jio

2021

Jio 5G Innovation

WHITEPAPER

Executive Summary

Reliance Jio being one of the largest VOLTE only network in the world, with 425+ million customers and carrying traffic volume of over 140 million GB/day; deeply understood the design and operational challenges faced by the telecom operators. During its research for 5G, Jio envisioned future networks to be a fundamental component for all parts of life, society, and industries; fulfilling the communication needs of humans as well as the intelligent machines. With that in context, JPL started the journey towards an exciting vision of what the network will be able to deliver in 2022, exploring the technology components that will make it possible.

As technology is evolving, the need for digitizing society and industries has become a key enabler for economic progress. Jio 5G further catalyzes the path to this imminent digital transformation. This involves co-innovations not only in 5G Radio and wireless core, but also collaboration in other associated areas such as AI, Cloud and Edge Computing. Jio has an evolved 5G product portfolio & embracing technologies such as IoT and Blockchain for building next generation products. We have also developed an array of Utility Platforms and Protocols Stacks which are reusable sub-products across the product line.

In this case study we uncover how Jio has pushed the boundaries by establishing itself as a global first in being a self-sufficient and cloud native carrier, which is poised not only to deploy the largest 5G network in India along with being the flagbearer of Innovation: offering end to end capabilities that will spur transformation making the 5G experience completely seamless & immersive..

What's Inside

Jio Accelerating Innovation & Transformation with 5G

In name, it may feel like just one small step from 4G. But the fifth generation of cellular networks represents a huge leap for industry and society. 5G is rolling out much faster than any previous generation of mobile network. When JPL started its foray into the development of 5G RAN products, most of the early movers in 5G were deploying 5G in Non-Stand Alone (NSA) mode with EUTRAN-NR Dual Connectivity (EN-DC). However, JPL has been very clear from the onset that true 5G experience can only be delivered with Stand Alone (SA) mode in conjunction with Cloud Native 5G Core. Thus, SA mode is the foundation of all Jio 5G RAN products. At the same time legacy 5G UEs which can support NSA-only (not SA) can also be supported. Considering this approach, JPL developed 5G RAN portfolio consisting of Jio Outdoor Small Cell (ODSC), Jio Macro gNodeB with Massive MIMO and Jio Indoor Small Cell.

To unlock the potential of the 5G promise and capture its full value, the evolution to a cloud native 5G core became a pre-requisite. Jio built a 5G core solution that can safely run a hyper-connected world with an unprecedented speed, ultra-low latency & a capacity to connect 500 times more devices than 4G. It is built on a cloud-native, microservices-based technology that enables Real Time Intelligent networks with its advanced Automation, Artificial Intelligence & Machine Learning Platforms like Jio Automated Cloud Installer for automated cloud deployments, Jio SDNO for SDN Orchestration, Jio MANO for CNF & VNF Lifecycle Management & Orchestration, Jio NMS for FCAPs Management & Jio OSS FMS for fulfilment, inventory & workflow automation. These platforms help to support a large variety of 5G use cases for every Consumer, Enterprise and Industrial applications.

> ❝ *The real promise is in the enterprise* ❞

But the real promise of 5G lies in its potential for the enterprise. With its increased bandwidth, ultra-low latency, enhanced security, and the ability to connect one million devices per 0.38 square miles, 5G will make possible many new and transformative applications of technology.

It will enable equipment and vehicles to be controlled remotely, making operations like mining and inspections safer. It will be the enabling network for adaptive city infrastructure (think road systems that automatically divert traffic if there's an accident, or when air pollution levels reach a certain level). In healthcare, it will enable doctors to conduct remote diagnoses and even remote surgery.

Combined with AI capabilities at the edge of the network, it will accelerate the introduction of autonomous vehicles, capable of sensing and responding in real time to their surroundings. It will take remote work and learning to a whole new level, enabling people to meet, interact and carry out tasks in rich virtual reality or augmented reality environments.

Jio's End to End 5G Platform

Jio's end-to-end 5G Platform, across radio, core and transport networks together with OSS/BSS and network services enables operators to evolve to new 5G capabilities at a speed that matches their own business strategy, while enhancing current 4G business by reducing risk and making best use of current infrastructure. It enables evolution to full 5G deployment through natural, step-wise implementation – one that balances investment, new revenue streams and competitiveness. Furthermore, Jio's network technology enables operators to quickly offer enhanced mobile broadband to consumer customers and address the new opportunities with Fixed Wireless Access, Internet of Things, and industrial applications. The Network portfolio of Jio includes hardware, software, solutions, and related service offerings, covering end-to-end 5G platform. Jio's philosophy is to enable evolution to full 5G deployment through manageable steps, based on well-designed components of multiple technologies, in a way that matches business and technology realities resulting in result in intelligent devices, application consuming and generating data like never before.

Cloud Native 5G Core

ATOM

Automated
Troubleshooting
and Operations
Management using
AI/ML

5G Security Centre
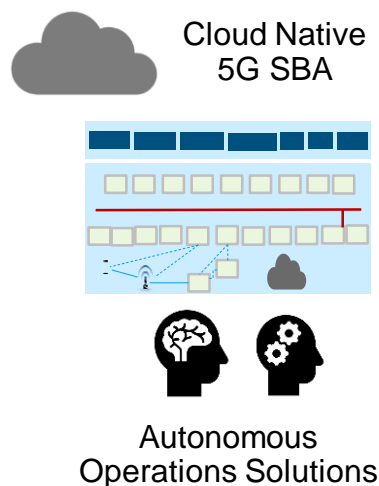
Making 5G Network
Secure

NMS

Network Management
System

Jio OSS FMS

Open APIS for Fulfillment
and Inventory

Cloud Native 5G CN

SBA + VoNR Products

Cloud Native
5G SBA

Autonomous
Operations Solutions
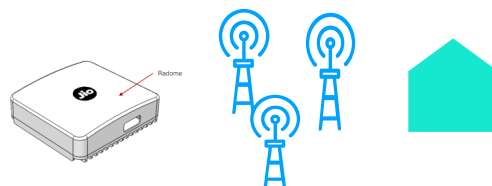
5G RAN

5G IDSC

Indoor Small
cell Solution

gNodeB

5G Ready Jio
Coverage Platform
for Network
Lifecycle
Management

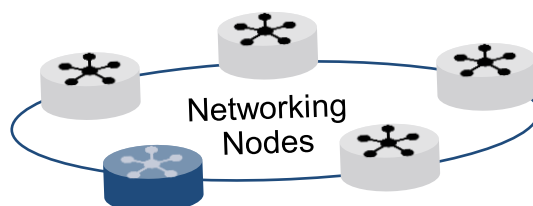### 5G ODSC

Outdoor Small
cell Solution

Radome

Transport

Jio SDN Orchestrator

Increased Capacity of
Transport and Making it
Programmable

Jio MANO

Converged Management and
Orchestration with Slicing
and Edge Computing support

Networking
Nodes

True Standalone 5G Deployment

Operating independently of 4G (LTE), 5G standalone enables lower latency than current 5G non-standalone networks and allow more people and connected objects to use mobile data simultaneously. For service providers who are looking to deliver mainly high-speed connectivity to consumers with 5G-enabled devices, NSA mode makes the most sense, because it allows them to leverage their existing network assets rather than deploy a completely new end-to-end 5G network. Most carriers opted to start their 5G networks with a NSA version because it relies on LTE as an anchor whereas the SA does not need LTE to work. However, for those who have their sights set on new services such as smart factories, a straight-up 5G wireless technology that is no longer dependent on an existing 4G network could make more sense. SA Mode enables the operators to truly implement Network Slicing, Cloud Native Deployments and Mobile Edge Computing which are otherwise not possible in NSA Mode, this further cascade to enablement of plethora of new consumer services in the area of mMTC and uRLLC.

Considered as the ultimate 5G, Standalone NR – coupled with cloud-native 5G Core – will provide better support for all use cases and unlock the power of the next-generation mobile technology. Jio has deployed a 5G Standalone Core Network, which can support 120Mn active concurrent Customers on Day-0 generating in excess of 90 Tbps traffic. This 5G network is deployed across 8 data centres and 42 MEC Sites with full geo redundancy and disaster recovery in place.

The Deployment Options – Standalone mode (SA) and Non Standalone mode (NSA)

Why SA?

- Target 5G architecture option
- Simplified RAN and device architecture
- New cloud-native 5G Core
- Brings ultra-low latency
- Same 5G coverage for low band as legacy system
- Supports advanced network-slicing functions
- Facilitates a wider range of use cases

Delivering Best-in-class RAN Portfolio

JPL's RAN product portfolio is based on the combined principles of traditional and Open-RAN principles. With a strong focus to have least wasteful integration efforts, Jio Platforms believed right from the onset that true 5G experience can only be delivered with Stand Alone (SA) mode in conjunction with Jio 5G Core. With SA Mode, legacy 5G devices with NSA can also be supported. With a Distributed RAN approach, Jio's 5G RAN architecture complies with Open F1 interfaces between CU- DU Mid haul. Jio Platforms RAN portfolio supports mid-band 5G NR for HetNet deployments covering both Macro and Micro layers of 5G Coverage. The functional split access is aligned to support Option 7.2-X, which breaks down the Lower PHY layer to save on large transport bandwidths, reducing large dependence on "extensive fibrization" required for faster deployment of 5G NR networks, otherwise. To summarize, JPL's RAN portfolio for 5G NR in mid-band (3.3 GHz – 3.6 GHz) consists of three products:

5G Outdoor Small Cell (ODSC)

Jio 5G ODSC is a unique product in the 5G ecosystem that delivers the required capacity at the hotspots under the umbrella of 4G network. It is a compact, single-box, zero-foot print solution which can be deployed on a 10-15 meter pole, to provide the intended coverage and capacity. The product is designed to operate in 3.5 GHz spectrum with a bandwidth of 100 MHz and radiated power of 20 Watts. It supports 4x4 SU-MIMO in Downlink and 2x4 SU-MIMO in Uplink with 256 QAM such that a peak throughput of 1.8 Gbps can be delivered in downlink. The Hardware Design, Physical Layer (PHY) Software and MAC Scheduler functions are have been developed in-house to have cost efficiencies and full control over the product. The product supports not only eMBB (Data) services but also Voice-over NR (VoNR) and Video-over-NR (ViNR). Going forward it will also support URLLC services.
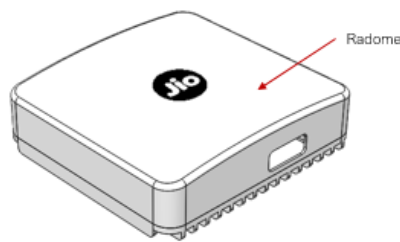
5G gNodeB - Massive MIMO in Sub-6 GHz

To ensure that Jio's 4G Towers deliver 2.3 GHz identical coverage with 3.5 GHz 5G NR, the baseline Macro gNodeB solution will be a 32T32R Massive MIMO product. This has also been designed and developed in-house and contain advanced Beamforming and Multi-User MIMO algorithm to maximize the capacity at site. Architecturally, the 5G Massive MIMO is based on the split architecture proposed by 3GPP and ORAN and will consist of three units:

• Massive MIMO Radio Unit (MRU) – 3 per site, 160 Watt O/P Power
• Distributed Unit (DU) – 1 per site, 8 Layer DL, 4 Layer UL
• Centralized Unit (CU) – In Telco cloud co-located with 5G Core

5G IDSC (Indoor Small Cell)

Jio's 5G IDSC in 3.5 GHz is an "All-in-one" unit comprising of the Baseband, RF and Antenna Units in single closure for easy and efficient installation

- 2x2 SU-MIMO in Downlink with 256 QAM and 2x2 SU-MIMO in Uplink with 64 QAM
- Peak throughput of 1.0 Gbps can be delivered in downlink.

RAN Automation Suites

Higher Traffic densities and variety of new 5G use cases from industries would demand extreme agility in deploying and maintain access networks. It becomes extremely essential to target automation of the complete service lifecycles with a strong control over costs and complexity which may deteriorate the service quality. In order to serve multiple 5G use cases to various industry verticals, Jio's RAN Automation suite addresses the needs of automation in area of RAN Operations.
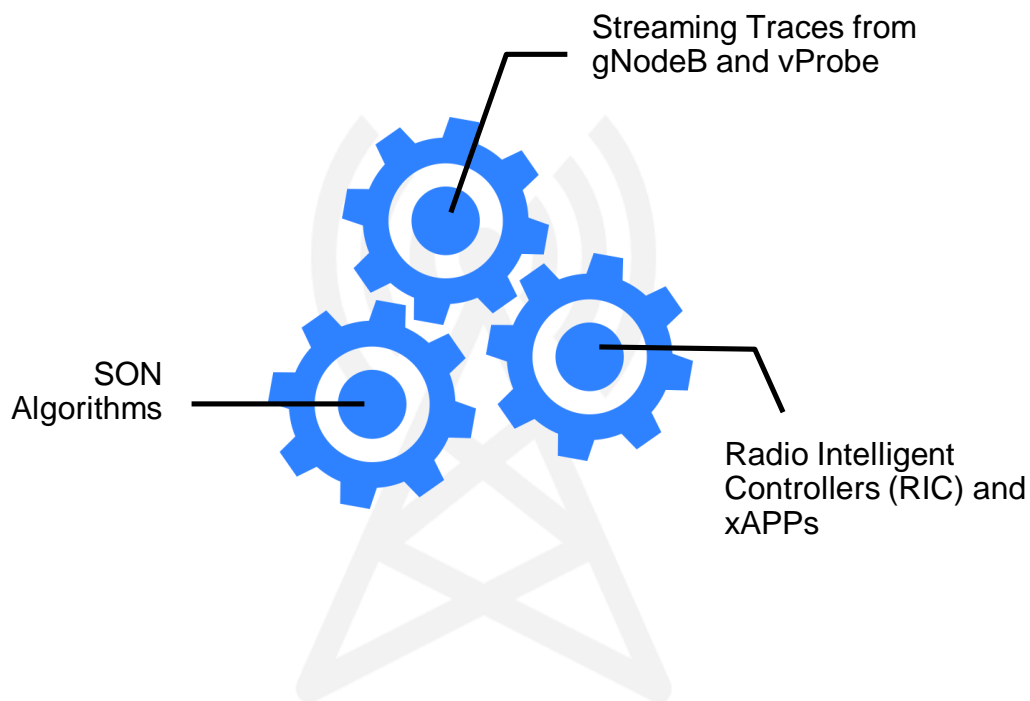
JPL's RAN automation strategy revolves around the following three inter-twined products / solutions:

SON Algorithms: This consists of LTE-like SON algorithms for Neighbor management, PCI management and Mobility Robustness which work on the basis of inter-play of a distributed SON (DSON) component in the gNodeBs and a centralized SON (CSON) component that leverages EMS databases.

Streaming Traces from gNodeB and vProbe: Protocol Events as well as periodic RF measurements for every connected User are streamed from all types of gNodeBs to a vProbe Solution that ingests all the traces and applies geolocation algorithms to approximate the position of the users.

Radio Intelligent Controllers (RIC) and xAPPs: A scalable and extensible RIC framework which can ingest geolocated trace data from vProbes and counters and alarms from the EMS and run intelligent algorithms to optimize the configuration parameters in near real time so that the Radio Network always performs at its best.
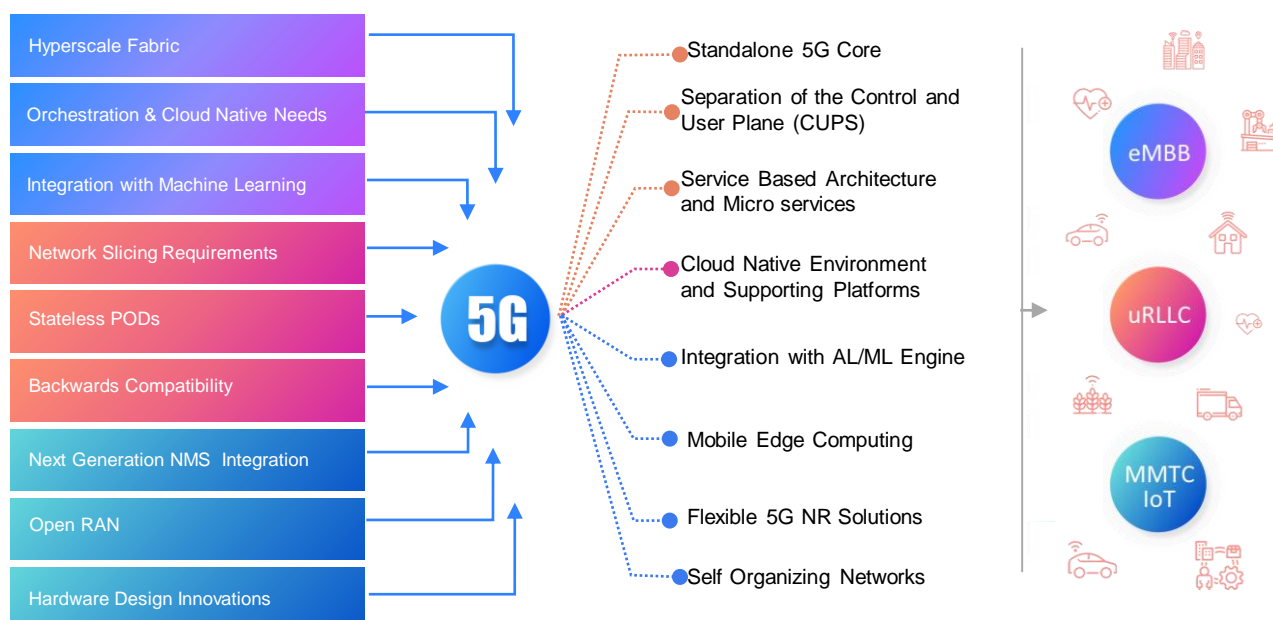
The non-real time component of the RIC will ensure that machine learning and AI techniques are applied over the data sets collected over longer duration (days, weeks) such that the thresholds and parameters for near-real time RIC xAPPs are always up-to-date with the changing traffic models, user counts and radio conditions.

Streaming Traces from
gNodeB and vProbe

SON
Algorithms

Radio Intelligent
Controllers (RIC) and
xAPPs

RAN Automation Suite

Jio's True 5G Core Network Enablement of Enterprise 5G

The impending 5G transition will enable a new wave of services including Enhanced Mobile Broadband (eMBB), Ultra Reliable Low Latency Communication (uRLLC) and massive Machine Type Communications (mMTC). Network Operations will be fully driven by Automation Platforms and Data. While the need to capture, process and react to network data in real-time will give rise to machine learning, platforms must also evolve to fully automate the network lifecycle.
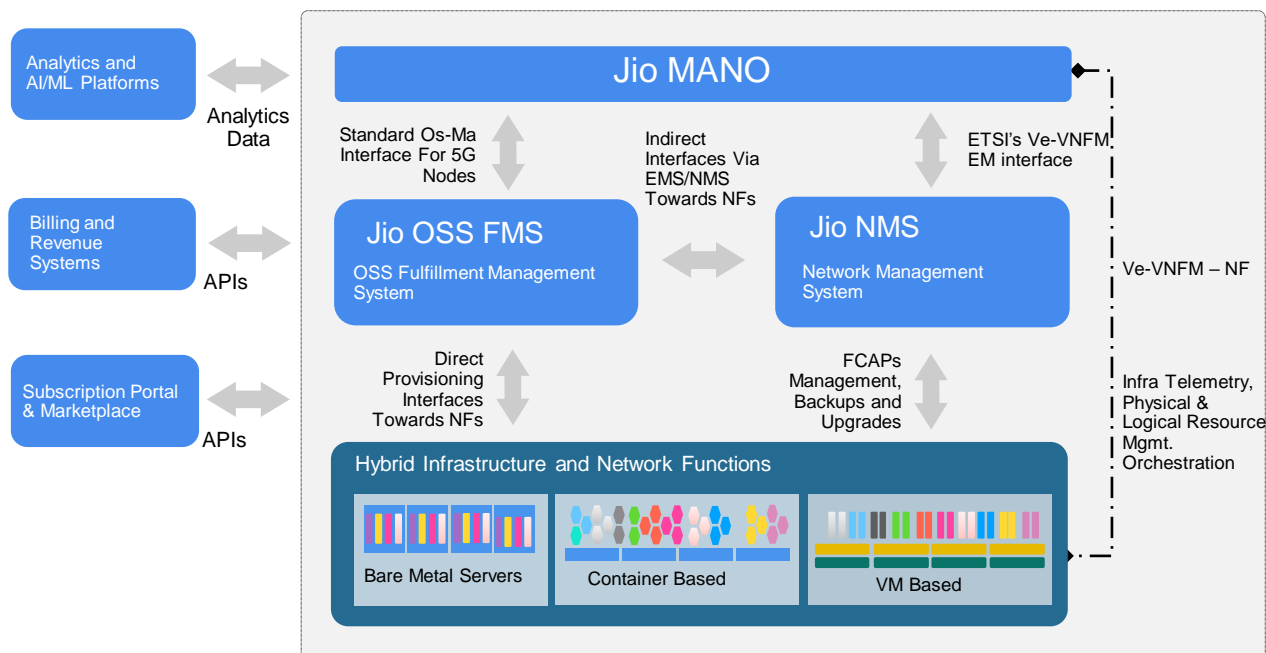

To accommodate various use-cases proposed in 5G, it is important that the core network should be architected with inherent flexibility and efficiency. This can be accomplished by designing systems where control plane and user plane are segregated as cloud native functions integrated with cross domain, data agnostic AI / ML engines. All functions should also be stitched together using Automation platforms for Planning, Deploying, Maintaining and Operating next generation Networks.

The largest 5G SA Core network supporting 120 Mn Customers and 90 Tbps of traffic is deployed, for ongoing 5G PAN India Trials. Jio's Cloud Native 5G SA Core combined with the automation platforms, enabled such a large-scale rollout in less than 50 days – despite the Covid situation in India.

Truly Cloud Native 5G Core

Unlike the simple virtualization of network functions in the form of software appliances deployed in virtual machines, the cloud native approach is truly transformative. Fully automated life-cycle management of network functions, instant deployment of 5G core network slices at any scale, configuration management, portability across private and public cloud stacks, and DevOps-style continuous innovation can together bring stunning improvements in network operations efficiency and customer-facing responsiveness. That is the promise of the cloud native approach to NFV. Network Operators who have the courage to embrace cloud native, and do so quickly, will surely emerge as the winners of the future.
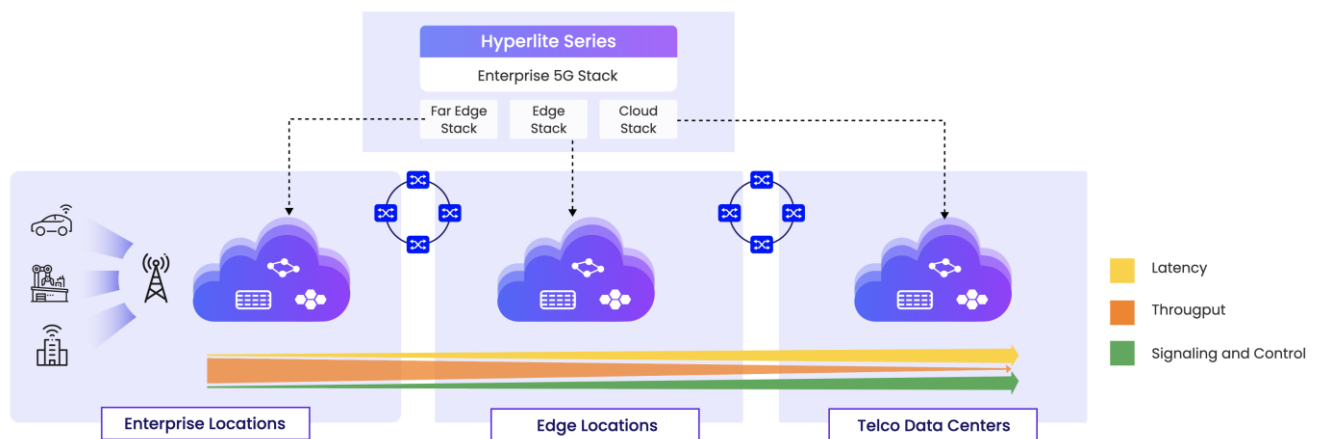
Jio has designed and developed Next generation Assurance and Fulfilment Platforms for Telecom Operators to provide operations support for an existing network, a transforming network as well as a transformed 5G network. These platforms acts as a backbone for Business Support Systems to enable agility in operations. Platform designs are in alignments with the Open Digital Architecture defined by the standard bodies.

As mentioned in the above diagram, on the south bound, the platforms integrates with Network Functions deployed in Hybrid Infrastructure for direct provisioning and FCAPs management. On the north bound they provide standard interfaces to integrate with Management and Orchestration layer. The platforms are also pre integrated with the existing AI/ML platforms for providing insights on the network data.

Jio's Hyperlite 5G Stack Series Enabling Enterprise 5G

Jio Hyperlite 5G Stack Series provides complete flexibility in deployment of the 5G functions across multiple deployment locations to cater to private and enterprise 5G deployment scenarios. Apart from the 5G SBA functions, Jio's 5G stack includes a suite of hyper scaled products which helps enterprises to implement wide variety of enterprise services on Voice, Video and SMS.

Edge Computing Capabilities in 5G

Far Edge

Low latency MEC Application (e.g Robot Control Services)

Far Edge in enterprise 5G context, is the edge computing infrastructure which is deployed in the enterprise premises, farthest from the cloud data center(s) and closest to the users.

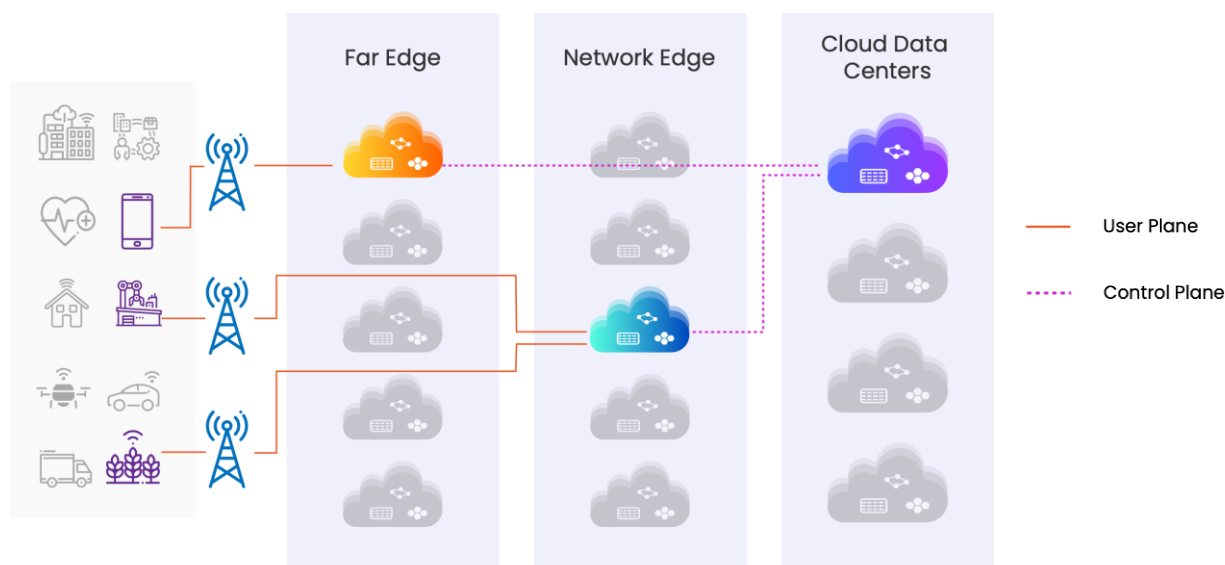### Network Edge

For Location Specific Generic MEC Applications

Network Edge is the edge computing infrastructure which is deployed in a location between the far edge and the cloud data centers.
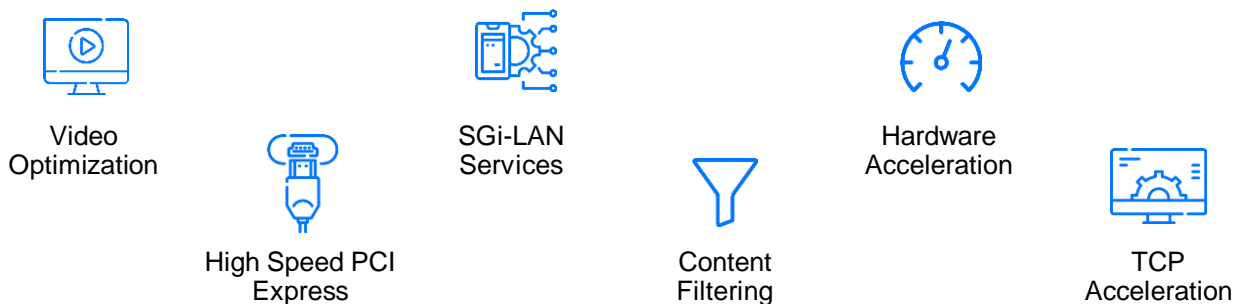
Cloud Data Centers

Telco NW Nodes

Cloud Data Centers are the Carrier's Private data centers hosting the complete set of core network nodes as well as Automation Platforms for Network Lifecycle Management.

Far Edge   Network Edge   Cloud Data Centers

— User Plane
···· Control Plane

High Performance Data Planes

The User Plane Function (UPF) is a single element decoupled from the control plane that handles all aspects of user plane packet processing between the Radio Access Network (RAN) and the Data Network (DN) through one or multiple instances. Apart from the gateway user-plane functionality, an operator deploys an array of services in the user plane. Known as SGi-LAN services, these consist of services like DPI, Video Optimization, TCP Acceleration, Content Filtering for Enterprises, Parental Control, etc.

JPL's next generation NR products' user planes are built using Integrity Protection as well as Ciphering with Snow3G algorithms. High speed PCI Express interface combined with the QDMA (Quadrature Division Multiple Access) solution provides support for multiple Physical / Virtual Functions with scalable queues. This is ideal for applications that require small packet performance at low latency. Apart from this, Jio's Small Cell units are leveraging DPDK libraries for hardware accelerations to achieve unparalleled data plane performance.

Video Optimization

High Speed PCI Express

SGi-LAN Services

Content Filtering

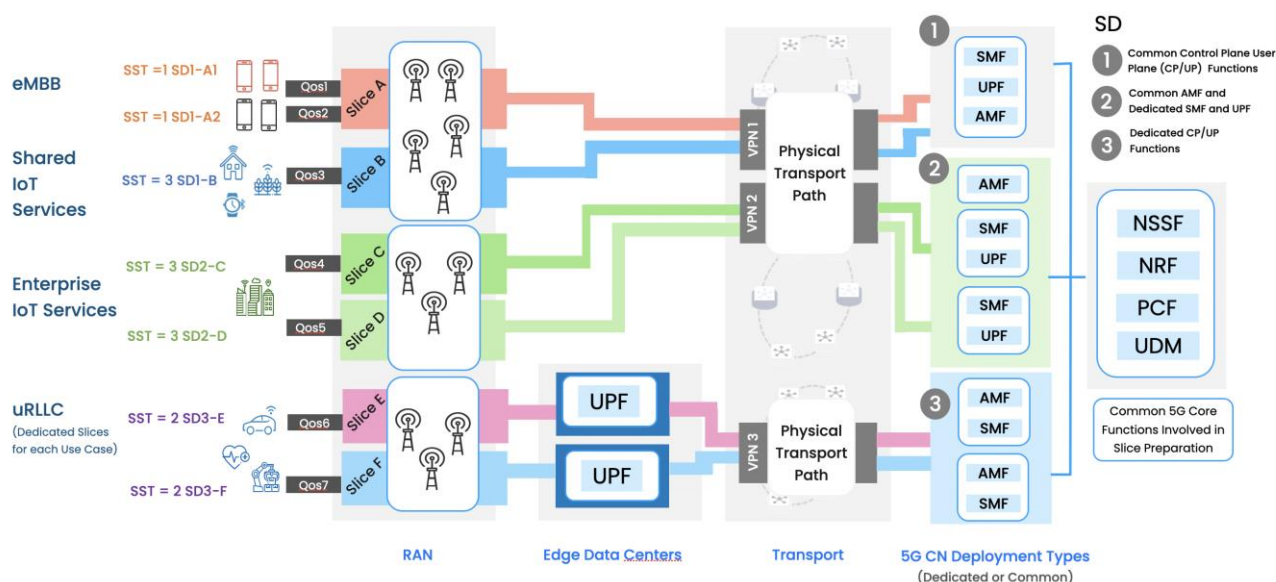Hardware Acceleration

TCP Acceleration

Network Slicing in the Core

Network slicing is one of the fundamental building blocks of core networks. It enables service providers to rapidly create custom services by segregating traffic and delivering specific sets of KPIs for each of them.

Each network slice (Mobile broadband slice, Massive IoT slice, Mission critical IoT slice & Other slices) is an isolated end-to-end network tailored to fulfil diverse requirements in different Industry verticals requested by a particular application. The salient feature of network slicing is the ability to customize the capabilities and functionality that a mobile network offers to its business customers.

Network slicing allows the flexible ramping up of network functions, fast and dynamic service deployment, the logical separation of network functions and grouping of network functions. It also enables the support of different use cases and business models.

Being a key technology included in 5G, networks will need to be sliced to ensure sufficient isolation and security between public and private application instances. These independent network instances enable service-specific Service Level Agreements (SLAs) for connectivity, mobility, capacity, security, redundancy and QoS/QoE.

Core Automation

Continuous demand for scaling the telecom network is to be expected over the next few years as the colossal data volumes driven by 5G become a reality. The automation is required to handle the magnitude of tailor-made services and slices that are introduced with 5G. Introducing Core Automation will automate the process of planning, configuration, data collection & analysis, network monitoring and provisioning of devices, which are performed manually earlier. This can impact the role of telecommunications in assuring the success of the digital transformation of industry by enabling more responsiveness to the verticals in exploiting their business, in terms of operations efficiency and new revenue opportunities. The Automation stack of Jio improves the network efficiency, performance, customer experience and helps identify opportunities of new revenue streams for 5G use cases. Automating the tasks not only removes the possibility of human errors due to manual data analysis but also removes the false positives and increases the data security and privacy.

Reduce costs in purchasing network equipment via migration to software on standard servers.

Cost Reduction

The productivity increases as it performs precise commands eliminating operator errors.

Productivity

Highly increases overall performance of the system which is error free

Performance

Reliability

Significantly reduces the chances of error in operations.

Availability

Removes the issue of unavailability of workforce

The Jio's solutions for Enterprise Automation provides a versatile way to simplify operations, maximize efficiency and closes the automation gap which is a must to ensure future success. New solutions can help in the deployment of new services faster and to orchestrate the operational tasks between systems. Building the entire system in-house, Jio Platforms could focus on innovation and adopt tried-and-true practices, such as developing open solutions that interoperates well with third-party systems. The Automation stack of Jio which includes Jio ATOM, Jio MANO, Jio NMS. Jio ACI and CN-OPS.

The Jio Automated Cloud Infrastructure Installer (Jio ACI) fully automates the cloud deployment on Docker based and Openstack based production grade environments. The solution aims to deploy hybrid production grade environments in a way that makes them simple to operate, upgrade and scale. With its comprehensive and easy to use graphical user interface, a user can easily plan and deploy Openstack or Docker clouds across deployment sites. This leads to a significant reduction in the time taken for their installation and commissioning. The Jio ACI makes it easy to provision instances, networks, and a production ready cloud infrastructure.

The Jio C-MANO platform is a MicroServices based, distributed, scalable and extensible framework designed for rapid integrations and service implementation. This modern solution enables rapid time to market for new services and capabilities while also supports scalable operations that reduce IT complexity and costs. The platform is able to efficiently scale resources on demand, support services in a distributed manner across distributed "clouds" or "edge cloudlets" for fixed and mobile users, can proactively monitor and take fast intelligent action to manage and orchestrate its distributed resources. The Jio's converged and cloud native MANO platform supports not only virtualized but also containerized workloads, without the need to fallback on open-source solutions such as Kubernetes. The Jio MANO platform has been leveraged to deploy more than 500 cloud native pods, while the Jio ACI solution (Automatic Cloud Installer) has commissioned the cloud native infrastructure across 50 sites with only 7 engineers required for deployment. This entire deployment took place amidst difficult Covid times, with severe constraints on office access, personal exigencies as well as logistic challenges.

The Network Management System (NMS) is a critical piece in the overall telecommunications-management solution. It is the sole mediator for monitoring and managing the FCAPS data of the network elements and provides a single pane of glass for the Network Operations Centre. It is fully integrated with AI and ML capabilities, leading to "light touch" operations.

The Jio ATOM platform leverages machine learning to detect anomalous network patterns and create reports and alerts based on these patterns. The troubleshooting helps in proactive root cause analysis and resolution before the network symptoms start affecting operations.
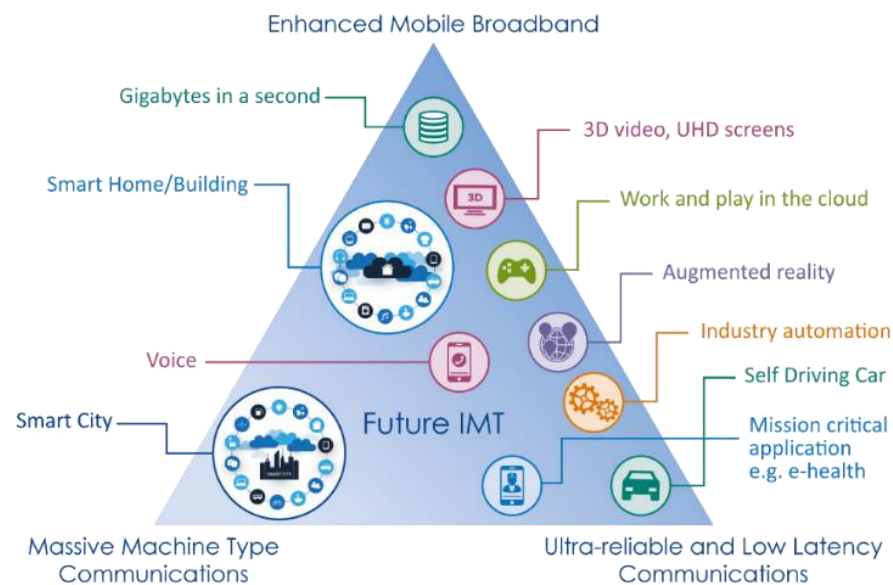
Jio 5G CN-OPS is Core Network Operations platform, which automates the process of upgrades of the network elements. With a view to provide best customer experience, Jio CN-OPS is an intelligent solution to upgrade the network functions. It is deeply integrated with AI, data native, and automation technologies based on the technical advantages in the 5G core network and in-depth understanding of O&M services. The main functions of Jio CNOPS are Node Management, Site-Topology Management, MOP Creation and MOP Execution.

5G Built for Innovation

5G fundamentally changes the game by enabling, for the first time, innovation at scale and speed.It primarily delivers value by enhancing three applications: — Enhanced mobile broadband (EMBB), which provides faster data rates across wide coverage areas to improve various functions, including ultra-HD video streaming — Ultra-reliable, low-latency communication (URLLC), which increase the speed and quality of service in critical functions, such as the control of robots and drones — Massive machine-type communication (MMTC), which involves the automatic generation, transmission, and processing of data among numerous machines with little to no human intervention (for instance, to track goods along the supply chain). The adoption of 5G will likely happen in waves in major markets, with EMBB reaching mass adoption first, URLLC gaining traction soon afterward, and MMTC trailing the pack.

Jio is leading the 5G race is India and has built the 5G infrastructure by using native developed technology for its hardware, network, and technology components. Jio is working to integrate 5G with autonomous vehicles, connected drones and remote healthcare services, ultra-high-speed mobile internet speeds and mixed reality which can help in creating more employment in India.

To boost growth in the fields of agriculture, education, healthcare, Infrastructure, Financial Services, Jio platforms have connected with over 20 startups to build world-class solutions for Artificial Intelligence. Cloud computing, Machine learning, IoT, Blockchain etc. Jio has partnered with Samsung in a trial to test the 5G network capabilities. We are ready with the 5G service and extensive fiber assets which will play a crucial role in the rollout of the 5G infrastructure. Jio has also partnered with Google and Facebook who cover a vast majority of the internet landscape also hold shares in the company, are also global investors in the 5G tech space. Reliance Jio's vision is to build a 5G ready network in India before deploying its technology to other countries.

Jio 5G will clearly disrupt both the B2C and B2B markets with Self-driving cars, Delivery drones, Smart factories, Robotic Surgeries, Smart homes and even an entire Smart city- Jio's 5G is the Future of Innovation: offering end to end capabilities that will spur transformation making the experience a total Game Changer.

Conclusion

Jio Platform's 5G is all set and ready to transform industries and society by evolving their networks to cater to everything from smartphones to robots on factory floors. That's why we've built a flexible 5G platform, enabling service providers to embrace opportunities and challenges, and offer new services for a whole range of users and industries.

With a strong and robust 5G product portfolio, Jio aims to be the global technology pioneer in 5G product and ecosystem development. We have built the complete platform from scratch with 100% home grown technologies & solutions making it a complete Made in India platform which is Simple, Smart & Secure.

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Made in
India Platform

Simple, Smart &
Secure

Fastest
Deployment

Autonomous
Operations

Hyperscale
Architectures

Extremely
Cost Effective

Acronyms

Acronym	Definition
AI	Artificial Intelligence
ACI	Automated Cloud Installer
ATOM	Adaptive Troubleshooting Operations Management
CN	Core Network
DPDK	Data Plane Development Kit
DN	Data Network
EPC	Evolved Packet Core
eMBB	Enhanced Mobile Broadband
FCAPS	Fault Configuration Accounting Performance Security
FMS	Fault Management System
HTTP	Hypertext Transfer Protocol
IDSC	Indoor Small Cell Solution
IMS	IP Multimedia Subsytem
IoT	Internet of Things
LTE	Long Term Evolution
MAC	Media Access Control
MANO	Management & Orchestration Platform
MEC	Multi-access Edge Computing
ML	Machine Learning
mMTC	Massive Machine Type Communication
MIMO	Multiple Input Multiple Output
MRU	Massive MIMO Radio Units
NF	Network Functions
NFV	Network Function Visualization
NMS	Network Management System
NR	New Radio
NSA	Non Standalone
NST	Network Slice Template
OSS/BSS	Operations Support System/Business Support System

Acronyms

Acronym	Definition
ODSC	Outdoor Small Cell Solution
POD	Port of Discharge
QAM	Quadrature Amplitude Modulation
QDMA	Quadrature Division Multiple Access
QoE	Quality of Experience
QoS	Quality of Service
RAN	Radio Access Network
SA	Standalone
SAAS	Software As A Service
SBA	Service Base Architecture
SDG	Sustainable Development Goals
SDN	Software Defined Networking
SHF	Super High Frequency
SSR	Secondary Surveillance Radar
TCP	Transmission Control Protocol
THz	Tera Hertz
UPF	User Plane Function
uRLLC	Ultra Reliable Low Latency
VoLTE	Voice Over Long Term Evolution
ViNR	Video Over New Radio
VoNR	Voice Over New Radio
VLC	Visible Light Communication
VNF	Virtual Network Function

Team Members

#	Name	Role
1	Aayush Bhatnagar	Lead Architect with deep knowledge in the areas of Cloud Solutions, AI/ML applications, Blockchain and Telecom Industry.
2	Mohit Vaish, Bhavin Patel, Neha Nayyar, Nitin Khurana, Ashish Bhatnagar, Sony Sankar.	Experienced product management professional with in-depth knowledge of conceptualizing next generation telecom networks.