Vanguard Report

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5G, Edge and the Quest to be Green

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451 Research

S&P Global Market Intelligence

Introduction

The digital transformation of the telecommunications industry has reached an inflection point and will accelerate as many mobile network operators embark on the next phase of deployments of 5G and edge computing. The next generation of mobile networks are cloud-native, disaggregated, decentralized and increasingly open systems. Disaggregating via virtualizing or containerizing network functions and opening the network breaks decades-old control points and enables new value-chain participants to now compete at every level of the network stack. These networks will increasingly operate more like modern cloud infrastructures and create opportunities to serve enterprise and developer stakeholders with advanced network features and integrated network edge computing. Early returns on 5G have been mixed; the hope is that a fully realized 5G sets the stage for a more lucrative era.

Cloud-native 5G networks bring a specific set of challenges that operators must navigate. At or near the top of the list is managing the environmental impact and energy costs of this new highly distributed and power-thirsty topology. Entering this intermediate phase of 5G deployment broadly intersects secular trends impacting the telecom C-suite, including a need for ESG transparency and setting and progressing against net-zero targets. Regional conflicts are creating energy inflation and scarcity, which in turn raises the stakes even higher to find sustainability innovations. We recently conducted a ”5G and sustainability” research study with telecommunication operators from around the globe to understand network stakeholder priorities at the intersection of 5G, open networks, edge computing and sustainability. On the latter point, our survey reveals that sustainability goals are now materially affecting network architecture decisions (see Figure 1).

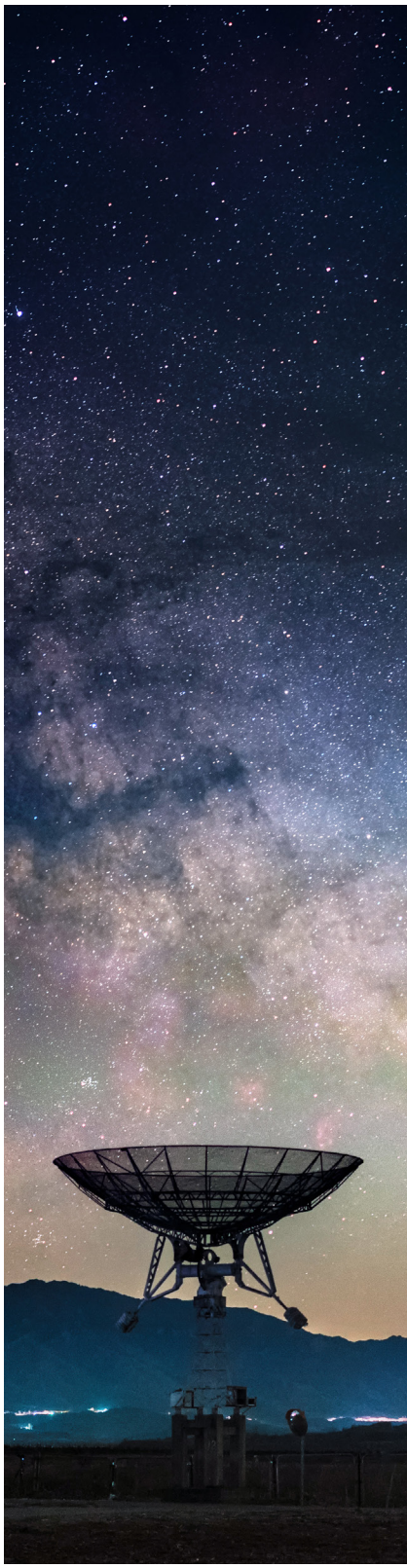
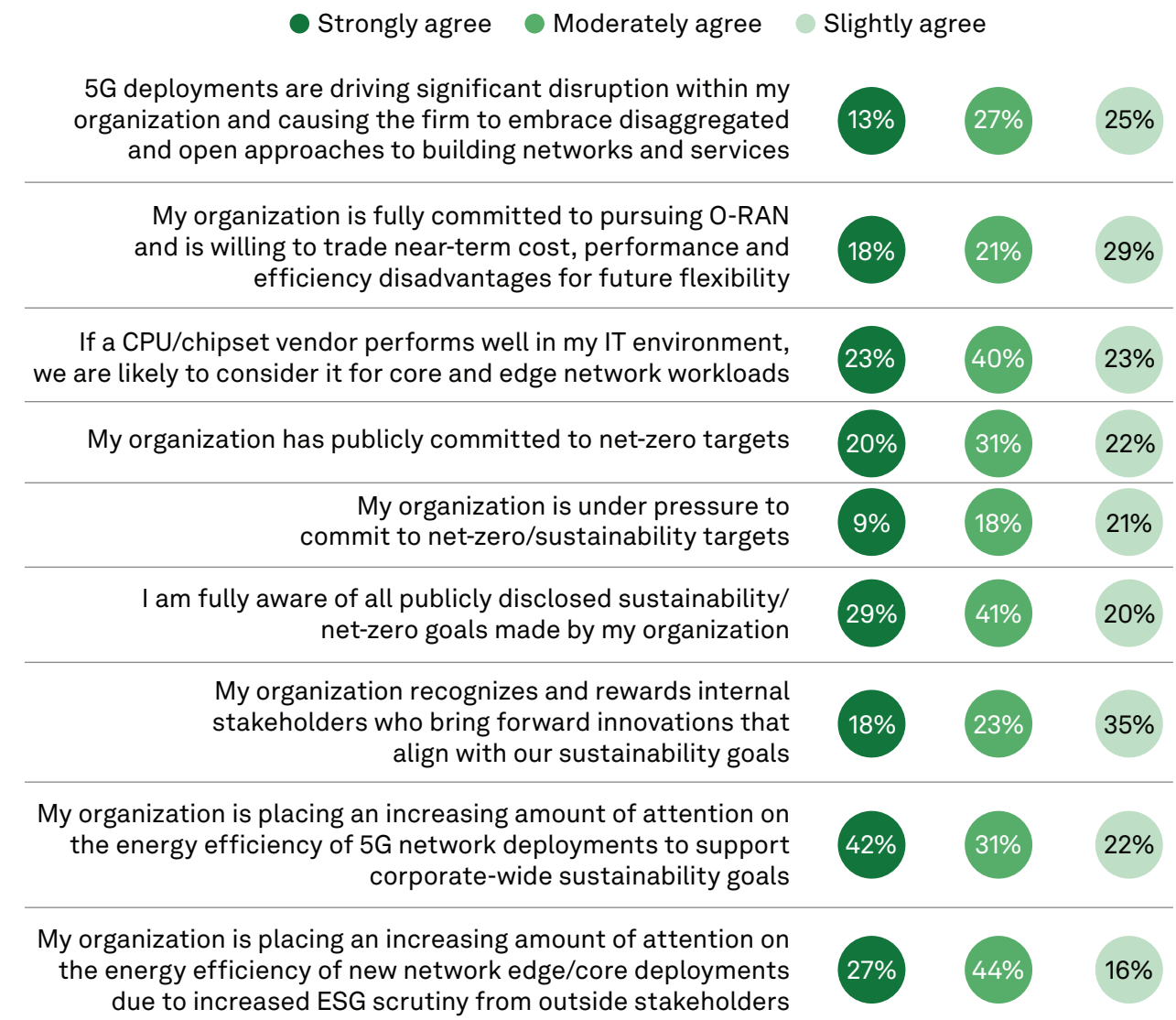


Figure 1: Attention on 5G energy efficiency on the rise



Q. Please share your level of agreement with the following statements.
Base: All respondents (n=107).
Source: 451 Research 5G and Sustainability Study commissioned by AMD.

The Take

5G is entering a second act driven by the rollout of cloud-native stand-alone cores and distributed edge network computing capacity that promises to open the door to new services and operational efficiencies. This coincides with net-zero targets and environmental, social and governance (ESG) transparency becoming ubiquitous C-level initiatives in the telecom industry. Gathering economic storm clouds add to persistent competitive pressures in largely saturated developed markets. Against this backdrop, our research shows that global telecom operators are more open than ever to new infrastructures and architectures that can materially impact sustainability outcomes and contain energy bills while setting the stage for 5G's next chapter.

As networks become more open and disaggregated, the door swings ajar to new competitors at every level, including the processing chipsets powering core and edge network servers and workloads. Open RAN remains a long-term target for most operators enticed by the economic and performance/agility advantages of leveraging best-in-breed software running on industry standard hardware. A persistent theme revealed in our study is that long-held control points in the telecom ecosystem are ripe for disruption by trusted solutions that deliver better performance or sustainability outcomes, preferably both. There is still work to do among suppliers and telecoms to obviate the costs and cultural changes associated with foundational changes, but network sustainability performance and new innovations will have secured a top position as an area of long-term focus and importance.

Telecom's Digital Imperative

Business trends, drivers, requirements

Globally, mobile network operators are significantly impacted by internal and external challenges. The current environment is one of ongoing economic uncertainty impacted by supply chain instability, inflation, regional conflicts and hyper-competition. Telecommunications is energy-intensive and subject to cost increases from energy price inflation. External pressure for decarbonization and transparency on ESG objectives adds to impacts forcing telecoms to use cleaner, but more expensive, power.

Most mobile network service providers are also navigating a major network transition to 5G's next act, which sets the stage for new services and operating models. The first phase of consumer-focused 5G coverage brought mixed results; on one hand, it was a wondrous technical achievement under pandemic-era constraints, but on the other, it generally scored immaterial impact to top-line revenue despite industry-wide spending that reached hundreds of billions on network upgrades and low-, mid- and high-band spectrum leases.

In short, telecom leaders find themselves under pressure to transform seemingly everything, everywhere, all at once — starting with the disaggregation of core and edge network infrastructure, a crucial concept for this next wave of 5G. At the edge, telecoms have a durable advantage in controlling the physical real estate assets to position IT resources within their own network edges or to deploy in private models in customer locations. The result is a disaggregated and distributed topology, delivering advanced 5G services via cloud-native stand-alone core infrastructure and edge applications including virtualized RAN and open RAN (O-RAN). This topology also supports a completely new platform business whereby multi-access edge computing (MEC) hosts enterprise workloads and lets operators target application developers. These network changes must also support new monetization strategies, especially B2B support and go-to-market operations, and enhance customer experience and business intelligence across the board. To reach this future, operators are willing to reconsider prior axioms of infrastructure. Our survey revealed, for example, that 39% of respondents strongly or moderately agree that their organizations are fully committed to pursuing O-RAN and willing to trade near-term cost, performance and efficiency for future flexibility.

These modern network and IT architectures must support the need for internal/external ESG scoring and measurement, however, to meet the needs of corporate responsibility, invoke customer and investor confidence, and meet emerging or existing regulatory requirements. Our research shows that telecom network stakeholders are prioritizing sustainability features when choosing infrastructure. For example, 43% of our survey respondents indicate that power efficiency is the most important feature consideration when specifying edge servers, even ahead of security and trust credentials (37%), which came in second.

5G's Next Chapter: More Open, More Edge

As noted above, the 5G story is not yet fully written. The next chapter, once fully realized in terms of density, coverage and edge locations, should give operators a dynamic and agile platform for innovative services and partnership opportunities while enhancing operational efficiency through automation and sustainability features.

Edge computing in the form of MEC is both a 5G network engineering requirement for services like ultra-reliable low-latency communications (URLLC) and an opportunity to convert network aggregation and C-RAN or even tower-level physical points of presence into hyper-local IT hubs capable of serving nearby enterprises, devices, vehicles and sensors. These edge locations are extremely valuable assets and have catalyzed a series of partnerships between public cloud providers and 5G network operators. Use cases could include supporting digital experiences in retail stores, medical facilities, smart factory workloads and modern entertainment venues.

Open Network initiatives such as O-RAN break the hold of proprietary interfaces that served for decades as lock-in mechanisms that blunted cost and pricing leverage for operators. The promise is a highly competitive and multi-vendor approach to building the RAN edge and core. Our survey found that 40% of respondents are pursuing an O-RAN architecture, and market activity has been gaining speed on the back of large greenfield deployments of 5G O-RAN in Japan and the U.S., as well as several incumbents that are beginning proofs of concept and early commercial launches.

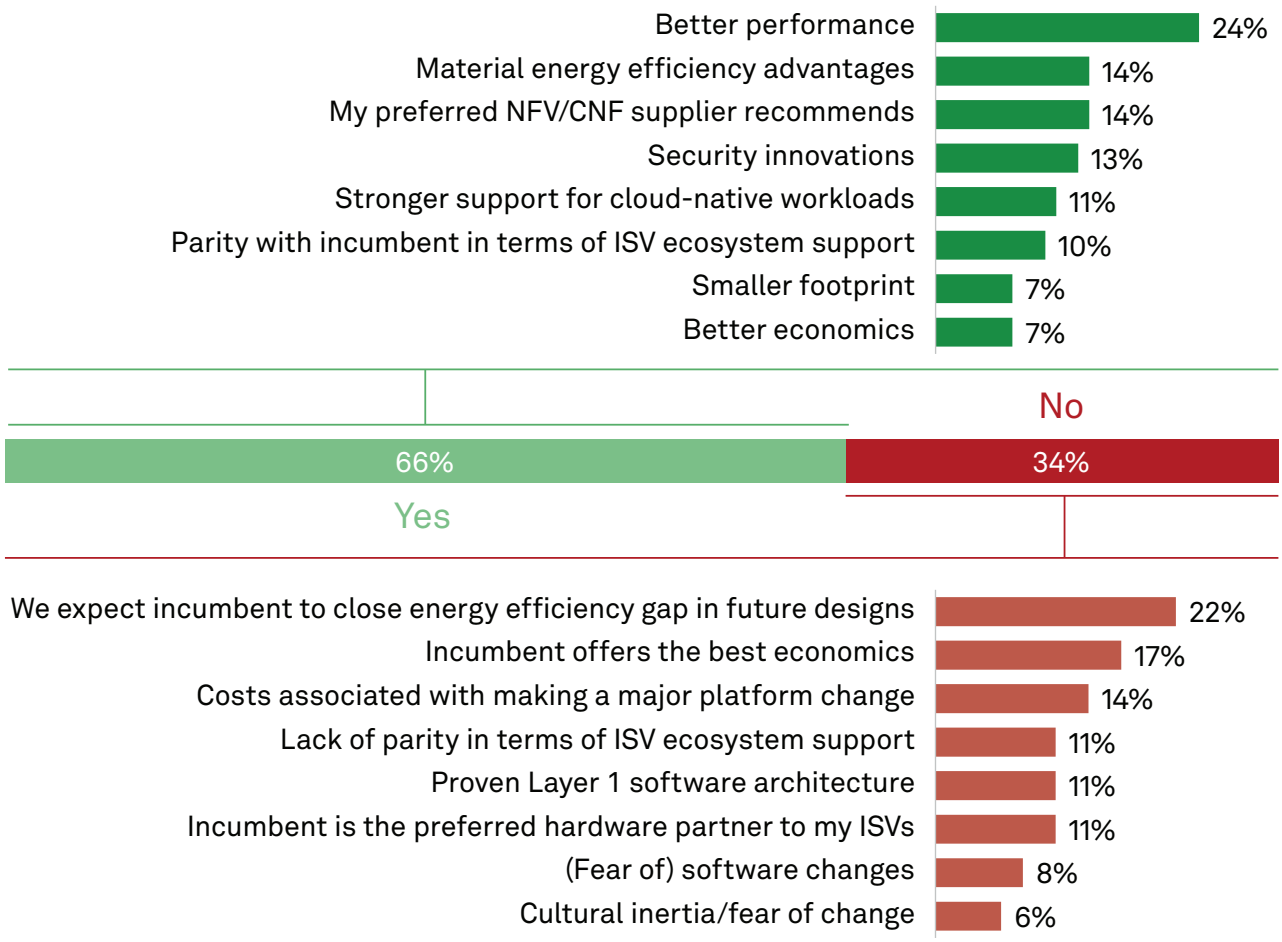
Sustainability and Energy Efficiency: Disruption for Progress

These changes add up to a seminal shift in how networks are built and run. Disaggregation reduces vertically integrated network appliances into virtualized/containerized software functionality running on standard servers in private clouds, public clouds and edge locations. This "opening" of the telecom network creates green shoots of opportunity for upstart makers of specialized telecom core software and the supporting IT infrastructure on which they will run, and many of the giants of enterprise digital infrastructure services (cloud and non-cloud) have set into motion new product and sales organizations and optimized platforms specifically designed to support 5G network workloads.

For user plane functions at the network edge, x86 servers are a natural choice, but deltas around energy efficiency performance have created an opportunity for disruption of the status quo. When asked about this point blank in our 5G sustainability survey, 66% indicated that they would be willing to consider an alternative x86 platform versus an incumbent provider to support network core/edge workloads, and the top reasons they would consider a change are better performance and energy efficiency gains (see Figure 2). Note that even among those unwilling to consider changing their x86 supplier, efficiency factored into the selection because they expect that incumbent providers will eventually "catch up" with alternative suppliers' energy performance. Changing x86 server architectures is not necessarily trivial because these systems often bring their own proprietary control points such as Layer 1 RAN software frameworks. Still, our respondents indicate that they are open to working with the best of breed when it comes to achieving performance/efficiency KPIs.

We note that several other areas of innovation are also expected to contribute to power efficiency goals. These include using alternative energy sources, datacenter innovations such as liquid cooling, specialized accelerators to improve performance per watt and radio access network features such as sleep mode.

Figure 2: 5G stakeholders are open to alternative server architectures



Q. Would you consider an alternative x86 server/silicon platform vs. your incumbent supplier to support network core/edge workloads for any reason?
Base: All Respondents (n=107).
Q. What is the most compelling reason to consider an alternative x86 server/silicon platform?
Base: Those who said yes, they would consider an alternative x86 platform (n=71).
Q. Why not?
Base: Those who said no, they would not consider an alternative x86 platform (n=36).
Source: 451 Research 5G and Sustainability Study commissioned by AMD.

Conclusion

The 5G services ecosystem is hungry for new sources of revenue and operational efficiencies to set a path to a positive return on investment on the billions already spent and the billions more yet to be spent. Operational efficiency in the form of cloud-like automation and full-stack observability must be combined with cutting-edge innovation on energy efficiency. Together, these capabilities sit in the critical path to fully realize the potential of 5G while contributing to net-zero commitments and the need to be green. 5G operators seek out efficiency and sustainability innovations at every functional layer, starting with CPUs.

Our survey reveals that sustainability goals created at the top of the organization are rapidly driving the feature requirements of infrastructure in the network core and edge. Once closed and proprietary systems are being opened to new competitors that will compete on their features, performance and energy efficiency. Incumbency, cultural inertia and proprietary software control points are no longer valid excuses to thwart new entrants as 5G networks pursue a path that is truly cloudified and open.

AMD addresses the needs of Communication Service Providers with a complete portfolio of innovative and proven products. A unique combination of security features, flexibility, and outstanding TCO supports your applications and platforms in the cloud, on-premises, and at the edge. An industry leader, AMD brings numerous strengths to deliver 5G deployment success: close engagement with customers to develop real-world solutions; a vibrant partner ecosystem offering; a well-defined roadmap; and stability and consistent growth to power advanced R&D. Discover more here.

About the author

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Brian Partridge is a Research Director for the Applied Infrastructure & DevOps and Cloud Native Technologies research channels at 451 Research, a part of S&P Global Market Intelligence. In these roles, Brian has overall responsibility for channel research deliverables and team management. As a researcher he actively contributes to the Internet of Things (IoT), 5G and edge computing research agendas and has subject matter expertise in telecom systems and strategy, mobility and enterprise networking domains.

Brian joined 451 Research with the company's acquisition of mobility research firm Yankee Group in 2013. Prior to nearly 10 years at Yankee Group, Brian held various senior-level marketing and sales roles at leading technology vendors such as ReefEdge Networks, 3Com, Enterasys Networks and Cabletron Systems.

Partridge holds a BS degree in business administration from the University of New Hampshire and an MBA degree from Plymouth State University.

About S&P Global Market Intelligence

S&P Global Market Intelligence's Technology, Media and Telecommunications (TMT) Research provides essential insight into the pace and extent of digital transformation across the global TMT landscape. Through the 451 Research and Kagan products, TMT Research offers differentiated insight and data on adoption, innovation and disruption across the telecom, media and technology markets, backed by a global team of industry experts, and delivered via a range of syndicated research, advisory and go-to-market services, and live events.

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