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Ericsson Microwave Outlook

Backhaul media for 5G and beyond

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Backhaul media for 5G and beyond

By 2030, when 6G deployment is expected to start, Ericsson forecasts that 50 percent of macro sites will be connected and backhauled through microwave solutions.

Microwave solutions continue to be a key enabler for building timely, cost-effective mobile coverage and capacity across the globe. Usage varies considerably across different regions, countries and service providers – and even within different parts of a service provider's network.

Advances in technology including higher modulation schemes, broader channel bandwidth and the introduction of new spectrum, such as E-band, are examples of new developments introduced to keep pace with evolution in the RAN domain.

In the mid-1990s, when GSM networks were established and deployed, copper cable for fixed telephony was the main infrastructure used in the access portion of the networks. These were mostly operated by government-owned service providers. Microwave provided an opportunity for new private service providers to

build their networks and compete with the established incumbent wireline organizations. Additionally, microwave became an opportunity for existing service providers to expand beyond the grid of the copper cables. Aggregation networks in developed regions were mostly deployed using fiber, while long-haul microwave solutions were used in developing regions.

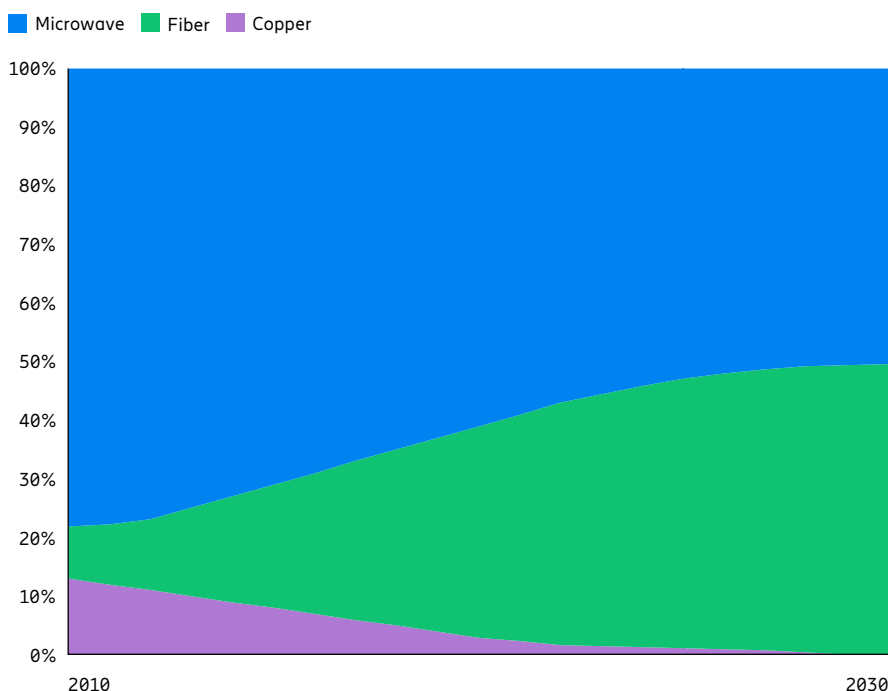
With the evolution of mobile technologies over time – from 2G up to today's 5G deployments, and shifting usage from voice to data – backhaul capacity requirements have shifted from a few Mbps to multiple Gbps – over 1,000 times higher. Over this period, microwave and fiber-based solutions have become the media of choice. Some copper is still used today, but is expected to be taken out of service by 2030. Additionally, in remote rural areas, sites can be connected through satellite

services when no other solutions provide adequate coverage. However, use of satellites for backhaul is not expected to grow dramatically in the coming years as capacity and performance requirements will continue to increase.

Fiber development

Governmental and regulatory considerations are key when it comes to fiber availability, both in terms of the quantity of fiber deployed and who owns the fiber assets. As highlighted in a previous report, in Egypt only government-owned companies are allowed to deploy fiber, which limits usage by privately-owned service providers. Another issue is right-of-way permissions, which can constrain the deployment of fiber across land, and is constraining fiber deployment in many parts of the world, for example in India.

Figure 1: Predicted global backhaul media distribution up until 2030



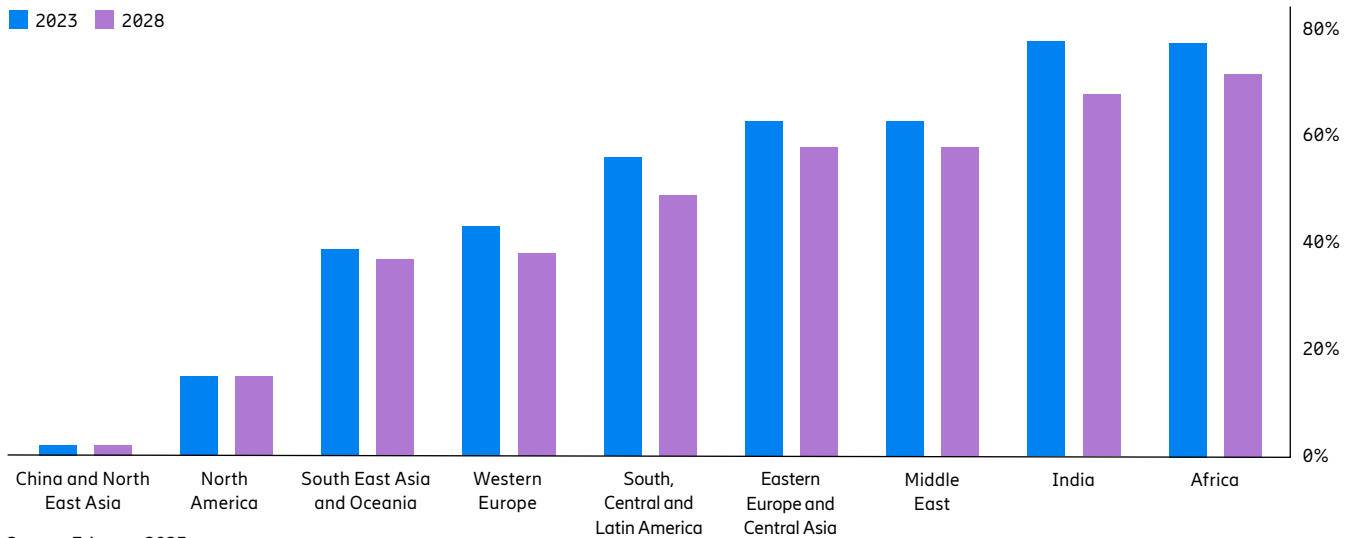
We foresee a 50/50 split between microwave and fiber for mobile backhaul by 2030.*

50%

*Excluding North East Asia

Source: Ericsson 2023

Figure 2: Predicted regional differences in deployment of microwave backhaul 2023 and 2028



Source: Ericsson 2023

Fiber is mainly deployed for fixed and broadband services, or in combination with mobile services, rather than solely for mobile services because of the effect on market forces. A trend observed in Europe, but likely to be present in other global regions, is that fiber assets are acquired when mobile service providers invest in national or regional fixed broadband service providers. Typically, the fiber asset is not the only reason for mergers and acquisitions but is a good additional benefit. Also, in network-sharing scenarios, service providers can share and reuse fiber assets across different operations.

Reaching 50/50

Going forward to 2030, the general trend is expected to be a gradual increase in the share of installed sites connected through fiber, reaching a 50/50 share of the media used. Existing microwave connections, especially those in urban areas closer to the aggregation network, will slowly be replaced with fiber. For new mobile sites, the key factor is the availability of fiber. In 2030 there will still be new sites where fiber is unavailable, in which case a microwave solution will be the main option for connecting to the grid. In rural areas, microwave is most often preferred, as the business case to motivate fiber investments can be challenging.

Regional aspects

When considering the global average of media usage in backhaul, the deployment of mobile sites is key due to significant variations around the world. Initial 5G deployments were centered upon markets where fiber is very present, such as China,

North East Asia and the US. Now there is a shift in 5G deployments to more microwave-centric markets such as Europe, the Middle East, South East Asia, Latin America and India, which is impacting the deployment ratio. With this transition, Ericsson expects the increase in the fiber share of total backhaul links will slow down and even flatten out by the end of the period. This will result in a 50/50 split between microwave and fiber for mobile backhaul by 2030, excluding North East Asia. The new fiber share estimation is slightly higher than in previous forecasts, as in a few regions, such as South East Asia and parts of Europe, the shift to fiber has been slightly faster than anticipated. However, the main reason for the deviation is that site growth in some regions with a high microwave share has been lower than expected. One example is India, where a large operator consolidation has taken place in recent years, resulting in a lower site count – impacting the country's global share. Another example can be seen in parts of the Middle East that have been economically challenged, resulting in investments in the rollout of mobile networks being delayed.

While fiber continues to dominate backhaul deployment in China and large parts of North East Asia, in other parts of the world the different technologies complement each other. In some cases, microwave is the only way to achieve mobile services, and is also being used as a backup solution to increase network reliability when there is a high risk of getting fiber cuts, such as when a cable is severed during roadworks, resulting in loss of service.

India is one of the markets with the highest usage of microwave in the backhaul domain, and the highest deployment rate of 5G systems. With attractive pricing, and with mobile being the primary broadband connection, India is projected to have the highest global average mobile data traffic per smartphone in 2023 and up to and including 2028.¹ As India is a country with one of the largest growth expectations in terms of 5G subscriptions and the highest levels of usage, it is expected to continue to have a high share of microwave backhauled sites. A key component in this is the introduction of E-band spectrum for backhaul, allotted to the mobile operators where they hold 5G spectrum. E-band is crucial for supporting the expected 5G evolution in India, both in standalone deployment, covering shorter distances, and in multi-band combination, combining E-band with 13, 15 and 23 GHz to support longer distances.

Delivery of mobile services will continue to rely on microwave solutions. With continuing site growth and increasing numbers of transceivers per site – driven by multi-carrier and multi-band solutions – we expect the microwave market to continue to be of key importance. The 5G capacity needs of both today and tomorrow can be met by E-band solutions. When required in the future, new frequency bands, such as W and D, are in the pipeline to support the next generations of mobile networks.

¹ Ericsson Mobility Report (June 2023)

About Ericsson

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