Reliance Jio's 5G push to be India's answer to Huawei

Not content with being India's largest telco, Jio is on its way to becoming India's first bonafide global telecoms giant

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Reliance Jio built a $46 billion pan-India 4G network with Samsung, with a 10-year lock in period With that set to expire, Jio is attempting to DIY its 5G open interface network In-house 5G development will cut capital expenditure by 70%, and will make deployment faster Jio, however, needs to reconcile its tech focus with the culture clash with its parent company

On 25 February, during a roundtable discussion between US President Donald Trump and Indian CEOs, Mukesh Ambani rose to speak. "We're the only network in the world which doesn't have a single Chinese component," the Reliance Industries Ltd (RIL) chairman said. Some saw it as a facile attempt to play to Trump's famous anti-China rhetoric. Within Reliance Jio Infocomm—RIL's telecom subsidiary—it was seen as a sales pitch: Jio could play a part in building the next generation of US telecom networks.

And while it partnered with Samsung to build its $46 billion pan-India 4G network, its 5G project is going to be a DIY effort as its 10-year lock-in period with the Korean telecom major is set to run out in a few years.

Jio isn't alone in its efforts to make its own 5G equipment. There has been a global movement driven by major operators like Vodafone and AT&T to set specifications and standards in line with operators' requirements. Based on principles of openness and interoperability, the movement, called O-RAN, seeks to end the hegemony that's long existed in the telecom equipment space.

Traditionally, the 3rd Generation Partnership Project (3GPP), which is led by large vendors like Ericsson, Nokia, Qualcomm, Huawei, ZTE, and Samsung has set standards, with operators forced to follow.

“Vendors make a specification and then make a product out of that specification. Operators’ requirements are not fully taken into account. Vendors develop specific protocols for hardware to talk to software, and that costs a bomb,” said a senior executive working closely with a leading Indian operator.

5G networks are especially given to this. Software and hardware are now two separate commodities, and both can be sourced separately. Crucially, while the intellectual property resides in software, hardware has been commoditised and could be bought off the shelf. As a result, even German businesses like automaker BMW and air carrier Deutsche Lufthansa are building private 5G networks, well ahead of Germany’s telcos.

Jio is also hitching its cart to these open standards. The use of open interface networks, that too, developed in house, could bring down Jio’s capital expenditure by nearly half, said multiple executives working closely with Reliance Jio. This is vital in a country like India, where 5G use cases will not emerge from day one and the average revenue per user remains low. These savings could also allow Jio to buy a larger chunk of spectrum.

For a company that already reported a net profit of Rs 2,331 crore (~$307 million) for the quarter ended March 2020—a year-on-year increase of 3X—this would reinforce its already strong standing.

In March, Jio sought governmental approval to test its new 5G equipment, a culmination of years of research and development that began in 2017-2018. That was when the company’s top brass hit upon the idea of becoming a telecom equipment behemoth, potentially even creating a rival to China’s Huawei.

Shortly after, in mid-2018, Jio acquired US-based telecom software company Radisys. This boosted Jio’s capacity to build software components, which constitutes a significant part of the 5G network. With Radisys in its arsenal, Jio could now stitch together disaggregated and open interface equipment. Some of this could be developed entirely in-house, with the rest sourced from vendors.

“We hired 150 graduates from the Indian Institutes of Technology (IIT). We built networking equipment and ran prototypes in Jio’s campus,” said one of the top Jio executives at the time, who is no longer with the company.

With software and hardware designed and tested, the final stage of the plan would be to get original design manufacturers in China and Taiwan—who already work with vendors like Ericsson and Nokia—to produce the equipment. Coincidently, the same year Jio began its equipment push, Trai, India’s telecom regulator, came up with a set of recommendations on ‘promoting local telecom manufacturing’. As part of this, Trai redefined Make in India, adding a new category—design in India, manufacture abroad. This would mean that Jio’s plans would still qualify for incentives under the Make in India scheme.

Multiple industry executives XXX spoke with don't believe Jio can pull off a 100% in-house developed network. However, Jio's efforts will give it greater control over its network and, potentially, the ability to become a bonafide equipment player in its own right. The company did not respond to a detailed questionnaire from *XXX*

Even as it sorts out the technology side of the problem, it must also confront an issue with its culture. Its leadership isn't necessarily from the tech or telecom space. "Mukesh is a visionary; he keeps himself abreast of new developments and reads regularly. The problem is with an inner circle of advisors, all of whom come from the petrochemical business and carry a different line of thought," the former Jio executive said.

Jio's DIY imperative

Jio's insistence on building out its own 5G capabilities stems from its experiences with vendors throughout its four-year-long existence. For outdoor coverage, it used macro base transceiver stations (BTS) by Samsung. For indoor coverage, Jio procured micro BTS technology, or in-building solutions (IBS), from US-based telecoms company AirSpan. Jio even invested in AirSpan to get a better deal for itself.

The problem with this two-vendor set-up is that the equipment of one vendor can't communicate with that of the other. "When a subscriber comes out of a mall or building to the street, there may be a delay or a call drop. That's not seamless. But you can't do anything," said the senior executive working with the Indian operator quoted earlier.

In addition, network management systems are also proprietary and, therefore, vendor-specific. So, instead of having one network management system to monitor both sets of equipment, Jio needed two. This is something that O-RAN is working on changing, said the aforementioned executive. "It's forcing vendors to support open interface management systems."

"The advantage of using an open and disaggregated architecture is that when you don't like one software, you can change the vendor. Similar to changing apps on your smartphone," the former executive said. It allows operators to write their own software code, meaning they can modify the network as per their requirements. Think of it like buying a house, but doing the interiors yourself.

Jio has set about cracking this methodically.

Jio's in-house research and development team is massive. Headed by Pradeep Kumar Bhatnagar, who led Reliance Industries' tech development arm, Rancore, it has between 600-1,000 engineers. Incidentally, Bhatnagar's son, Aayush, also leads work on 5G and blockchain. This team and Radisys are working in parallel to develop 5G RAN," said the aforementioned senior executive. "Once the prototypes are out, the management will figure out whether or how to use both."

In 5G, the radio access network (RAN) deployed at towers consists of Reliance Jio's 5G push to be India's answer to Huawei

three parts: a radio unit (RU), distributed unit (DU), and centralised unit (CU). All of these are a combination of software and hardware. While the radio unit is a highly specialised job, carried out by the likes of Japanese IT giant NEC, the DU and CU can be developed in-house.

According to multiple sources, Radisys is building DUs and CUs. Bhatnagar's team may design RU and give it to a design house in China or Taiwan or any such country, a couple of executives working closely with Reliance Jio said. Intel would provide the microchips and hardware. "For general-purpose hardware, Jio will not go to an original equipment manufacturer. It will negotiate directly with Intel or Xilinx, the chipset manufacturers, as per its own terms and volumes," the executives said.

Radisys' test centres will also allow Jio to test its equipment in-house. This combination is likely to speed up its 5G development considerably. At present, operators have to wait six to 12 months to get a software or hardware update if they come across bugs in the network. According to the executive, the turnaround cycle can be cut by 75% when you have everything in-house.

"The future network will be determined by one principle: choose the best components in the market and build your network," said a senior industry executive who has worked with a US-based telecom tech company.

New partners, new ways in 5G

Jio's plans for 5G self-sufficiency are greatly helped by India's massive telecom engineering and software talent pool. Most global equipment vendors—including Ericsson and Nokia—have development teams in India. Huawei's Bengaluru tech development centre, for example, does a lot of the heavy lifting for the Shenzhen-based telecom behemoth. Newer telecom companies in the US—the likes of Mavenir, AltioStar, and Parallel Wireless, all of whom have Indian founders—have followed suit.

"India can develop products—that capacity is already there. It is a matter of putting together those capabilities and building solutions out of that," said the senior executive.

Jio, though, doesn't want to cut its external dependencies altogether. Indeed, while Jio prepares for in-house development, it is actively looking for another supplier.

This is probably not going to be any of the big vendors. Samsung, like other major players, is unlikely to move away from proprietary systems entirely. Jio, meanwhile, will be reluctant to partner with either Ericsson Reliance Jio's 5G push to be India's answer to Huawei

or Nokia, since both also supply to its rivals, and are big enough not to have to bend in the face of Jio's terms and conditions.

"Samsung grabbed the Jio opportunity because if it was a novice in network technology… It was easier to extract a deal from Samsung than Ericsson or Nokia," said a telecom expert involved with the development of 5G technology. "If I own a $46 billion network, I would want to negotiate with the vendor on my own terms."

Instead, Jio could pick one of the younger equipment vendors like Mavenir. “Open RAN will bring up new vendors, Reliance Jio’s 5G push to be India’s answer to Huawei

which are not even heard of before,” the senior industry executive said. “A few years ago, when Mavenir and AltioStar built open interface telecom software, the open RAN standards were not in place. Now, even they are customising and realigning their products,” he added.

Jio has worked closely with Mavenir for the past few years. In 2018-19, it gave Mavenir a small contract to deploy an IP MultiMedia Subsystem (IMS) software in the Chennai telecom circle. But Mavenir’s solution could not handle the traffic. The deployment failed. Eventually, Nokia was contracted to provide this software across a majority of telecom circles circle. But Mavenir’s solution could not handle the traffic. The deployment failed. Eventually, Nokia was contracted to provide this software across a majority of telecom circles in India.

Since then, however, Mavenir has ramped up its capacity, leading to projects with Vodafone Idea and US-based Dish Networks to deploy the Open RAN network for both companies. It’s also served as a supplier to Japan’s newest mobile operator, Rakuten.

While Mavenir remains a potential candidate, AltioStar is far less likely. In 2018, Jio, in tandem with Tech Mahindra, attempted to acquire a stake in the Massachusetts-based company but a deal didn’t materialise. “Later, Tech Mahindra went without Jio and invested in the Altiostar,” the 5G expert quoted earlier said. In April, AltioStar bagged a contract from Bharti Airtel to deploy 5G-ready radios.

Driving Force

Tariq Amen, the Jordanian expat who headed the networks team at Jio until 2018, was the driving force behind strategic investments like the Altiostar attempt. He later joined Rakuten, which has since acquired a stake in AltioStar.

Culture eats strategy for breakfast

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While other operators like Bharti are also procuring open RAN technology, Jio is the only one that could potentially productise and sell these solutions to other countries. For foreign operators looking to avoid being affected by the blow hot-blow cold relations between the US and China, an Indian equipment vendor would be a particularly appealing prospect.

To realise this opportunity, though, Jio needs to reconcile its tech focus with its parent company’s trader mentality. This has come in the way of Jio really becoming a force to be reckoned with in the equipment space. According to various industry executives, Jio’s R&D team has built prototypes of BTS for 4G in the past. For the last two years, it has even attempted to build its own IBS, though multiple executives believe the operator has had little success. Even for 5G, Jio has developed a prototype for core software, said a senior executive working closely with Jio executive.

But most of these prototypes have never seen real network deployment. Instead, some equipment vendors claim Jio uses its prototypes to extract better deals from suppliers. “Since you have built the equipment, you know what all elements have gone into making it. So, you use that to negotiate hard with your vendors,” a senior executive with a European vendor told XXX

The former Jio executive quoted earlier recounts a similar strategy. In 2018, Jio hired over 150 graduates from IITs. “The team built prototypes which were demoed in Jio’s campus,” one of the former Reliance Jio executives said. “Later, Reliance Jio used this to negotiate hard with Cisco,” the former executive said.

There is also a culture clash at play in Jio’s offices, with the old guard refusing to make room for newer, fresher minds, alleges the former executive. “Mukesh [Ambani] is surrounded by old hats, and some of them have insecurities. They will not let newcomers come close to the chairman… With Akash and Isha (Mukesh Ambani’s children) taking higher roles in future, there is some hope. But if they are surrounded by the same kind of people, it may not work,” the executive said.

Even within the old guard, there exist various power centres, each with their own ideas on how Jio should proceed, say executives both past and present.

For instance, there’s Manoj Modi, who’s seen as Mukesh Ambani’s right-hand man. Modi is close to Jyotindra Thacker, another member of the old guard. In the past, they have pushed for the design and development of 5G tech in partnership with external vendors, the former Jio executive said.

Bhatnagar is another power centre. He has pushed for Jio to be completely self-sufficient.

According to the senior industry executive quoted earlier, these two parties are finally on the same page. “I now see a synergy. The focus is now on building in-house as far as possible,” he said. India’s 5G rollout in the next two to three years, therefore, could see the christening of India’s first indigenous network and, possibly, its first global telecoms giant as well.