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WHAT'S THE PROBLEM WITH OPEN RAN: IS VRAN THE ANSWER?

Webinar: Questions and answers

NOVEMBER 2022

What's the problem with open RAN: Is vRAN the answer?

This document outlines the questions and answers received from the STL Partners webinar, '**What's the problem with open RAN: Is vRAN the answer?'** which was hosted on Tuesday 22nd October 2022.

You can watch the recording of the session, and also access the slides, using the link here. *We have included the following timestamps for the webinar recording:*

- **02:27** for the introduction to our presenters
    - **David Martin,** Senior Analyst, STL Partners
    - **Emma Buckland,** Senior Analyst, STL Partners
- **03:26** for STL's presentation on "What's the problem with open RAN: is vRAN the answer?"
- 39:55 for Q&A session
- If you have any questions not addressed in the webinar or this Q&A document, or want to hear more about our research findings or from our speakers, please contact:
- **David Martin**, Senior Analyst, STL Partners, david.martin@stlpartners.com
- **Emma Buckland**, Senior Analyst, STL Partners, emma.buckland@stlpartners.com

Note that the statistical and background data on the open RAN, vRAN and cloud RAN deployments discussed in our webinar and this Q&A document come from our **Telco Cloud Deployment Tracker** which is updated quarterly and reflects all telco cloud deployments in commercial live networks which reported in the public domain during the reporting period. The latest iteration of our tracker was published in October 2022 (Excel database and companion report) and had a similar focus to this webinar: Will vRAN eclipse pure open RAN?

The below questions were received from the webinar audience during the live session. The first section includes questions and answers asked during the webinar and the second section presents our answers to questions from the audience which we did not have time to cover live.

Live webinar questions and answers

1. **Why do you class Vodafone UK as v-RAN? Will you carry on classifying them when the MIMO integration comes through**

We categorise them as vRAN because the system they are deploying is basically a Samsung vRAN product. It's vRAN because it is not fully open nor open RAN compliant. They are actually using a proprietary CPRI interface between the BBU, DU, CU and radio. So, it's closed to that extent. It isn't an open RAN deployment in the strict definition of the term, and it isn't fully open RAN interface based. In terms of the massive MIMO integration, I don't necessarily see that as something that affects whether you categorise it as open RAN or vRAN.

Clearly, there have been massive improvements now, with being able to integrate open RAN with massive MIMO. But Samsung and the radio vendor in this instance [NEC], have a strong track record of integrating massive MIMO as part of its RAN deployments. Given that we're categorising it as a closed system, with the interface to the radio being CPRI-based, I don't see that there's any reason why we would change the categorisation. In fact, if anything, it probably reinforces the categorisation as vRAN.

2. **Aren't RIC, MEC and Apps clear O-RAN/vRAN benefits?**

Yes, that's right. I completely agree with that. In fact, during the presentation, I was emphasising the fact that one thing you lose if you do vRAN rather than open RAN is the ability to gain the benefits of the RIC and the SMO [Service Management Orchestration].

But that's a compromise. And to some extent, it is about what use case you are pursuing. Clearly, for the macro network as we would say, particularly in the brownfield deployments, vRAN seems much more strongly positioned to capitalise on the opportunities that are emerging there. But the RIC and the SMO present many more attractive propositions for some of the new emerging use cases, particularly the industry 4.0 ones, the MEC, and so on. We are not saying that vRAN is going to completely eclipse open RAN, particularly as those are real significant opportunities that are very promising for telcos and vendors alike in the future. Maybe there will be bifurcation in the short-to-medium term, with the macro network going down very much more the vRAN route. But also, those other use cases have been elaborated for private networking and industry specific applications.

3. **Is the lower quality of new open RAN vendors causing slower adoption of open RAN? The person asking the question is involved with a large western telco. His experience is that those products are far behind compared to legacy vendors.**

It's very difficult to be impartial about this. Everybody, particularly those that are involved in the development side of the equation, is going to have strong views on that.

In the talk, I was pointing to the fact that at least in the marketing presentation of the trials and tests that have taken place, the point being made is that the performance characteristics of open RAN are now reaching parity with those other legacy RANs, particularly with the ability to now support massive MIMO. These claims are difficult for us, looking at this from a somewhat removed perspective, to verify.

But, if I can give a slightly theoretical answer to that, there's no reason why in my view, based on its characteristics, open RAN shouldn't equal or attain the performance levels of a legacy RAN.

Given all the optimisations that are taking place with hardware, the improvements that have been demonstrated in recent tests, in terms of operational efficiencies and performance, the energy efficiency profile is now comparable, if not better, for open RAN. Open RAN is making progress all the time and can only get better. To some extent, it's a race.

Ultimately, we would say that cloud native RAN platforms, whether fully open RAN or more like vRAN, are essentially the future. Owing to all the technological and business model efficiencies of a cloud native environment for delivering networking, cloud is essentially the future.

I am very confident that performance parity will be achieved. There is so much investment in it and so many improvements that are continuously being made, that it is a case of keeping the faith and making the investments that have already been done pay off. I am sure that there is considerable momentum and will to achieve it. The point we are making is that it isn't going to be one or the other. The reality is going to be more mixed, in any case, more hybrid. Even to the extent of being a kind of hybrid combination of virtualised and appliance based. Really, I am trying to equivocate the terms of the question. It is not going to be one or the other. Improvements are going to be made on both sides, and open RAN is still a very promising technology for many use cases.

4. What's your view on energy efficiency performance when we compare open RAN and vRAN? Do you think that non-open RAN would have an advantage on achieving higher energy performance than disaggregated open RAN?

It's obviously been a problem for open RAN because there has been a problem in getting energy efficiency. But the news we've been getting from the tests and the trials is that operators and vendors are more satisfied that the energy efficiency is now comparable, if not superior, for open RAN.

In theory, open RAN ought to be a much more energy-efficient technology. The cloud-based nature allows for:

- more sharing of resources
- more efficient use of resources
- less redundancy
- less redundant capacity having to be maintained across telco networks
- pooling of resources
- hyperscale deployment is potentially very efficient from an energy and resource point of view.

Energy efficiency is getting better and, as computers get more efficient, that improves the energy profile. I feel confident to say that things are improving in that regard.

5. You have not mentioned security as one of the factors for open RAN. Security cannot be under underestimated. Do you have any comments?

That is a good point, it is a major concern. However, I don't take the view that open RAN inherently presents more of a security risk than proprietary RAN. Though, there are obviously familiar arguments on both sides.

Some think that because you have open RAN systems (open programmable networks) you leave yourself open to cyber-attacks and security risks. Equally, closed systems are also vulnerable. One of the reasons why suspicions are falling on Huawei so much is because they are on a closed platform. There are suspicions, because they won't fully open the platform, that vulnerabilities and backdoors are left within those systems.

Maybe openness represents more security at the end of the day. There is a lot of financial and political US state investment in making sure that open RAN delivers as an alternative to the closed systems from the Chinese vendors. So, I think security is going to be at the forefront of ensuring that these systems can be delivered and adopted with confidence by operators.

It is a good question, but I don't take the view that open RAN is inherently more of a security risk than the more proprietary systems.

6. Does vRAN come as a surprise? Or is it the smart strategic response of the traditional RAN vendors to displace open RAN competition?

I think it probably is, to some extent.

I think many of us have always taken the view that the objections, raised by the likes of Nokia and Ericsson, were to some extent, a tactic while they also got up to speed with the open RAN interfaces and were fully on board with the O-RAN alliance and the open RAN initiatives across the industry.

Why would you have that two-pronged approach? Because they want to make sure that they incorporate everything that's viable and productive from open RAN into their product portfolio. This means that they can present themselves as providing a secure migration path from legacy to the future without operators having to make a risky all-in-one jump from one to the other.

The proof depends on whether operators are attracted and convinced by the vRAN propositions of the likes of Ericsson or Nokia, as genuinely offering a migration path to the full vision of openness. I think the jury is still out on that question.

7. Africa still needs 3G coverage and no open RAN vendor is meeting the specifications yet. 5G is not really required in Africa, except in South Africa. Do you have comments?

Vendors such as Parallel Wireless have made it a USP of their platform that it offers fully convergent, 2G, 3G, 4G open RAN with the ability to then upgrade to 5G at a future stage for that very purpose. In Africa, South America and developing markets, 3G is still very much needed, as is 2G. If you do not have an open, software-based, cloud-based RAN, you will need to be able to support those legacy technologies.

Whether a convergent open RAN platform does that job more effectively than a legacy 3G RAN is a moot point. Yet, as existing platforms near the end of life and are no longer maintained to the same extent, there will be a need to migrate to a more virtualised, consolidated platform for delivering those things. In theory, the migration path to a more open RAN platform, for those particular operational needs, makes logical sense. Whether the systems currently deployed are meeting that need, or delivering the performance, is another matter.

Post webinar questions and answers

8. There's a large overlap between Open RAN and vRAN. But isn't it preferable to talk about them separately? I'd suggest that you will be very disappointed if you Expect Nokia 2023 Open RAN to have any of your green ticks, they're likely to have only Open FH support which was not on the table.

David Martin: I would in fact expect Nokia open RAN / vRAN to be as you say; and we're clear in the webinar that vRAN has only partial support for open RAN interfaces. So, we do treat them as separate entities.

9. Open vRAN can also be vEPC, vUPF. Existing RAN cannot. Without (Open) vRAN, isn't Telco Cloud a job half done?

David Martin: With respect, I don't think that's correct. There has been a whole wave of mobile core virtualisation - such as vEPC and 5GC - where the core is connected to an appliance-based RAN. But I agree that without RAN virtualisation, the job of telco cloud is only half done. But as we said in the webinar, this doesn't mean that fully standards-based open RAN is the only way to deliver a cloudified RAN. The key factor is cloud-native software design and, of course, open, disaggregated software and hardware components.

10. Can you share with us an example (if that one exists) where ORAN shown Capex/Opex reduction during the trial or commercial phase?

David Martin: There's the example of Axiata's trial, quoted in the webinar: "Open RAN solutions enable greater operational and cost efficiencies using advanced technologies, whilst also meeting the needs of our digital inclusion efforts across the region." That implies at least that they saw those cost efficiencies during the trial. Also, in the deployment of Parallel Wireless at Tigo Colombia, the operator reported a 15% reduction in energy consumption compared with legacy RAN, as well as a 50% reduction in time to deploy, with also much less reliance on truck rolls to remote sites.

Emma Buckland: In terms of Capex savings, a very small regional operator in the US (Inland Cellular in Idaho; 41,000 customers and 140 cell sites so not dissimilar to a trial or pilot) quoted 40% in cost reduction by sourcing its open RAN equipment form Parallel Wireless rather than traditional vendors[1].

11. What do you think the ROI of vRAN will be?

Emma Buckland: I'm not sure that the vRAN solutions are inherently cheaper than traditional RAN ones especially if they come from the same vendors. Virtualisation per se doesn't make the solution cheaper beyond being able to pool underlying hardware and, in any case, the largest expense in the RAN isn't the CU/DU it's the radio units. So vRAN's main advantage from an RoI point of view would

[1] https://www.lightreading.com/broadband-tech/fixed-wireless-access-(fwa)/in-expanding-fwa-inland-cellular-remains-unafraid-to-try-new-things/d/d-id/776875

be, down the line, to leverage open interfaces to open the network to a wider ecosystem of vendors to choose from in the hope that increased competition, or the threat of it, might bring prices down.

David Martin: I agree that the cost structure for vRAN won't be all that different from traditional RAN. That depends, though, on the degree to which operators are content to persist with the existing model, whereby vendors take charge of deployment, integration, operations, maintenance, and updates. This approach is consistent with a more closed, proprietary implementation of vRAN. But if things are deployed in a more open RAN-compliant way, this is likely to mean that the operators themselves will want to take control over integration, customisation, lifecycle management, etc. via CI/CD, etc. That changes the whole cost structure: possibly cheaper to deploy, because the vRAN is deployed to a more firmly-established telco cloud platform; not necessarily cheaper to run (if internal staff are used to operate and develop the platform); but more possibility to generate new value from new services and use cases – whereas the more vendor-dependent approach will involve more emphasis on low-margin, commodity connectivity.

12. Can you provide insight into some vRAN business cases? e.g. Capex savings, Opex Savings, Revenue+

Emma Buckland: We spoke with a number of telcos in the first half of 2022 about cost savings and other benefits associated with virtualisation in general (this provided the background research from which David wrote Telco Cloud: Short-term pain, long-term gain). It was difficult to get any actual figures from most telcos (often because they cannot easily measure the savings, if any) but one interviewee told us that with their first wave of NFV, they saved 20% on Capex on their infrastructure compared with buying the equivalent appliances from NEPs. The savings came both from standardising the COTS equipment bought (which reduces variability and therefore allows for more automation of deployment) and the fact that this infrastructure is multi-tenant (i.e. not application-specific). That is just with straightforward virtualisation, not even containerisation, which should be even more resource efficient. The telco in question is medium sized so with limited ability to attract discounts based on volumes.

David Martin: At a general level, open RAN *should* be more cost-efficient than legacy RAN, because of its cloud-native characteristics. These enable elastic scaling: both upwards to add capacity when required, and outwards to distribute workloads more optimally. Consequently, there is less redundant physical kit that needs to be purchased and maintained but is not used much of the time. Participants in open RAN trials continually emphasise that it is indeed more cost-efficient.

Equally, operators such as Rakuten Mobile and DISH claim to be making significant Opex and Capex savings. A key driver of savings, according to Rakuten, is automation of deployment and operations in general, with new sites, for example, able to be activated in a fraction of the time it would take to bring new sites on stream in a legacy network. Automation is a key benefit from cloud-native operations in general, although automation gains are not the product of cloudification alone.

However, it is true that there are insufficient proof points that open RAN delivers substantial cost savings when deployed commercially at scale – partly because there aren't any large-scale, brownfield deployments! Maybe the deployment of vRAN in such contexts will indirectly provide some of these

proof points, given the substantive overlaps between vRAN and open RAN. Assuming these vRAN deployments do deliver the performance and cost savings operators are seeking, this will at least demonstrate what open RAN would be capable of achieving if certain barriers are overcome. And many of these barriers are as much to do with perception as reality, e.g. performance, integration challenges and costs, energy efficiency, etc.

13. Is there a business model to estimate the business value for the various option of RAN

Emma Buckland: We are working on an RoI tool to quantify the economic benefits of virtualisation in general which we will publish in the first part of 2023. Our Consulting team has already developed an open RAN RoI tool, which we are looking at repurposing and publishing as part of our Research output during 1Q 2023. There are a number of external studies which have been carried out by other research houses, in tandem with equipment vendors, which indicate a range of TCO reductions for open RAN[2] and centralised, virtualised RAN[3]. We prefer not to comment on the output of those studies until we have done the calculations ourselves.

14. The case for O-RAN is clearer in greenfield, and rip and replace (e.g. Huawei) scenarios, but for brownfield, incumbents play a huge role in blocking O-RAN. Do you think having more contractual leverage or more than two RAN vendor could help brownfield operators help get more buy-in from incumbents?

David Martin: Yes, and I think the way Nokia and Ericsson have moved to vRAN and incorporated open RAN interfaces in their solutions is a product of the threat that operators would otherwise adopt open RAN. In fact, one of the purposes of the many open RAN trials, I think, has been to demonstrate to the legacy vendors that the operators involved are ready to switch to open RAN.

15. Would ORAN be used in Private Campus Networks, while it seems not have materialized in macro networks despite the latency requirements of Ind 4.0?

David Martin: I think there's a lot of potential for open RAN in campus and other private networking scenarios. Having said that, there's virtually no open RAN deployed in private networks yet. What will be crucial will be the ability of vendors, operators, and other providers to demonstrate cloud-scale economic benefits for clients (as-a-Service business model) without compromising performance, and while customising the networking service to the specific requirements of the client's use case and applications.

16. Another promise of Open RAN was that we would see an ecosystem of specialized RAN vendors developing "best of breed" RAN subsystems. But it appears that the Open RAN vendors are developing the entire RAN solutions and in fact becoming an alternative to Nokia and Ericsson and still deploying monolithic solutions.

[2] https://www.analysysmason.com/research/content/perspectives/open-ran-tco-rma18-rma16/
[3] https://www.redhat.com/cms/managed-files/ve-virtualizing-ran-acg-analyst-paper-f19427-201909-en.pdf

David Martin: That's a good point, this is what we're calling *de facto* vRAN. The difference between that and traditional single-vendor solutions, though, is the open interfaces, which should - in theory - allow components to be swapped for those of other vendors.

17. Are going back to vendor locking with vRAN?

David Martin: My answer to the question above covers this point.

18. In your categorisation you are missing the fact that a key point to classify as Open Ran is that there is a RIC. Without a RIC it's not Open Ran

David Martin: yes, I agree. We mention RIC and SMO towards the end of the webinar. Our answer to the second live question also covers the point about the RIC.

19. Also, when it comes to RIC, aren't some of the algorithms offered as part of RIC, can incumbents or DU vendors provide that as part of DU functionality and make RIC redundant?

David Martin: The difference with RIC is the ability to design and run rApps and xApps, which allow the RAN functions to be optimised around a wider range of parameters and client needs than incumbent or closed DUs alone.

20. **To my experience it come on price (ROI) of vRAN versus oRAN, since even MNOs in Africa choose traditional RAN vendors over oRAN (proof that traditional RAN vendors can undercut oRAN ecosystem)**

David Martin: Traditional vendors will always try to undercut their competitors' and challengers' platforms, and they have many weapons in the armoury to do so. Open RAN vendors can't compete on scale, at least not until – or if – open RAN starts to be deployed at scale. Traditional vendors can offer a lower up-front capital investment and faster time to deploy. But then they tie clients into lengthy O&M service contracts, meaning the TOC is not necessarily cheaper.

Conversely, it might be more costly initially to roll out an open RAN network, at least until platforms and multi-vendor solutions become more commoditised, standardised, automated, and scaled up. But then it should be easier for telcos to run, upgrade and develop their RANs themselves, particularly when they develop the appropriate DevOps and CI/CD skills and practices. Plus, open RAN offers more possibilities to customise and innovate the RAN around different use cases and client needs. So, in the long run, the costs may be less, and the revenue-generating opportunities may be greater.

21. Do you see vRAN vendors offering a pre-packaged alternatives like Rakuten Symphony aka positioned as services?

Emma Buckland: not specifically for VRAN products but for core services we have seen Nokia offering its Core-as-a-Service for a year or so. Nokia only offers Core-as-a-Service on public cloud as integration with private clouds would be too difficult. Since most RAN workloads still run on private clouds, this would be an obvious limitation to traditional vendors at least offering vRAN-as-a-Service in this way.

David Martin: However, vendors and hyperscalers clearly both have an interest in developing RAN-as-a-Service, though not specifically open RAN or vRAN: as both are cloud-native, either can in theory be delivered via the hyperscale cloud. Larger vendors will be able to achieve this more quickly, but Rakuten Symphony also struck a deal in September 2022 to deliver its Symworld platform via AWS. (Admittedly, Rakuten Symphony is what we term '*de facto* vRAN' rather than 'pure' open RAN.)

22. Don´t you think that benefits of Open RAN were exaggerated compared to the reality? Open RAN had a very good initial traction because it was promising reduced cost and greater flexibility but that was actually not true.

Emma Buckland: I don't see the fact that open RAN has not yet proved cheaper or more flexible as a evidence that it can't deliver on both fronts in the longer term once solutions have matured. It is also the case that open RAN solutions have been deployed in very diverse environments: on the one hand, both greenfield and brownfield networks with a large amount of legacy at Western Tier 1 operators); and, on the other hand, multi-G and 4G deployments in the developing world, involving more remote sites. The business case in each context is very different, and automation enabled by open RAN is clearly a USP in the developing market environment where the ability to deliver connectivity at a very low price point is vital.

David Martin: Greenfield, developing economies, and remote sites / coverage extension represent key use cases where costs could be less and flexibility enhanced. It makes no sense to roll out brand new networks using appliance-based RAN, even if it remained possible to do so: even Nokia and Ericsson may soon be vRAN by default (in the same way that they have phased out their appliance-based cores altogether).

In the greenfield context, things might as well also be open RAN rather than vRAN: why build in inflexibility and vendor lock-in via vRAN? DISH's deployment of Samsung vRAN will be – to reverse our terminology – de facto open RAN, because the interfaces will have to be open so that the vRAN platform can interoperate with DISH's other open RAN platforms and with the AWS cloud.

And let's not forget that all networks eventually need to be replaced as they near the end of their lifespan and the technology evolves. Many Western networks are entering this phase more quickly than they'd anticipated, because of the need to rip and replace Huawei. But the next phase of 5G RAN roll-out will need to be as open and future-proofed as possible, including anticipating 6G. In that context, the whole radio network is likely to need to be re-engineered from the ground up. This may not be open RAN as we know it, but it will be a form of open, cloud-native RAN for sure.

23. Regarding RIC, as far as I understand, if the DU, CU or even monolithic eNB or gNB supports E2 interface to connect to near RT RIC it´s possible to use a RIC in V-RAN, in fact we are planning some tests with Nokia.

David Martin: that's an interesting point. And yes, in theory, it's entirely possible to develop the RIC around vRAN, and not just open RAN. In fact, that's completely consistent with our view that the future RAN will be hybrid: employing a blend of proprietary / open and dedicated appliance / COTS.

24. Slide 6 showed a selection of trials by leading providers - what is the number if you took into account of the full list?

Emma Buckland: we show 3 maps in the presentation. (See page 2 of this document on how to access our presentation online.)

- Slide 10 shows the three open RAN deployments which took place in 2021 and 2022
- Slide 11 shows a total of thirteen open RAN trials
- Slide 21 shows the seven commercial vRAN deployments. These took place in 2020 and 2022 or we estimate they will take place next year (DISH with Samsung).

We continuously track all telco cloud deployments in commercial live networks that are reported in the public domain and log them in a quarterly updated tracker (Excel database and companion report in PDF form). The latest iteration of our Telco Cloud deployment tracker focused open RAN, vRAN and cloud RAN.

25. What is the main difference between vRAN and Cloud RAN

Emma Buckland: please refer to slide 7 in our presentation. See page 2 of this document on how to access our presentation online.

26. (edited) Do open RAN and vRAN architectures have enough security measures built in to result in secure networks?

We addressed the security aspects of open RAN towards the end (see question 5 in this document).

27. When you talk about disaggregation, I guess it is about HW and SW disaggregation...If I´m not wrong you said that v-ran does not support disaggregation, but some vendors (Nokia for example) supports virtualization over proprietary HW or general purpose servers like x86...what do you think about it?

David Martin: I suppose we'd call that 'partial disaggregation': software / hardware separation, but not disaggregation at the software layer or within the hardware layer. I.e. the vRAN in this instance will be running on a virtualisation layer (probably OpenStack / OpenShift in most cases), for which it has been optimised; and it may even be Nokia's own distribution of OpenShift, for example – although I'm speculating. Plus, the hardware will not be a pure white box / open compute, but it will probably be from a major vendor (e.g. HPE or Dell) running something like the Intel FlexRAN platform, optimised for RAN workloads and probably also customised for Nokia vRAN. So again, not fully disaggregated. But that's fine: as we say, not just the future RAN but open RAN / vRAN as currently deployed is often hybrid in this way.

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