Pushing the edge to net zero

INSIGHT SPOTLIGHT

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This Spotlight is part of a research series in partnership with Dell and Intel on the use of edge compute and RAN as part of sustainability strategy. Following the publication of *The next generation of operator sustainability* and *Open RAN: engineering for energy efficiency*, this analysis examines edge compute and the energy (saving) considerations made possible by positioning servers closer to end users.

Edge is, by definition, a continuum along which processing power resides in relation to the person or business using it. The huge rise in mobile data traffic forecast over the remainder of the decade means both edge and cloud compute will have to handle higher capacity loads. However, deciding when and where to use each should factor in energy use, just as traditional performance metrics such as speed and latency have been to date. How should this be done?

Analysis

Who's in? Who's out?

How, and how much, 5G can be monetised to bring about a meaningful uplift in mobile revenue growth depends on successfully selling into enterprise verticals. Airtime used by consumers still represents 65–80% of revenues for most operators, but price premiums are likely to be competed away after 1–2 years because of the nature of telecoms market structure. By contrast, 5G connectivity for enterprises – or products enabled by that connectivity (e.g. private network deployments, low-latency IoT or edge compute services) – is mostly new and therefore incremental.

5G is now five years old, but the question of which industries offer the best potential for 5G sales is as relevant now as it was when services launched. We asked operators this question in our latest survey (see chart). However, rather than solely focusing on opinions of where sales promise resides, we include how much each industry accounts for in terms of IoT and energy use.

An opportunity to push the energy credentials of 5G

Retail has ranked highest in sales prospects (just over 40% of operators rate it a top-three sector), followed by financial services, healthcare and manufacturing. The latter three have always been viewed as fertile ground, but retail's inclusion is newer, reflecting basic connectivity upgrades and the potential for immersive demonstrations that require low latency.

Heavy industry in the form of mining and oil & gas rank lower, but this is partly due to them being country-specific and biased towards a smaller number of national or global buyers.

More is revealed if the lens for analysing which sectors offer high potential includes energy efficiency. This suggests that for some industries that over-index on their share of energy consumption compared to the size of their device footprint, there is an opportunity for operators and their partners to push the energy credentials of 5G solutions more than is already happening. Mining and oil & gas are particular examples here.

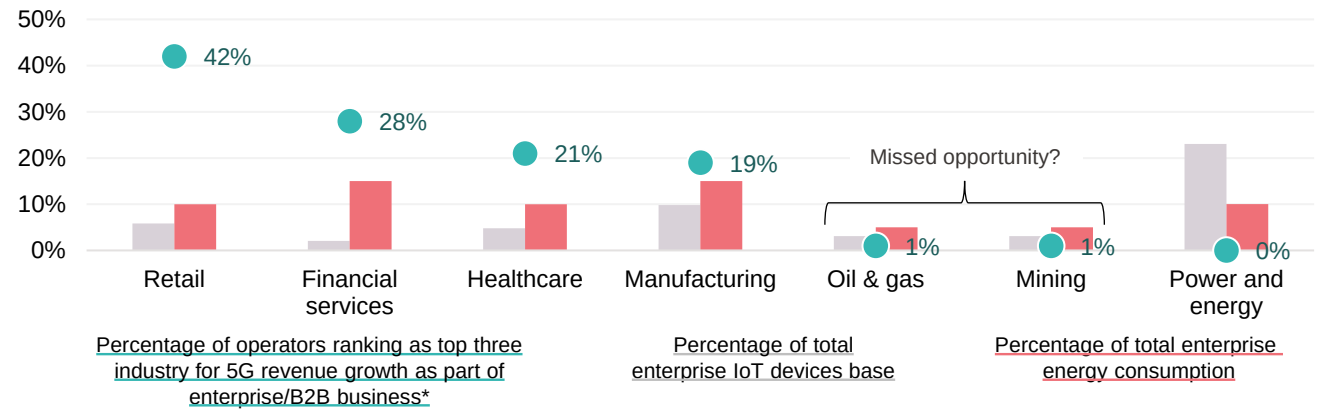
How using edge compute saves energy

The general savings come from reduced energy associated with backhauling traffic to the cloud, and datacentre processing. This will vary for individual deployments, depending on scale and how close the edge servers are to end users.

Backhaul represents around 30% of the total energy used in sending data to – and processing in – the cloud. The backhaul savings from retaining data at the edge arise because most of the traffic (60%) still uses cellular frequencies (microwave or mmWave). These offer a far lower energy efficiency than fibre (5× less). Fibre is the preferred means of transporting backhaul, particularly for high-volume links, but its cost and time to lay mean it takes only 30% of traffic. Datacentre processing efficiencies and cooling methods have vastly improved – though not equally in all regions, and investments needed for higher grade chips from silicon providers.

Source: GSMA Intelligence

Selling 5G into enterprises should include promotion of energy-efficiency credentials



*N=100 operators in the GSMA Intelligence Network Transformation Survey, June/July 2023.

Implications

Mobile operators

- **Balancing edge and cloud.** Cellular data traffic will rise sixfold between now and 2030 for both consumer and enterprise customers. However, the enterprise traffic is likely to become more concentrated as companies situate private network deployments on premises such as factories or ports. The cloud and on-premise edge currently process around 30% and 25% of enterprise traffic, respectively, which will rise to 40% and 30% by 2030. Given the backhaul-associated energy (and emissions) of sending data to the cloud, there is an emphasis on working with hyperscalers and chipset groups to increase datacentre energy efficiency. Currently, datacentre processing comes in at around 0.15 kWh per GB on average (with significant variation depending on location, load and operator), which is just under the prevailing rate for mobile networks. Reducing it further will require gains in processing efficiency and parallel increases in renewables.
- **Sales strategy.** There is a rationale to incorporate energy as part of the sales strategy of edge deployments. Edge has experienced a renaissance. Some 30% of operators rate it as their top asset in selling 5G into enterprise verticals – well above speed and latency, which topped the list in 2019 and 2020. However, this is a competitive arena with blurred lines between operators and cloud groups. Success in winning business will most likely come from a partnership approach that works in energy-efficiency gains of 5G and retaining data at the edge, along with IT integration support for existing local or wide area networks. BT (through its Global Services division), Vodafone and Verizon are all examples of companies taking this approach.

Vendors

- **Competitive edge.** This ultimately comes down to articulating the energy savings possible by retaining data at the edge, aside from the latency benefits from localised compute. GSMA Intelligence high-level estimates suggest material savings on a near-linear basis. For example, if a company retained 10% of traffic at the edge otherwise sent to the cloud, energy savings would be 7–8%. However, this is a general estimate; marketing to specific clients should take into account specific circumstances (size of deployment, distance to datacentres, type of backhaul) so that trade-offs with the cloud are clear. Enterprise IT groups, systems integrators and telco vendors that move early are best positioned; Dell's XR8000, powered by Intel® Xeon®, is a good example; it is designed to drive power efficiencies and is deployable in a range of enterprise settings.
- **Sector pivots.** Several of the industries viewed favourably by operators as potential buyers of 5G services are perhaps unexpected. Media, retail and parts of healthcare are examples. This reflects the changing utility of 5G and edge compute beyond the higher profile use cases such as robotics and private network deployments. Edge providers and telecoms equipment makers have an opportunity to front-run some of this demand using energy as a competitive differentiator. This may mean sales pivots to effectively target companies in these industries, with a focus on case studies and proofpoints to underpin a product marketing strategy that equally covers performance, price and sustainability.

This research has been supported by our partners Dell Technologies and Intel.

For more information and to learn more, check out:
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Related reading

The next generation of operator sustainability: greener edge and open RAN

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