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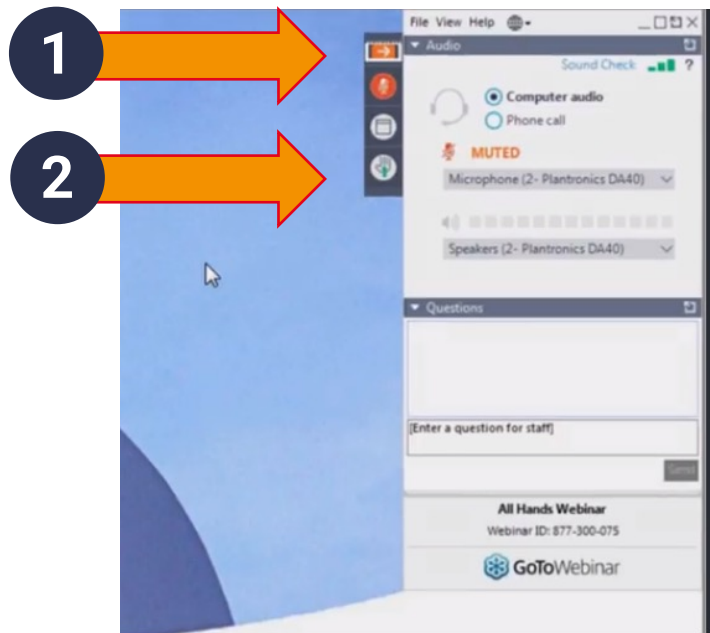
Webinar

Tuesday 22nd November 2022

4:00 PM GMT | 6:00 PM CEST | 11:00 AM ET

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Agenda

1	**Introductions**	16:00 – 16:05
2	**What's the problem with open RAN?**	16:05 – 16:25
3	**Is v-RAN the answer?**	16:25 – 16:45
4	**Q&A session**	16:45 – 17:00

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What's the problem with open RAN?

Is open RAN an over-specified solution for an unspecific need?

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Open RAN, vRAN and cloud RAN (C-RAN): overlapping and disputed boundaries

- **Open RAN/O-RAN**: open interfaces; cloud-native; disaggregated; multi-vendor; virtualised. But CAN be delivered as a pre-integrated, single- or multi-vendor solution (*de facto* vRAN); and CAN be partly appliance-based

- **vRAN**: open or **proprietary** interfaces; cloud-native; **not** disaggregated; **single- or dual-vendor** (i.e. one vendor for RAN software and another for radio); virtualised. Open interfaces mean it CAN be adapted to an open RAN architecture; it CAN also use appliance for the DU

- **C-RAN**: proprietary interfaces; not disaggregated; single-vendor; **Virtual Machine-based**, or part-VM / part-appliance
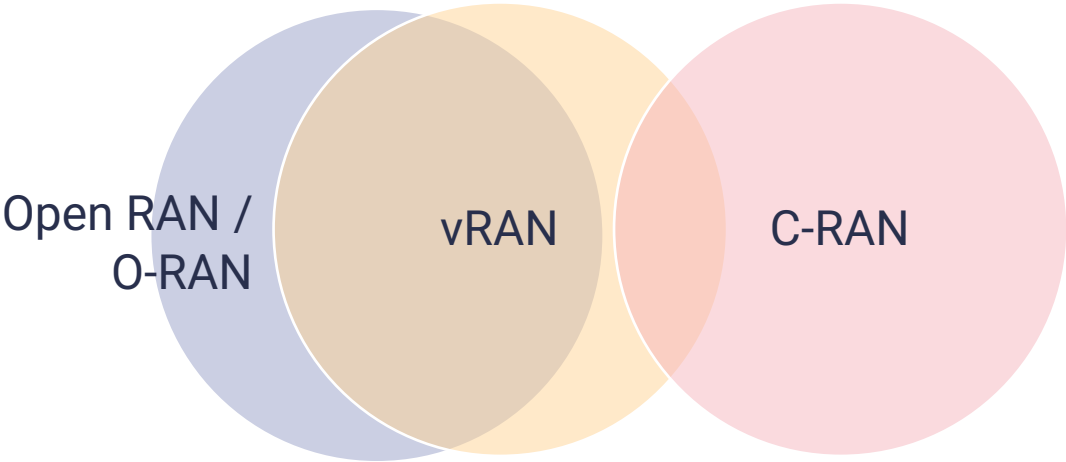
	Open RAN	vRAN	C-RAN
Virtualised	✔	✔	✔
Cloud-native	✔	✔	✖
Open interfaces	✔	✔	✖
Multi-vendor	✔	✔	✖
Disaggregated	✔	✖	✖

Open RAN / O-RAN   vRAN   C-RAN

Open RAN, vRAN and C-RAN: Examples

Type of virtualised RAN platform	Vendors		
1) 'Purist' open RAN: open interfaces/cloud-native/disaggregated/multi-vendor/virtualised	ALTIOSTAR	MAVENIR	Parallel WIRELESS / JMA WIRELESS
2) Pre-integrated open RAN / _de facto_ vRAN: open interfaces/cloud-native/not disaggregated/single- or multi-vendor/virtualised		Rakuten Symphony	
3) (Partly) appliance-based open RAN: open interfaces/not or only partly cloud-native/not disaggregated/single- or multi-vendor/not or only partly virtualised		FUJITSU + NEC + NOKIA @ docomo	
4) vRAN: open or proprietary interfaces/cloud-native/not disaggregated/single- or dual-vendor/virtualised	SAMSUNG _vRAN product_	ERICSSON _Cloud RAN product_	NOKIA _Cloud RAN product_
5) Cloud RAN: proprietary interfaces; not disaggregated; single-vendor; Virtual Machine-based, or part-VM / part-appliance	Historical 'Cloud RAN' deployments NOKIA ERICSSON HUAWEI		

2022 was meant to be the breakthrough year for open RAN: what happened?

- Of the eight deployments of open RAN we were expecting to go live in 2022, only three had done so by October 2022, when we published this chart and the data it is drawn from in our Telco Cloud Deployment Tracker.

- For 'open RAN' here, we are taking the first two, strict definitions in our table in the previous slide.

- And by 'deployments', we mean live, fully commercial services, not tests, trials or commercial pilots.

- This is hardly the wave of 5G open RAN, macro-network roll-outs that the likes of **Deutsche Telekom**, **Orange**, **Telefónica** and **Vodafone** originally committed to for 2022.

- So what went live in 2021 and 2022?

Global deployments of C-RAN, vRAN and open RAN, 2016 to 2023

Legend:
- Cloud RAN
- Open RAN
- vRAN

Annotation: Only 3 out of 8 live

Chart values by year: 2016: 3, 2018: 3, 2019: 6, 2020: 15, 2021: 2, 2022: 13, 2023: 1
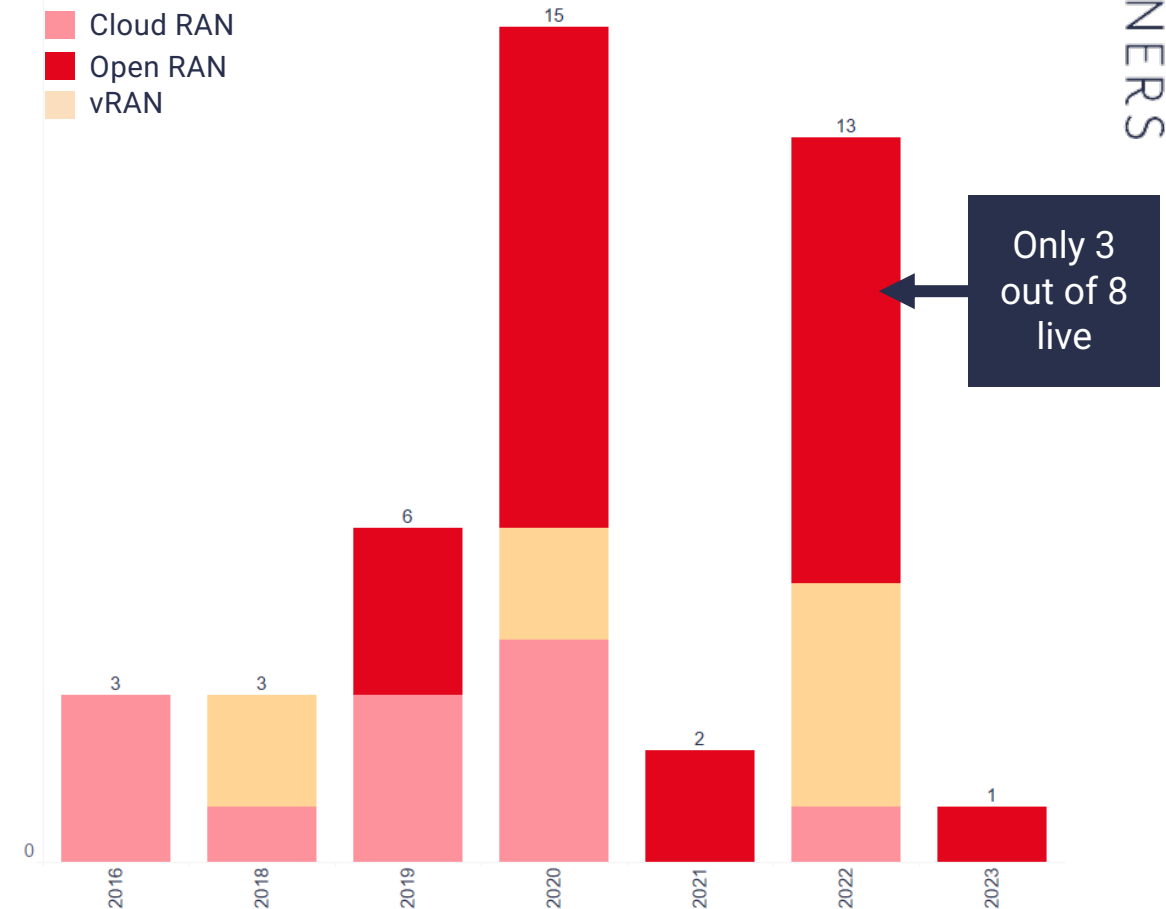
Commercial open RAN deployments in 2021 and 2022

USA
- DISH network launched in Las Vegas in May 2022

Italy
- Commercial launch of 4G open RAN in the city of Saluzzo in October 2021

Colombia
- Integrated 2G/4G open RAN deployment to up to 30% of Tigo's rural sites by 2025. First sites live in 2021

Central African Republic
- Converged 2G/3G/4G deployment for Orange CAR. STL estimates this was live – at least in part - by October 2022

By contrast, there have been *many* open RAN trials and pilots over 2021/2: here is a selection of those by leading players
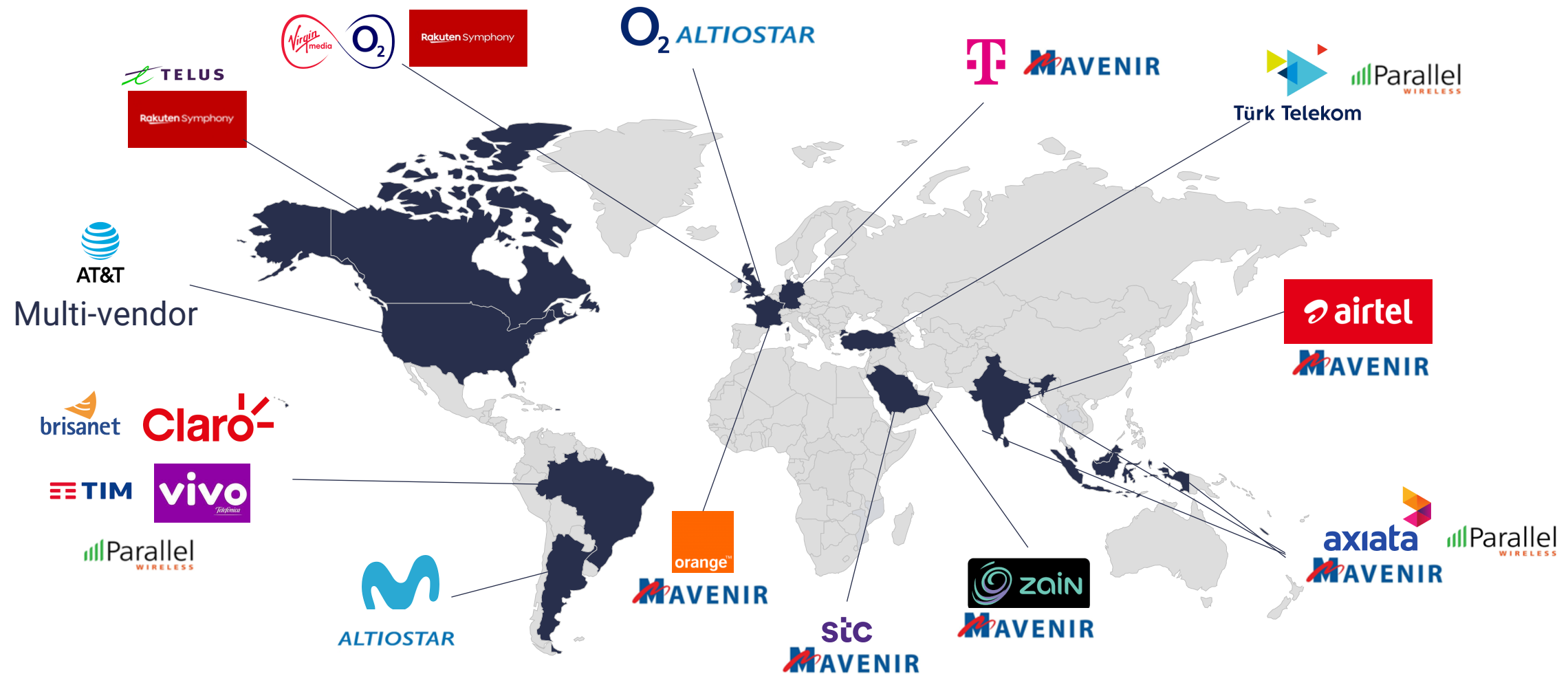
Open RAN trials – and tribulations

The trials in 2021 and 2022 build on a multi-year record of lab tests, POCs, trials and commercial pilots the world over by many operators

Most of these trials have not yet resulted in large-scale, commercial deployments

What is left to be tested? Is open RAN not fit for purpose?

What's the problem?

Open RAN is the 'future' – but how do you get there?

"The paradigm shift in telco networks towards Open RAN requires system integration capabilities to bring together the ecosystem of disaggregated components using standardised open interfaces on general purpose hardware and ensuring interoperability in a carrier grade environment. Axiata was supported by Infosys in executing multi-faceted system integrations required to demonstrate the comprehensive coverage of Open RAN configuration options. . . *"Open RAN is the future for mobile networks, and it will be critical for 4G expansions as well as the 5G evolution that Axiata's markets will soon embrace. . . 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. We look forward to taking the next step towards commercialization"*.

Press release on Axiata, Mavenir, Parallel Wireless trial, June 2021 – wider commercial deployment not yet happened

O2 (Telefonica UK) and NEC Corporation have announced a successful Open RAN trial on O2's network with NEC and its ecosystem of partners . . . NEC helped to define a customised Open RAN architecture, optimised and adapted to the requirements of the O2 mobile network. Given its role as the system integrator for this trial, NEC coordinated the overall design of the system, which delivered a solid end-to-end solution and was conducted in collaboration with the aforementioned industry leaders. . . *"The partnership between NEC and O2 promises to accelerate the provision and growth of Open RAN solutions in the UK. O2 will continue to transform our network through collaboration and the optimisation of new technologies such as Open RAN."*

Press release on O2, NEC, Altiostar trial, February 2021 – followed by a field trial (not commercial deployment) of the now Rakuten Symphony platform by the now Virgin Media O2 in August 2022

Open RAN works, but what's it for?

There were three main purposes to the open RAN trials

- ✓ **Resolve the integration challenges:** yes for internal solution integration; but integration with existing, deployed platforms?
- ✓ **Resolve the operational challenges**: teams, processes, reliability, performance, energy efficiency, troubleshooting, etc.
- ➢ **Explore different use cases** and role of open RAN as a 'disruptive' technology alongside existing networks: what's the business model?

What are the proven benefits of virtualised RAN (fully open or not)?

- Cost efficiencies
- Flexibility
- Scalability
- Programmability

- Automation
- Technology platform for innovative, cloud-based services

There's no way back to a fully appliance-based RAN

What problem remains?

Unproven business case and business model: what is open RAN actually for? What's the ROI?

Is open RAN a solution in search of a problem?

There are many potential use cases for open RAN, which the trials, pilots and limited roll-outs have been addressing

Macro network – greenfield

Private networking

4G for remote, under-served regions in developing markets

Urban coverage densification in developed markets

Macro network – brownfield

Multi-G consolidation, particularly 2G / 3G / 4G, *or* new 4G / 5G-ready, in developing markets

4G / 5G 'rip and replace', e.g. Huawei replacement

Rural broadband - 4G (and 5G) for coverage 'notspots' in developed markets

Indoor Coverage

But, is open RAN – strictly defined and fully spec'ed – the optimal solution for *all* of these use cases? In the present, that is, not even in an elusive 'future'?

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Is vRAN the answer?

Compromise is inevitable

—

Pure open RAN vs 'cloudy', compromise alternatives

- For most of the use cases described above, there are alternatives that are ready to go without the integration and operational headaches of open RAN (see table to right)

- Some of these alternatives fall into one of the looser categories of open RAN, vRAN or cloud RAN discussed earlier (recap below):
  - part open and part closed
  - part virtualised and part physical
  - and sometimes addressing the needs of the use case via radio and spectrum, rather than software and RAN design.

Prospective open RAN use case	Possible alternatives
Macro network – brownfield	• Type 3 • Type 4 (vRAN) from new vendor • Type 4 from existing vendor (e.g. Ericsson or Nokia Cloud RAN products) • Appliance from existing vendor, e.g. E or N, with migration path to vRAN
Rip & replace	• vRAN from new vendor
Private networking	• Business and technology models far from established; virtually no commercial open RAN yet. Alternative of appliance-based solutions, e.g. small or micro cells; network slicing on existing macro network
Multi-G consolidation: converged 2G/3G/4G, or 4G upgradable to 5G	• **Significant open RAN use case in developing markets / new 4G networks – but not relevant for most developed markets**
4G for remote / under-served regions	• **Strong open RAN use case – important for the regions concerned but not high-value for Western operator groups or established vendors**
Coverage extension in developed markets / rural broadband	• Potential for 4G open RAN, but only a brief window. Then needs re-addressing as part of 5G roll-out (open RAN or not?). Can be targeted by physical networking options, e.g. low-band spectrum, small cells, network sharing, etc.
Coverage densification in urban areas	• Physical networking solutions, e.g. mmWave, massive MIMO, small cells, microcells; also, improvements offered by 5G Standalone
Indoor coverage	• Microcells • DAS • WiFi6

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4) vRAN: open or proprietary interfaces/cloud-native/not disaggregated/single- or dual-vendor/virtualised	SAMSUNG ERICSSON NOKIA _vRAN product_ _Cloud RAN product_ _Cloud RAN product_
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Even for the most viable open RAN use cases, vRAN offers an attractive option

- The other, more obvious use case for open RAN in developed markets is in greenfield networks

- Here, we *have* seen significant deployments: **Rakuten Mobile** and **DISH**, with **1&1 Drillisch** in Germany to follow (launch expected summer 2023)

- In addition to this, there is a significant opportunity for open RAN in the realm of 'rip & replace', e.g. **Huawei** replacement

- But even in these contexts, vRAN is an attractive alternative that is starting to gain momentum

Commercial vRAN deployments in 2020, 2022 and 2023

Open RAN advocates embrace vRAN

- Open RAN advocates **DISH**, **Rakuten**, **Verizon** and **Vodafone** are also embracing vRAN.

- **DISH** announced in June 2022 it would deploy a **Samsung** vRAN platform, alongside its ongoing deployment of AWS-hosted **Altiostar** and **Mavenir** open RAN. This is driven by a need to roll out coverage fast: **DISH** has been set the regulatory target of 70% national coverage by June 2023.

- Verizon is also deploying 5G vRAN from **Samsung** and **Ericsson** in one of the world's largest 'rip and replace' projects. In September 2022, **Verizon** revealed that for its mmWave roll-out, it was using a **Samsung** DU appliance together with a Samsung vCU. However, for midband, **Verizon** is also deploying a **Samsung** vDU.

- In September 2022, **Rakuten** also launched a DU appliance: when deployed as planned in Rakuten Mobile's own network, this will constitute a similar hybrid vRAN (part virtual, part physical).

- **Vodafone** is also rolling out Samsung vRAN across the UK This uses open RAN-compliant interfaces for the CU/DU split; but a proprietary CPRI interface to the radio (Samsung): another hybrid solution. Vodafone will also trial a Nokia vRAN in Germany in 2023.

- In principle, though, **Samsung**'s and **Rakuten**'s vRANs are open RAN-compliant: supporting the standard open RAN and O-RAN interfaces, and able in principle to interoperate with third-party vendors' CNFs and cloud infrastructure (e.g. as part of **DISH**'s deployment across the AWS cloud).

- This arguably represents a more realistic, commercial template for future open RAN deployments:
  - The solution comes pre-integrated and pre-optimised (no unpredictable integration overhead)
  - It is backed by a single vendor (aka 'neck to choke')
  - And it leverages operators' existing network footprint and operating processes, with DU appliances potentially on every cell site.

Commercial vRAN deployments in live networks, 2018–2023
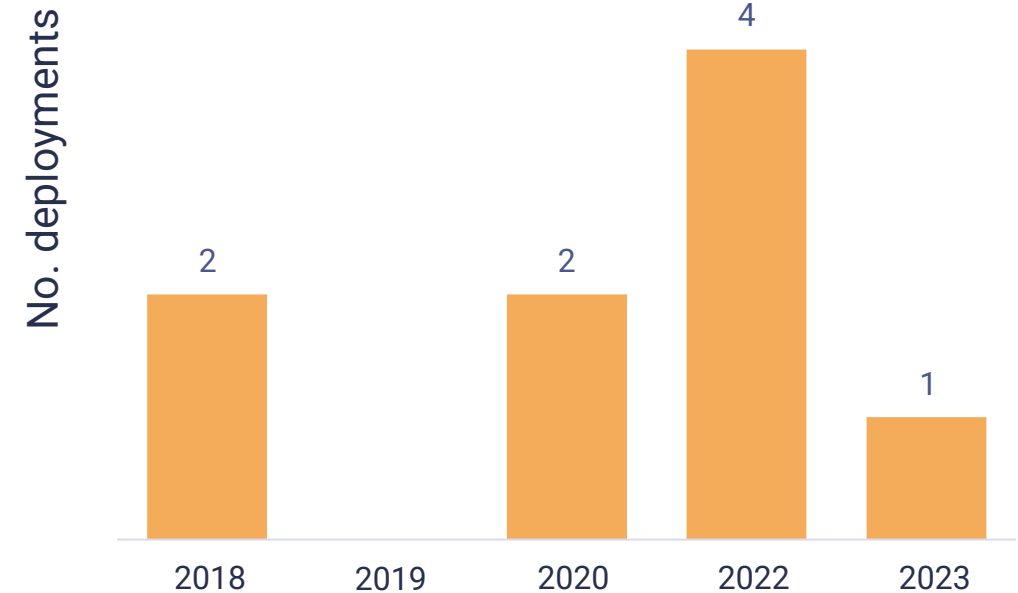
So: will vRAN succeed where open RAN has not?

- We would not say that vRAN will simply displace open RAN in the brownfield 5G macro network. **However**:
  - Many deployments in the short-to-medium term that were expected to be open RAN will be vRAN instead
  - The large, non-Chinese vendors have all embraced vRAN
  - The boundaries between open RAN and vRAN are becoming fluid: delivered as a pre-integrated, single/multi-vendor solution (e.g. **Rakuten Symphony**), open RAN is '*de facto* vRAN'
  - And, as many current vRAN deployments employ open RAN-compliant interfaces, they could *in theory* be adapted or migrated to full open RAN at a later stage

- **However:** the RIC and Service Management and Orchestration (SMO) layer will be missing from a vRAN universe
  - This will close off much of the promise of open, programmable networks and near-real-time network optimisation that open RAN promises

- So is the window of opportunity for the purist vision of open RAN about to close before it was ever really . . . open?

|	vRAN	Open RAN
5G macro-network deployments	✔	✔
Commercial solutions from traditional NEPs	✔	✔
Commercial solutions from open RAN vendors	✔	✔
RIC and SMO	✖	✔

The 'future RAN' is hybrid, 'cloudy' and agile

- We'd rather reframe the terms of that last question – vRAN displacing open RAN

- In reality, the open RAN and vRAN deployments of today are already hybrid: sometimes 'open RAN' but not (entirely) virtual; or vRAN that is open (RAN) in part, but in part also proprietary and physical

- In essence, what will be deployed will inevitably be a compromise between the ideal of an open, innovative platform and the real-world imperative to deliver performance, reliability and coverage profitably and at scale

- But the really disruptive factor is the _cloud-native_ characteristic of virtualised/open RAN: the future RAN is cloud-delivered, software-based and – by that very token – inherently more open, iterative, innovative and hybrid than previous generations of the RAN

- We can expect to see many more 'messy', non-pure, non-standards-compliant iterations of the virtualised RAN – adapted to serve use cases and client needs as yet not in view

- Isn't that what cloud is all about: networks on-demand, and adaptable to demand?

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Q&A session

Please submit any questions using
the GoToWebinar control panel
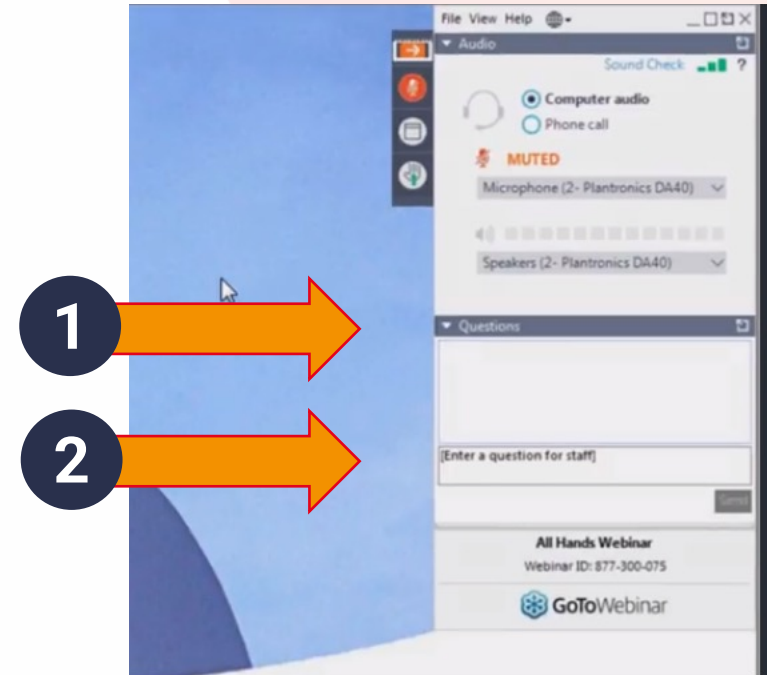
Thank you for joining!

All registrants will be receiving the link to the recording and slides shortly to watch back or to share with colleagues, plus a Q&A write-up in due course.

For any other questions, please contact:

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