN ecosystem in and around the Indian subcontinent.

The results are now visible. "The vendor ecosystem in the industry is getting diversified," says Sandeep Gupta. "There are more than a dozen partners in various sub-systems of the RAN." This has enlarged the opportunities for Indian innovators like Saankhya Labs and the Centre for Development of Telematics (C-DoT), India's premier R&D hub in telecom technology.

The Chipset ecosystem is expanding for Airtel with partners like Intel, Qualcomm, Marvel, Xilinx, Saankhya Labs (TCS), ARM etc.

Qualcomm

Airtel and Qualcomm announced their partnership for 5G in India. Airtel will use the Qualcomm® 5G RAN Platforms to roll out virtualised and Open RAN-based 5G networks as well as collaborate on a wide array of use cases, including 5G Fixed Wireless Access (FWA) designed to deliver broadband connectivity at Gigabit speeds to homes and businesses.

The Radio units are being offered by non-traditional radio partners like NEC, MTI, Comba, Rosenburger, Fujitsu, Mavenir and others. The distributed units or DU and central units or CU hardware is being provided by HPE, Dell, Supermicro, Silicom, MiTAC etc. A wide variety of choices are opening up for DU / CU virtualized infrastructure with partners like Redhat, RobinIO, VMWare and Windriver. Hyperscale cloud providers like Amazon, Google and IBM are entering the RAN space to offer their cloud infrastructure for deployment of OpenRAN solutions.

This kind of large ecosystem was never possible with the monolithic RAN architecture. It was dominated by the likes of Ericsson, Nokia, Samsung and Huawei.

THE AIRTEL NETWORK (ANNUAL REPORT, FY 2020-21)

216,901

Mobile Network Towers

606,783

Total Mobile Broadband Base Stations

3,603 Bn

Minutes on Network (Mobile)

32,541 Bn MBs

Data Traffic (Mobile)

324,825 RKms

Optical Fiber Network

RAN ARCHITECTURE
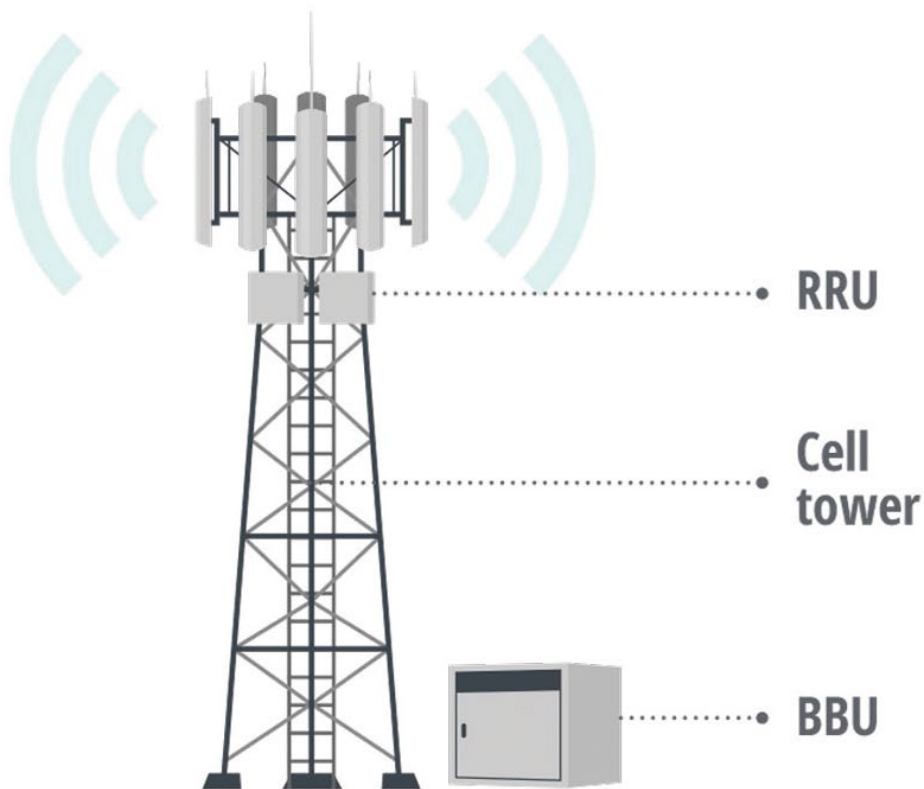
Note: RRU = remote radio unit; BBU = baseband unit
Source: Deloitte analysis.

Confirming this point of a growing vendor base, Abhishek Shukla of Red Hat says: "We are working with partners like Altiostar, Intel, Mavenir, Nokia, Samsung, Tech Mahindra and others to allow customers to deploy pre-integrated open RAN components from different vendors."

Global operators like Verizon & Telefonica are hosting multi-vendor network functions of 5G Core & OpenRAN ecosystems on the Red Hat open Telco grade Cloud. Red Hat has created a dedicated engineering team of more than 250 engineers dedicated to solutions in the RAN space. It has invested approximately $25 million in engineering resources focused on innovation for RAN.

Diversity

Beyond the infrastructure, Airtel is also working with Indian software developers for the management & orchestration of RAN platforms. These solutions are competing with global vendors in the same space.

Hardeep Saini says OpenRAN is more software centric and allows more Indian companies to participate. It involves significant amount of system integration where Indian companies excel and have immense experience. They can support and expand their offerings in the space. Adding to the wider vendor base.

Airtel's ORAN partnership with Mavenir and TCS aims to provide radio software applications over the open infrastructure.

"They have complete systems integration responsibility which is very critical for stitching different components and making them work seamlessly especially in the early adoption phase," says Randeep Sekhon.

TCS is the Radio and systems integrator for BSNL's 4G network that is currently being deployed on the core developed by C-DoT.

All of these together essentially reflect the Airtel "minutes factory" model – by handing over the setting up of 5G networks to experts and specialists. As Akhil Gupta, said at the TLF: "We believe, we can partner with the best. The operators' dependence on proprietary technologies is going away. And then it doesn't really matter who's providing the equipment."

Airtel is at the cusp of defining a new paradigm for the next generation of mobile services in the 5G space.

It will in turn will continue to focus on its core capabilities – services, customer delight and innovation.

Airtel's leap into 5G

In 2021 Airtel tested its 5G readiness in partnership with some of the leading OEMs.

Airtel Announces 5G Ready Network
Jan'21 - Hyderabad - Ericsson

- 5G Demo over a commercial network - Airtel 5G is capable of delivering 10x speeds, 10x latency and 100x concurrency when compared to existing technologies

Airtel and Qualcomm to collaborate for 5G in India
Feb'21-Manesar-Qualcomm

- Airtel will utilize the Qualcomm® 5G RAN Platforms to roll-out virtualized and Open RAN-based 5G networks

Airtel launches 'Airtel IoT' a 5G Ready Platform
Apr'21 - Manesar

- Airtel launched 'Airtel IoT' – an integrated platform that enables enterprises to harness the power of Internet of Things (IoT) and be ready for the emerging era of connected things

Airtel and Tata Group / TCS announce collaboration for 'Made in India' 5G
Jun'21 - Manesar - TCS

- Tata Consultancy Services (TCS) brings its global system integration expertise and helps align the end-to-end solution to both 3GPP and O-RAN standards

Airtel and Intel announce collaboration to accelerate 5G in India
July'21 - Manesar – Intel

- Airtel will deploy Intel's latest 3rd gen Xeon® Scalable processors, FPGAs and eASICs, and Ethernet 800 series across its network for wide-scale 5G, mobile edge computing and network slicing

Airtel demonstrates India's first Cloud Gaming experience on a 5G network
Sep'21 – Manesar

- Popular gamers Mortal and Mamba push their skills on Airtel's hyper fast and ultra-low latency 5G test network to experience the future of gaming . 5G to massively accelerate the growth of India's cloud gaming ecosystem

Airtel conducts India's first Rural 5G trial in partnership with Ericsson
Oct'21 - Delhi/NCR – Ericsson

- Demonstrates the potential of 5G to bridge the digital divide with network coverage of over 10 Km through a single 5G site with both FWA and mobile devices

Airtel rolls out #5GforBusiness for enterprises
Nov'21 - Manesar

- To showcase transformational high speed & low latency network solutions for a range of industries in partnership with top companies - Accenture, AWS, CISCO, Ericsson, Google Cloud, Nokia, TCS

Airtel conducts India's First 5G trial in the 700 MHz
Nov'21 - Kolkata – Nokia

- The demo conducted using 5G Standalone (SA) mode, achieves the highest broadband coverage of 40 Km between two 5G test sites

Airtel hosts the India edition of O-RAN ALLIANCE Global PlugFest 2021
Dec'21 – Gurgoan

- Demonstrates the growing maturity of O-RAN 5G ecosystem
- Top technology companies - AMI, ASOCS, Capgemini Engineering, Cisco, Intel, IP Infusion, Keysight Technologies, Mavenir, Sercomm, STL, TCS, VIAVI Solutions, VMware and VVDN joins

Airtel and TCS demonstrate 5G based Remote Robotic Operations and Artificial
Dec'21 - Gurgaon

- The demo leveraged Airtel's 5G test network and TCS' advanced Neural Manufacturing Solutions Suite for Intelligence driven Quality Inspection for Factories of the Future

Randeep Sekhon
CTO, Bharti Airtel

"Airtel has been a founding member of the ORAN Alliance since 2018 "

In an exclusive interview with Voice & Data, Randeep Sekhon, CTO, Bharti Airtel – who is leading the 5G network roll out and network innovation involving OpenRAN, AI and race to launch 5G services with multiple use cases in healthcare, mobile gaming and Enterprise applications.

OpenRAN is a global initiative of mobile operators to induct greater competition in the network infrastructure eco-system. What has been Airtel's experience with OPENRAN.

Radio network is key for mobile broadband services and its architecture has been evolving in-line with the evolution of technology. At Airtel, we have been adopting best in class radio network architecture with two key objectives – cost and best experience to our customers.

We were the first operator in India to scale our network with a Single RAN, with 100% of our sites having different technologies running on single radio using SDR (Software defined radios).

In 2017, we joined (Meta) Facebook's global TIP initiative to build Virtual RAN solution. It was an endeavour to implement radio network over virtualized infrastructure. Subsequently, we rolled out India's first virtual RAN based small cells, both for outdoor & indoor applications.

ORAN is the start of a movement to remove radio networks away from its current monolithic architecture to a commercial off the shelf (COTS) based compute format. ORAN opens up the radio network for innovation through participation from a wider community of developers.

Realizing the legacy challenges of a monolithic and closed radio network, leading operators across the globe came together under the ORAN Alliance to build openness in radio network architecture.

Airtel has been a founding member of the ORAN Alliance since 2018. Since then, we have been leading efforts in building the ORAN community and solutions which can be deployed in our 5G rollouts.

What specific benefits does ORAN bring for network roll out and costs.

ORAN unlocks the application programming interfaces (APIs) and brings in openness in the radio network architecture across all components.

> Airtel has been a founding member of the OPENRAN Alliance since 2018. Since then, we have been leading efforts in building OPENRAN community and solution which can be deployed in our 5G rollouts.

> OPENRAN is opening up opportunities for players both in hardware and software to offer their solution which was never possible in monolithic RAN architecture. This helps in getting to the right cost structure as well mitigates delivery challenges which are very critical in the current environment.

On the hardware side, it allows use of Cloud infrastructure on COTS hardware rather than on custom application specific integrated circuits (ASICs) that are proprietary and are used in the earlier monolithic architectures. Cloud allows innovation in compute, acceleration and energy consumption. The open interfaces in the radio network allow us the option to have radios from multiple partners. We can integrate them seamlessly with the hardware / compute layer or the Cloud.

ORAN software architecture can be broken down into different layers. Each layer can be built and provided by different (niche) partners. This includes the open source software communities. They can build open source code for RAN, thereby providing benefits of reuse of code, ease of modification and collaborative software development.

A community effort reduces dependency on proprietary contributions from a single vendor. With an entire community of players to work on identifying bugs, defects and areas of improvement it introduces agility. It also results in better code quality and stronger products. OEMs can use the open source software to package it with additional security and lifecycle management capabilities for commercial deployments.

ORAN also addresses open architecture for management & service orchestration, providing capabilities of best in class service management and orchestration (SMO) solutions to manage RAN networks. The Open APIs of the RAN network also orchestrate radio resources using AI to improve radio network performance.

Different components of the Radio Unit are open for automation and zero touch deployments. This allows better visibility of KQIs (key quality indicators).

From Airtel's perspective how does ORAN help your network and customers.
We are working towards creating the best in class experience for our customers with minimum cost to bring value to our shareholders.

5G deployments in Airtel network would require radio network in new spectrum bands, wider coverage using heterogeneous frequency layers and deployment of our solutions at the edge for applications such as Enterprise 4.0.

ORAN would help us in multiple ways to meet this objective, especially during 5G deployments. It provides us with a wider ecosystem of partners to work with. We

RAN Intelligent Controller (RIC)

Deployment of RAN in 5G is a complex exercise. There are many applications and new services. This makes it increasingly difficult to manage RAN operations using standard manual procedures. It is for this reason that the intelligence in RAN was undertaken by the OPENRAN Alliance. Leveraging big data analysis, artificial intelligence (AI) and machine learning (ML) it aims to reduce opex by reducing the network optimization efforts and resources.

This is where the RAN Intelligent Controller (RIC) makes intelligent radio resource management and optimization easy. It works in both non-real-time and near-real-time modes.

> We are leveraging our state-of-the-art technology lab in Manesar for end to end integration and performance validation of OPENRAN solutions. The lab provides a platform for our partners to test & validate their solution with other partners.

can choose best of the breed products at lowest cost. Traditionally, all hardware and software components came from a single partner.

ORAN gives us an opportunity to converge our virtualized infrastructure to be used for both Radio and core network, which is not possible with monolithic RAN architecture.

We would now be able to use the common set of automation, orchestration and lifecycle management across radio and core networks. We would also be more agile in bringing new software features through continuous integration (CI) and continuous delivery (CD), the CI/CD framework — that allows incremental and continuous addition of new features without waiting for big upgrades.

This makes us ready for deployment of Private Network for Enterprise 4.0 applications. Enterprises would need radio and core network deployments at the far edge. With OPENRAN architecture, we can deploy these solutions on a converged edge-cloud infrastructure with a single management layer and minimum cost.

With open management and orchestration layer defined in ORAN, we are building digitisation and automation capabilities for a single touch deployment and zero touch operations.

ORAN also lets us leverage Artificial Intelligence (AI) and Machine Learning (ML) for network optimization using non-real time RAN Intelligent Controller (RIC).

We would also be leveraging on our efforts till date in building A-SON and analytics to evolve it towards SMO architecture. Third party software partners can bring in their management applications to our platform for continuous improvement and automation of our radio network.

Airtel recently announced a trial deployment of OPENRAN — what were the objectives of this trial.
Airtel is the first Operator in India to commercially roll out a Virtual RAN solution both for outdoor and indoor applications.

Currently, with Mavenir, we are working on India's first field trial of OPENRAN solutions for 5G network using 3.5GHz spectrum and delivering speeds of upto 1 GBps.

The field trial is ongoing in Chandigarh and Mohali using 5G trial spectrum allocated by DOT. The trials have multiple objectives starting from performance validation of ORAN solution, its reliability or stability to testing complete lifecycle management capabilities.

Open sub-systems from multiple partners are involved in this trial. It gives them a platform for bringing in their solution and testing it in our lab as well as in real field deployments.

At this stage, we have already integrated four such sub-systems, which are cloud compute, CaaS layer, radio units, gNB/eNB Software and management plane.

Another aspect of the trial is to validate interoperability of commercial smartphones available

in the India market with the ORAN solution. India is a unique open handset market as it has hundreds of 5G smartphone models already available in commercial network.

Operationally, we are using these trials as an opportunity to create and validate site engineering of ORAN solution and the way it is going to be deployed on our existing towers. It will ensure compatibility of active ORAN infrastructure with our passive infrastructure as well validate operational costs of these sites to ensure minimum impact on our Opex during mass rollouts.

Airtel's 5G roll out is likely to be in the NSA mode — it means backward integration into your 2G / 3G/ 4G networks. There are also a substantial number of users on feature phones, how does this impact the 5G roll out.

We have demonstrated both the non standalone (NSA) and standalone (SA) capabilities during our 5G trials. This is applicable to both OPENRAN solutions as well as monolithic RAN solutions deployed by us.

On backward compatibility of ORAN solutions, we are working on an innovative approach for deployment of OPENRAN for 5G NSA, by building a dual stack gNB & eNB container function on single DU (distributed unit).

Radio units are compatible to support 4G & 5G in the same spectrum band due to common nature of waveform between these two technologies.

In summary, we have achieved 5G NSA capability using two radios in sub-6GHz (TDD) and mid band (FDD), SDR capability of the radio and converged DU for gNB & eNB functionality.

OpenRAN brings Higher Security to Networks

Since O-RAN involves multiple vendors, it is perceived to increase risk. But this is far from being true.

"Existing networks already contain sub-components from multiple vendors. The "Open" in O-RAN means that the specification to the interface is published and connecting to that interface requires gaining access to it. Auditing closed networks for security breaches is quite difficult. In contrast, open networks allow for the deployment of proven, cutting-edge security systems that examine the behavior of the various sub-components and use AI to detect breaches.

— HardeepSaini, Senior Director, Engineering, Qualcomm India.

The United Kingdom in fact encourages vendor diversity as a matter of national importance, with OpenRAN playing a key role:

In a security analysis for the UK's telecom sector, the National Cyber Security Centre of UK identifies reliance on a single supplier as a source of national dependency and something that is not desirable from a security perspective.

"Our telecoms networks represent critical national infrastructure, enabling a wide range of essential public and private services," says the UK Government in its Policy Paper. "The impact of malicious functionality being added to equipment by a hostile actor or a vulnerability being exploited increases when there is a lack of vendor diversity."

Increasing the number of vendors and reducing the number of proprietary interfaces, should go hand-in-hand with greater openness and scrutiny of standards development. "By promoting vendor diversity therefore, we seek to strengthen the ability of critical national networks to continue to function under threats including cyber attacks and supplier exits. And for vulnerabilities to be identified and rectified swiftly, with minimal impact," says the paper.

> We are working on building the converged SMO platform by integrating both OPENRAN & monolithic RAN solutions and re-using underlying data lake, AI/ML analytics & self organising network algorithms.

This would lead to an expansion of Airtel's vendor pool — does this in any way impact the need for support of your existing networks.

The entire vendor ecosystem is getting diversified in ORAN. There are more than a dozen partners ready to contribute in various sub-systems. Chipset ecosystem is getting wider with partners like Intel, Qualcomm, Marvel, Xilinx, Sankhya Labs (TCS) ARM etc. Radio units are being offered by non-traditional radio partners like NEC, MTI, Comba, Rosenburger, Fujitsu, Mavenir etc. DU and CU hardware is provided by HPE, Dell, Supermicro, Silicom, MiTAC etc.

There is a wide variety of choices for DU / CU virtualized infrastructure with partners like Redhat, RobinIO, VMWare and Windriver. Hyperscale cloud providers like Amazon, Google and IBM are also entering in this space to offer their cloud infra for deployment of OPENRAN solution both for DU & CU (Control unit). Such a wide ecosystem was never possible with monolithic RAN architecture.

Beyond the basic infrastructure, the service management & orchestration (SMO) platform is entirely software driven, which is being developed by Indian software houses and ISVs, competing with global vendors in this space.

We have announced ORAN partnerships with Mavenir and TCS, who are going to provide radio software application over the open infrastructure. They have complete systems integration responsibility which is very critical for stitching different components of the solution and making them work seamlessly specially in the early adoption phase.

How does this impact service delivery, quality and cost of services to customer — this may be a key consideration.

Cost of Ownership and experience to the customer are two key drivers for our initiatives at Airtel. These continue to be guiding principles for success of ORAN. Wider ecosystem of partners (as mentioned above) give us choice of partners and creates healthy competition in the industry.

It is opening up opportunities for players both in hardware and software to offer their solution which was never possible in monolithic RAN architecture. This helps in getting to the right cost structure as well mitigates delivery challenges which are very critical in the current environment.

For service delivery and experience, ORAN architecture allows us to use common virtualized infrastructure and automation tools for managing and orchestration among radio and core network.

As demonstrated during the last Plug Fest event, AI techniques can be used to improve capacity and spectral efficiency in ORAN based architecture.

Low latency applications in 5G are moving the core to the edge, and using ORAN architecture, we would be able to deploy core & radio network functions at our network edge or far edge at enterprise locations.

We are building our edge cloud offering, which can have the network & application for Industry 4.0 solution in a single converged cloud infrastructure as per enterprise requirements.

There are many areas of concern on OpenRAN — especially on integration issues. How does Airtel resolve this.

Any open source system and open architecture needs integration and validation, which is more critical in the initial phases till the open interfaces and solutions are deployed on a mass scale.

As early adopters, we are taking multiple steps to address this requirement.

Airtel has provided a platform for interoperability on ORAN open interfaces — hosting the ORAN Alliance

> ## We are working on an innovative approach for deployment of OPENRAN for 5G NSA, by building a dual stack gNB & eNB container function on single DU (distributed unit).

Global PlugFest two times in India in partnership with leading global and Indian technology companies.

These events have seen enthusiastic response, which underscores the growing maturity of O-RAN and the global conviction towards this movement. Solution partners like AMI, ASOCS, Capgemini Engineering, Cisco, Intel, IP Infusion, Keysight Technologies, Mavenir, Sercomm, STL, TCS, VIAVI Solutions, VMware and VVDN showcased their solution alongwith interoperability on the open interfaces on this platform.

Airtel is a close partner in Telecom Infra Project (TIP) which is another platform facilitating validation of various deployment blueprints. Airtel closely collaborates with the TIP community in establishing the right interop requirements and tests to ensure that ecosystem continues to grow.

We are leveraging our state-of-the-art technology lab in Manesar for end to end integration and performance validation of ORAN solutions. The lab provides a platform for our partners to test & validate their solution with other partners.

Currently, we are using the lab for validation of Mavenir's solution and would be using the same for TCS OPENRAN solution as well.

For smooth commercial rollouts, we are putting systems Integration responsibility with our ORAN software solution providers. They would be responsible for stitching the deployment lifecycle of the solution and smooth handover to our post deployment services team.

As part of operations, we would have a single field team to manage both ORAN & monolithic RAN solutions in the field. For that, we are integrating our ORAN solution with our existing network operating center (NOC), automation tools, data lake and analytics for AI Ops including digital workflow for field resources.

With the converged tools and digital operations, our customer experience team would be able to have a single pane of glass view for 5G infra across the network.

How does this change the rules of the game for existing partners like Ericsson, Nokia, Huawei etc.

We are working with our existing partners on their roadmap to support ORAN architecture. One of the priority areas on ORAN architecture is for building converged management & orchestration solution for both type of sites deployed in the network, i.e. sites with OPENRAN and monolithic RAN architecture.

SMO platform is one of the open solutions defined in OPENRAN architecture, which provides capability to build rAPPs and xAPPs to manage & optimize radio resources and customer experience.

SMO platform works on open A1, O1/O2 & other OSS interfaces for non-real time applications and use cases.

We are working on building the converged SMO platform by integrating both ORAN & monolithic RAN solutions and re-using underlying data lake, AI/ML analytics & self organising networks (SON) algorithms across network.

How does OPENRAN use the capabilities of Indian manufacturing and Aatmanirbhar concepts in R&D

TCS is one of our local partners for building ORAN solutions. They are building a complete ecosystem for their solution. This provides us access to an alternate and indigenous ecosystem of partners for rolling out OPENRAN sites based on their solution.

This also provides opportunity to choose best in class sub-systems between multiple ORAN partners in the ecosystem. Key benefits of ORAN based solution built by Mavenir and TCS is the interoperability provided among these components.

We will have options to choose between radio, CU/DU infra, application software & SMO between these two set of ecosystems in future. 🔅

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Sandeep Gupta
Executive Vice President and
Chief Architect Network, Airtel

"Hyperscale cloud providers like Amazon and Google are potential players in the ORAN ecosystem"

Sandeep Gupta, Executive Vice President and Chief Architect Network at Airtel is the thought leader and nodal points person overseeing the OpenRAN trials at Airtel. He has a granular understanding of technology and mobile networks. And his deep insights in the Radio Network space are unparalleled. This is important because this is unexplored territory and new paradigms are emerging due to the old and the new RAN platforms having to co-exist (at least for the time being). In a chat with Voice & Data he shares his thoughts on the key metrics for the roll out.

Is the Airtel ORAN solution the same as a Multi-Vendor Ran

Multi-vendor RAN and ORAN have different connotations in different contexts.

Open-RAN is all about openness in the architecture, interoperable interfaces and capability to build RAN using components from different vendors — if we choose to do that.

Therefore, it would possibly have multiple partners providing their respective sub-systems or building blocks for deployment of ORAN site.

Multi-vendor RAN, on the other hand, often is referred to RAN deployment where there are multiple vendors involved in site rollout, with each of the vendors bringing in their respective monolithic or vertical RAN solutions.

Such an approach has been adopted in the past to accommodate different RAN vendors for different geographical territories or splitting different radio layers of the same site among different RAN partners.

> Radio coverage is being validated in the field during the 5G trials. We are benchmarking RF performance of the ORAN solution with the traditional RAN deployments.

There continue to be concerns about the radio propagation side in OpenRAN deployments. How will Airtel resolve the RF Engineering aspects.
We are taking multiple steps to ensure that RF engineering and performance are consistent and best in class either in ORAN or monolithic RAN deployments. For ORAN solution, comprehensive set of radio performance and conformance is being carried out in our lab using test environment provided by partners like Keysight, Viavi and others.

Radio propagation and its performance is integral part of the ORAN solution. It cannot be treated in isolation with ORAN solution but an integral outcome of performance of ORAN software & hardware. In fact, ORAN architecture is working on qualifying radio performance and building AI/ML capabilities to optimize radio coverage & capacity based on clutter and traffic distribution of the site.

This is one of the use cases identified for non-real time RIC platform introduced by ORAN architecture.

Radio coverage is being validated in the field based during the 5G trials, where we are benchmarking RF performance of the ORAN solution with the traditional RAN deployments. Real time performance and reliability of cloud OS is critical for optimized performance of radio networks. Cloud OS partners are working on bringing lower latency in host and guest OS especially in DU deployments. This is an important part of our validation process beyond physical radio layer performance.

We are building converged platforms and operational workflow for RF engineering and optimization across both ORAN and traditional RAN deployments.

Amazon and Google Cloud are now moving into this space.
Hyperscale cloud providers like Amazon and Google are potential players in the ORAN ecosystem.

Their scale of cloud deployments and automation can be leveraged for building best in class infrastructure for ORAN sites. These players are working on building cloud hardware, software and automation optimized. The infra layer is completely interoperable with the ORAN gNB / eNB container functions.

Finally, with ORAN, multiple vendors and COTS — who will the operator depend on for support, maintenance and servicing. Will it be an operator function.
One of the factors for the success for ORAN deployments would be seamless lifecycle and operations as being carried out for traditional RAN network. For the user, there will be no difference. Keeping this in perspective, we are integrating ORAN sites with our existing operations framework and tools and the other way around as well. Any tool especially SMO for ORAN would also apply for traditional RAN sites.

Overall, we would have our tools, data analytics and operational framework for operations, maintenance and lifecycle services. Our system integration partners would be responsible to stitch the solution and its lifecycle (such as upgrades and updates). ♣

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Sanjay Bakaya
Country Head - India & Regional Vice President,
India & South Asia, Mavenir

"Radio access networks are on the cusp of change thanks to the Open RAN movement"

Sanjay Bakaya — Country Head - India & Regional Vice President, India & South Asia at Mavenir.

Airtel and Mavenir have created one of the first field trials on Open RAN that aims to demonstrate end to end integration, management and deployment. What is the path forward?

Open RAN has become an important part of building 5G mobile networks. Our partnership with Airtel has given impetus to the Open RAN ecosystem towards faster deployment of Open RAN in India. The commercial deployments on a scale is the likely next step.

Red Hat is working with Mavenir for Cloud-Native ORAN platforms. What does this aim at in the ecosystem?

Our solutions are all in software, in any cloud and in one network. Red Hat is also working with Mavenir to enable developers to employ the Red Hat OpenShift platform, based on Kubernetes, to build container network functions (CNFs).

Mavenir solution offers containerized network functions (CNFs) and uses cloud-native architecture with granular micro-services, following web-scale principles which provide the required scalability, agility, and reliability to address a range of 5G use cases and 5G performance requirements for end-to-end latency, high-throughput demand, and network availability.

From the pioneering work in Rakuten and global deployments, where do you see the ORAN movement going in Asia and other parts of the world?

The Dell'Oro Group OpenRAN advanced research report calculated that Open RAN revenues are expected to account for around 15% of the overall

> The study revealed that 95% of MNOs understand the importance of virtualisation and have it on their roadmaps, with 98% of MNOs considering open architectures or the opening of network architectures.

2G-5G RAN market by 2026, reflecting healthy traction in multiple regions with both basic and advanced radios.

The analyst expects the Asia-Pacific region to dominate the Open RAN market in this initial phase and to play a leading role throughout the forecast period, accounting for more than 40% of total 2021-2026 revenues. To find out where mobile network operators (MNOs) are on their journeys, Mavenir commissioned a survey with the GSMA's Mobile World Live, reaching executives from 156 global network operators. It enabled operators to share their views on virtualisation, public and private cloud strategies, multi-generation networks, Open RAN and network automation. Overall, the Mavenir survey found almost total acceptance of the need to virtualise mobile networks, embrace the use of public or private cloud services and adopt software-led open network architecture. It also showed an overwhelming number of operators were well advanced on the path to network virtualisation.

Specifically, the study revealed that 95% of MNOs understand the importance of virtualisation and have it on their roadmaps, with 98% of MNOs considering open architectures or the opening of network architectures.

Is ORAN the beginning of a new age in the Telecoms industry as a whole, which has traditionally been dominated by very large vendors and operators?

It is the future of mobile networks. Historically, RAN vendors used proprietary equipment with tightly coupled hardware and software. Because they controlled the distribution, use, access, service, and maintenance of the RAN, operators were heavily dependent on their vendors for advances and upgrades. This hindered their ability to innovate as proprietary RAN cannot sync with other equipment, leading to vendor lock-in and higher total cost of ownership (TCO).

Today radio access networks are on the cusp of change thanks to the Open RAN movement that brings together vendors, software developers, telcos, and more to develop new RAN prototypes based on open-source, open architecture, and open networks. Open RAN is a vendor-neutral disaggregation of RAN at both the hardware and software levels on general-purpose processor-based platforms. It breaks all proprietary bonds between hardware, virtualized components, and even software, exposing all interfaces and connections. This deconstruction provides an open playground for true innovation. Open RAN is an important opportunity and a huge area of commercial interest. It could lead to substantial savings for telecom operators. The combination of commercial off-the-shelf (COTS) hardware and standards-driven solutions is expected to offer operators a significant gain in CAPEX reduction. The traditional RAN domain is the most expensive part of a mobile network, representing 65 to 70 per cent of its total cost.

According to Deloitte, OpenRAN can reduce CAPEX by 40 to 50 per cent. The open standard promotes faster innovation cycles, improves supply chain diversity, and encourages automation of network operations to enable a lower overall network TCO.

What else is Mavenir working on in the Indian market?

Mavenir is committed to the Indian market with its continued investments in the development of cutting-edge technologies at R&D centres across India. We have been working with all Indian operators. We're also building radios with Jabil in Pune. 🏵

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A BRIEF HISTORY OF ORAN

With the rise of LTE, a few vendors became dominant. Primarily Nokia, Ericsson and Huawei captured most of the radio units market. The three of them commanded 74% of the market share in 2014

BY V&D BUREAU

The Evolution

In the early 2000s, when Nokia, Samsung, NEC, and LG together introduced the OBSAI (Open Base Station Architecture Initiative) interface between Radio and Baseband, Jukka Klemettilä, Chairperson of the Open Base Station Architecture Initiative (OBSAI) said: "Open Base Station Architecture will revolutionize radio base station development. It will allow next-generation radio base stations to be built using best-of-breed, shared platforms and modules, available on an open market, whilst letting network suppliers differentiate on system and network-element levels."

However, there were other suppliers who did not want OBSAI to proliferate. Some of them formed their own alliance to create an alternate interface called CPRI (Common Protocol for Radio Interface) to further divide the market. The result was that both OBSAI and CPRI remained proprietary because even though several components of these interfaces were standardized and open, the Operation and Management (O&M) protocols continued to be proprietary.

This is also the story that comes to mind when thinking of Open RAN. Mobile Network Operators (MNO) have forever been pursuing this but never managed to get right. Till now, that is.

Even during the definition of the WCDMA standards, the Radio Access Network was split into the "Node B", the physical layer of the base station, and the Radio Network Controller (RNC). A group of Node Bs was controlled by an RNC, and the interface between them, known as the Iub interface, was targeted to be standardized so that MNOs could mix and match RNCs and Node Bs. Again, as it wasn't in the vendors' interests to do this, there was no momentum to implement such an open interface.

Then with LTE, all RAN functions moved to the base station, now called the eNodeB. Radio to Core interoperability has existed since GSM days and this architecture allowed small cell vendors to use the S1 interface to get into the Radio business.

However, the X2 interface which allows eNodeBs to communicate with each other was still proprietary and prevented true multi-vendor RAN in LTE.

In 2010, ETSI (European Telecom Standards Interface body) and NGMN (Next Generation Mobile Networks) announced the creation of a new Industry Specification Group (ISG). Its aim was to develop the Open Radio equipment Interface (ISG ORI), enabling interoperability between elements of base stations in cellular mobile network equipment. Despite its well-defined open standards and good intentions, the level of adoption in the industry remained limited.

With the rise of LTE, a few vendors became dominant. Primarily Nokia, Ericsson and Huawei captured most of the radio units market. The three of them commanded 74% of the market share in 2014. This was difficult for the Operators who again tried to create an alliance to "open" up the RAN and foster competition in a market where vendor choice was limited.

ORAN

The O-RAN Alliance was founded in February 2018 by five Operators – AT&T, China Mobile, Deutsche Telekom, NTT DOCOMO, and Orange – to integrate the existing xRAN Forum and the C-RAN Alliance. The xRAN forum mainly consisted of American enterprises but also included among its members Japanese, Korean and European companies. The C-RAN Alliance consisted mainly of Chinese enterprises. Both organizations were involved in developing interoperable open interfaces, intelligent control using big data and virtualized RAN.

By unifying the two organizations, it was expected to streamline activities and make faster progress.
· O-RAN Alliance develops specifications, largely for the following 3 aspects:
· Open interface between base station equipment (e.g., Fronthaul, X2)
· Open interface within BS equipment for HW/SW decoupling (i.e., Virtualization)

• Open interface for onboarding open RAN Intelligent Controllers (i.e., Intelligence)

At the same time, TIP OpenRAN was formed by the Telecom Infra Project led by Facebook (now Meta), with an original goal similar to O-RAN.

However, since the establishment of O-RAN, its objectives have shifted to building RAN solutions based on general-purpose vendor-neutral hardware and software-defined technology. (Source: https://www.redhat.com/en/blog/open-ran-and-o-ran-brief)

Their recent focus has been on adoption of open compute hardware. Some vendors thought of O-RAN as just another attempt by the industry to create competition. The hype would fade away soon. Others like Ericsson and Huawei initially stayed away from the activities of the group.But there is a difference this time.

There are two major global disruptions in the ORAN story. The first is the adoption of Telco Cloud. The telco cloud is a software-defined, highly resilient cloud infrastructure that allows telcos to add services more quickly, respond faster to changes in demand, and centrally manage their resources more efficiently. So what was essentially an Enterprise solution, suddenly became accessible to Telecom applications, allowing the disaggregation of the Hardware from the Software.

This enabled the possibility to use Commercial-off-the-shelf (COTS) Hardware, at least in theory. The second was the vision of one man, who after having closely contributed to the 4G network launch at Reliance Jio, was attracted to Japan to see if he could topple the vendor establishment in a far more advanced market.

This man is Tareq Amin, who as chief technology officer of Rakuten Mobile, proposed to use tools that originated in the IT industry to construct a state-of-the-art mobile network, from scratch. The key achievement of Tareq Amin was to get several vendors on board to build

> Rakuten's CTO Tareq Amin has said the Open RAN framework has proved approximately 40 percent less expensive than traditional telecommunications infrastructure (Source: Light Reading; SDX Central, 2020).
>
> Rakuten deployed lean cell sites, with only antenna and remote radio heads, easing site acquisition and reducing deployment costs, and used virtual RAN (vRAN) for baseband processing.

a true multi-vendor network. However, one aspect truly stood out. They got Nokia to open up its CPRI interface to work with Rakuten.

Amin said this was a big concession for Nokia, which he appreciated because in the past, vendors kept their CPRI interfaces proprietary so that operators would not have the choice of mixing and matching hardware and software. It is another thing that Rakuten did not select Nokia for the 5G rollout (choosing NEC instead). But without Nokia's collaboration in 4G rollouts, it would have been hard for Rakuten to pull off something that was carrier-grade.

Tareq Amin is no stranger to innovation. Before joining Rakuten Mobile in 2018, Amin as Senior Vice President of Technology Development and Automation, Reliance Jio, was responsible for overseeing all aspects of the Technology Development and Automation organization, including innovation, development and operations. His organization led software development, systems engineering, next-generation access networks, technical operations and R&D. Amin drove end-to-end network design and deployment to meet coverage, capacity, and performance needs of India's largest green field LTE TDD network, supporting industry leading data connectivity and innovative services such as VoLTE/HD Voice and eMBMS. It is no wonder that when he got the opportunity to create something as disruptive as what Rakuten had planned, he readily took the plunge.

Should anyone be worried then? The statement by Stephen Elop in 2011, who as the then CEO of Nokia stated that the Company is standing on a "burning platform" shows that waiting too long to react can lead to irreversible damage.

We are yet to see an impactful disruption in the telecom network space as was seen in the Smartphone space with Android and iOS – where Nokia and its dominant Symbian slowly faded away.

With 5G deployments in advanced stages in several parts of the world, real impacts of wide-scale Open RAN can start to be seen when virtualization becomes mainstream and new vendor ecosystems mature. For India, where 5G networks are yet to be launched, OpenRAN provides a huge opportunity to create in-house capabilities for new Radio Access products that are made-in India, for the world. 🔥

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Global Deployments — OpenRAN in Europe

Orange has launched its Open RAN Integration Center, the first test lab to be dedicated to open RAN technology in France

BY DINESH CHAND SHARMA

Major European Operators including Deutsche Telekom AG, Orange S.A., Telefónica S.A., and Vodafone Group Plc are joining forces to support the rollout of Open Radio Access Network (Open RAN) as the technology of choice for future mobile networks to the benefit of consumer and enterprise customers across Europe.

In a Memorandum of Understanding (MoU) the four operators expressed their individual commitment to the implementation and deployment of Open RAN solutions that take advantage of new open virtualized architectures, software and hardware to build more agile and flexible mobile networks in the 5G era.

The four operators work together with existing and new ecosystem partners, industry bodies like the O-RAN ALLIANCE and the Telecom Infra Project (TIP), as well as European policy makers, to ensure Open RAN quickly reaches competitive parity with

> In Brazil, Telefonica's brand Vivo already conducted Open RAN technology-based trials for 4G and 5G.

> Orange plans to deploy solely Open RAN compliant network equipment starting 2025.

traditional RAN solutions. This initiative is an important milestone towards a diverse, reinvigorated supplier ecosystem and the availability of carrier-grade Open RAN technology for a timely commercial deployment in Europe.

Telefonica

Telefonica is planning to deploy Open RAN technology in three phases:

- Initial Phase (2020-2021): Pilots & Trials

- Phase 1 (2021-2022): Initial deployments

- Phase 2 (2022 and onwards): Massive deployments in Spain, Brazil, Germany, and the UK

The objective is to deploy Open RAN in 50% of the network between 2022-2025. Telefonica also signed an agreement with Rakuten Mobile in Sep 2020 for research and lab trials supporting OpenRAN architecture, jointly developing proposals for optimal 5G RAN architecture and OpenRAN models.

In Brazil, Telefonica's brand Vivo already conducted Open RAN technology-based trials for 4G and 5G with Mavenir, Parallel Wireless, Altiostar, Supermicro, Intel, Gigatera Communications, and Xilinx.

In Argentina, Telefonica's brand Movistar conducts Open RAN proof-of-concept with Altiostar, RedHat, Quanta, Gigatera, Kontron, and IBM.

Telefonica's Deutschland went live with the Open RAN network at three sites in Landsberg am Lech, Bavaria, and plans to deploy Open RAN at 1000 sites in Germany by the end of 2022. The ecosystem vendor for Open RAN deployment includes Altiostar, Gigatera Communications, Dell, Intel, Red Hat, Supermicro, Xilinx, and NEC.

In Jan 2020 Telefonica O2 initiated a range of Open RAN (O-RAN) projects to provide better network service to its customers in the rural areas and dense urban hubs, with the expectation of commercial deployment in the next 18-24 months. O2 partnered with non-traditional RAN vendors – Mavenir, DenseAir, and WaveMobile for the O-RAN projects.

- In partnership with Mavenir, O2 enhanced coverage and capacity in high-density environments in London. They provide enhanced mobile connectivity and a better customer experience in areas such as stadiums to shopping centers.

- In partnership with DenseAir, O2 is deploying O-RAN-based 4G and 5G networks at Millbrook. O2 works with Millbrook Proving Ground, a neutral host provider for public and private 5G connectivity, for testing and developing CAV technology.

- O2 has deployed O-RAN-based coverage solutions developed with WaveMobile, across several sites in the UK, including Woldingham, Surrey, which carry mobile traffic for O2 customers

In Jan 2021, O2 conducted a successful Open RAN trial with NEC, Altiostar, GigaTera, Supermicro, and other ecosystem partners.

- NEC developed customized Open RAN architecture, conducted end-to-end testing and interoperability verification in its UK center of excellence running via O2's core network

- Alitostar provided the virtualized RAN software

- GigaTera and Supermicro provided the hardware for the trial

Deutsche Telekom

Deutsche Telekom started deploying Open RAN technology-based 4G and 5G services in 2021, at 25 sites in Neubrandenburg, a city north of Berlin, in Germany. The key vendors part of this Open RAN validation process include Mavenir, Fujitsu, NEC, Nokia, Dell, and others. Based on the results of the small deployment, DT may plan for wider deployment of Open RAN technology in 2023-24.

In November 2021, German government announced the first projects to receive support from a €300 million fund created to develop and test open RAN technology.

One of the winning projects is an open RAN test lab run by a consortium of partners including Deutsche Telekom, Vodafone and Telefónica.

> Vodafone has plans to have more than 2,500 openRAN sites by 2027 (the date for the removal of Huawei RAN equipment). 30% of all its European sites will be using open RAN by 2030, this means 30,000 sites.

Orange

Orange plans to deploy solely Open RAN compliant network equipment starting 2025 and conduct virtual and automated network trials by the end of this year. They believe that Open RAN will provide opportunities to the new vendors but not at the expense of Nokia and Ericsson. Orange has launched its Open RAN Integration Center, the first test lab to be dedicated to open RAN technology in France.

Telecom Italia

Telecom Italia is deploying Open RAN technology for 4G services in Faenza, Italy. The Open RAN deployment initiative is part of the signed MoU between Vodafone, Telefonica, Deutsche Telekom, Orange, and Telecom Italia to deploy Open RAN technology across Europe. The key vendors enabling the Open RAN-based 4G deployment for TIM include JMA wireless and Microelectronics Technology (MTI). TIM will extend the Open RAN solution to support 5G services in the future.

Vodafone

Ireland: Vodafone has plans to launch Open RAN-based 4G services at 30 locations in Ireland, in partnership with Parallel Wireless. It was initially trailed in North Kildare and then rolled out across the North-West region. Additionally, Vodafone will also leverage system integrators to improve product automation covering zero-touch provisioning, testing, and operational process definition for Open RAN. In this process, it will further extend the developing ecosystem to include RAN automation vendors.

UK: Vodafone recently launched the first open RAN 5G site, which is the first macro-open RAN site in the UK that uses low-cost hardware and cloud-based capabilities. The base station is powered by Samsung's vRAN technology platform, which includes its own radios along with Intel Xeon based servers from Dell operating a Wind River cloud platform. Capgemini Engineering and Keysight Technologies provide the acceleration and testing.

Vodafone has also reiterated its plan to have more than 2,500 open RAN sites in operation in 2027 (the date for the removal of Huawei RAN equipment) and confirms that 30% of all its European sites will be using open RAN by 2030, this means 30,000 sites including both 4G and 5G sites.

Italy, Romania, and Spain: Vodafone also conducted field/lab trials with Open RAN technology for 4G services with Parallel Wireless and Lime Microsystems, in Italy, Romania, and Spain.

Vodafone Ziggo (Netherlands): Vodafone Ziggo is conducting a trial of Open RAN technology with NEC Europe and Altiostar.

They tested the first voice call over the Open RAN network in Oct 2020. They plan to integrate solutions from other technology and radio vendors using commercial off-the-shelf hardware from third parties to transform the Vodafone Ziggo network into a software-based network.

Vodafone announced in Nov 2020 that it would open multiple OpenRAN Research & Development labs across Europe. In April 2021, Vodafone opened its first Open RAN test and integration lab at Newbury, UK, tech campus.

Vodafone has partnered with Qualcomm to develop the reference designs and technical blueprint for equipment suppliers to help build 5G networks of the future using Open RAN technology, enabling further diversification of network equipment vendors.

The Open RAN reference design will combine Vodafone's engineering expertise at building high capacity, large-scale networks with Qualcomm Technologies' leadership in developing high performance and low power Application-Specific Integrated Circuit (ASIC) solutions for device and infrastructure products. The combined solution will ensure Open RAN is ready for use in 5G networks and capable of supporting applications with high bandwidth requirements such as virtual and augmented reality devices, even in urban areas.

"Building an Open RAN ecosystem for Europe"

A report titled "Building an Open RAN ecosystem for Europe" has been jointly released and published by Deutsche Telekom, Orange, Telecom Italia (TIM), Telefónica, and Vodafone. As the title suggests, the

> Vodafone has partnered with Qualcomm to develop the reference designs and technical blueprint for equipment suppliers to help build 5G networks of the future using Open RAN technology.

paper aims to drive the telecoms community in Europe, from regulators and governments to businesses and research labs, to embark on a full-on campaign to win the leadership in Open RAN.

For Europe to overhaul its weak Open RAN ecosystem and to assume global leadership, the operators put forward five policy recommendations:

- Ensure high-level political support for Open RAN, including designating "the development of Open RAN as a strategic priority for the EU's Digital Decade", as well as recommending a joint declaration by the EU Commission, EU member states, and industry stakeholders in support of Open RAN. "Europe needs to talk with "a common voice" related to Open RAN", the paper says.

- Create a European roadmap for network innovation, including encouraging the European Commission "to create a European Alliance on Next Generation Communication Infrastructures", similar to earlier alliances the Commission has created for Cloud and Semiconductors sectors. The Alliance should develop a network technology roadmap for Europe, starting with embracing Open RAN.

- Incentivise and support EU Open RAN development, including setting out specific priority domains for investment, public funding, tax incentive, as well as policy support. It also highlights the importance of closer scrutiny by the European Commission over any "strategic take-overs of European companies, including start-ups, by large non-European companies".

- Promote European leadership in O-RAN standardisation, including establishing "pan-European certification for Open RAN interoperability and quality to build deployer and ecosystem confidence" and adopting "O-RAN specifications as voluntary standards by ETSI, in complement to existing 3GPP specifications."

- Engage in international partnerships, including setting up a multilateral fund with allies and partners, in particular the US and Japan, "for the adoption of secure, open and interoperable network equipment in third countries".

OpenRAN Standardization

OpenRAN standards include work on network controllers, management and orchestration frameworks, and the interfaces that connect all the network elements in the RAN infrastructure. There are a multitude of interfaces at work connecting the various parts of the open RAN infrastructure, many of which are borrowed from 3GPP standards.

There are two dominant open RAN standardization bodies: the O-RAN Alliance and the Telecom Infra Project (TIP), however, they are not the entirety of the open RAN standards movement.

The O-RAN Alliance has released its own second major package of open RAN specifications. While "Release 001" batch of specs was focused on creating open interfaces for technologies like fronthaul, transport and cloud, Features in "Release 002" include specifications for Traffic Steering, Quality of Service and Quality of Experience Optimization, RAN Slicing, and Service Management and Orchestration.

3GPP - the primary standards partnership body currently developing 5G technologies and putting the finishing touches on its "Release 17" package of specifications, with its final "protocol coding freeze" due in June'22.

On May 27, 2021, the O-RAN ALLIANCE signed a cooperation agreement with the European Telecommunications Standards Institute (ETSI). O-RAN ALLIANCE shares with ETSI a common objective to perform and promote regional and international standardization for 3GPP based technologies.

According to O-RAN Alliance - it plans to make its initial batch of standards more formal by passing them through the ETSI standards organization in 2022. 🔥

Dinesh Chand Sharma, Director – Standards & Public Policy (SESEI)

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Cloud & the New Wave of Risks for Business Applications

One of the main drivers of these cyber threats is the increase in online activity - users engaging with commerce, education, shopping and more on the Internet and through mobile applications – mostly deployed on the Cloud

BY DHANANJAY GANJOO

India is among the top five countries in the world with the highest number of cyber security incidents in 2020. While all industries are prone to cyberattacks, Government, insurance, legal, education and research, healthcare and manufacturing remain the most vulnerable

11,58,208 cyberattacks were registered by the Indian Computer Emergency Response Team (CERT-IN). In response to this the government launched the Cyber Surakshit Bharat program which aims to create awareness about cybercrime and set in place adequate safety measures for Chief Information Security Officers (CISOs) across all government departments.

The implications of growing cyber-attacks on Indian businesses are serious.

86% of the data breaches occur at the app level, making it imperative for businesses to strengthen the application ecosystem. Bad actors probe the networks to find vulnerabilities in applications and use a variety of tricks to lure customers into giving up sensitive information and carry out account takeover (ATO) attacks.

Today, a business of any size becomes an easy target of automated botnets that can launch massive, terabyte-per-second attacks. This disrupts business and can cause massive losses every year.

Doing business in an online, interconnected world raises a constant fear about cyberattacks, outages, and privacy violations. Businesses need to have active bot management and anti-fraud capabilities.

One of the main drivers of these cyber threats is the increase in online activity - users engaging with commerce, education, shopping and more on the Internet and through mobile applications – mostly deployed on the Cloud. According to the 2021 report by IDC, the Indian public cloud services market will be approximately $10.8 billion by the end of 2025.

As businesses increasingly migrate to more efficient cloud-based services to meet escalating demands on

> Systems, infrastructure, networks, platforms and applications equip every digital business with a vast wealth of digital-health data through probes, agents, logs, or traces.

infrastructure, they also become victims of a range of security complexities that follow.

We must therefore ask: How can businesses optimize performance from any device while providing a robust behind-the-scenes security architecture to their customers?

Four essential considerations:
Zero trust model for a robust cybersecurity framework
Organizations must adopt a 'Never trust, always verify, continuously monitor' approach. This is important because users connect from a variety of locations and devices to access a range of applications. Security of applications is critical for preventing data breaches. Thus, the first approach is to create a cybersecurity framework with a zero-trust model to protect from bad actors. Then, to anticipate, plan and respond to risks in real-time, advanced web application firewall (WAF) and Web App and API Protection (WAAP) solutions monitor behavioral analytics embedded with machine learning and artificial intelligence.

Enhancing observability with analytics and automation
Leveraging automation to bypass manual review and approvals in the wake of an attack can improve performance or even halt an attack.

Systems, infrastructure, networks, platforms and applications equip every digital business with a vast wealth of digital-health data through probes, agents, logs, or traces.

However, they don't always have insights to take positive or corrective action. Advanced machine learning based analytics can deliver quick and accurate actionable insights and align with desired business outcomes.

Protecting end-users against fraud with client-side security
Businesses are broadening their digital services. Offering more convenience and enhanced customer experience leads to expansion of the digital attack surface. The need to defend against bots, recognize legitimate users

and rapidly gain insight into client-side attacks is thus growing daily. Real-time engines that proactively monitor traffic and identify fraudster activity can help mitigate fraud early.

Seamless coordination between the security and fraud teams can prevent fraudsters from targeting the teams with automated credential stuffing and launching account-takeover (ATO) attacks.

ATO is considered the most prevalent and expensive attack, which resulted in over $ 6 billion in losses globally in 2020, as per the 2021 Identity Fraud Study by Javelin Strategy and Research.

Strengthening security with updates and training
Web app exploits are among the most common techniques in security incidents and have an average time-to-discovery of 254 days – a long time for damage to be done. Performing threat assessment and security testing regularly – especially after changes or updates in an application – is imperative.

It helps uncover potential risks. Incorporating a standard practice to update security patches helps plug every target hole. This controls, mitigates, and protects applications against security misconfigurations and prevent data leakage.

Attackers today have the advantage of a vast data pool. Application security training for stakeholders becomes even more crucial due to this. Conducting regular security awareness trainings for employees to recognize and mitigate threats – using appropriate tools – can ensure employees' preparedness for potential attacks.

Applications are the heartbeat of every business. Today, organizations should take all steps to ensure that their applications are fast, secure, and available for employees and customers and ready for application-layer attacks. 🧩

Dhananjay Ganjoo, Managing Director for India and South Asian Association for Regional Cooperation (SAARC) at F5, Inc.

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UPI 123 – Aims to bring Digital Financial Inclusion to Feature Phone Users

But TRAI's recent Tariff Amendment to bring USSD tariffs to ZERO could also give a boost to feature phone banking users

BY VOICE&DATA TEAM

In March 2022, the Reserve Bank launched the UPI123Pay – which aims to bring the Unified Payments Interface (UPI) payments to feature phone users and include them in the digital payments eco-system.

In April, Telecom Regulatory Authority of India (TRAI) introduced a tariff amendment to eliminate all charges for use of Banking services on USSD dialing code *99#, which was introduced in 2012, but was slow to take off, thought it still in use.

The UPI 123 services will reach out to the estimated 450 million feature phones users in the country – mostly on 2G networks of Airtel, BSNL and Vodafone Idea.

UPI-123Pay aims to make the digital payment value of the UPI stack (currently available only on smartphones) to feature phones. There are 4 solutions going live according to the National Payments Corporation of India, NPCI.

· Payment through and Interactive Voice Response (IVR) number

· Payment through a missed call

· Payment through an app like feature from the Device maker

· Payment through a Sound based technology

UPI payment through pre-defined IVR numbers would require users to initiate a call from their feature phone to a predetermined number and complete UPI on-boarding formalities to be able to start making financial transactions without internet connection.

The IVR will provide multiple language options for customers to choose their preferred language. IDFC First Bank, City Union Bank & NSDL Payments bank have gone

HOW DOES UPI – 123 WORK
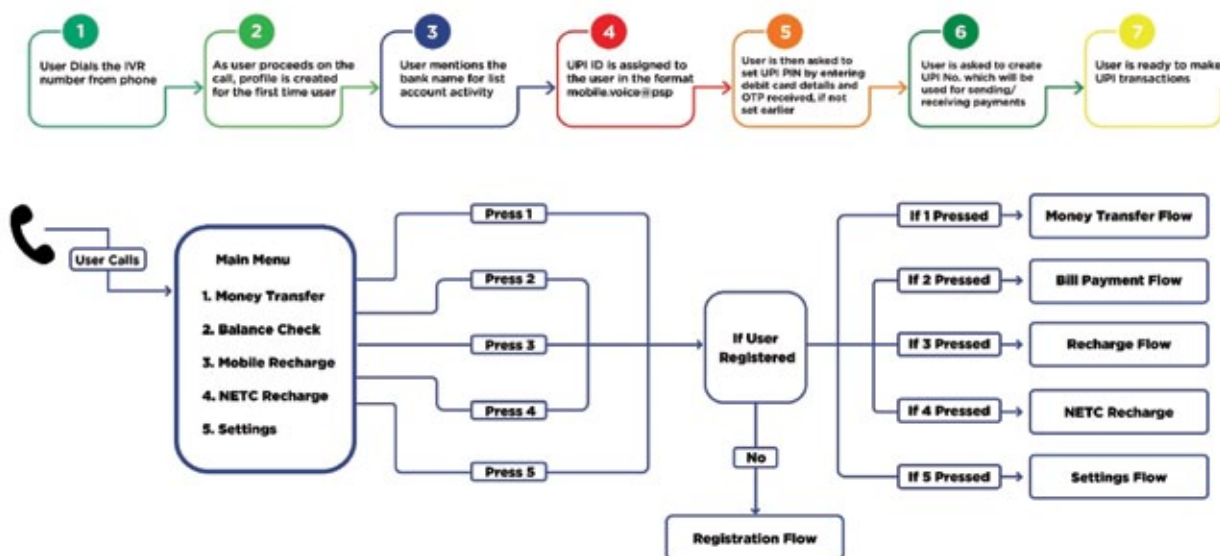
A Brief History Of USSD Based Banking Services in the Mobile Sector

TRAI issued its 68th Amendment to the TELECOMMUNICATION TARIFF ORDER on 7th of April 2022.

Its main objective is to rationalise all charges for mobile banking on USSD.

A short history of how the USSD tariffs were introduced and where they are today is given below.

In December, 2011, Department of Financial Services (DFS) was allocated USSD code *99# by the Department of Telecommunication (DoT) for mobile banking services. This was to be implemented through the USSD gateway of National Payment Corporation of India (NPCI). In April, 2012, TRAI mandated that every Telecom Service Provider (TSP) should facilitate the banks to use USSD to provide banking services in not more than two stage entry of options in the case of USSD.

In November, 2012, NPCI launched a USSD Gateway (National Unified USSD Platform) for enabling mobile banking through the USSD channel.

In 2013, the Authority through the Mobile Banking (Quality of Service) (Amendment) Regulations, 2013, increased the maximum number of stages for completing a mobile banking transaction from two to five, primarily to increase the number of banking services available to USSD consumers.

TRAI issued the Fifty Sixth Amendment to its Tariff Order in 2013 and prescribed a ceiling tariff of Rs. 1.50 per USSD session for USSD-based mobile banking service

To increase financial inclusion, the TRAI further reduced the USSD - based ceiling tariff for banking and payment services from Rs. 1.50 to Rs. 0.50 per session in 2016

TRAI also suggested mechanisms for improvement in software features, design of user-friendly menu, increase in consumer awareness, developing Unified USSD platform to support transactions across all payment platforms to the NPCI/Banks to increase usage and popularity of this service.

Reserve Bank of India (RBI) constituted a High-Level Committee on Deepening of Digital Payments (CDDP) with the objective of encouraging digitization of payments and enhancing financial inclusion through digitization.

The committee recommended further rationalization of USSD charges to increase its adoption and popularity. RBI urged the Authority for a follow-up action on the recommendations made by CDDP and provide the required regulatory framework for the same. The Department of Financial Services (DFS) requested for waiving off USSD charges to facilitate faster adoption by common people especially in rural/ difficult areas, the segment of population for whom the Pradhan Mantri Jan Dhan Yojana (PMJDY) Accounts scheme has been established to promote financial inclusion.

Following a request from the DFS in this regard, the Authority initiated a consultation process to further rationalize USSD charges. The outcome of this consultation has resulted in the Telecom Tariff order of USSD being brought to "0".

The present tariffs for wireless services for the quarter ended September, 2021 is given below (TRAI order):

Table: Average tariffs for wireless service for the quarter ended September, 2021

Item	Value for wireless service
Average tariff for outgoing voice call (Average outgo per outgoing minute)	Re. 0.04 per minute
Average tariff for outgoing SMS message	Re. 0.01 per SMS
Note: The above figures are based on data submitted by the TSPs to the Authority	

This shows that the present ceiling tariff of Rs. 0.50 for each USSD session for mobile banking is quite high as compared to the average tariff for one minute of outgoing voice call as well as for one outgoing SMS.

Based on information furnished for two consecutive quarters of F.Y 2021-22 by Operators providing USSD services, it is observed that sessions for self-care service (service used by USSD subscribers to seek information on pre-paid balance, validity period, details of tariff plan etc by dialing a USSD code) constitute 99.5% of the total USSD sessions.

A miniscule share of 0.5% pertains to USSD sessions for mobile banking and payment services.

TRAI notes that one operator is providing USSD non-self-care service free of charge at present whereas, other operators are charging at the ceiling tariff of Rs. 0.50 per session.

The number of USSD mobile banking and payment sessions, for the operator that doesn't charge, is four times the number of sessions initiated at ceiling tariff.

Since the USSD banking targets users who are in the low- income and rural population segment. These are users of feature phones.

Removing the USSD charges for the banking service can have a positive impact on number of USSD transactions, which will be a significant step towards achieving digital financial inclusion. TRAI feels that this will not impact the revenues of the industry substantially, especially when similar transactions for self-care services are being provided free by the service providers.

TRAI has decided to do away with the charges prescribed for USSD for mobile banking and payment services.

The total revenue generated through USSD mobile banking sessions in the country is quite small at approximately 0.00007% of the total revenue of the industry.

UPI TRANSACTIONS

According to the NPCI In April 2022, 316 Banks were live on UPI accounting for nearly 5.6 billion transactions worth 9.8 lakh crores !

Month	No. of Banks live on UPI	Volume (in Mn)	Value (in Cr.)
Apr-22	316	5,583.05	9,83,302.27
Mar-22	314	5,405.65	9,60,581.66
Feb-22	304	4,527.49	8,26,843.00
Jan-22	297	4,617.15	8,31,993.11
Dec-21	282	4,566.30	8,26,848.22
Nov-21	274	4,186.48	7,68,436.11

UPI – 123 aims to bring the entire population of Feature Phone users on this platform and create a digital payments revolution that would enable seamless and easy transactions for even the most remotely located consumers

This is one more step for the country towards Financial Inclusion.

live on IVR payments. Ultracash & Tonetag are technology solutions providers.

The UPI – 123 feature can also be used through a missed call.

Feature phone users can access their bank account and perform routine transactions such as receiving, transferring funds, regular purchases, bill payments, etc., by giving a missed call on the number displayed at the merchant outlet. The customer will receive an incoming call to authenticate the transaction by entering UPI PIN.

UPI – 123 has another interesting option: Proximity Sound-based Payments (that is, use of sound waves to enable contactless, offline, and proximity data communication on any device). All of this is expected to be a huge boon for the non - smart phone users.

Further there are over 25000 villages that still remain without any mobile network connectivity (refer V&D March issue Aatmanirbhar). These villages would take first steps using feature phones. 🔶

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IDEMIA — Global Biometric platform leverages ML and AI solutions developed in India

Continuing our series on Aatmanirbhar — R&D on Biometric Technologies in India is growing fast

BY VOICENDATA BUREAU

Hundreds of employees at the IDEMIA headquarters in Noida, UP, walk in every morning and wave their fingers (horizontally) through an optical console on a device that is now considered one of the world's most advanced Contactless biometric access & attendance solution. And partly developed in India. IDEMIA employees wave their fingers (without touching) over the panel (called the Platen area) as the digital screen on top recognizes the finger print, lights up and flashes a message -- Access Permitted.

The MorphoWave is a biometric device that reads 4 fingerprint in one go using an Artificial Intelligence based algorithm along with a high end graphics processor. It became popular during the Pandemic, to overcome the fear of touching exposed surfaces and soon became one of the world's most advanced 3D fingerprint contactless authentication technology.

MorphoWave is ideal for time & attendance, access use cases in organizations that have large numbers of employees.

A large part of the MorphoWave biometric algorithms have been created by IDEMIA's India team working out of its Noida headquarters. Nearly 800 engineers and software developers work here to create high end software for Machine Learning (ML), Artificial Intelligence (AI) and video analytics solutions (for emerging technologies like Facial Recognition, Payment Card solutions and Identity).

> We are wielding technological expertise available in India with the presence of Global R&D and Global Digital Platforms to create innovative solution based on biometrics, AI and cryptography for our clients across the world.

The strong R&D team in Noida develops software solutions which are incorporated into world class hardware at factories in France and shipped to over 180 countries globally. This is Indian R&D for global markets.

"We are wielding technological expertise available in India with the presence of Global R&D and Global Digital Platforms to create innovative solution based on biometrics, AI and cryptography for our clients across the world." Said Matthew Foxton, IDEMIA India Regional President.

"The MorphoWave scanner is capable of handling up to 50 scans per minute," said Peeyush Jain, Vice President - India and APAC, Corporate Identity, Public Security and Identity Business Unit. This is ideal for deploying in premises like factories and large enterprises where large numbers of workers and employees stream into and out of the office or factory premises at peak hours.

IDEMIA's customers include India's leading Oil and Gas companies, E-Commence companies, commercial builders, Govt. organizations, Financial institutions, Telecom companies, industries and other establishments.

The IDEMIA biometric scanners (touch based) are also used by the UIDAI, for Aadhar enrollments. One of the core technologies underlying IDEMIA products is the security and encryption solution that ensures that these data point are never breached. Both the contact and contactless products store the details in highly encrypted formats which are destroyed if there is any tampering with the hardware.

The MorphoWave scanners can be deployed for easy access to parking lots as drivers simply wave and pass through, or at factories, entry gates and at Cafeterias in large organizations. Employees biometrics is assimilated with payment solutions at these latter locations. Food can be ordered and paid by just waving one's hand over the device.

The MorphoWave scanner uses heavy duty Graphic Processing Units or GPUs (from industry leader NVIDIA). The GPUs are capable of processing huge video files (which are the 3D template of fingers) and crunching them very fast for quick comparison with local database. . The need for such high end graphics processors are also required to ensure accurately capture finger prints that are moving fast. The fingers move fairly quickly across the platen (in about one second). These finger templates are quickly referenced to a stored database of approved biometrics. It verifies and authenticates in milliseconds.

The MorphoWave technology was originally launched in 2016. It has been installed in more than 18,000 gates worldwide, according to IDEMIA. The Biometric device is integrated with most of global access control platforms, like gates and turnstiles. 🧩

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India needs a Limiting Space liability and Insurance Policy

India needs to move swiftly and bring in the National Space Act and SpaceCom policy which lay a facilitating risk management framework for the Industry. The policy must define the scope of damage to include all types of damage caused in all stages viz., prelaunch- launch, inorbit

BY ANIL PRAKASH

Space risk management is a critical aspect of the space missions and has evolved as one of the most talked about topic in recent years with the space sector becoming increasingly commercialized. The Space industry conversation is no longer about just exploring but about protection of National Space Assets.

The first satellite insurance policy was placed with Lloyd's of London in 1965 which was designed to cover physical damages on pre-launch of Intelsat 1. But now the definition of damage is wider with complex spacecrafts, new modernized payload facilities and all types of risk mitigation options available. The global scenario of insurance liability for satellites covers the risks in the Pre-launch period to launch to in-orbit risks with a new segment in ground insurance called "spaceports". Interestingly, the coverage deals mostly with the physical damages.

However, there is lot of ambiguity on the risk case scenario of a cyberattack on the space assets. The Lloyd's Market Association (LMA) recognized that there is an urgent need for the insurers and the space community at large to address the potential of a cyber-attack on satellites, launch vehicles or ground-based control systems. ISRO too has acknowledged the criticality of cyberattacks on the space assets. As per global policy best practices space insurance and liabilities are viewed as a key cost for the operators. Policies are framed suitably so that insurance liability and cost are not very taxing on the private sector and the startups which would disrupt their commercial viability and stifle innovation.

Scenario in India

The democratization of space allowing private entities to participate in space activities is a revolutionary step and represents a striking shift in the vision of the government for the space programme.

However, in the absence of Space Policy or a space Act, issues of space liability and insurance remain critical. At present, the liability for damage caused to third parties or to space assets are guided as per established UN Liability Conventions, 1972.

The national draft SpaceCom policy which is in final stages requires the entities to insure themselves against any liability accruing from space operations in India or outside and also holds private entities liable

> The liability for damage caused to third parties or to space assets are guided as per established UN Liability Conventions, 1972.

for any damage caused due to its space operations. This obligation to be fulfilled by providing a financial guarantee/insurance cover as determined by IN-SPACe who would evaluate the risks involved in nature and operations of that space system in outer space.

The absence of a transparent risk assessment framework entails an open ended liability creating an ambiguous undertone to it. This would impose undue burden on private entities especially start-ups and MSMEs with limited financial capacity and resources.

There are several Startups and MSMEs in India that are poised to play a critical role in the value chain and cannot afford to abide by or sustain a liability clause which provides unlimited and absolute liability coverage to third parties. The burdening of the entire sovereign liabilities to the private sector is going to be non-starter for the NGPE participation in the Indian space economy.

Internationally, the policies are devised to limit the liability on the private entities and in most of the jurisdictions the State guarantees for excess liability claims or adopts the waiver scheme in public or government interest.

SIA-India has in its response to the draft SpaceCom policy 2021 stated the critical need to create a limited liability framework based on the best practices of International economies. The association thanks Mr. Anirudh Rastogi from IkigaiLaw and Dr. Ranjana Kaul from Dua Associates for their contribution to the matter of insurance liability Draft Spacecom Policy 2021.

Here are some of the common and most effective international practices followed in different jurisdictions that should be adopted by Indian Policy makers while drafting the New Spacecom Policy or a Space Act

- **Limited liability from private entities:** Major space faring nations have limited the liability of private entities towards third parties by providing a certain quantum of liability up to which the private entity is obliged to be insured. This practice is adopted by almost all nations to support the private sector for their space activities. This does bring about a gap in the liability arising out of any damage and the amount insured by the industry player. Other tools of policy come into play to bridge this gap.

- **State guarantee for excess liability claims:** In the US, the state ensures the liability to be paid off if it exceeds the insured amount. The private entities are expected to get insurance for any space mission/activity. In terms of liability claims exceeding the insured amount, the government would pay up to a cap of $1.5 billion. A similar practice is also followed in Austria and South Korea where the space operators are required to ensure a particular amount of sum for any space activity. Any damage exceeding the amount insured shall be paid by the state. India should consider adopting a similar approach, whereby the government provides guarantee for any liability claims exceeding the quantum of liability capped for private entities. With additional state guarantee, the quantum of liability for start-ups and MSMEs can be capped at a lower amount, and any liability claim exceeding that amount can be incurred by the state. This will reduce the burden on private entities especially start-ups.

British Petroleum could survive claims against the oil spill damage in the Gulf of Mexico because the UK Government provides sovereign guarantee for several high risk activities.

- **Right to recourse:** Russia, where in case of a higher degree of damage caused to either organization involved in a joint space mission must claim the liability and impose it on the organization which did not face immense damage. The degree of the damage is decided by the Russian Federation. Thus, ensuring the liability is not covered by the organizations equally.

- **Waiver of liability and insurance for space activities in public or government interest:** Space Legislation in Bulgaria states that the authority has the right to waive off the obligations:

  - When the operator has sufficient capital to compensate for the damages caused

  - When the nature of the space activity is for public interest and not for commercial usage.

> The aforementioned international best practices which has helped the private players in the space industry to flourish must be studied and analyzed while framing the policies in India.

In Russia, the compensation of the damages caused to space objects would be taken up by the Russian Federation, given the space operation was conducted in association with the Russian Federation. Thus, waiving off the space operator from the compensation of the damages caused. Similar approach is also followed by France, Austria and some other nations.

To encourage space innovation, research and exploration among start-ups, a similar approach could be adopted in India. Start-ups engaging in space operations for public interest, including science, research or education, or at least jointly with the government, could be granted a complete waiver for any liability claims arising out of such operations and any compensation from liability claims could be borne by the government. The government could prescribe detailed rules on eligibility criteria and the types of space activities that will be considered to be in public interest. This will encourage private entities to take on space activities despite the enormous risks involved:

- **The limitation period for liability claims:** Under the French Space Operation Act (2008), there is a limitation period of one year from the damage caused by the entity which would be compensated after a year of the damage caused. If in any case, the compensation is not paid the following would be passed on to the government.

- **Mandatory reciprocal waiver of liability:** During space operations, the concept of reciprocal waiver is common and the agreement of mutual waiver of liability ensures that the involved launch providers, contractors and sub-contractors bear the loss or damage during the space operation equally. This international practice is followed in France and USA. It is considered that a similar practice must be followed in India as well, ensuring limited liability to the extent of the private entity's responsibility.

- **Formation of National Space Fund:** Implementation of the National Space Fund would focus on contributions from the profits of space missions and activities. In Russia, usually, the profits from space missions and activities is used for research purposes, however, with the creation of the National Space Fund there is the utilization of the funds for compensation of liabilities from damages caused to space objects along with funds for research purposes as well. Such a collective burden sharing responsibility will be beneficial for start-ups and MSMEs. Unlike insurance solutions where funds from space industry move to insurance industry, a solution like this where the funds remain within the space industry must be adopted in India.

Conclusion

India needs to move swiftly and bring in the National Space Act and SpaceCom policy which lay a facilitating risk management framework for the Industry. The policy must define the scope of damage to include all types of damage caused in all stages viz., prelaunch- launch- inorbit. A smooth space traffic management framework must also take into account the insurer's or actuary's point of view as well. The aforementioned international best practices which has helped the private players in the space industry to flourish must be studied and analyzed while framing the policies in India.

Additionally, the insurance companies must collaborate with the space market to develop innovative solutions which allow the private sector to be more participative and encourage them to be risk-takers.

The participation of private sector enables the nation's aspiration for an exponential growth in the space economy and needs to be supported by government interventions including relief to the private segment from these liabilities and obligations. Major space economies use different practices to handle this matter in favour of the private companies and the startups. When the world is moving towards limited liability and insurance cost for private entities, India cannot afford to work otherwise. The government's approach on liability and insurance is, hence, very critical. 🔆

Anil Prakash is the Director General of Satcom Industry Association (SIA), which is a Thought Leader and Advocacy body for the Satellite Communication Industry in India.

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Open Optical Networks (OON) The new paradigm for multi-vendor Optical networks

It is the choice of Network operators to decide how fast and how far, they want to have transition — from a proprietary network to a fully open architecture

BY DR ANUJ KUMAR SRIVASTAVA

Optical communication systems have been a closed end to end proprietary infrastructure consisting of: optical system, transponders at both ends, a line and management system. In this conventional optical network architecture components were supplied by a single vendor with proprietary rights. While the concept of disaggregated or open optical components is an open interface or non-proprietary interface. This enables the service providers to purchase different components from different vendors and assemble a system themselves in the most optimized, innovative and cost effective manner .

This concept of openness in in optical network architecture facilitates a multi-vendor solution and enables to mix and match devices from different vendors with the expectation to have greatest innovation that the broadband industry provide can provide.

Such network is called Open optical networking and describes an optical network that uses open standards and commodity hardware and components which provides network operators with more choice and enables each function of node to innovate at its own manner because of disaggregation of transponders and line systems.

> Network operators and service providers can reap benefit from open Optical networking system because of number of choices of hardware and software as they have not to depend on a single vendor.

Open Optical networking enables interoperability and data exchange around set of equipment from different vendors in a network. This enhances expandability and extendibility — in both hardware and software - in the optical network.

Advances in silicon performance improvement cycle described by Moore's law, advent of Coherent optical transceivers and researches in photonic technology provide faster innovation cycle relative to the conventional optical line system. Network operators and service providers can reap benefit from open Optical networking system because of number of choices of hardware and software as they have not to depend on a single vendor. Out of various benefits that come from open networking, the most important are the potential to saving in cost compared to proprietary vendor products and the extra flexibility in configurability.

Motivation for Open Optical Networking- Increasing Traffic Demands

A number of research reports have found and given indication about the increasing traffic demands on our networks. In the era of Covid-19, importance of network has been greatly realized— not only for entertainment but for remote learning and work-from-home also .

Anticipated Annual Traffic Growth by Network Segment is depicted in Figure1.

Such a high anticipated traffic growth is a strong motivation for service providers to reconfigure and switch to open optical networking with non-proprietary and multi-vendor components at lower costs.

There is an indefinitely increasing array of bandwidth-hungry applications with the ever increase of digital traffic coming out of social media, multimedia services,, VoIP, mobile applications, and cloud computing. With the growth of Internet of Things (IoT) and Machine-to-Machine (M2M) communications, an explosion of data is be generated. Therefore, this will give a potential impetus to the growth to the optical transport network market. Hence, the tremendous growth of digital traffic will have a substantial positive effect on the optical transport network. To minimize losses because of system failures, service providers depend on high-speed optical transport networks. The wide spread pandemic the COVID-19 has also resulted in a major disruption in supply chain of telecom infrastructure. So the ever rising requirements for home connectivity, digital health, and also even economic indexing measures may give a boost to low cost, highest reliability and lowest latency optical connectivity. This
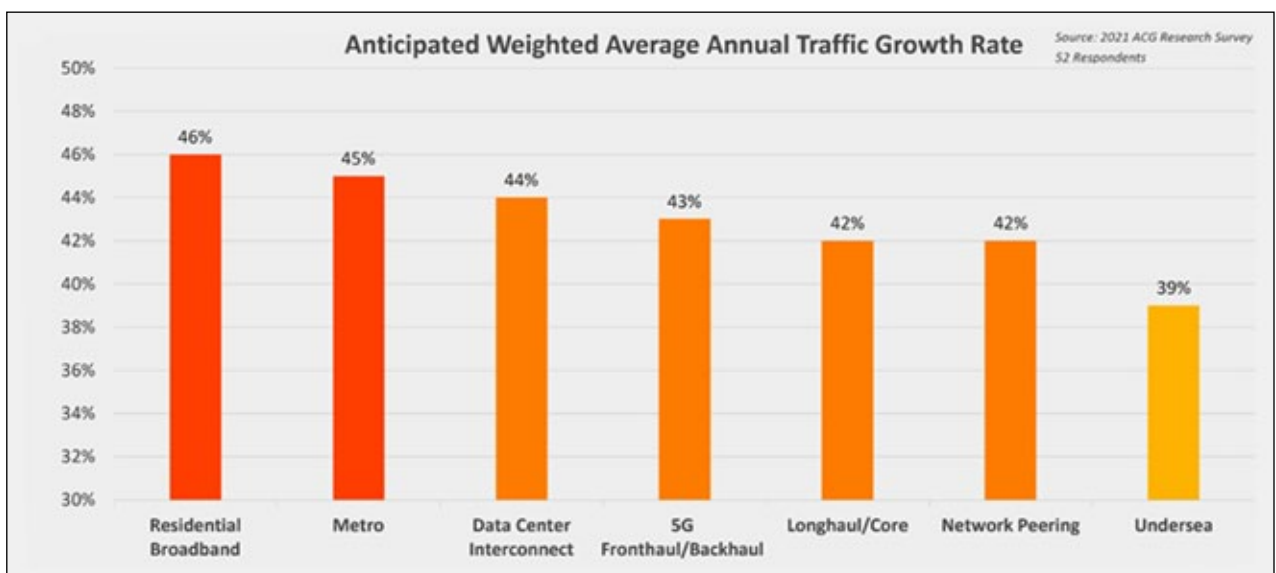

Figure 1: Anticipated Waited Average Annual Traffic Growth Rate by Network Segment

has given birth to the idea of Open Optical Network. Since 2017, optical transport networks have seen the emergence of various initiatives to transformation culminating into an open optical architecture similar to emergence of open 5G Radio Access Network (OpenRAN) and open architectures in the data center etc.

Benefit of Open Optical Networking

The objective of more and more openness a to get rid of vendor's monopoly over proprietary infrastructure and to enhance supply chain resilience by having multi-sourcing options. By incorporating SDN and orchestration, network becomes smarter, more capable, and grows in scopes. Simultaneously open interfaces also grow in relevance and importance. Applications of well-defined standard protocols and open source code versus proprietary APIs, greatly simplify the Integration efforts.

Open Optical and disaggregation networking gives impetus to optical network with enhanced velocity of innovation cycle, economic benefit and evolution as telecommunications industry matures. Such evolution can be seen across a number of areas in networking, including open RAN initiatives for 5G. As per ACG Research Survey report 2021, service providers are anticipating a are number of benefits

Three top envisaged benefits of Open Optical Networking are:

1. Increase the Innovation Velocity of Optical Network
Leverage of innovation capabilities of network operators can be enhanced regarding the entire optical ecosystem by disaggregating the optical network into functional blocks depending on their innovation cycle, by selecting the best-in-class technology from any vendor. The increased pace of velocity of innovation is another benefit of open optical networking. On separating the network functions each of them become capable to innovate itself at its own pace. The innovation ecosystem which are expanded, further simplifies the integration of new technology with YANG data models and with open APIs, etc. This is in contrast to traditional network where upgradation of the networks are entirely based on the capabilities of innovation of the single vendor regarding the propriety interface.

2. Optimize and Differentiate with Multivendor Solutions
With the implementation of open optical networking, network operators or service providers can build a more tailored network with the help of combination of the best technology from each vendor which gives them a competitive advantage. Open optical networking also immensely increases the scope for operators to build a network that optimally meets their specific needs and provides a platform for differentiating their services.

3. Transform the Economics of Optical Network
Open optical networking enhances tremendous economic benefits to the operators and service providers by enabling them to scale up capacity of their networks within the scope of budget limitations.
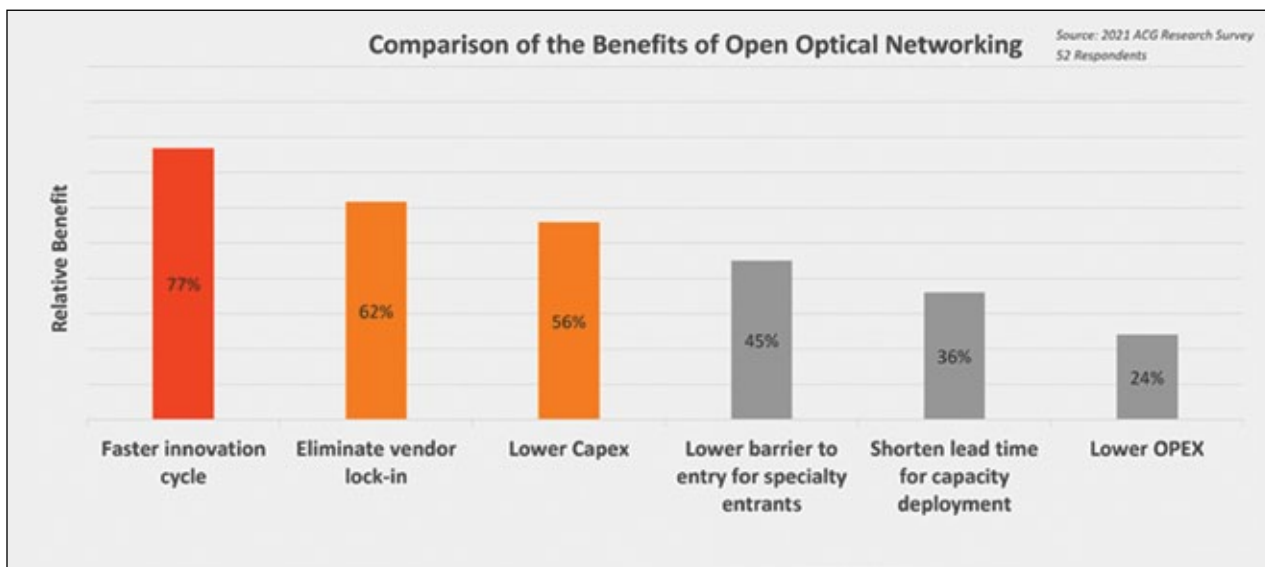

Figure 2: Comparison of Anticipated Benefits of Open Optical Networking

> Open Optical and disaggregation networking gives impetus to optical network with enhanced velocity of innovation cycle, economic benefit and evolution as telecommunications industry matures. Such evolution can be seen across a number of areas in networking, including open RAN initiatives for 5G. As per ACG Research Survey report 2021,

Accelerated innovation speed is the most important driver for reductions in cost-per-bit in Open optical networks. Because by doing so, with each generation of coherent technology offers an additional step of change in increase in capacity-reach, This reduces footprint and power consumption. By enabling a multivendor option, the economic benefits of ecosystem-level innovation quickly realized in the entire the network lifecycle. The flexibility and option to select the best products in multivendor scenario for each layer and domain independently rather than purchasing whole solutions from a single vendor only, is on more reason for a better economics

Optical Industry Evolution to Openness and Disaggregation

This evolution is now enabling and facilitating optical networking to take advantage the principles of openness and disaggregation by separating the two key primary functions in optical networks i.e. optical line systems and transponders and also by minimizing challenges with the help of disaggregated optical solutions and by reducing the operational issues arising due to multi-vendor networks.

These aspects of openness are arrived at by using coherent transceiver technology; by adopting of line systems along with flexible grid support and monitoring power per-wavelength ; driving standards and interoperability in terms of optical transmission, open APIs, and standardized YANG data models and by organizations, including ITU-T, Open ROADM MSA, OpenConfig, Open Networking Foundation (ONF), and Telecom Infra Project (TIP).

Implementation of Open Optical Networks - Requirements

It is the choice of Network operators to decide how fast and how far, they want to have transition — from a proprietary network to a fully open architecture — and all points in between -Open Xponders and Open (optical) line systems. To assist with the transition to open, the Open Line System (OLS) and a compact modular platforms with wide range of functions reference architecture provide a general guideline for constructing disaggregated systems. There are important four points to be discussed for transition from proprietary to fully open architecture :

1. Open Xponders provided by any vendor with performance is not dependent on specific optical line system features. It is highly desirable attribute that Open Xponder should have ability and capbility to tune the center frequency along with baud rate/spectrum, and modulation of the wavelength .

2. Open (optical) line system (OLS) should be able to support a wide range of open Xponders supplied by a third party. OLS allows independent selection of ROADM and transponder vendors in anumber of configurations in terms of per-channel power monitoring and attenuation for third-party wavelengths, flexible grid support, link control algorithms from any third-party Xponders without affecting performance.

3. Compact modular platforms have a wide range of functions. They are enabled by self-contained sled-based hardware and with a robust and flexible microservices-based software architecture. In provides footprint, power, and cost benefits and reduces the number of platforms for each vendor. It further speeds up the pace of deployment of new functions and technologies from a particular thid party vendor.

4. NETCONF, RESTCONF, and gRPC/gNMI APIs are Open APIs and YANG data models which are compliant with Open ROADM and/or OpenConfig, These data models are compatible on compact modular platforms and they in turn support the management and control of multi-vendor optical networks and also multi-layer networks. It facilitates new optical technologies for smooth integration with industry tools for streaming telemetry, analytics, dashboard, automation and machine learning etc

Optics for Open Optical Networks

400G OpenZR+ and Digital Coherent Optics (DCO) shall
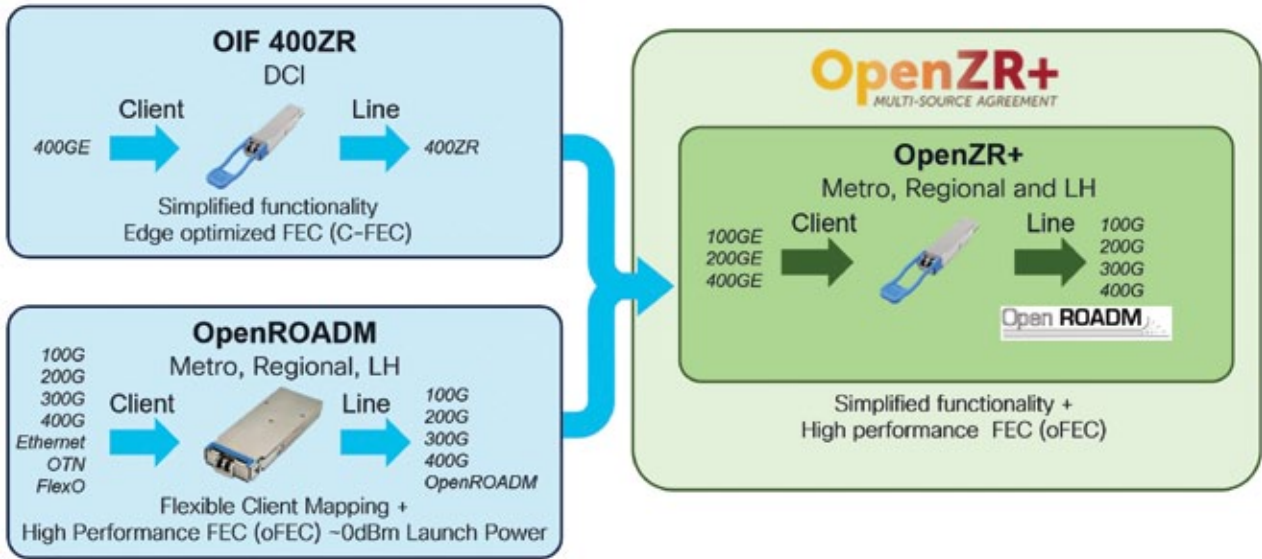
Figure 3 Optics for Open Optical networks Ref: Cisco Blog

transform conventional datacenter interconnect, metro, and regional markets, because both 400G OpenZR+ and Digital Coherent Optics (DCO) have been standardized to be inserted directly into any optical, router, and/ or switch platform. This plug-and-play or pluggable option did never exist earlier before and this aspect opens the optical networking market for DCO optics and may be deployed ubiquitously based on the standards. Few options are shown as in Fig 3 (ref Cisco blog)This includes the 400G QSFP-DD, which is either the 400G

ZR of Optical Internetworking Forum (OIF); or the OpenZR+ supporting Open Reconfigurable Optical Add-Drop Multiplexer (ROADM) on the line side; or the Open ROADM, in CFP2 format.

Barrier to Open Optical Networking Adoption

The operational complexity of dealing with multiple vendors is the paramount barrier to the adoption open optical networking .Other top barriers are lack of standards and immaturity of the standards which are

Figure 4 Barrier to open optical networking adoption in terms of percentage

> Open Optical and disaggregation networking gives impetus to optical network with enhanced velocity of innovation cycle, economic benefit and evolution as telecommunications industry matures. Such evolution can be seen across a number of areas in networking, including open RAN initiatives for 5G. As per ACG Research Survey report 2021,

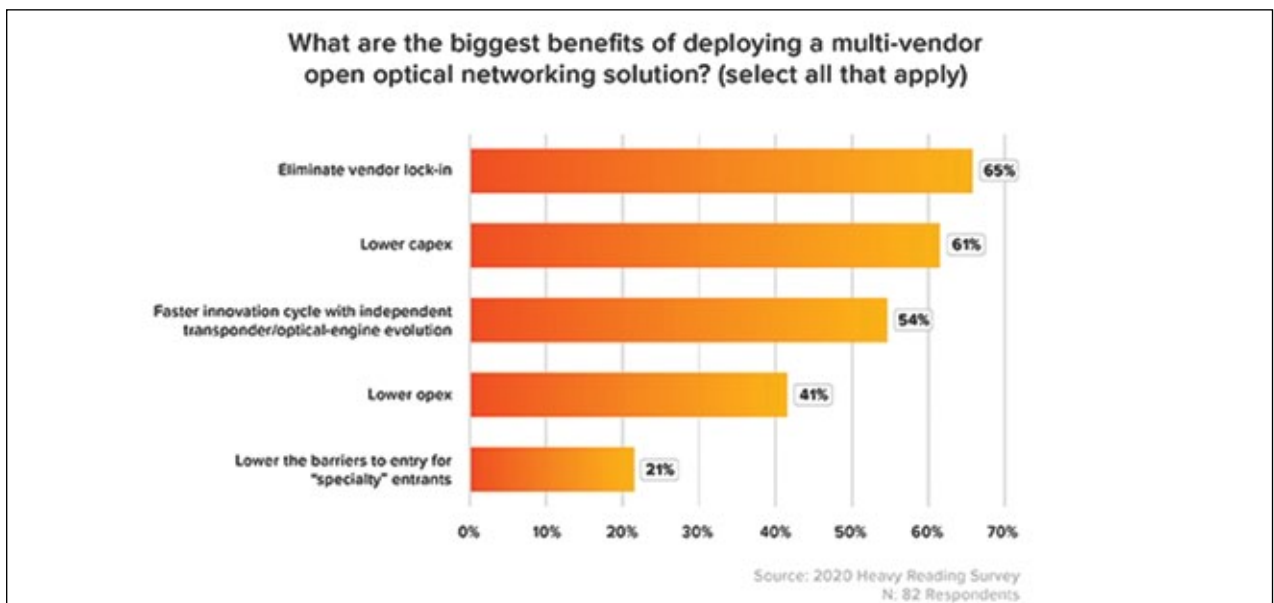presently existing. Because of all these barriers, industry is making efforts into standardizing data models, application programming interfaces (APIs) and different protocols.

Figure 4 above presents Barrier to open optical networking adoption in percentage.

Industry Initiatives for Open Optical Networking

The vision and the initiative of Open Optical Networking are quite complex and compelling. If the industry agrees on reference architectures and standard protocols, it leads to modular building blocks for both open optical hardware and open source Software Defined Networks(SDN). This in turn will attract new vendors and developing and building up a robust open ecosystem. Following are some of the major initiatives in the industries:

Open ROADM: Defines specifications of interoperability for, pluggable optics, transponders and ROADM. It covers both YANG data models and optical interoperability .

TELECOM INFRA PROJECT(TIP): It works on various sub-projects regarding different parts of the network Open Optical & Packet Transport (OOPT) group

GNPy is an open-source library for building route planning and optimizing the tools for real International multi-vendor optical networks

DOS (Disaggregated Optical Systems) defines and builds open transponders and other disaggregated optical hardware.

CANDI (Converged Architectures for Network Disaggregation & Integration) works on defining and proving service provider use cases in open converged packet/optical networks.

OOPT-NOS (Network Operating Systems): works on a reference open source Network Operating System (NOS) and supports disaggregated hardware platforms of OOPT (Open Optical Packet Transport Network) .

ODTN (Open and Disaggregated Transport Network): This is initiative by a service provider for building data center interconnects with the use of disaggregated optical equipment along with open and common standards, and open source software.

A project of the ONF (Open Networking Foundation), OpenConfig: It is a working group of an informal service provider adopting SDN (software-defined networking) principles.

OpenDaylight: This is an Open source SDN controller for customizing and automating optical networks.

Open Network Automation Platform: It is for orchestration, management, and automation of network and edge computing services and virtual network functions.

These initiatives sometimes overlap, though sometimes they have differences in their approach and specific areas of focus. They are associated with telecom industry and optical networking industry.

Future of Open Optical Networks

The group of open initiatives appear to be sometimes confusing and even sometimes contradictory. Each of them have different level of openness. They have strengths as well as weakness. Ultimately openness in the open optical networks provides cost effectiveness and opportunity of innovating on one side and value to customers on the other.

Future of Open Optical Networking will have some specific reference network components and few new technologies such as Opening the ROADM network, Disaggregating the Transponder, Planning with Multi-Vendor Optical Design Tools, Controlling Multi-Vendor Optical Networks, Adding Alien Wavelengths etc. 🔥

Dr Anuj Kumar Srivastava, Former Executive Director, MTNL, Government of India, Visiting Faculty IIT Delhi and FMS University of Delhi

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Smart Cities – Using AI for Smarter Roads

Road safety measures need to take into account the fact that humans will make mistakes, but this should not lead to loss of life

BY VAIBHAV KUSH AND AMIT BHATT

In June 2021, WRI India, together with Rohtak District Administration, Rohtak Police, Raahgiri Foundation and Nagarro launched the Safe rohTECH Challenge. This was modelled around India's Smart Cities challenge, but with a focus on improving road safety using communications and Artificial Intelligence (AI).

Road Safety

Road traffic injuries (RTIs) are among the worst man-made disasters as every year more than 1.35 million people lose their lives globally.

World Health Organisation (WHO) lists RTIs as the 8th leading cause of death globally and the leading cause

> The situation is much worse in our country. India has only about 1% of motor vehicles globally and it records more than 11% of global road traffic deaths. That translates into roughly 150,000 people - as per the National Crime Records Bureau, it is the leading cause of all accidental deaths in India.

for children and young adults aged 5-29 years. The situation is much worse in our country. India has only about 1% of motor vehicles globally and it records more than 11% of global road traffic deaths. That translates into roughly 150,000 people - as per the National Crime Records Bureau, it is the leading cause of all accidental deaths in India.

The impact of road safety is multidimensional as it impacts poverty, gender balance and the overall development of a nation. The issue is so big that the United Nations declared 2021-2030 as the 2nd Decade of Action for Road Safety. Earlier it was 2011-2020.

What do people expect from a transport system? Safety is the most important aspect. Followed by its convenience, affordability, equitable access and comfort.

Road safety measures need to take into account the fact that humans will make mistakes, but this should not lead to loss of life. Design of road systems should be forgiving in nature.

Using Artificial Intelligence and Machine Learning

The rohTech competition was launched as part of the 'Safer Mobility for Youth' project that WRI India started with support from the Global Road Safety Partnership and Fondation Botnar in June 2020. One of the key components of the projects is to explore and amplify the use of technology for urban mobility and road safety.

rohTech aimed to leverage digital solutions to improve mobility and safety on roads. WRI India partnered with Nagarro as a technological mentor, to ensure that the solutions ideated by the participants are practical and readily testable.

The competition was divided into three stages – concept note stage, proof of concept stage, and testable solution stage. Of the 45 concept notes, 18 went into the 2nd stage and finally 5 in the last stage.

Among the ideas were – a technology solution for measuring road surface quality, a mobile phone-based navigation app that shows high crash risk areas, proximity-based emergency responses application, CCTV-based automatic crash detection and automated emergency response system, intelligent traffic light system, integrated ride-hailing application, mobile phone-based driver alertness app.

'UltraviZ' solution of KasperTech finally won the challenge.

It is a CCTV-based automatic crash detection system that includes a crash intensity assessment feature. Ultraviz, utilises AI based image processing on every frame of a CCTV feed for object identification, speed, movement path, proximity to other objects etc.

Using machine learning algorithms and pre-defined parameters it assesses every frame to determine if objects (vehicles, humans, animals, etc) are on a path to collision or have already collided. In case of a collision, the algorithm assesses the crash intensity based on speed to prioritise alerts / notification to authorities. KasperTech team is developing an add-on product for drones that can help in fast response and investigation. It determines a drone nearest to a crash site and charters a flight plan keeping in mind surrounding building heights, aviation norms etc. and flies it to the crash site with first aid.

Looking at the novelty and potential impact of the solution, Rohtak Police has agreed to test the winning solution. WRI India is in conversation with Rohtak Police, Team KasperTech and Nagarro to take this solution forward. 🔶

Amit Bhatt, Program Executive Director – Transport, WRI India

Vaibhav Kush, Senior Program Associate – Transport, WRI India

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Semiconductor Industry –
Market Potential and Skills Gaps

Extracts from the Report Semiconductor Manufacturing Supply Chain – India's Opportunity in the Global market. Releaesd by the India Electronics and Semiconductor Association (IESA) at an event recently

BY V&D BUREAU

The global semiconductor manufacturing supply chain is mainly pivoted around 3 important pillars of the ecosystem.

The three main segments of the semiconductor manufacturing supply chain collectively accounted for US$ 180-200 Bn currently, which is likely to reach US$ 550 – 600 Bn by 2030 at a CAGR of ~10-12%.

>> Semiconductor Manufacturing Equipment used in the Fab/Foundries and ATMPs/ OSAT's — The global semiconductor manufacturing equipment segment is expected to reach ~US$ 200 Bn by 2030, from the current levels of ~US$ 71 Bn in 2020

India is already manufacturing some of the important parts along with precision components required for semiconductor manufacturing equipment / sub-systems which are being utilized in different industries such as

Aerospace, Automotive, Medical Devices, etc. Some of the major opportunities at India's doorstep are electrical products such as power control panels, rectifiers, etc. stainless steel plated and polished products, C-parts, ancillary tools for refurbishment and maintenance. India has a strong MSME base which is into manufacturing some of the spare parts such as bellows, valves, Ball Bearing, actuator, washers, C-parts etc. which is being consumed in almost all the industries with machinery and are supplied to Global markets as well.

>> Materials (Chemicals, Minerals and Gases) used in the manufacturing process — Semiconductor production uses hundreds of unique materials, gases and specialty chemicals which are mainly supplied from China, Japan, Taiwan, South Korea, Germany, and the US. Material and gases market contributed nearly US$ 48 bn to the overall semiconductor industry in 2020 and China is the market leader in the overall production of materials used for

CONCENTRATION OF OSAT (2020)
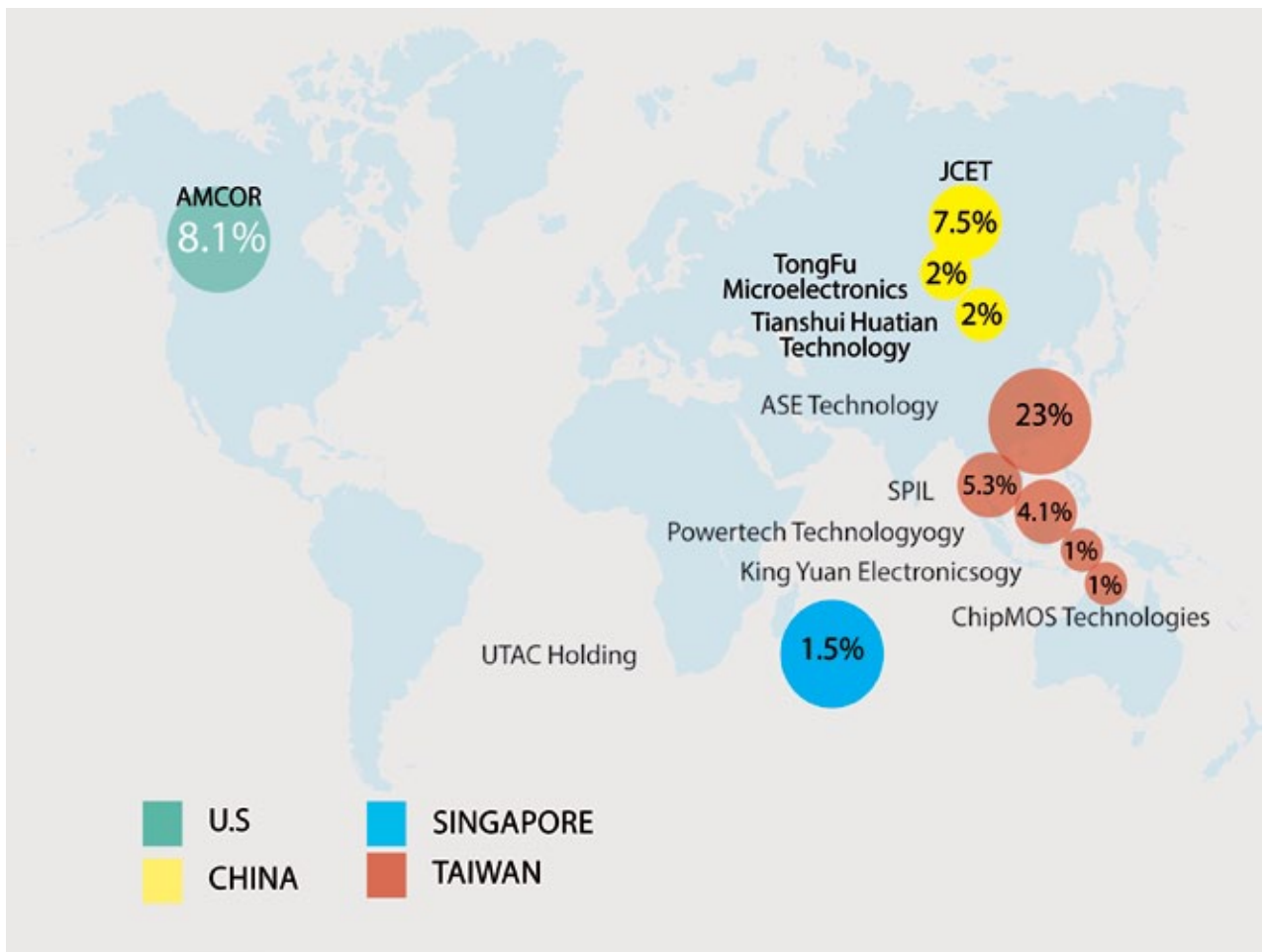
> Large global equipment OEMs have demonstrated this capability with Technology/Engineering centers based in India, wherein the local workforce is meeting the requirement of the global market demand.

semiconductor manufacturing with ~40% market share, followed by other Asian countries (Japan, South Korea, Taiwan) and Africa. This segment is estimated to reach US$ 150 Bn by 2030.

Semiconductor production uses more than 150 materials, many unique chemicals such as sulfuric acid, nitric acid, Hydrochloric Acid, Hydrochloric Acid, ethanol, acetone, phosphoric acid etc., minerals including aluminium, antimony, arsenic, beryllium, bismuth, boron, carbon, chlorine, cobalt, copper, fluorine, gallium, and germanium among others and gases like hydrogen, argon, nitrogen, oxygen, helium etc.

India has many of the chemicals, minerals, gases used in semiconductor manufacturing which have been used by different segments of the Indian industry such as Pharmaceuticals, Paints, Automotive, etc.

The Indian materials industry will have to improve the quality and purity of these materials (Chemicals, minerals, and gases) to be of semiconductor manufacturing grade.

>> Services across the Semiconductor manufacturing value chain. The scope for Services across the Semiconductor Manufacturing ecosystem is estimated to be US$ 180 – 200 Bn by 2030

Services and skills segment includes areas like Fab services, ATP services, Semiconductor Manufacturing Equipment Services, Supply Chain Services, Automation services and Skills aligned with the semiconductor manufacturing industry. India has the availability of skills required across the semiconductor manufacturing supply chain, which are currently being utilized in different industries.

TOP 10 SEMICONDUCTOR MANUFACTURING EQUIPMENT COMPANIES BY MARKET SHARE (2020)
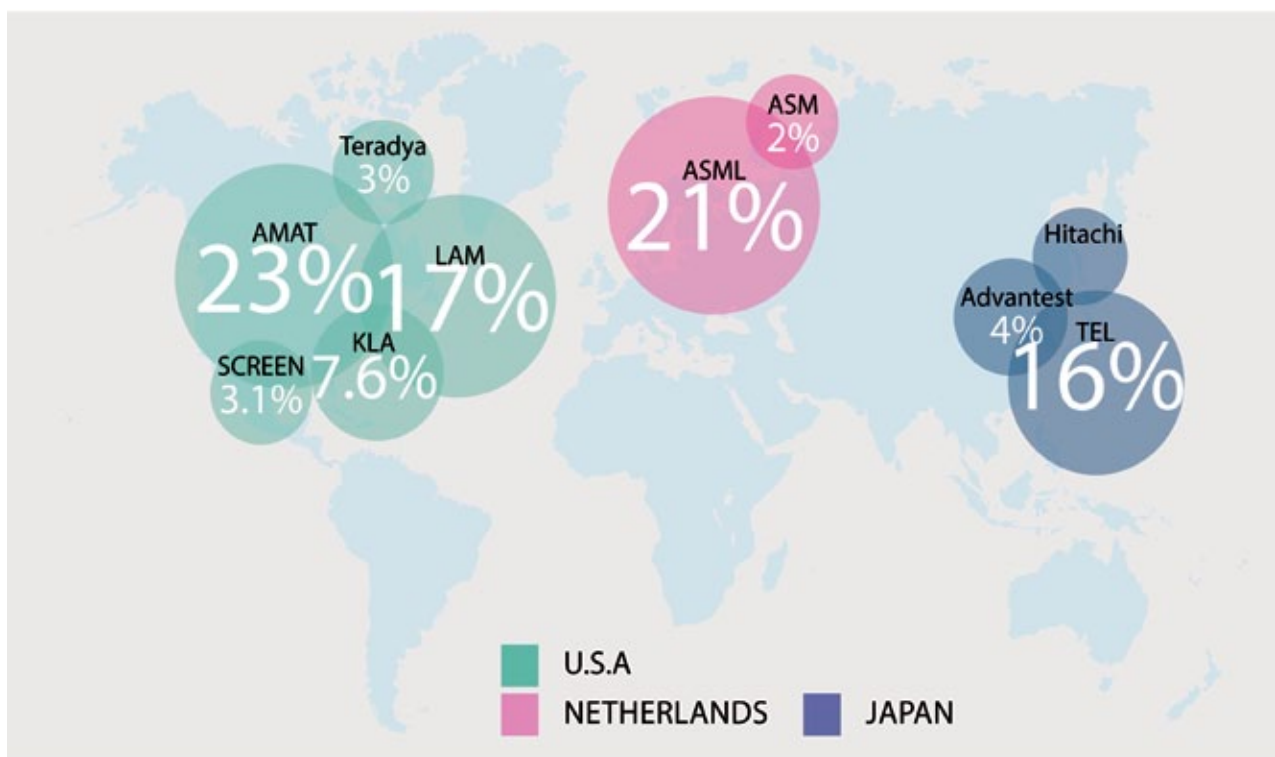
Source: SEMI, Feedback Advisory

> India can provide services to large semiconductor companies in the Industry 4.0 implementation as it is one of the major countries which occupies a major talent in AI, big data, cloud computing and IoT.

R&D AND MANPOWER

Global Equipment OEMs are also keen to work towards setting up R&D Labs in India with the scope for prototyping, testing, measurements, characterisation, etc.

They are keen to work with, and develop the local talent to be able to work in these Labs. However, seek strong policy support from the Government to make this a viable value proposition to set up Labs and service the Domestic and Global market requirement.

India has one of the best human resources available for design which can be further leveraged to set up the Semiconductor engineering and equipment designing labs. Through this approach there is scope to create IP in this space as well

Virtually, all the world's biggest fabless chip companies have an Indian presence, and it can be rightly said that India has the capabilities required to be a part of the IP creation supply chain. Over the years, many major global semiconductor companies have established their chip development R&D centers in India.

This has built a critical mass of talent in semiconductor design and a vibrant domestic design services market.

Most of the major semiconductor companies (TI, Broadcom, Intel, Qualcomm, Western Digital, and Samsung & Huawei) have their fabless Intellectual Property (IP) & System-on-Chip (SoC) design houses in India. India retains excellent chip designing capabilities as tens of thousands of engineers work directly in VLSI

Table 1: Presence of Large Global Semiconductor Equipment Manufacturers in India

Name of the Company	Country	Operations in India
Applied Materials	USA	Engineering Support
LAM Research	USA	Engineering Support
ASML	Netherlands	Marketing
Hitachi	Japan	Marketing
Tokyo Electron	Japan	Marketing
ASM Int.	Netherlands	Marketing
KLA	USA	Engineering Support
Advantest	Japan	Engineering Support

India is already manufacturing some of the important parts along with precision components required for semiconductor manufacturing equipment / sub-systems which are being utilized in different industries such as Aerospace, Automotive, Medical Devices, etc. Some of the major opportunities at India's doorstep are electrical products such as power control panels, rectifiers, etc. stainless steel plated and polished products, C-parts, ancillary tools for refurbishment and maintenance. India has a strong MSME base which is into manufacturing some of the spare parts such as bellows, valves, Ball Bearing, actuator, washers, C-parts etc. which is being consumed in almost all the industries with machinery and are supplied to Global markets as well.

INTERVIEW

Mr Arvind Bali, CEO Telecom Sector Skills Council (TSSC) spoke to Voice & Data about the skills requirements in the Semiconductor Industry.

How deep is the shortage of skills in the Semiconductor sector and how many of could TSSC fill this gap?
TSSC views the tremendous opportunity brought on by the semiconductor PLI as a boon for electronics manufacturing in India. Besides setting up India as a key player in semiconductor FAB, it will also motivate OEMs and ancillary industries to be setup in India.

As far as the skill shortage is concerned, we need inputs from the industry, design houses & other subject matter experts to understand the demand clearly for the skilling in semiconductor domain. However, TSSC has proactively started developing courses around semiconductors and measurement & testing (M&T) for varied coverage of job roles. Training Partners (TP) are a facilitation medium to impart quality skill training so with our wide reach through 1000+ training centres, the skill training can be imparted.

What has been the TSSC's key success metrics so far?
TSSC has skilled more than 1 million youth in various skillsets across all sub-segments of the telecom sector.

We have 1000+ training centres in all 36 states and UTs across India. Youth trained by TSSC are placed in leading organizations in telecom services, device manufacturing, network management and passive infrastructure providers.

We currently have 39 NSQF aligned job roles (will reach to 51 courses by next month) for futuristic technologies like 5G, IoT, drone technology etc.

We have trained close to 4 lac in telecom services related jobs, 4 lacs in handset & manufacturing segment and 1 lac each in network management and passive infra respectively.

What are the plans of TSSC for 2022 and 2023 in all segments?
TSSC proposes to train roughly 30% of the total market requirement in telecom domain.

TSSC is actively developing Centres of Excellence (CoE) to train youth in futuristic courses. We have already started engagement with state b odies to sensitize them about drone, 5G, ioT etc. TSSC has established a CoE for IoT in NIT Patna and plans to setup more such skill labs this year.

designing and their chips are tapped out in leading edge labs around the world.

Virtually, all the world's biggest fabless chip companies have an Indian presence. However, indigenous design IP creation is still nowhere seen in India.

SKILLS

For manufacturing high quality semiconductor chips in India, there is a need for availability of highly skilled personnel. Semiconductor manufacturing requires skills in domains like Microelectronics, Optics, Physics, Material Sciences, Chemical etc.

Bangalore, the capital city of the state of Karnataka, based in southern India, is known as the 'mini–Silicon Valley' or the 'Silicon Valley of India' due to the abundance of chip design centers of all the major fab players. Bangalore has been a pioneer for bringing semiconductor ecosystem in India by employing thousands of software engineers, postgraduates and PhDs in the designing segment. In fact, it can be the first again in terms of thinking beyond software and introducing the fab ecosystem in the country due to the presence of right manpower, skills and support from the government.

One of the country's biggest gaps according to the report: India (government + private) invests 0.65% of its GDP on R&D (across sectors) in comparison to China (2.4%), the United States (2.85%), and Europe (2.18%). 🔧

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Aatmanirbhar — Will the PLI incentive help the India Electric Vehicle manufacturers

While people might be willing to switch to EVs, the lack of infrastructure like electrical charging stations and high prices are a concern

BY KUNWER SACHDEV

Very few of us are aware that on the 3rd February 2022, India completed 97 years of its first electric train, which ran between Bombay VT and Kurla Harbour in 1925. The inventions started way back in 1828 when Anyos Jedlik, a Hungarian Inventor and Engineer, developed an electric motor that he used to make the small electric car. Then during 1832 and 1839, Scottish inventor Robert Anderson developed a crude electric carriage.

The first electric three-wheeler, the Vikram Safa was invented by Scooters India Pvt Ltd in 1996, and

> Supply of domestic cells and batteries is going to be important to achieve battery standardization. India lacks a domestic supply of key raw materials.

approximately 400 vehicles were made and sold at that time. In 2000, BHEL developed an eighteen-seater electric bus, which became popular too, after which approximately 200 electric vans were made and run in Delhi.

Electric vehicles came into existence in the 19th century but did not succeed due to high manufacturing costs, lack of technology for power back-up, and a lack of charging infrastructure. India saw its first electric car in 2001 but failed to create excitement in the market, as no one imagined a future with electric mobility. Society has been more than comfortable with the conventional ways of transport.

However, we have arrived at a juncture where no further delay or wait for electric mobility to penetrate the country is logical anymore. One of the biggest reasons is, of course, the imminent danger of adverse environmental impact on health.

Atmanirbhar Electric Vehicle (EV) supply chain
Self-reliance is critical.

In India, two-wheelers and passenger vehicles dominate the market. India is expected to be the world's third-largest automotive market in terms of volume by 2026. There has been an apparent shift in the priorities and working of the automobile sector and this shift is leading us towards EVs.

All things considered, one of our biggest challenges is to drive higher adoption of EVs through the supply chain and infrastructure. The sector needs a focused approach towards R&D and localization. A strong, local supply chain, accessible battery prices, and widespread charging infrastructure are the components for the EV market to become more attractive.

EVs need to become accessible to everyone for a sustainable future. For this, it is important to lower cost barriers. The existing practice of making EV assembly here in India, can only sustain if the service set up is backed by the seller. As we reach volumes, market forces will come in to play and we will see most of the manufacturing done right here, in India and that would also bring down the costs.

There are so many Lithium battery manufacturers in India who are making them here on Chinese machines by importing the cells and BMS from China. China of course, has already taken the lead in EV sector and their manufacturing ecosystem is in place therefore, their products are accessible and have led to strong dominance in 2 and 3-wheeler segment.

EVS in India
The present EV ecosystem in our country is a complex one with sales at a bare-minimum. While people might be willing to switch to EVs, the lack of infrastructure like electrical charging stations and high prices are a concern. To create a robust ecosystem for the EV agenda, we need to set up funds (overall the union budget has been favourable for the EV space like reduction in customs duty from 10% to 7.5 % in motor parts, will also help reduce the cost of EVs) and R&D facilities. According to reports TATA and Mahindra are top R&D spenders in the electric mobility industry. Also, for a strong manufacturing base, simultaneously we must ensure designing vehicles that are close to conventional vehicles – many start-ups like OLA Electric, Ather Energy, Yulu, Tork motors etc are playing an important role in evolving this space.

I think that the automobile sector in India is a robust one and the moment all the players begin focussing on EVs, things will change faster – we are definitely poised to be a major exporter in the EV segment. Leading players in India like Tata, Mahindra, OLA, Ather have already initiated the change and once they sort out the service set up and maintenance issues, the domestic sector will rule the roost.

Still a Strong Electric Vehicle policy is required
EV transition is a critical area and is a high priority for both national and state governments in India. Through the national FAME (Faster Adoption and Manufacturing of Hybrid and Electric vehicle) policy, and state-level equivalents, the Indian government has signalled a strong commitment to growing the sector and reducing the carbon footprint of transport, in line with its targets under the Paris Climate Agreement Act.

At this point, the policy for EVs is encouraging however, I believe, we need to implement incentives to boost the production of Lithium cells.

> Small businesses cannot benefit from the Production Link Incentive (PLI) scheme. There has also been a reduction in export incentives, which is affecting exporters as well.

Small businesses cannot benefit from the Production Link Incentive (PLI) scheme since it is only available to big investments. Currently, the government does not promote exports or offer incentives to existing industries to attract dollars into the country, only foreign investment is a priority. There has also been a reduction in export incentives, which is affecting exporters as well.

The PLI policy will not attract people in this space as this industry needs a complete set up of manufacturing, sales, marketing and service set up. Which will not attract the foreign players unless the market is already there.

The unorganized sector which is growing initially will automatically convert in to the organized sector over a period of time which I saw in the Inverter segment and other sectors over a period of time.

We also need improved monitoring and execution of the policies. EVs need electricity, therefore, simultaneously we must start looking to strengthen our solar charging capabilities because we will need an alternative source of energy sooner.

The Union Budget for 2022-23 aims to strengthen the EV ecosystem to speed up the demand for green vehicles. The introduction of the battery swapping policy and interoperability standards announced in the Budget will go a long way in building the use cases and will be a boost for the start-ups in the space. The battery swapping policy will create new avenues for companies to venture into the business. The budget promises to encourage the private sector to develop sustainable and innovative business models for battery and energy as a service and we are in for better times!

Electric Vehicles and localization and domestic battery technology

In the last few years, Electric Vehicles have become a part of our daily conversation.

EVs have come in as a ray of hope for the future of mobility. It is certainly a revolution in the making that is poised to bring remarkable changes, especially in an environmental aspect.

With the gradual emergence of EVs in India, the domestic EV industry is keenly shifting its gears towards localization of key components like batteries and helps to gather and enhance the local assembly of EVs.

The automobile sector has gone through a paradigm shift and efforts are being made to switch to less energy-intensive options.

Supply of domestic cells and batteries is going to be important to achieve battery standardization. India lacks a domestic supply of key raw materials – like lithium, cobalt, and nickel. This makes cell manufacturing a costly affair.

The Indian manufacturers need to focus on indigenous battery packs. India is a distinct market and we need batteries that are favourable for Indian conditions – like extreme temperatures and humidity.

The battery swapping policy, once in play, will help our EV segment to grow. Charging through the solar with storage need to be encouraged otherwise India will need additional power generation and that would bring us back to where we started i.e. dependence on coal, gas and oil. 🔧

Kunwer Sachdev, Entrepreneur and Innovator, Founder - Su Kam Power Systems

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Street Furniture used for 5G Deployment

TRAI launches 5G Deployment Pilot study Using Street Furniture at Deendayal Port

The pilot study will help in understanding challenges in 5G small cell deployment at Indian ports.

On 29th April 2022, Telecom Regulatory Authority of India (TRAI) in association with Deendayal Port Authority (DPA) launched a pilot named "5th Generation (5G) Small Cell and Aerial Fiber deployment using Deendayal Port Street Furniture."

The TRAI press release said, Small Cell are equipment which will be deployed for upcoming 5G networks uses higher frequencies spectrum to provide ultra-high broadband speed and are placed closer to user so as to provide quick responses to user's request using street furniture, ie electric poles, bus stands, traffic lights, street lights, etc.

The pilot study will help in understanding challenges in 5G small cell deployment at Indian ports. Hundreds of 5G Small Cells need to be installed in a square KM of area to provide good coverage. Use of Street furniture already available at ports like poles etc. can be used for mounting these 5G Small Cells, obviating the need for erecting thousands of new towers. This will not only ensure faster deployment of 5G but also unlock true potential of underutilized street furniture at ports. Ports, using these highly reliable 5G networks will be able to launch Enterprise Solutions which will in turn help them to compete with best of international ports.

Apart from senior officials of Telecom Regulatory Authority of India (TRAI), Department of Telecommunications (DOT) and Telecommunication Engineering Center (TEC), the meeting was also attended by Cellular Operators Association of India (COAI) along with higher officials of BSNL, 310, Air-tel, Vodafone Idea Limited and Indus Towers. The team of Deendayal Port Authority (DPA) was led by Deputy Chairman.

Vodafone Idea, Airtel and BSNL along with Indus Towers will be jointly working on this pilot with Deendayal Port Authority (DPA).

Better productivity and efficiency of Indian ports will help in more efficient supply chain and boost the overall Indian economy. Worldwide 5G deployment at ports and various use cases are resulting in improved operations, decreased costs and enhanced productivity.

Similar pilots were started by TRAI at Delhi International Airport, Smart City Bhopal and Namma Metro Bengaluru also.

Airtel acquires minority stake in Cnergee Technologies

The stake acquisition will enable Airtel to sharpen its NaaS proposition for Small and Medium Businesses (SMBs) who are looking to accelerate their shift to cloud-based applications.

Bharti Airtel has acquired a strategic minority stake in cloud-based networking solutions provider Cnergee Technologies under the Airtel Startup Accelerator Program.

Navi Mumbai-based Cnergee specializes in integrated networking solutions over the cloud for businesses of all sizes. Cnergee has developed a range of 5 G-ready software tools for Network as a Service (NaaS) that can be deployed at scale to enable zero-touch service provisioning, central remote monitoring, and management of all connected devices with a host of real time analytics.

The stake acquisition will enable Airtel to sharpen its NaaS proposition for Small and Medium Businesses (SMBs) who are looking to accelerate their shift to cloud-based applications. Airtel already offers a wide range of connectivity and productivity solutions for SMBs backed by unmatched distribution network reach across India.

In addition, Cnergee's advanced software tools will boost Airtel's 'Work From Anywhere' solutions portfolio as businesses look to adopt hybrid work models in the post-pandemic world. Ajay Chitkara, Director and CEO

– of Airtel Business said: "As businesses move to cloud-based applications, software-defined agile networks are becoming the norm. Airtel is on a mission to accelerate the digital transformation journeys of enterprises through our world-class NaaS platform. We welcome Cnergee to the Airtel Startup Accelerator Program and look forward to deploying their 'Made in India' solutions at scale in the fast-growing NaaS market in India." Airtel Business serves over one million businesses of all sizes through its integrated portfolio of – connectivity, conferencing, cloud & data centers, cyber security, IoT, Ad-tech, CPaaS (Airtel IQ), and more. It is the market leader in India's enterprise connectivity segment.

Suvarna Kulkarni, Founder, and MD – Cnergee Technologies said: "Cnergee has always believed in developing innovative, intelligent, and cost-efficient cloud-based solutions. It is an exciting time for Cnergee to partner with Airtel in this digital transformation journey and reach out to emerging businesses of all sizes driving Digital India."

Airtel Start-up Accelerator Program invests in early-stage start-ups engaged in developing solutions based on new-age technologies which also complements Airtel's Digital vision across segments.

Cybersecurity Skills Gap Contributed to 80 Percent of Breaches — Fortinet Report

Fortinet, a global leader in broad, integrated, and automated cybersecurity solutions, released its 2022 Cybersecurity Skills Gap Report.

The new global report reveals that the cybersecurity skills shortage continues to create multiple challenges and repercussions for organizations — including security breaches and financial loss.

The survey shows that 64% of organizations experienced breaches that resulted in lost revenue and/or cost them fines during the past year. A staggering 38% of organizations reported breaches that cost them more than a million dollars (USD).

About the research

The survey was conducted among 1223 IT and cybersecurity decision-makers located in:

Argentina	India	People's Republic of China	Sweden
Australia	Indonesia		Taiwan
Brazil	Israel	The Philippines	Thailand
Canada	Italy	New Zealand	United Arab Emirates
Colombia	Japan	Singapore	United Kingdom
France	Malaysia	South Africa	United States of America
Germany	Mexico	South Korea	
Hong Kong	The Netherlands	Spain	

Respondents came from organizations of various sizes:

100-499 employees: 22%
500-999 employees: 24%
1,000-2,499 employees: 23%
2,500-4,999 employees: 16%
5,000+ employees: 15%

Respondents came from a range of industries. The best represented were technology (28%), manufacturing (12%), and financial services (10%).

In addition:
12% of respondents are owners
34% hold C-level executive positions
6% are vice presidents
14% are department heads
34% are directors
64% are male
35% are female

One of the key contributors to this has been the increase in remote and hybrid work models which resulted in the expansion of the threat landscape as vulnerabilities multiplied. IT teams had to act quickly to deal with an increasingly harsh reality.

Millions of employees were logging in from their unsecured home offices, led to significant spikes in malicious cyber activity. In 2021, the Fortinet Global Threat Landscape Report revealed a tenfold increase in ransomware attacks alone. According to the Fortinet-sponsored survey, it's clear that many of the challenges organizations face in combating cybercrime are directly related to a lack of qualified cybersecurity professionals.

While the number of professionals needed to fill the gap has decreased from 3.12 million down to 2.72 million in the past year, this is still a significant void that leaves organizations vulnerable. Skill development with Certifications in Cyber Security have a positive impact for job seeker.

Central to the challenge of recruiting and retaining cybersecurity talent is the importance of certification. Certified professionals are universally sought after. Globally, 91% of organizations claim they are willing to pay for an employee to achieve a cybersecurity certification. In India and People's Republic of China,

certifications are especially sought after with 100% of leaders looking for certified people when hiring. In North America, 85% of organizations are reporting a preference to hire certified people.

Retention Challenges

A significant challenge for organizations has been finding and retaining the right people to fill critical security roles ranging from cloud security specialists to SOC analysts. The report found that 60 percent of leaders admit their organization struggles with recruitment and 52 percent struggle to retain talent.

Leaders from France (81%), North America (77%), and Hong Kong (77%) show the highest level of concern and believe that skills shortages pose additional risks to their organization. Whereas only half of the leaders from Indonesia (50%), Italy (50%), and Israel (47%) indicate concern.

Fortinet Skills Gap Survey:

· The survey was conducted among more than 1200 IT and cybersecurity decision-makers from 29 different locations, including India, U.S., France, Japan, Mexico and more.

· Survey respondents came from a range of industries, including technology (28%), manufacturing (12%), and financial services (10%).
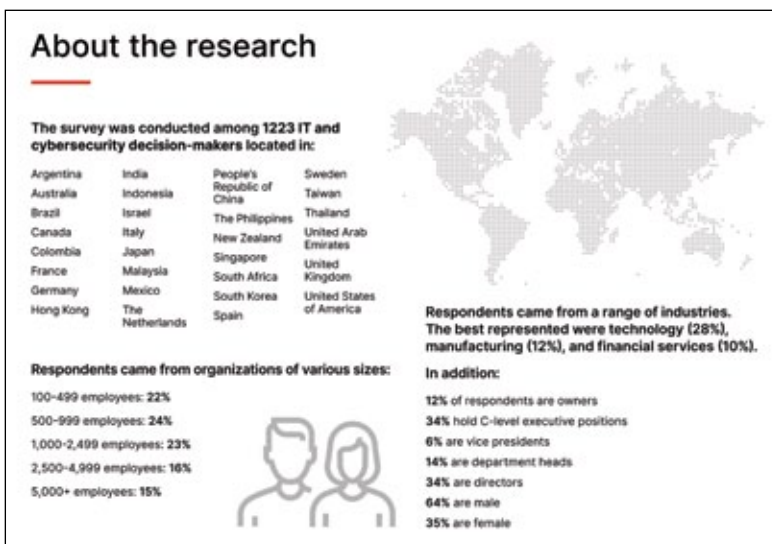
Zoom Ramps Up Momentum in APac to Meet Era of Flexibility
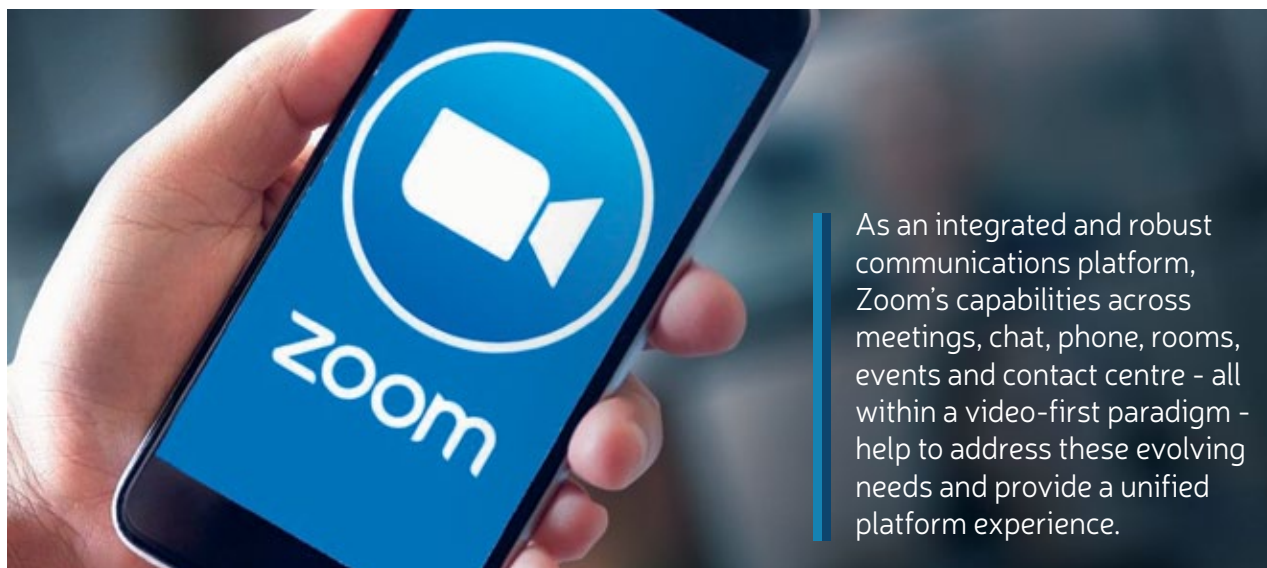
> As an integrated and robust communications platform, Zoom's capabilities across meetings, chat, phone, rooms, events and contact centre - all within a video-first paradigm - help to address these evolving needs and provide a unified platform experience.

NDIA - Zoom Video Communications, Inc. (NASDAQ: ZM) today announced key business momentum updates for the Asia Pacific (APAC) region, including its growing partner ecosystem, customer success highlights, and new additions to its senior leadership team across the region. The company highlighted the strong growth of Zoom's solutions and presence in key APAC markets including Australia and New Zealand, ASEAN, China, Hong Kong SAR, India, Korea, and Taiwan, led by Ricky Kapur, Head of APAC, Zoom.

This comes as APAC undergoes a critical transformation into a hybrid future, driving demand for secure, seamless, and connected experiences across virtual and physical channels. This is accompanied by an explosion of digital-native organisations born in the digital age and in the cloud, underpinned by the rise of a generation who has grown up in the presence of modern information technology. As an integrated and robust communications platform, Zoom's capabilities across meetings, chat, phone, rooms, events and contact centre - all within a video-first paradigm - help to address these evolving needs and provide a unified platform experience.

While customers desire hyper-personalisation and total convenience across virtual and physical touchpoints, the integration of video capabilities via the Zoom platform has allowed a range of organisations, spanning

a variety of sectors including healthcare, education, and financial institutions, to reimagine the customer journey. Similarly, to meet employee demand for greater flexibility and freedom of choice, Zoom enables the 'work-from-anywhere' workforce, providing the technology required for enhanced collaboration, productivity, and inclusivity in hybrid teams.

"APAC has always been a strategic region for Zoom's international growth," said Ricky Kapur, Head of APAC, Zoom. "The potential for this region is enormous, propelled by a new generation of digital natives that will spur APAC's transformation into a thriving digital economy. We have been and will continue to be committed to supporting our partners and customers here as they transition successfully to a hybrid world. With the expansion of our operations and teams in the region, we look forward to continually delivering an unmatched pace of innovation, empowering our customers to leverage new opportunities and overcome challenges - both quickly and securely."

Earlier this month, the company also announced a new technology centre in Chennai, India. This facility adds to Zoom's existing technology centre in Bangalore, India, and 21 co-located data centres across the globe, including in Singapore, India, Australia, Japan, and Hong Kong SAR in APAC, along with a Singapore-based research and development (R&D) centre.

IP Infusion and HFCL to deliver open networking 5G solutions

IP Infusion, a leading provider to disaggregate telecommunications networks for global providers and HFCL Ltd, a leading telecom equipment manufacturer and technology provider, announced their partnership to deliver 5G Transport portfolio of products.

The 5G Transport products include Cell Site Router, DU (Distributed Unit) Aggregation Router, and CU (Centralized Unit) Aggregation Router. IP Infusion's OcNOS integrated with HFCL-designed high-performance 5G Transport routers will dramatically improve network efficiencies and optimize telecom infrastructure as 5G rollout accelerates.

HFCL is currently investing in a portfolio of 5G products for the Radio Access Network (RAN) and Transport. The transport network of communication service providers (CSPs) needs modernization due to much higher bandwidth per 5G cell site, densification of cell sites in 5G, Ethernet and IP based transport, and new services with stringent latency requirements like drones, autonomous vehicle and robotics-based precision manufacturing. HFCL is developing 5G transport products for the fronthaul, midhaul and backhaul to help CSPs transform their transport network.

This joint solution gives operators flexible vendor integration options that support affordable 5G access. IP Infusion's OcNOS enhanced capabilities are custom designed to seamlessly work with HFCL's 5G Transport routers to reduce overall equipment and maintenance costs. HFCL will also have access to IP Infusion's world-class maintenance and technical support.

The 5G Transport router portfolio with IP Infusion's network OS showcases leading-edge innovations in multiple areas, including segment routing protocol for significantly increased scalability, closed loop automation for continuous analytics optimizing the end user experience, and increased power efficiencies. To detect and prevent security threats, a simplified configuration interface delivers the benefits of maximum server hardening. HFCL managed the full cycle from concept to design to implementation, tailoring the solution for the specific needs of market use cases both for India and global customers.

HFCL's 5G Transport products are based on merchant silicon, network dis-aggregated architecture, and on open standards like TIP (Telecom Infra Project), and OCP (Open Compute Project).

"This strategic partnership signals a huge step forward in our goal to help operators modernize their 5G transport network which is critical for the successful rollout of 5G services," said Mahendra Nahata, MD, HFCL. "We are pleased to partner with IP Infusion, and trust their exemplary record of flexibility, reliability and collaboration will equip us to bring a highly efficient and future-proof solution to our market and to the rest of the world."

"OcNOS combined with HFCL's proven hardware will revolutionize India's telecom industry, allowing for the deployment of new services quickly based on tested, and validated open networking," said Atsushi Ogata, President and CEO of IP Infusion. "This strategic partnership will also comply with the Make in India initiative and is a major milestone in bringing open architecture, broad access and innovation as 5G becomes a reality in India and global markets."

IP Infusion's carrier-grade disaggregated networking solutions allow network operators to create innovative services and accelerate new revenue streams. Its validated network operating system, combined with HFCL-designed high-performance 5G Transport routers, supports a diverse range of networking use cases. With HFCL's and IP Infusion's advanced support services, network operators can migrate seamlessly to an end-to-end disaggregated networking solution that delivers lower TCO.

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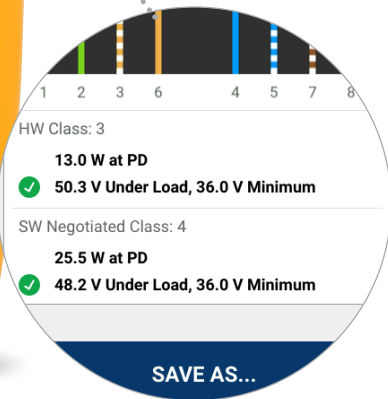- 25 Years of Mobile Telephony India

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