CONNECT
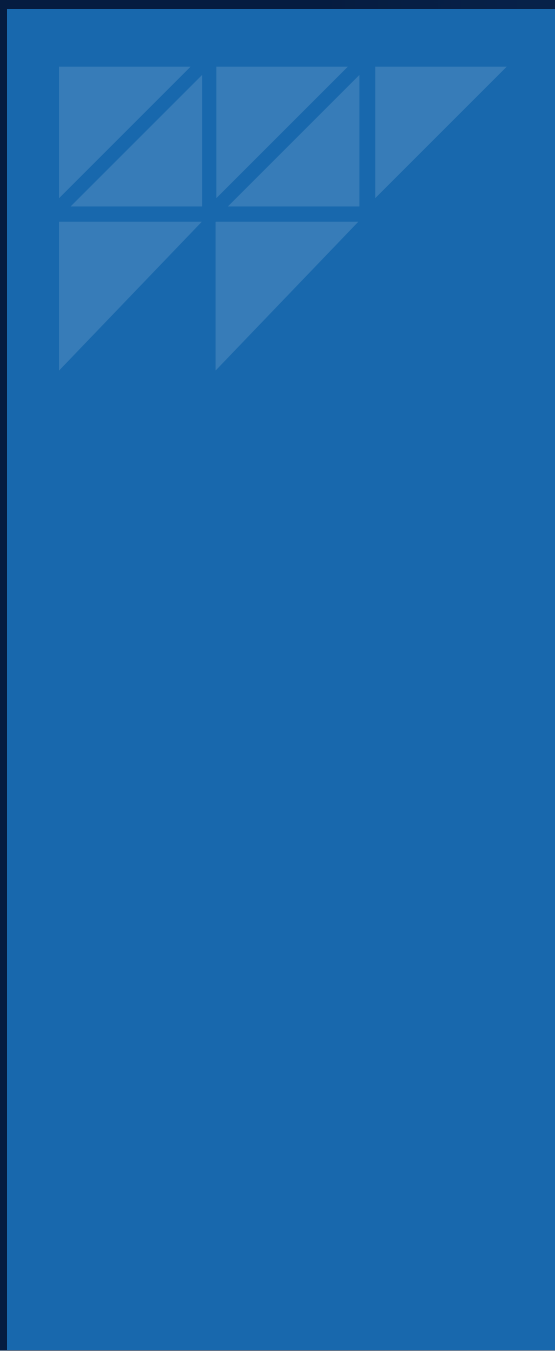
What will telecoms networks look like in 2030?

Introduction

Many factors will shape how telecoms networks look in 2030. This white paper explores the impact of what we expect to be the main ones. However, predicting the future network is challenging. Since 2020, a pandemic, major conflicts in Europe and the Middle East, and geopolitical tensions have impacted supply chain, investment and deployment of some technologies.

Fixed broadband shot up the political agenda as the pandemic underlined its economic and social importance. Build-out is progressing rapidly. The FTTH Council Europe found 219 million premises had been passed in September 2022[1], compared to 172 million in September 2019[2]. In mobile networks, deployment of 5G Standalone and the edge have stalled, while the emergence of Open RAN has all but stopped[3].

Back in 2016, CNET's top five predictions[4] for 5G were typical: VR-dominated, streamed gaming; self-driving cars becoming the norm; remote healthcare, especially robotic surgery; warp-speed web loading; and a boom in video conferencing 'like you're there'.

VR is not mainstream and the $3,499 price tag for Apple's Vision Pro VR headset, launched in June 2023, is too high for the mass market, like many technological breakthroughs, especially during a cost of living crisis. Self-driving cars on public roads are rare and controversial[5] – the UK abandoned smart motorway projects due to cost and safety concerns[6]. Remote surgery is restricted to proofs of concept. 4G still handles most mobile data and while the number of premises passed by fibre has risen fast, gaining subscribers is another matter, as this analysis shows[7].

Video conferencing boomed in the pandemic, but not 'like you're in the room'. Facebook's founder, Mark Zuckerberg, promised to transform digital interactions via the metaverse. After renaming his company Meta and investing tens of billions[8], he "quietly buried the metaverse"[9] in favour of AI in March 2023.

Generative AI shot up the agenda. ChatGPT attracted 100 million users in two months in early 2023, shattering the previous take-up record for an internet app.[10] Telecoms is still trying to work out the many potential implications of generative AI for the industry and adjacent sectors.

ChatGPT's record sign-up rate was smashed within six months: Meta's Twitter rival, Threads, gained 100 million users in five days in July[11]. Meanwhile, European telcos' battle for 'fair-share' contributions[12] and to generate greater capacity at ever less cost[13].

Against this complex, fast moving backdrop, we look at key developments that we think will help shape mobile networks to 2030.

> **Note:** This white paper does not focus on IoT which it is an entire subject in its own right.

1 https://www.ftthcouncil.eu/knowledge-centre/all-publications-and-assets/1707/european-ftth-b-market-panorama-2023
2 https://www.ftthcouncil.eu/Portals/1/FTTH%20Council%20Europe%20-%20Forecast%20for%20EUROPE%202020-2026%20AFTER%20COVID19%20-%20FINAL%20Published%20Version.pdf?ver=p8LTSV2c-CpbNwByeC3RjWQ%3D%3D
3 https://www.delloro.com/news/ran-market-to-decline-at-a-1-percent-cagr-through-2027/
4 https://www.cnet.com/tech/mobile/5-amazing-things-youll-be-able-to-do-with-5g/
5 https://edition.cnn.com/2023/08/14/business/driverless-cars-san-francisco-cruise/index.html
6 https://www.theregister.com/2023/04/17/uk_government_scraps_smart_motorway/
7 https://www.mobileeurope.co.uk/whats-holding-up-the-adoption-of-ftth-in-europe/
8 https://www.mobileworldlive.com/featured-content/home-banner/meta-to-invest-19-2b-in-metaverse-next-year/
9 https://www.thestreet.com/technology/mark-zuckerberg-quietly-buries-the-metaverse
10 https://www.graphicnews.com/en/pages/43884/tech-chatgpt-is-fastest-growing-internet-app
11 https://www.visualcapitalist.com/threads-100-million-users/
12 https://www.politico.eu/article/telecom-netflix-tiktok-youtube-fair-share-why-telcos-are-going-at-war-with-big-tech/
13 https://www.fiercewireless.com/5g/dishs-cullen-vonr-will-be-deployed-more-broadly-coming-weeks

Section 1
Device connectivity now and its evolution

Developments are coming thick and fast that could have a profound impact on how devices interact with infrastructure and the introduction of new services.

Apple's support for private networks

Apple has thrown its $3 trillion weight behind private networks. Apple's iOS 17 support page says the platform supports SIMs or eSIMs provisioned for private LTE and 5G networks. Customers can select preferences for cellular or Wi-Fi connections on those networks, control when users connect to them using geofencing and support network slicing where 5G Standalone (SA) is available. This could boost private networks – see page 8.

Cloud and slices for phones

China Mobile launched a cloud phone with the apps, operating system (OS) and processing running in the cloud. The entry-level model costs CYN1,000 (about €126). Its performance is claimed to be equivalent to a "flagship" phone for general use, gaming and streaming. Future cloud phones could be tailored for specific uses. This has implications for the network in terms of supporting sufficiently low latency for delay-intolerant voice and video traffic in particular. See page 8.

Voice is a hot new app

China Mobile is trialling a phone with 5G new calling – apps like real-time translation, multi-party video or remote guidance can be integrated into a phone call. It builds on the Voice over New Radio (VoNR) 3GPP standard and is supported by the GSMA. The operator says it will launch nationwide later this year.

This is appealing, but operators are grappling with Voice over New Radio (VoNR) which requires optimisation between the phone, RAN and core network, and cannot tolerate glitches[14]. Further, it will mostly run alongside VoLTE, which has roaming issues, and legacy infrastructure[15], in a complex environment with IP Multimedia Subsystem (IMS).

Core network services

Core network services are run from Connect44's Centres of Excellence (CoE) and Network Operations Centres (NOC) in the UK and Romania. They span legacy voice-core, mobile-core and IMS-core, planning, optimisation, integration, monitoring, remote intervention and field support services to mobile operators and for fixed networks, aggregation network providers, fibre networks serving internal and external customers and telecoms site providers.

Operator core network planning for voice services involves designing and optimising central infrastructure that supports voice communication within a network. It focuses on ensuring high-quality voice calls, efficient call routing and seamless connectivity for voice services.

As the core network underwrites the performance of the whole network, Connect44's core network Plan, Build and Manage services fulfil the end-to-end requirements.

Services include:

- Network architecture planning & design
- Network dimensioning, routing and switching
- Network resilience, redundancy & security
- Core network optimisation
- Design of key elements of voice core network

14 https://www.fiercewireless.com/5g/dishs-cullen-vonr-will-be-deployed-more-broadly-coming-weeks
15 https://commsbrief.com/voice-over-5g-vo5g-why-is-ims-used-in-5g-networks/

Satellite initiatives

The 3GPP Release 17 specification was finally published in February 2023[16] after COVID-related delays and includes two new standards for satellite communications. Satellites have been part of the mobile communications infrastructure for decades, but primarily to provide backhaul rather than direct communications to mobile devices, except expensive, specialist handsets and emergency equipment.

By 2030 ordinary mobile phones should be able to use satellite transparently as part of the mix of underlying networks that fill gaps in terrestrial cellular coverage.

This will benefit many industries as well as help close the digital divide, including by leapfrogging generations of technology, perhaps bringing 5G to unserved or underserved rural areas.

Qualcomm and Iridium announced they are working[17] to enable high-end Android phones to access satellite services later this year while AST SpaceMobile[18] is building a global cellular broadband network in space to work with unmodified mobile devices.

Section 2
Frequency allocation

Availability of spectrum and the allocation of frequency licences, including cost, are foundational to the success of cellular and other wireless networks.

Auctions divert funds from networks

As frequency is a finite resource, its allocation is often seen by governments as a golden opportunity to boost their coffers. European operators collectively paid €110 billion in 2000 for 3G spectrum, which they never recouped, and the same dynamic is still being repeated in many parts of the world [19].

Auctions for initial 5G frequency bands in Italy in 2018 and in Germany in 2019 each raised more than €6 billion. Most European operators carry heavier debt than other industries[20] and selling spectrum licences so dear diverts cash away from investment in the network.

Reallocation unsettles potential bidders

Reallocating frequencies also undermines investors' confidence. For example, in the UK Ofcom gave five years' notice that it is revoking licences in the 40GHz band in May 2023. It wants to recycle the frequency for mmWave to densify 5G coverage in built-up areas and make bandwidth available for emerging technologies, such as driverless vehicles, alongside 26GHz frequencies.

Three UK, MBNL Ltd (a Three UK and EE joint venture) use 40GHz spectrum, the licences for which have been revoked[21]. They must reallocate equipment using those frequencies bearing the investment and reallocation cost of tens of millions of pounds.

Planning and availability

The ITU World Radiocommunication Conference 2023 (WRC-23) will be held in Dubai from 20 November to 15 December 2023[22], which is of critical importance to European operators. As this GSMA blog spells out, "The EU's Digital Decade envisages full 5G coverage by 2030. Mobile needs the spectrum capacity to deliver digital inclusion: connecting everyone, everywhere"[23]. In particular, the GSMA highlights the importance of a primary mobile allocation of the 470-694 MHz band (Agenda item 1.5) and an IMT identification for the 6425-7125 MHz band (Agenda item 1.2).

WRC-23 will set the agenda for WRC-27, which includes exploring the suitable bands – and their allocation – for 6G and unlicensed services in the 7 GHz–15 GHz range, which is already a geopolitical hot potato[24].

16 https://www.forbes.com/sites/tiriasresearch/2023/02/27/space-the-final-frontier-for-wireless-communications/
17 https://www.bbc.co.uk/news/technology-64182383
18 https://www.independent.co.uk/tech/space-phone-call-spacemobile-smartphone-b2327341.html
19 https://strandconsult.dk/what-europe-can-learn-from-why-american-mobile-operators-paid-81-billion-for-mid-band-spectrum/14 https://www.fiercewireless.com/5g/dishs-cullen-vonr-will-be-deployed-more-broadly-coming-weeks
20 https://think.ing.com/uploads/reports/Telecom_Outlook_2023.pdf
21 https://www.ofcom.org.uk/consultations-and-statements/category-1/mmwave-spectrum-for-new-uses/revoking-licences-in-40-ghz-band
22 https://www.itu.int/dms_pub/itu-r/opb/act/R-ACT-CPM-2023-PDF-E.pdf
23 https://www.gsma.com/spectrum/wrc-23-will-define-europes-digital-decade/
24 https://www.americanactionforum.org/insight/primer-world-radio-conference-2023/23 https://www.gsma.com/spectrum/wrc-23-will-define-europes-digital-decade/

Radio site locations

Finding and securing sites for mobile antennas and locations for small cells has always been and remains a challenge in many countries where planning and legal processes are complex and slow. In February 2023, the European Commission adopted a proposal for a Gigabit Infrastructure Act that will encapsulate new rules to enable faster, cheaper and more effective roll-out of Gigabit networks across the European Union[25].

The UK has already discovered this is not easy to achieve. The government revised the Electronic Communications Code (ECC) in 2017 with the aim of making it easier and less costly for operators of all kinds to access public or private land on which to build new network elements, such as masts and cabinets but lacked sufficient detail to be effective. Disputes rumble on through the courts[26] and relations with site owners fall apart.

Meanwhile in Germany, 1&1 blames Vodafone and its spun-off subsidiary Vantage Towers for giving preference to Vodafone Deutschland. This has led to 1&1 lagging behind its legally binding 5G build-out schedule and an enquiry by the competition regulator[27].

All of which puts specialist site acquisition and estates management services right in the spotlight.

Mobile site services: Acquire, Design, Build

Connect44 with its Centres of Excellence (CoE) for site acquisition, site design and mobile build has significant experience in the acquisition and delivery of radio site assets. Working with mobile operators, tower companies and network equipment vendors, Connect44 supports the needs of rapid 5G rollout and densification of the radio access network including roof top, greenfield towers, street works, small cells and DAS implementations.

◢ **Acquisition:** our professional site acquisition services and tools are developed from our CoE in Denmark and are operational in Denmark, Sweden, Germany and mobilising in the UK, completing site acquisition, estates management, lease renewal and lease management activities in Sweden, Denmark, Germany and France.

◢ **Site Design:** we operate one of the largest dedicated telecoms site and fibre design capabilities in Europe from our Design CoEs in Spain, Germany and Poland; in addition, together with our digital twin and automated design partner, Connect44 is renowned for site expedient design and outstanding quality while also providing a wider design portfolio, including structural design and engineering, design quality assurance, asset management and inventory services.

◢ **Site Build:** constructing greenfield, rooftop and street works in Germany and developing services in other business units from our Build CoE in Germany, mobile operators and tower companies trust Connect44 to rapidly build access network sites and install both passive and active equipment, delivering and exceeding our customers time, cost and quality expectations.

25 https://ec.europa.eu/commission/presscorner/detail/en/ip_23_985
26 https://www.ispreview.co.uk/index.php/2022/06/court-ruling-brings-clarity-to-uk-telecoms-disputes-over-rents-and-wayleaves.html
27 https://www.mobileeurope.co.uk/german-anti-cartel-regulator-investigates-vodafone-and-vantage-towers/

Section 3
The transport network

The transport network, that is, the connectivity between network elements, is increasing in capacity by orders of magnitude to meet the insatiable data demands of mobile device users.

Mobile data booms on

The Ericsson Mobility Report[28] found that total mobile network traffic, including Fixed Wireless Access, reached around 118 Exabytes (EB) per month at the end of 2022 and is expected to rise to 472 EB per month by the end of 2028. An EB is a billion gigabytes.

The challenges in handling data volumes in access networks can be resolved by 5G which offers much higher data capacity over the radio interface (the antenna to user) but 5G roll-outs are not always moving rapidly enough to meet demand. This is for many reasons, including the one having the greatest impact – significantly higher than expected deployment costs.
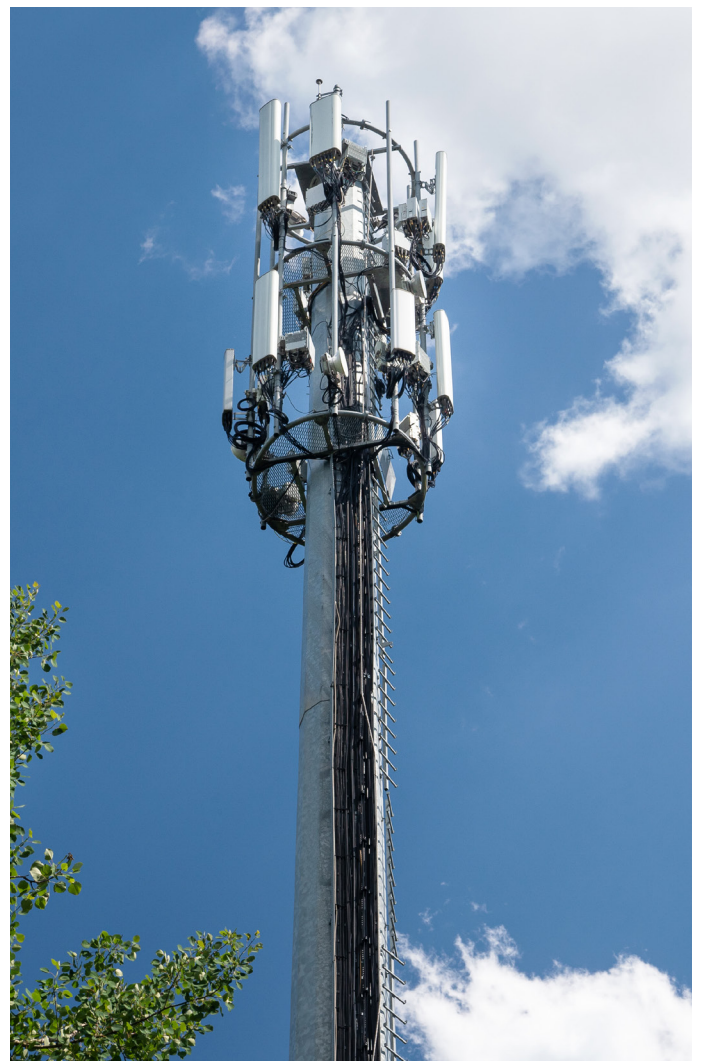
This is due in part to COVID, which held up the standardisation process, but in July 2023, analyst house Dell'Oro Group said additional factors are slower than expected growth in subscribers, inflation, possible recession and political conflicts. They have resulted in lower than predicted investment in mobile core networks at the point where it is needed most.

Dell'Oro has reduced its forecast to 1% compound annual growth rate between 2023 and 2028 – half of the 2% it predicted in January. It found that in the first six months of 2022, six operators worldwide had launched 5G SA enhanced mobile broadband (eMMB) networks, which fell to four in the first half of 2023. eMBB guarantees gigabit mobile broadband speeds and higher data bandwidth.

Such a low deployment rate to 2028 begs the question of just how widely implemented 5G SA will be, given that preparations for 6G will be well in hand by then and operators might prefer to see what that means for the evolution of their core networks and deployment budgets. Will 5G be the new 3G?

Transport services

Connect44 provides comprehensive transport services, including transport design and delivery survey, transport order management, site preparation, transport solution installation, and transport integration. The company's skilled operatives and delivery partners ensure accurate and trouble-free product delivery, while its NOC services monitor and manage multiple EU network operators' networks across all radio and fibre technologies.

28 https://www.ericsson.com/en/reports-and-papers/mobility-report/dataforecasts/mobile-traffic-forecast

Section 4
RIC and RAN roll out at the edge?

One of the biggest selling points of 5G is that it will enable operators to do things better and more cheaply, like providing connectivity at higher capacity, speed and reliability. It will also enable them to offer new services through network slicing and ultra-low latency to monetise their monumental investment in 5G.

Microwave lacks stability

How will network operators deliver ultra-low latency when most rely heavily on microwave within their infrastructure? Microwave supports low latency but lacks the stability for industrial applications, say.

Connectivity in that environment also needs to be ultra-reliable; if the network falters the production line stops, which is very expensive. Applications need to run consistently and constantly in real time or something very close to it, which will drive fibre roll-out into the far reaches of the access networks.

Removing the microwave transmission appeared unlikely before Ofcom revoked the 40GHz licences, due to cost and a lack of resources to do it, however, the revocation of spectrum heavily used for microwave connectivity will also drive a significant migration to fibre by 2030.

Microwave's lack of stability for industrial uses is partly where the concept of the edge came in – to locate compute power and storage close to where the data is generated. Progress has been slower than expected though, as Dell'Oro Group explains[29].

Open RAN and the RIC

Open RAN could have a role here. So far, it has been deployed in a way that mirrors the traditional, highly integrated RAN – perhaps waiting for 5G SA to hit the mainstream, but as we've seen, this has stalled.

The RAN intelligent controller or RIC, part of the Open RAN Alliance service management and orchestration [SMO] framework is "pivotal", according to Heavy Reading[30]. The analyst house noted the higher than expected level of activity around RAN automation and RIC at MWC 2023. RIC offers fine-grained control and capabilities via specialist software [rApps and xApps] to automate RAN processes.

RAN services for uncertain times

Connect44 has more than two decades' experience in providing RAN services to operators – that's a lot of experience in many areas. Services include greenfield RAN ADC implementation to swapping out operational RANs and all the way from survey to operation by Connect44 NOCs.

The company provides services involving every legacy technology and continuously prepares for future technologies and developments: being involved in some of the first UK and European Open RAN networks since 2020 and monitors live Open RAN networks in multiple European locations.

Connect44 provides end-to-end RAN lifecycle services solutions from macro networks to small-cell, in-building solutions, distributed antenna systems [DAS] and Open RAN deployments across a variety of hardware and software vendors' products.

More information **here**.

29 https://www.youtube.com/watch?v=Nmf3PGrVijw
30 https://www.lightreading.com/5g-and-beyond/5g-ran-automation-ric-apps-appear/a/d-id/783801

It separately controls non-real time events (from 10 milliseconds to 1 second) and near-real time events of more than 1 second.

Richard MacKenzie, Distinguished Engineer at BT is also Co-chair (with Vodafone and T-Mobile USA) of TIP's RAN Intelligence and Automation project which is all about commercialising the RIC. He thinks that when those rules are clearer for 5G network slicing, the RIC could potentially "be used to coordinate the virtualised, disaggregated, multi-vendor ecosystem to enable and optimise a range of services and capacity in a consistent manner."

He was speaking in a panel debate[31] at a recent Mobile Europe conference in London[32]. Fellow panellist Neil McRae, former Chief Architect at BT and now Chief Network Strategist with Juniper Networks, mused that there could be role for RIC in actual network slicing, such as to optimise users' experience on a campus, in stadia or factories. "Could RIC be used to improve the handover between cells?" he asked, adding, "This is probably the last big technological opportunity for a while, in terms of making a difference in what telcos can do with their networks out in the field".

It is hard to know how much any of these advanced ideas for the RIC will have come to commercial use by 2030.

Section 5
Private networks

There are two basic ways of providing private networks, as dedicated segments – or slices – of an operator's macro network or as standalone infrastructure. The operator is obviously at the very least the connectivity provider in the former and could play additional roles such as systems integrator or coordinate the ecosystem of parties involved. The second option might not involve an operator at all as in some markets, such as Sweden and Germany, where the regulators set aside 5G spectrum for industrial implementations.

This is a substantial market, yet according to a report published by the GSMA[33] in January 2023, only 12% of operators offer private 5G solutions. The market size was worth just $483.5 million in 2022, but analysis by PwC and Grand View Research[34] has projected a compound annual growth rate of 54.3% to 2030.

31 https://www.youtube.com/watch?v=Nmf3PGrVijw
32 https://www.telecomseuropeevents.com/telecoms-europe-live-2023/
33 https://data.gsmaintelligence.com/api-web/v2/research-file-download?id=74383877&file=040123-Trends-to-watch-2023.pdf
34 https://www.pwc.com/gx/en/industries/tmt/telecommunications/the-state-of-5G-capturing-more-value.html

There is progress. For instance, in July 2023, Orange announced successful trials of a hybrid private mobile network[35] using 5G Standalone (SA) at its premises in Arcueil, France. Orange used France's public network for the trials and claims the solution will have "many uses".

The operator gave the example of a port where a single network could cover both office and automation needs, supporting critical activities. They include public safety and activities within the port industrial zone, for example, connecting technicians via push-to-talk, and providing AI, computer vision, real-time video, lone worker protection and more.

It could also link subcontractors and remote sites, host third parties and provide coverage for users beyond the site's boundaries such as forklift drivers and freight travelling by road, river or rail.

Pick your own network

Ericsson is running a pilot[36] that takes a different approach to boosting performance, bringing network slicing direct to individuals. In July, the equipment maker announced it will offer 5G Standalone subscribers access to temporary network slices on-demand to improve the performance of applications running Android 14 OS. This would allow operators to monetise personalised, flexible services with variable parameters based on variables like duration, cost and availability.

The potential is interesting, but there are possibly limiting factors: Android 14 OS is still in beta; the slice's parameters are determined and provisioned by operators running Ericsson's core network software so there may be standardisation issues and concerns about vendor lock-in.

STL Partners[37] acknowledges that operators are a long way from delivering network slicing at scale. It advises that while network technology matures, operators should consider the commercial aspects and associated requirements on their IT systems such as the BSS/OSS so they can manage, orchestrate and monetise network slicing and support various business models and service types. This could include providing on-demand services or charging per slice of network capacity (instead of per byte), and different payment and commercial models, for example, selling slices wholesale to other service providers.

35 https://www.mobileeurope.co.uk/orange-completes-hybrid-public-private-5g-network-trial/
36 https://www.ericsson.com/en/news/2023/7/ericsson-brings-on-demand-network-slicing-capability-to-android-14-devices
37 https://stlpartners.com/articles/private-cellular/network-slicing-where-are-we-today/

Section 6
The confluence of web infrastructure and telco networks

Telcos have talked up 'the edge' as a huge potential source of growth for years, but little has come of it. Eventually Open RAN and its vendor-agnostic architecture will provide mobile operators with on-site, plug-in units for internet connectivity via secure gateways. Users will neither have to know nor care who is providing the connectivity.

How much will this undermine traditional telecom networks in the future? Will they still comprise a transport network from radio sites to the mobile core (whether that's 5G Standalone or the 6G equivalent by 2030)? Or will the radio site simply plug into an internet connection with a non-operator cloud-based core on AWS, for example?

A combination of the two is likely. Omdia expects the market for edge services[38] to generate revenues of $214.1 billion in 2026, up from $79.2 billion in 2022. However, operators' services only account for a relatively small part of those totals. Partnering hyperscalers means sharing edge revenues with them and, as is a possible scenario with private networks, the operator might be invisible to customers, with connectivity part of a packaged solution.

Leveraging the edge for content

It's not entirely clear how content at the edge will evolve, for example in terms of structure and what kind of content sits at the edge and what resides in the core. The main aim is to match users' expectations and avoid any perception of reduced quality or delay.

In an interview with Variety[39] during MWC 2023, Netflix's CEO Reed Hastings stressed his company is not looking to create content that is optimised for mobile. Rather the aim is that all content looks as good as possible on mobile devices, which typically have constrained bandwidth. To this end, Netflix invested in codecs that provide video streams using a fraction of the bandwidth that an HD video would use, and also cuts down on buffering time. Avoiding noticeable delays to shows starting "really changes your relationship to the service," Hastings said.

It is unclear how the clash between many European operators demanding a 'fair-share' contribution from the handful of companies that create most of the internet traffic will play out. Either way, operators can either invest more at the edge to stop traffic from traversing their networks unnecessarily and improve their relationships with Big Tech or the latter will continue building out its own caches and potentially rival infrastructure.

Vodafone for one is taking decisive action[40]: in July it announced it would deploy Qwilt and Cisco's federated content delivery platform to boost its streaming quality and capacity to its mobile and fixed broadband customers across Europe and Africa. The operator will embed the solution at the edge of its networks.

Open caching is good for operators because it converts already-deployed, less-flexible content delivery infrastructure into a higher-capacity, federated global content delivery network (CDN), featuring open APIs for content owners.

Cisco and Qwilt designed the CDN for operators' use, unlike bigger CDNs like Akamai. Hence the as-a-service solution is attractive for edge CDN deployments.

38 https://omdia.tech.informa.com/OM024012/Enterprise-Services-at-the-Edge--Forecast-202226
39 https://variety.com/2017/digital/news/reed-hastings-mwc-keynote-1201997852/
40 https://www.mobileeurope.co.uk/vodafone-commits-to-qwilts-content-delivery-network/

Conclusions

What will telco networks look like in 2030? How far will the acceleration of technology have taken us by then? By extrapolating current trends some of the main development are likely to be:

◢ Microwave connectivity will continue in networks, for example, providing 10-15% of coverage in the UK's hardest to reach places.

◢ The advance of fibre will surely drive even greater data demand to mobile devices.

◢ Connectivity will increasingly comprise a hybrid of fibre, cellular, wireless and satellite links.

◢ Traditional core networks will fly to the cloud on Software-as-a-Service platforms that serve the multifaceted demands of content location, economic connectivity and data demand.

◢ Post-economic recovery, Open RAN may have matured, or retired but solutions will have been resolved, vendor-agnostic hardware and software costs will have rationalised. Operators will realise the benefits of a diverse supply chain and the flexibility, performance and cost savings of RAN Intelligent Controller.

◢ Networks will most likely support thousands of small cell solutions on mobile operators' vendor-agnostic networks – or on third-party neutral host networks. That discussion, which raged from 2010-2012, might finally come to fruition.

CONNECT44™

THANK YOU FOR YOUR TIME!

Let's stay in touch on social media

Visit our website for more information
www.connect44.com