

Market Landscape: Core Vendors 2024

Roberto Kompany

Principal Analyst, Mobile Infrastructure

askananalyst@omdia.com

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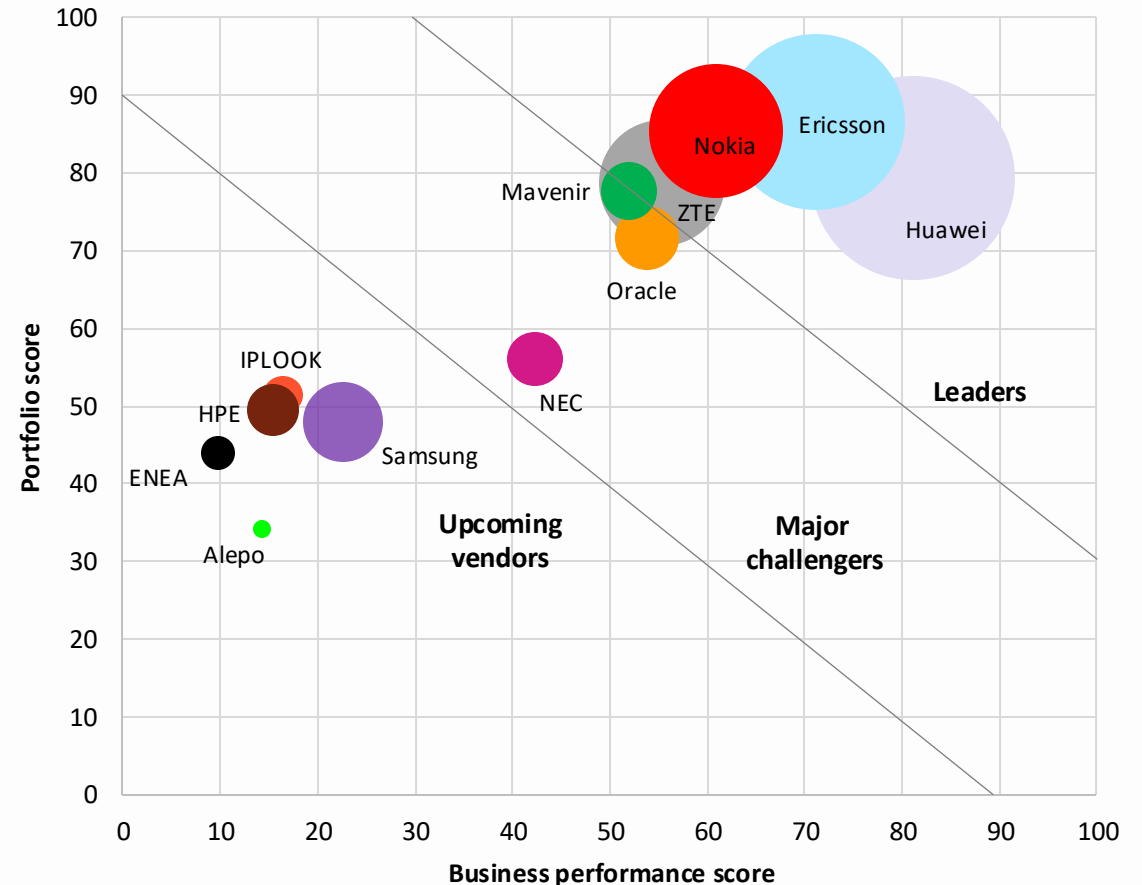
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Summary

Summary (1/5)

- Five vendors essentially control the 4G and 5G core market, with a combined market share of 87.6% in 2023, down from 95.4% in 2020. Of those five, the top three captured 70.3% of market revenue. With so much share concentrated among so few vendors, each vendor works to be perceived as a market leader, especially in the case of the new 5G core. But measuring leadership in this market has its challenges.
- Considering two dimensions, their business performance and portfolio, Omdia categorized 12 core vendors into three groups: market leaders, major challengers, and upcoming vendors.
- Compared to the 2023 edition, there are also four new vendors that did not participate last year: Alepo, ENEA, HPE, and IPLOOK are in the upcoming vendors group.
- The scores indicate the relative position of each vendor in comparison to the others. For example, if a vendor has a lower portfolio score in the 2024 edition than in the 2023 edition, it does not mean that this vendor's offering is weaker in 2024 than in 2023, but that its portfolio has not improved at the same pace as other vendors.
- Four market leaders emerged in this category this year: Huawei, Ericsson, Nokia, and ZTE. Mavenir, NEC, and Oracle are labeled as major challengers. Both Mavenir and Oracle improved their positions and are closer to the leader's group.
- Samsung Electronics and the four new players are in the "upcoming vendors" group. However, caution is required when benchmarking these vendors, given the relatively fewer network functions (NFs) that they develop and the smaller market reach compared to the larger players.

Overall core vendor positioning



Notes: Size of the bubble corresponds to the 2023 core revenue for each vendor.

Source: Omdia

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Summary (2/5)

Summary of categories, score weight, and top three vendors per category

Dimensions and categories	Score weight	#1	#2	#3
Business performance	100	Huawei	Ericsson	Nokia
Total core revenue market share	40	Huawei	Ericsson	Nokia
5G share of total core revenue	20	NEC	ZTE	Oracle
5G core deals with CSPs	20	Oracle	Ericsson and Huawei	Nokia
5G live core networks	10	Ericsson and Nokia	NEC	Mavenir
New logos	10	Mavenir and Oracle	Nokia	Huawei
Portfolio breadth and competitiveness	100	Ericsson and Nokia	Huawei	ZTE
Core portfolio breadth	25	More than five vendors with maximum score		
cloud native readiness	25	Ericsson	Mavenir and Nokia	ZTE
Signaling	15	Huawei	Nokia	Oracle
Automation	15	Ericsson	Mavenir and Oracle	Huawei, HPE and Nokia
Core as SaaS	10	NEC and Nokia	ZTE	IPLOOK
Policy and charging	10	Ericsson and Huawei	Mavenir and Nokia	NEC, Oracle and ZTE

Source: Omdia

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Summary (3/5)

Summary of leaders

Vendor	Summary
Huawei	Huawei is the leader in business performance, thanks to its high revenue market share despite the numerous challenges the company faced in 2023. It is a solid performer in most of the portfolio segments and its strengths lie in signaling and policy and charging categories. Some of the areas in which Huawei has room for improvement are cloud native readiness and core as SaaS.
Ericsson	Ericsson is the co-leader in portfolio dimension and second only to Huawei in the business performance. Ericsson is a strong vendor with good business performance in terms of core revenue market share and number of live 5G core deployments. Its strengths in portfolio dimension include cloud native readiness and policy and charging.
Nokia	Nokia is the co-leader in the portfolio category; however, in the business performance category, Nokia has some room for improvement, especially concerning the total core revenue and the 5G share of core revenue. Nevertheless, among the other vendors in the market leaders' category, it has made a good number of 5G core deals with its customers and captured a series of new logos for 5G core. Its strength lies in the number of live 5G core networks deployed.
ZTE	ZTE has made good progress in the 2024 edition and moved closer into market leaders' category. It achieved a good business performance thanks to the massive continuous deployment of 5G core in China, and, to a lesser extent, deployments in the rest of Asia and Europe. The vendor has reached third place position in both business performance and portfolio dimensions.

Summary (4/5)

Summary of major challengers

Vendor	Summary
Mavenir	<p>Mavenir has improved its position in the 2024 edition, and it is closer to the market leader's category. It ranks second in the portfolio dimension and has a mature portfolio of cloud native NFs. Mavenir has focused on winning new customers in all global regions for both 4G and 5G core, and in 2023, it added six new logos. It has further won expansion projects with its existing customers. In the business performance segment, it has some room for improvement, especially concerning the total core revenue and the 5G share of core revenue and in the portfolio segment, signaling and core as SaaS.</p>
Oracle	<p>Oracle progressed well in the 2024 edition and improved on both business performance and portfolio dimensions positioning it on the border line between major challengers and leaders. Given Oracle focused its efforts on the 5G core NFs in categories such as routing and selection, policy and charging, and analytics and automation only, we should be cautious when benchmarking its solutions against those of the larger vendors that develop all the core NFs. For NFs that it does not develop inhouse, such as packet core, it can partner with other players. Oracle's strengths lie in capturing new logos on the business performance dimension and automation on the portfolio dimension. Oracle also offers 5G core on the Oracle Cloud. An area to improve on is core as SaaS offerings.</p>
NEC	<p>It should be remembered that NEC focuses on a limited number of NFs. Nonetheless, NEC has made good progress in terms of business performance where its strength lies in 5G share of total core revenue. However, while it gained four new CSP logos, its activities are mainly limited to its home market in Japan. NEC also has significant focus on the enterprise market with its core network, which is where its strength in core as SaaS shines. An area where NEC has room for improvement is signaling.</p>

Summary (5/5)

Summary of upcoming vendors

Vendor	Summary
Samsung	Samsung's answers to some of the questions were rather limited, leading to challenges in benchmarking its portfolio. It should also be remembered that Samsung focuses on the packet core NFs, and we should be cautious when benchmarking its solutions against those of the larger vendors that develop all the core NFs. Samsung is absent from entire regions, which automatically reduces its addressable market and both potential revenue and deals. Samsung could move into the major challengers once it wins more 5G deals with CSPs and grows market share and develops categories, such as signaling and policy and charging NFs.
IPLOOK	IPLOOK is a provider of 4G and 5G RAN and core solutions, including packet core and IP multimedia subsystem (IMS) solutions for CSPs, MVNOs, and private networks. The latter is its largest market; however, for the purpose of this study, the focus is on its CSP deals and activities. Some of IPLOOK's strengths lie in cloud native readiness, but also, to a lesser degree, core as SaaS and automation.
HPE	Through the Athonet acquisition, HPE has significantly focused on private networks, for which it has developed a wide range of core NFs. For the purpose of this study, however, the focus is on its CSP deals and activities, where HPE's focus is on SDM NFs only. Given its limited range of NFs it develops, it is challenging for it to rank highly in either of the two dimensions when benchmarked against the larger vendors. Nonetheless, it ranks well in the cloud native readiness and automation categories.
ENEA	Unlike the leading vendors, ENEA provides only a few core NFs, which include PCF, SDM, and security edge protection proxy (SEPP). Nonetheless, it ranks relatively well on cloud native readiness and overall automation. It has also won several deals, and it is in trials and proof of concepts (PoC) with several other CSPs.
Alepo	Alepo sells NFs for subscriber data management (SDM) and policy and charging (PCF) categories only. It partners with both vendors and systems integrators to grow its market reach. It is focused on trials and deployments with leading operators in the US, Europe, and Australia, including a leading mobile operator deploying private 5G and a fixed broadband operator.

Source: Omdia

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Methodology

Methodology (1/2)

- The core network as covered by Omdia in this report includes only software. Services and other solutions in other network domains such as radio access network (RAN) and transport networks are not included.
- This report focuses as much as possible on six categories for which vendors were sent a detailed questionnaire. These responses were then converted into measurable and comparable metrics, using the information provided by vendors themselves, rather than the analyst's or a third-party's perceptions and opinions. Omdia also underlines some of the key caveats associated with the metrics that are used so that the reader is aware of limitations where they exist.
- Omdia selected two main dimensions for this evaluation: the core business performance and the core portfolio breadth. Each dimension is assessed by looking at different categories and metrics. Metrics have different priorities for different vendors, and what one vendor perceives as important (specific geography, technology, or type of product) may not be as important to other vendors.
- For business performance, the categories are the global packet core revenue market share, the 5G share of each vendor's total core revenue, the number of 5G commercial deals with CSPs, the number of 5G live core networks, and the number of new logos.
- For the portfolio dimension, Omdia took several subcategories into consideration, such as the portfolio breadth (the categories of core NFs), cloud native readiness, signaling, automation, core as SaaS, and policy and charging for 5G core. Details for each category and their weighting in the total score are introduced in relevant sections of the report.
- A caveat to this methodology is that the business performance score is largely based on revenue from evolved packet core (EPC) and 5G packet core, but the portfolio score is based on a broader scope.
- Price competitiveness is critical when an operator selects a vendor, but pricing information is highly confidential and specific to each client and each project. For this, Omdia uses total revenue for market share.
- Solutions' performance demonstrated during trials is another critical point of differentiation, but Omdia does not have the tools or resources to conduct lab or field tests to measure performance.

Methodology (2/2)

- Patent portfolios and contributions to standards are other interesting metrics, but claims from different vendors tend to be contradictory, and comparisons are difficult. Omdia also believes that these criteria are not as important as the ones included in this assessment. Essential patents matter, but Omdia argues that they are important for other reasons, not so much when it comes to assessing a vendor's position and competitiveness.
- For the 2024 iteration of the report, a survey questionnaire was sent to 16 vendors, seven more than in the 2022 edition of the report. Those that participated were Alepo, ENEA, Ericsson, HPE, Huawei, IPLOOK, Mavenir, NEC, Nokia, Oracle, Samsung, and ZTE. Some vendors that were contacted chose not to participate. Casa Systems also did not participate this year.

Business performance

Business performance

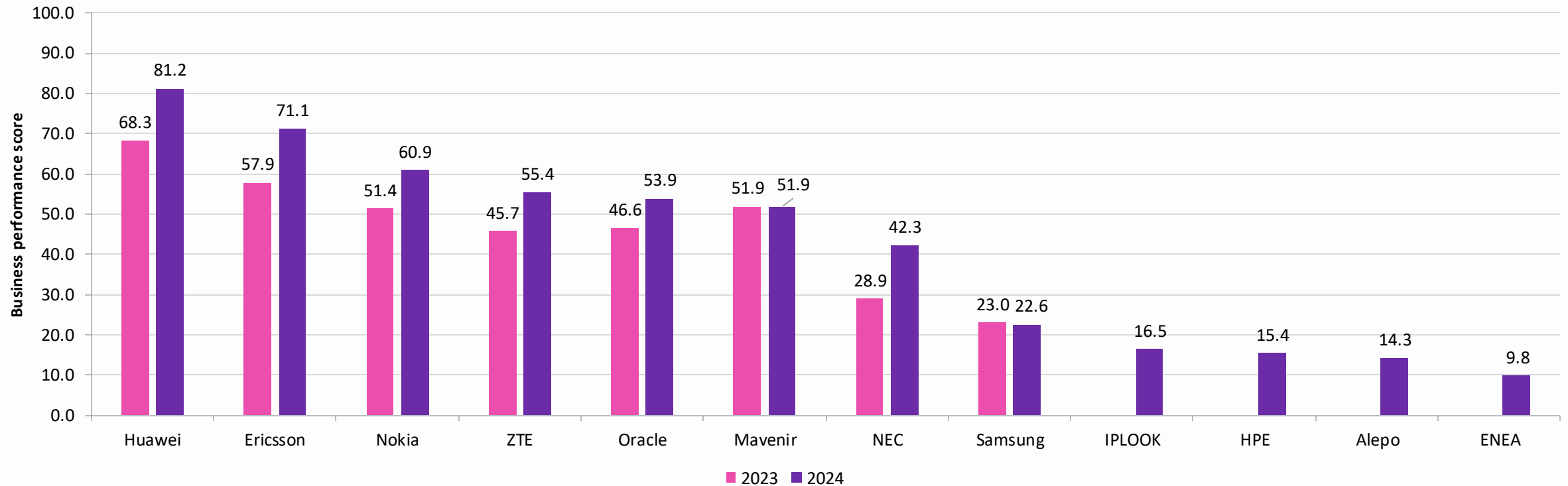
Summary of categories, score weight, and top three vendors per category

Dimensions and categories	Score weight	#1	#2	#3
Total core revenue market share (for the year 2023)	40	Huawei	Ericsson	Nokia
5G share of total core revenue (for the year 2023)	20	NEC	ZTE	Oracle
5G core deals with CSPs	20	Oracle	Ericsson and Huawei	Nokia
5G live core networks	10	Ericsson and Nokia	NEC	Mavenir
New logos	10	Mavenir and Oracle	Nokia	Huawei
Total business performance	100	Huawei 81/100	Ericsson 71/100	Nokia 61/100

- There are some caveats to basing leadership totally on market share, but market shares are important and a generally accepted way of measuring market leadership. Of all categories across the two dimensions considered in this report, market shares carry the largest weight (40% of the business performance score and 20% of the grand total).
- Omdia uses revenue for market shares because revenue is the most common indicator of business performance, and revenue data is more reliable. The revenue market share shows a company's scale, its business momentum, and its ability to win new business.
- Omdia also looks at the number of commercial 5G core deals with CSPs (excluding free trials, non-revenue-generating activities, and non-CSP deals). If a vendor has several 5G contracts with the same operator in the same country, it is counted only once, but in the case of multi-country deals with one telecom group (e.g., Vodafone UK and Vodafone Germany), each country counts for one deal.
- Omdia considers the number of deals to be less important than revenue in assessing leadership and, therefore, applies a smaller weighting to deals when calculating scores. Not all deals are equal: a deal with a Tier 1 operator in a big country tends to be worth more in monetary value than multiple deals with Tier 2 and Tier 3 operators in smaller countries.
- Nonetheless, deals are another indication of a vendor's reach and capacity to win requests for proposals (RFPs), and more broadly of its business momentum, so deals are worth looking at.
- Overall, Huawei was the leader in business performance in 2024 with a score of 81/100, followed by Ericsson (71/100) and Nokia (61/100). The main difference between the performance of the first and second positions is due to Huawei's total core revenue.

Business performance scores, 2023 and 2024

Business performance scores (maximum 100 points)



Notes: Scores are relative. If a vendor has a lower score than in the previous edition, it does not mean that this vendor's performance was necessarily weaker than before, but that the status of each vendor relative to the others has changed.

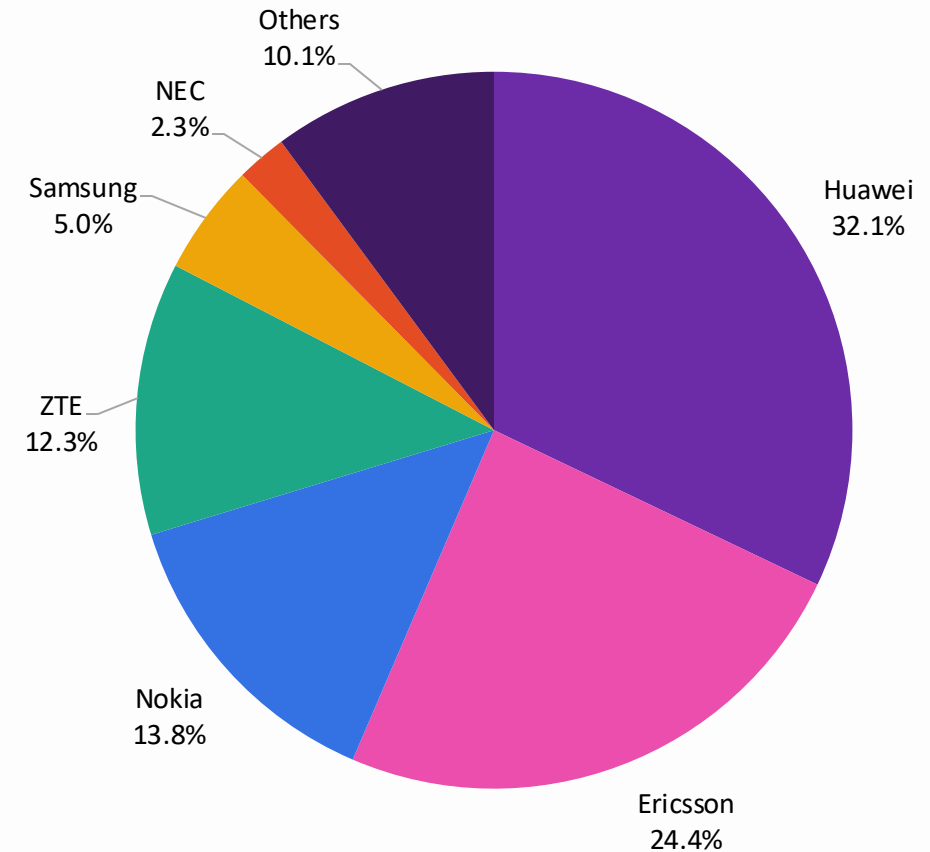
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Revenue market share

- In 2023, CSPs' spending on packet core was \$2,375m. Despite a difficult environment for the vendor and market share losses, Huawei remained the core revenue market leader, followed by Ericsson, Nokia, ZTE and Samsung Electronics.
- Note that this is the 2023 revenue, and it does not presume evolutions in 2024 because Huawei continues to face challenges, and the core network investments in China are expected to diminish after several years of significant spending.
- Huawei, Ericsson, and Nokia captured a combined 70.3% of global core revenue in 2023. When ZTE and Samsung Electronics are added, the top five companies generated 87.6% of total core revenue during the year. This is very high but still less than the 95.4% captured by these vendors in 2020, which indicates that upcoming vendors are collectively gaining market share.
- One thing to keep in mind is how market share fits into a vendor's strategy. Some vendors are willing to sacrifice short-term margins to gain share, winning business thanks to lower prices. This is particularly important for 5G core, given that it will create new opportunities for monetization, such as from new 5G features. Conversely, other vendors are willing to sacrifice share and top line to protect their margins. A single vendor may even use both strategies depending on the geography, project, or time.
- For 4G and 5G core revenue, Omdia does not include CSPs' spending in NF virtualization infrastructure (NFVi) nor server and management software.
- Market shares also determine the size of the bubbles on the summary chart on slide 4. Omdia provides extensive market share data and analysis on a quarterly basis in its *Mobile Infrastructure Core Market Tracker* report series.

Market shares for combined 4G and 5G core in 2023



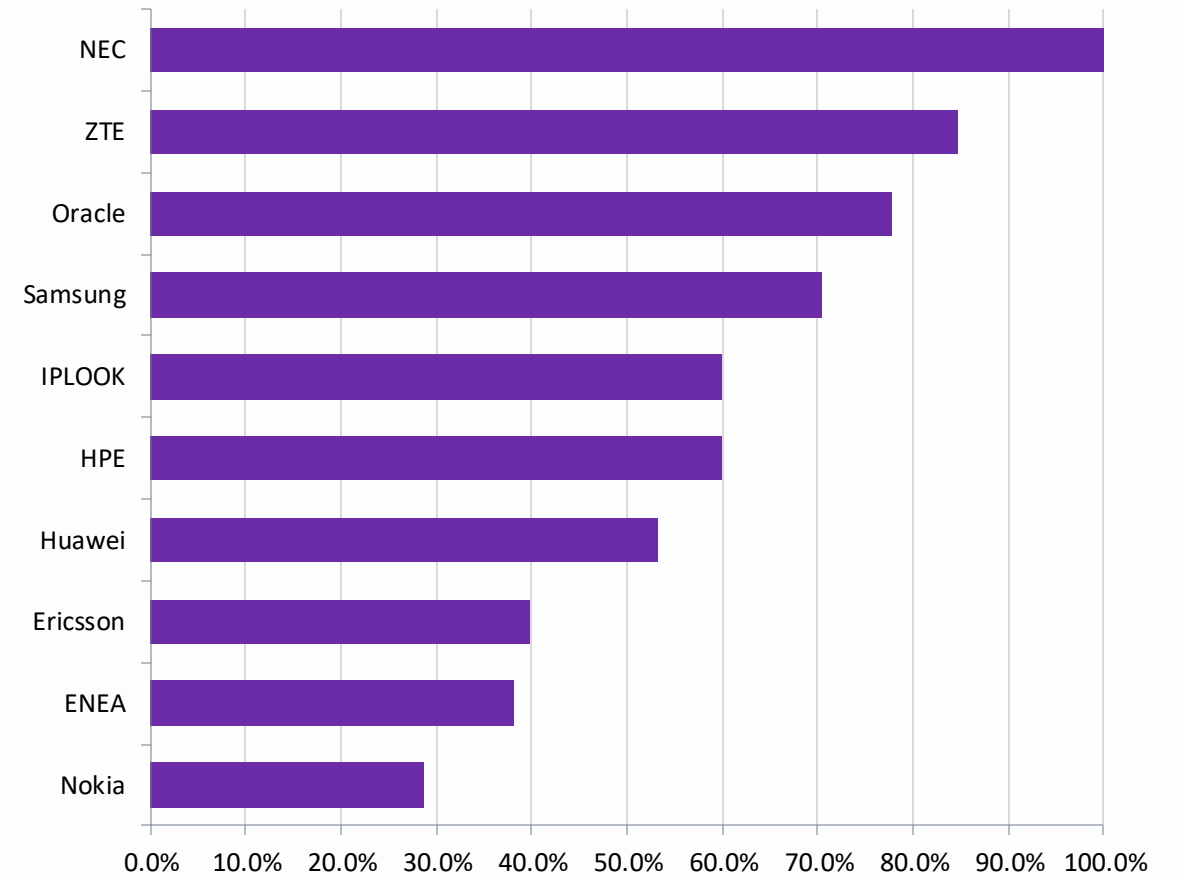
Source: Omdia

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Vendor's 5G revenue split

- To complement the revenue market share analysis (slide 15), Omdia also considers the share of 5G as a percentage of each vendor's total core revenue in 2023. Please note, this is not vendor 5G core market share.
- A dollar or yuan from the sale of 4G equipment is worth the same as a dollar or yuan from the sale of 5G software; nonetheless, Omdia and many of our readers consider the 5G revenue to be a relevant indicator of a vendor's commercial momentum and how fast the vendor is able to shift its revenue mix toward 5G—that is, the fastest (and only) growing segment of the core market. It is worth noting that products initially deployed for 4G EPC can often be upgraded to 5G via software. Revenue allocation may vary from one vendor to another.
- The vendors' 5G share was higher in 2023 than in 2022, given the transition to 5G core is advancing. As many CSPs seek to deploy the 5G core in a multi-vendor, more vendors will have the opportunity for deals for components beyond packet core.
- This metric largely depends on each vendor's revenue geographical mix. NEC benefited from the strong 5G business in its domestic market, Japan, while ZTE similarly benefited from 5G deployments in China—both early 5G-adopting countries where most investment has already shifted from 4G to 5G.
- Conversely, Huawei, Ericsson, and Nokia are global vendors with a more diversified client base and revenue mix, including some advanced and some less advanced markets (late 5G core adopters), which drags the percentage down. On the other hand, for these larger global vendors, their presence in both developed and emerging markets is an advantage over other metrics, including the total core revenue and the number of 5G deals. One vendor cannot win in all categories.

5G share of total vendor core revenue in 2023

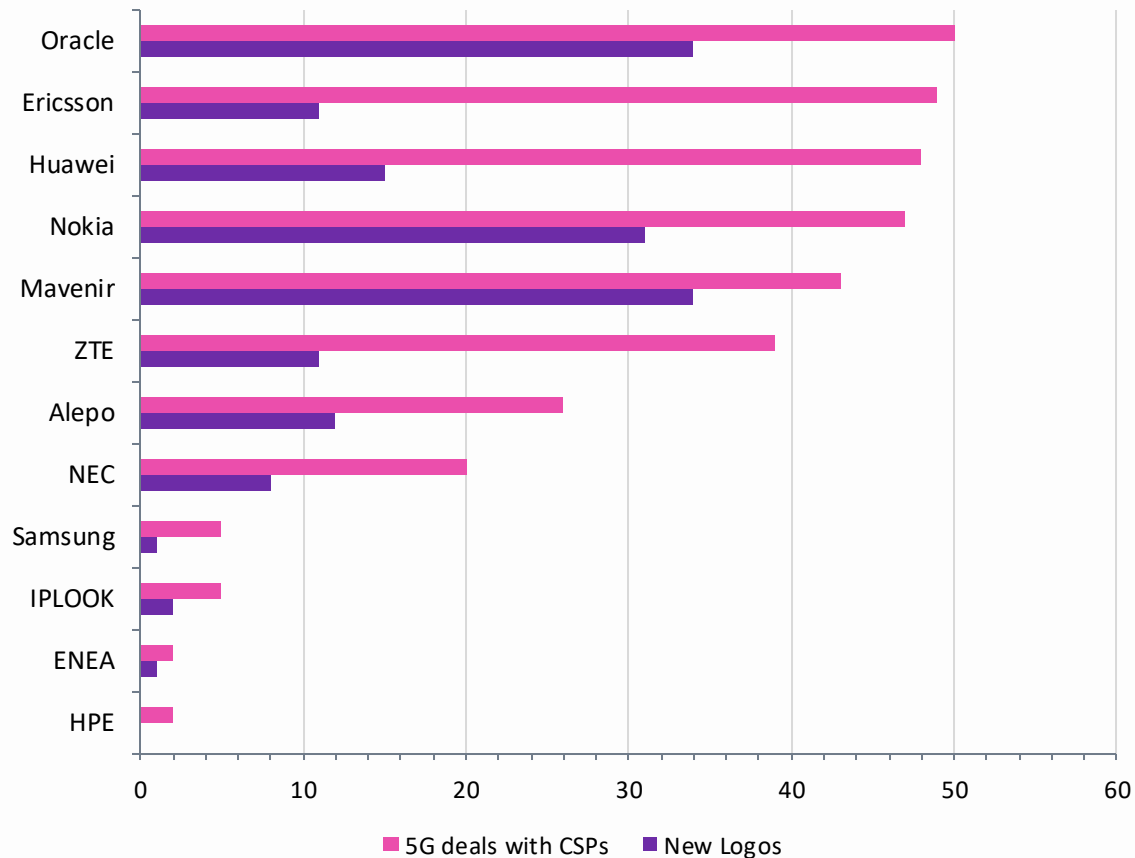


Source: Omdia

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5G deals with CSPs and new logos

Number of 5G commercial deals with CSPs and new logos (2023)



Source: Omdia

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- Oracle and Ericsson claimed a good number of 5G core deals in 2023, ahead of Huawei, Nokia, and Mavenir. While ZTE (and Huawei) must win new contracts to offset the slowdown in spending by the Chinese CSPs, Oracle, Ericsson, Nokia, and Mavenir have a strong focus in Europe where the market is both diverse and fragmented. The high number of operators in the region means significant vendor swap opportunities as many of these reduce their dependencies on the Chinese vendors.
- The new logo metric indicates whether a vendor has gained 5G business at the expense of a competitor or with a greenfield 5G deployment. With non-standalone (NSA) 5G, most operators use their existing 4G EPC vendor to upgrade the core. Given the tight relationship between 4G and 5G in NSA, winning 5G contracts where a vendor did not already provide 4G is a strong endorsement of its solutions. This shows an operator is willing to either rip-and-replace an incumbent 4G vendor by building a new, more advanced cloud native platform that services both 4G and 5G or go through the challenges of interoperability between the two vendors.
- The CSPs' desire to build their 5G core with a multi-vendor architecture gives the new players, such as Oracle, Alepo, and NEC the opportunity to win new logos, even if the deals do not encompass a full suite of 5G core NFs. Nonetheless, both Ericsson and Nokia are also winning deals to deliver one or more core NF groups. (See report: *Tech Trend: The Vendor Opportunity for 5G Core Network Functions Beyond Packet Core*)
- The 5G core is considered more strategic than the core from previous generations and for this, the vendors have, in some cases, benefited from policies against Chinese vendors, especially in the Five Eyes countries and Europe. In the meantime, Chinese vendors also secured deals, sometimes at the expense of Western vendors, especially in emerging markets.



Portfolio assessment

Core portfolio

- Omdia breaks down the core network portfolio into six categories where core portfolio breadth targets both 4G and 5G NFs, but the remaining five all target the new 5G core. The five categories are cloud native readiness, signaling, automation, Core as SaaS, and policy and charging.
- Omdia believes that core portfolio breadth and cloud native readiness are the most important categories. The cloud native readiness category accounts for the work done by vendors to deliver 5G core container network functions (CNFs).
- Signaling NFs will enable vendors to support CSPs' efforts to reduce 5G core deployment costs, while automation will help reduce opex and manual activities during core NFs' lifecycle management.
- SaaS used to be applied to IT workloads and it is a new category in telecoms infrastructure, where some vendors have expressed a vision to deploy the 5G core NFs as SaaS in hyperscalers, managed by the vendor and charged for via a subscription or consumption-based model.
- As stated previously, these rankings are based on portfolio offerings and detailed vendor descriptions but not on actual performance in the field because Omdia lacks the means to test vendors' software.
- For this report, Omdia collected information from twelve core vendors, which includes four new vendors, where each was asked detailed questions about each category.
- Ericsson moved to first position, which constitutes industry leader for the core portfolio, with a score of 87/100, followed by Nokia (85/100) and Huawei (80/100).

Summary of categories, score weight, and top three vendors per category

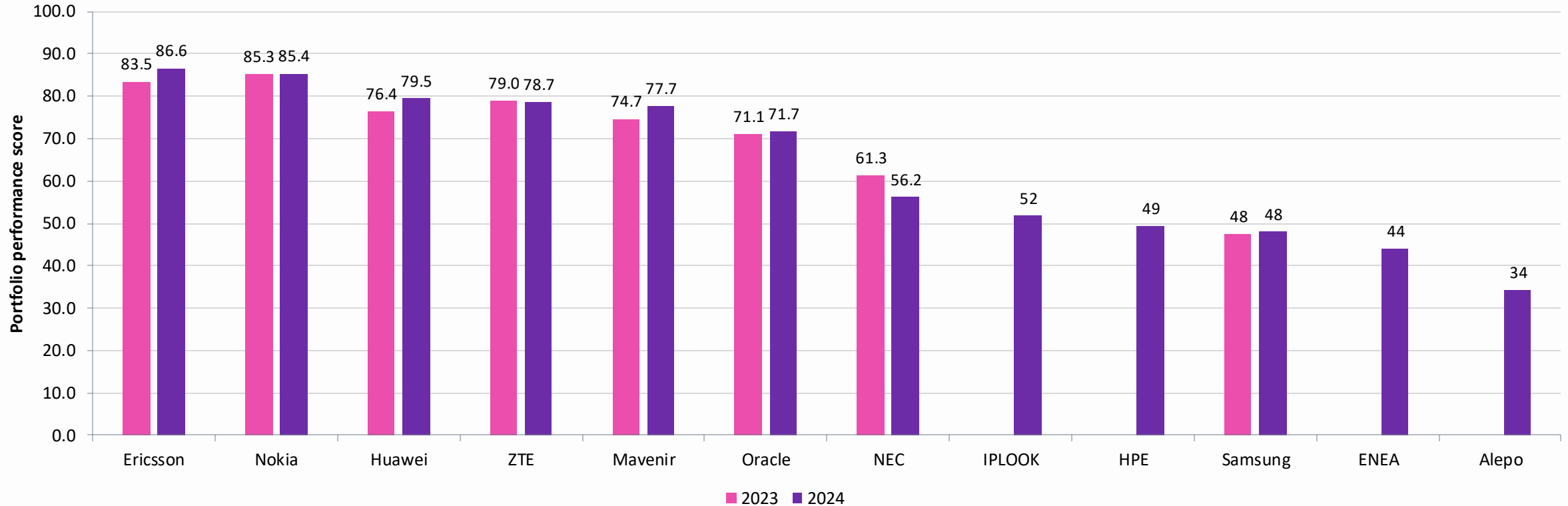
Dimensions and categories	Score weight	#1	#2	#3
Core portfolio breadth	25	More than five vendors with maximum score		
Cloud native readiness	25	Ericsson	Mavenir and Nokia	ZTE
Signaling	15	Huawei	Nokia	Oracle
Automation	15	Ericsson	Mavenir and Oracle	HPE, Huawei and Nokia
Core as SaaS	10	NEC and Nokia	ZTE	IPLOOK
Policy and charging	10	Ericsson and Huawei	Mavenir and Nokia	NEC, Oracle and ZTE
Total core portfolio	100	Ericsson 87/100	Nokia 85/100	Huawei 80/100

Source: Omdia

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Core portfolio scores, 2023 and 2024

Core portfolio overall scores (maximum 100 points)



Notes: Scores are relative. If a vendor has a lower score than in the previous edition, it does not mean that this vendor's portfolio is weaker in 2024 than 2023, but that the status of each vendor relative to the others has changed. Weighting has also slightly changed, and a new category added, which affects the total score.

Source: Omdia

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Core portfolio breadth

- The core portfolio category considers the availability of 3GPP-compliant 4G and 5G core NFs. Omdia's 2023 survey results indicated that 80% of CSPs will want to build a multi-vendor 5G core that includes two or more vendors and for this, they will need to be able to choose best-of-breed NF solutions from more than one vendor.
- For this, we divided the NFs into subcategories, which include packet core, subscriber data management, routing and selection, security and roaming, policy and charging, and automation, orchestration and analytics, for which vendors were surveyed to better understand their strengths.
- The 4G EPC NFs and vendor strengths were part of the survey research; however, Omdia research indicates that as CSPs plan their core migrations, they are interested in vendors' 5G core solution strengths. Further, given the industry move to virtualized solutions, most vendors, except for Ericsson and Nokia, stopped providing 4G core based on proprietary hardware in 2021 and instead focused their efforts on virtualized EPC solutions only.
- We must point out that some of the new vendors surveyed for this report, including Alepo, ENEA, and HPE provide a limited set of NFs. Similarly, Oracle does not provide the 4G or 5G packet core NFs and has focused its efforts on routing and selection, policy and charging, analytics, and automation subcategories. Therefore, we should be cautious when benchmarking these vendors' solutions against those of the larger ones. More than five vendors in this category obtained the maximum score.

Cloud native readiness

- It is important that vendors develop their NFs using an efficient set of microservices, where, to reduce footprint and increase agility, these can be shared among various NFs. In this report, several new questions were put to the vendors to better gauge their cloud native readiness. Some of these were the number of NFs that were deployed as cloud native in live networks, the number of microservices that made up each NF, the extent to which the microservices fulfilled cloud native requirements as well as robustness and scalability, and lifecycle management (LCM) of their solutions.
- CSPs may choose to deploy NFs on the vendor's own cloud environment (known as single stack solution); however, a more complex multi-vendor scenario would be to deploy the NFs from different vendors on third-party cloud for their private buildout. Some examples of private cloud environments are Red Hat Openstack (for virtual machine [VM]-based NFs), Red Hat OpenShift (for container-based NFs), SUSE, and VMware Tanzu.
- CSPs may also choose to build their 5G core on a combination of clouds. Examples are to build an instance of 5G core on the public cloud providers (PCPs), such as AWS, Google Cloud Platform (GCP), and Microsoft Azure. In most cases, however, the public cloud instance is built within the CSPs' own premises, such as the case with AT&T.
- For the overall category, Ericsson was the leader based on the details given on fulfillment of cloud native requirements, NFs certified on multiple cloud platforms, and container architecture. Mavenir and Nokia were the runners-up, followed closely by ZTE.

Signaling

- The 5G core is built as a service-based architecture (SBA) where the goal is to ensure consumer NFs can communicate efficiently and request services from producer NFs. Nonetheless, this will require the availability of a service-based interface (SBI) that acts as an abstraction, allowing NFs to discover other NFs connected to the same interface link.
- Four models, A to D, are devised by 3GPP in order of decreasing new NF rollout complexity to help alleviate CSPs' NF integration work. While model A was for lab trials, B was used in early rollouts; however, it is not considered an efficient architecture in the long term. 3GPP Release 16 introduced the service communication proxy (SCP) used in Model C and D; however, deploying the target architecture of mode D requires a performant SCP.
- Vendors reported that there are still many CSPs that are using model B, where these were the fast movers that deployed 5G core early and many of them are considering deploying the SCP to migrate to model C. It is also the case that in a multivendor environment, unless the SCP can manage protocol adaptations, to translate different vendors' messages, models C and D would not be feasible.
- Nonetheless, most vendors claim that they can deliver models C and D and have demonstrated their solution and are engaged in pre-production works. A few vendors, such as NEC and Samsung, said that they use partners to deliver the SCP. Huawei obtained the top position in this category given the improvements made to its SCP functionalities and their mode D deployments, while Nokia was the runner-up, followed closely by Oracle.

Automation

- CSPs will leverage automation to increase network agility, reduce costs, and compete better in the cloud era. Like PCPs that can fast launch new revenue-generating services to the market, CSPs will need automation tools to test and launch new services quickly.
- Several new questions were put to the vendors in this report to better gauge their automation strategies, from the frequency of general availability (GA) release, and automatic acceptance testing to product upgrade and support for continuous integration/continuous delivery (CI/CD).
- In the cloud era, there will be many software releases, from those for cloud and hardware layers to NFs and urgent security patches. CSPs will need CI/CD pipelines to deliver the software and acceptance testing and product upgrade solutions, such as in-service-software-upgrade (ISSU) to reduce maintenance windows and shorten time-to-market for new services.
- Given the growing demand for analytics and the long road to maturity, a few NWDAF questions were also introduced in this section. Several vendors have commented that they are engaged in a wide range of use case trials with CSPs, from network performance and UPF selection to end-to-end closed-loop automation. However, there are challenges, such as vendors using their own set of APIs, which creates difficulties in a multivendor setup.
- Ericsson obtained the top position in this category for the work it has done on its product upgrade automation solution, while Mavenir and Oracle scored the same as runners-up, followed by HPE, Huawei, and Nokia.

Core as SaaS

- It is important to understand how vendors define core as SaaS. Omdia defines core as SaaS as a core network solution provided on a scalable public cloud infrastructure, where the vendor is responsible for both the operation and the maintenance of the software and for ensuring that the cloud-based infrastructure can deliver the required network performance. The customer pays for the service on a subscription-based or consumption-based model.
- Many vendors' definitions included parts of the definition above but occasionally missed an important aspect—for example, what the payment model looks like or that the solution should be managed by the vendor. The latter is an important aspect of this new way of providing core solutions given that the CSPs can classify the investment as opex rather than capex, and there is no upfront cost. Organizations, such as cable operators with no mobile telecoms skillsets or enterprises wanting a private network solution, could depend on core as SaaS for their 5G core to enter these markets.
- Managing and maintaining 5G core networks is complex and requires specialized skill sets. Yet not all CSPs will have the in-house resources to manage such complex teams and deliver on their KPIs. Even some of the well-known Tier 1 CSPs that have been on the journey for several years do not find the transformation trivial.
- NEC and Nokia have traditionally been the market leaders in this segment and scored the highest given their understanding of the concept and their trial engagements. These vendors, together with ZTE as the runners-up were followed closely by IPLOOK. Only Nokia, NEC, and ZTE claimed that they had deployed commercially, whereas both Nokia and NEC specified AWS as the cloud environment.

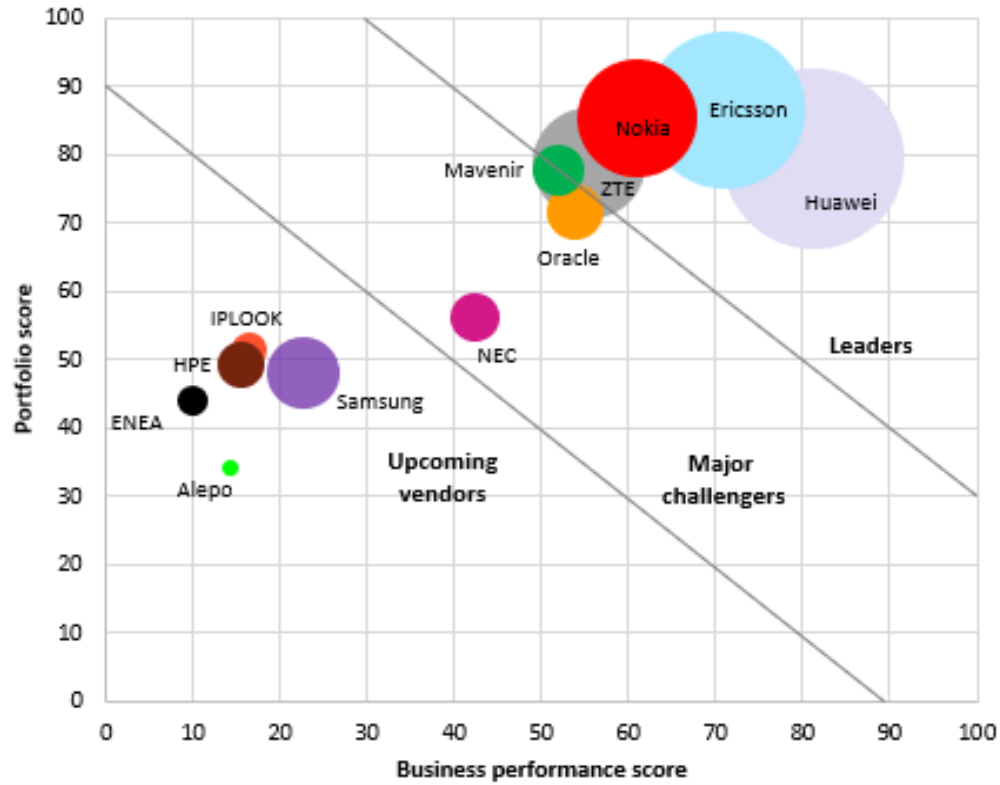
Policy and charging

- Policy and charging are two critical elements of CSP 5G monetization. 5G networks with a standalone core will offer a wide range of services beyond the traditional mobile broadband, available through 5G NSA architecture, where some of those will be delivered through network slicing. CSPs can acquire the NFs as separate components or as a combined converged charging systems (CCS) to support different services, customers, and metrics.
- Some of the questions in this segment related to the type of solution, the number of CSP customers where they had deployed their products, and how CSPs could purchase these, whether separately or as part of a bundle with other core network NF suites.
- Omdia's survey indicated that there were significant similarities between the solutions that the top vendors provided. Some of the differentiating factors, however, were about the ease of use, how the solutions were sold as part of a packet core suit, a CCS, or a dedicated offer as well as the number of live commercial deployments each had.
- Ericsson and Huawei obtained top scores for this category, with Mavenir and Nokia as the runner-up followed by NEC, Oracle, and ZTE.

Conclusion

Conclusion

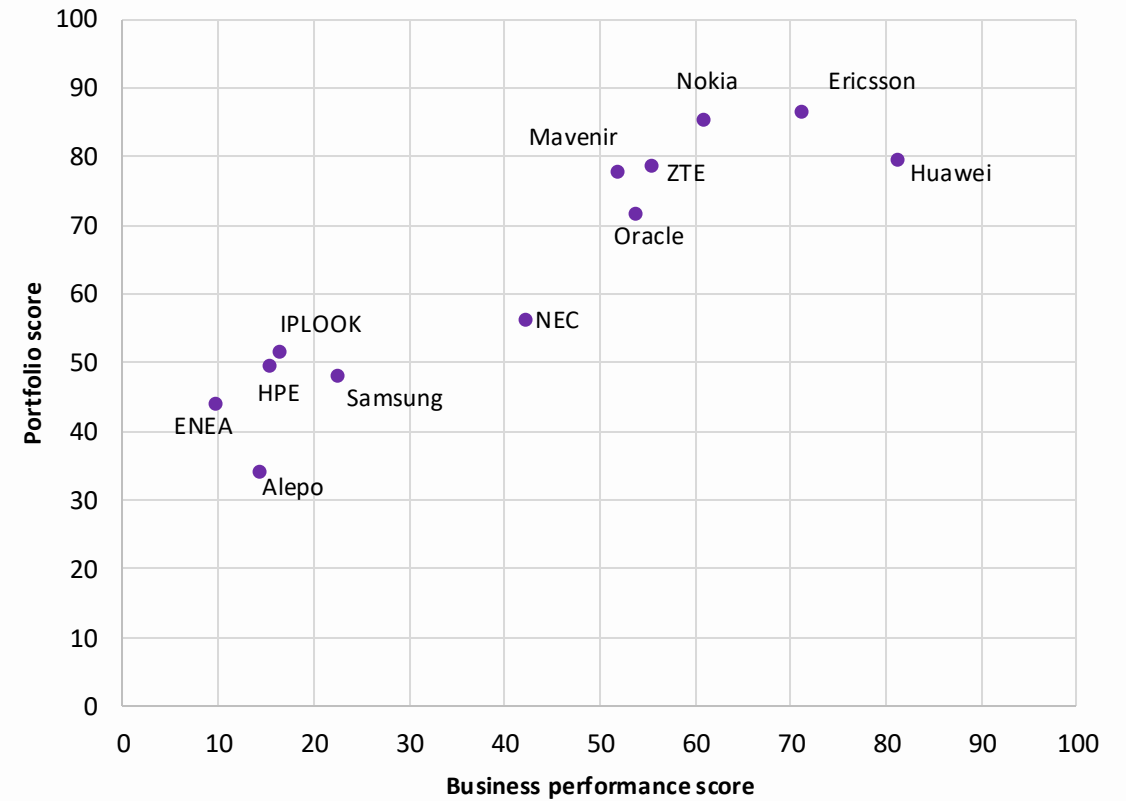
Overall core vendor positioning



Notes: Size of the bubble corresponds to the 2023 core revenue for each vendor.

Source: Omdia

Overall core vendor positioning (same-sized bubbles)



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Appendix

5GC and 4G EPC NFs

Network function	Description	4G equivalent
Access and mobility management function (AMF)	Supports the termination of nonaccess stratum (NAS) signaling, NAS ciphering, and integrity protection, registration management, connection management, mobility management, access authentication and authorization, and security context management.	Mobility management (MME)
Session management function (SMF)	Handles NAS for session management and interacts with the decoupled data plane by creating, updating, and removing protocol data unit (PDU) sessions and managing IP session context within the UPF.	Packet gateway for control plane (PGW-C)
User plane function (UPF)	Following on from the introduction of the control and user plane separation (CUPS), the UPF is an evolution of the 4G core PGW-U and will process and forward packet data so it can be distributed between the RAN and the wider data network.	Packet gateway for use plane (PGW-U)
Authentication server function (AUSF)	Used for device authentication and security processes between trusted 3GPP access and untrusted non-3GPP access. It stores authentication keys and provides AMF with the necessary authentication services.	New function
Network data analytics function (NWDAF)	Real-time monitoring and analytics of services, network-slice instances, and other core resources to provide insights as well as closed-loop automation.	New function
Charging function (CHF)	Supports online and offline charging features for multiple services, including 5G and 4G core integration.	New function
Policy control function (PCF)	This is an evolution from the 4G PCRF and supports a unified policy framework, such as providing policy rules to control-plane functions, and access to subscription information for policy decisions in UDR.	Policy and charging rules function (PCRF)

Source: Omdia

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5GC and 4G EPC NFs

Network function	Description	4G equivalent
Unified data repository (UDR)	A repository of subscriber information used to service other 5G core network functions, such as the PCF and UDM.	New function
Network exposure function (NEF)	This function did not exist in the 4G core; it supports exposure of capabilities and events, secure provision of information from external applications to the 3GPP network, and translation of internal/external information.	New function
Network repository function (NRF)	Provides a record of all network functions available on the platform, together with a profile of each and the services they support.	New function
Service communications proxy (SCP)	Introduced in 3GPP release 16, it is the central point that mediates high volume of control plane signaling and messages in real time, especially for the discovery requests sent to the NRF and other load balancing and traffic prioritization.	New function
Security edge protection proxy (SEPP)	A new security proxy between different operator networks, where all signaling traffic is expected to cross it. It provides authentication between SEPPs and enables filtering of incoming traffic from interconnect.	New function
Unified data management (UDM)	This provides a centralized way to process 5G user data. It also provides access authorization and registration.	Home subscriber services (HSS)
Application function (AF)	A similar function to the AF in 4G EPC. It retrieves resources through NEF and interacts with PCF for policy control.	New function
Network slice selection function (NSSF)	Designates network resources, such as the appropriate AMF, to different slices that deliver services to the end user devices.	New function

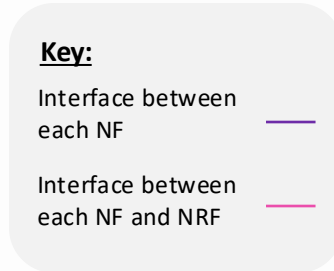
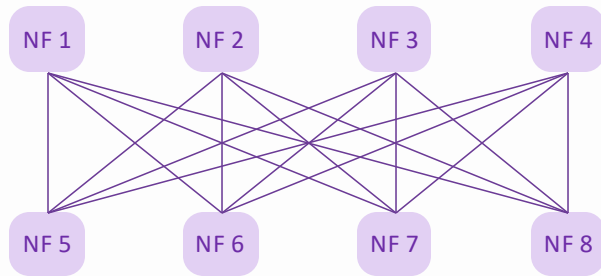
Source: Omdia

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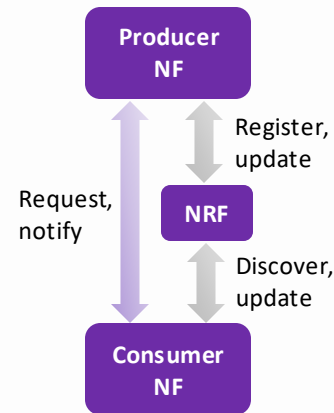
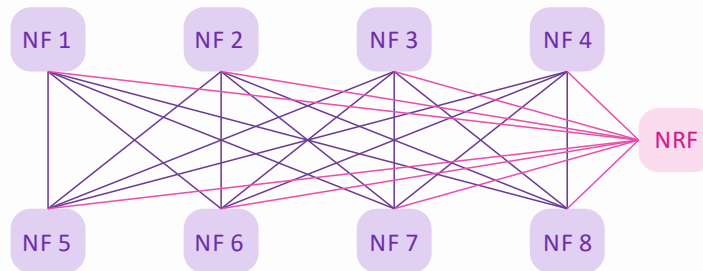
Without the SCP, CSPs' 5G core signaling will not benefit from the dynamic configuration and scalability that SBA can offer

5G signaling models A and B

(a) Signaling model A



(b) Signaling model B

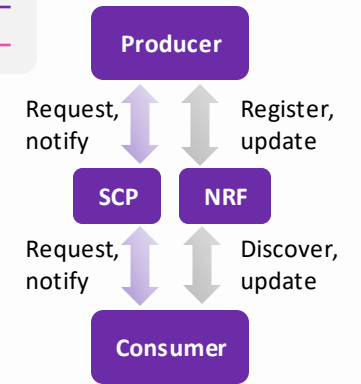
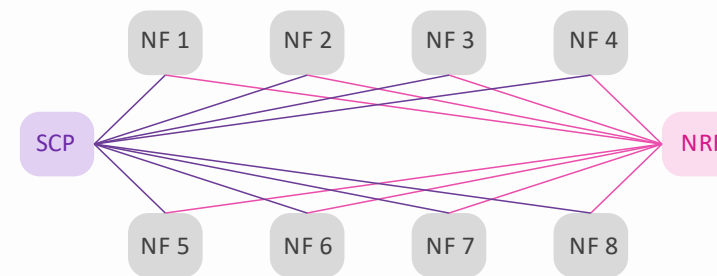
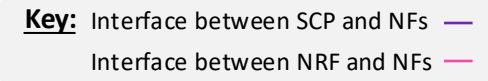


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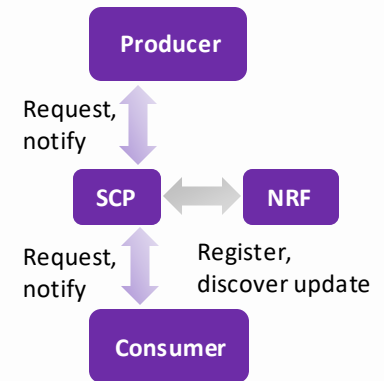
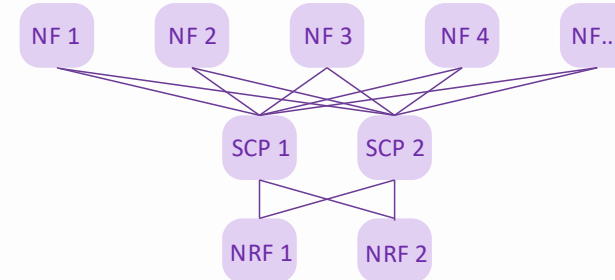
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5G signaling models C and D

(c) Signaling model C



(d) Signaling model D



Source: Omdia

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Appendix

Methodology

This report draws on extensive research with network operators, network vendors, and Omdia's tracker and data resources and forecasts.

Further reading

[Core Market Tracker – 1Q24 Analysis](#) (June 2024)

[Core Market Tracker – 1Q24 Data](#) (June 2024)

[Tech Trend: The Vendor Opportunity for 5G Core Network Functions Beyond Packet Core](#) (May 2024)

[Tech Trend: AI and ML for the Mobile Core Network](#) (March 2024)

[Is the Core Network the Winning Card in a Private 5G World?](#) (January 2024)

[Tech Trend: Voice for 5G Networks](#) (November 2023)

[2024 Trends to Watch: Core Networks](#) (October 2023)

[Service Providers Core Networks Survey - 2023 Extended version](#) (September 2023)

[New Business Models Are Key to Addressing the Challenges of 5G Core Development](#) (February 2023)

[Assessing MNOs' 5G Core Migration Strategies](#) (October 2022)

Author

Roberto Kompany, Principal Analyst, Mobile Infrastructure

askanalyst@omdia.com

Appendix

Omdia Consulting

We hope that this analysis will help you make informed and imaginative business decisions. If you have further requirements, Omdia's consulting team may be able to help you. For more information about Omdia's consulting capabilities, please contact us directly at consulting@omdia.com.

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Get in touch

Americas
customersuccess@omdia.com
08:00 – 18:00 GMT -5

Europe, Middle East & Africa
customersuccess@omdia.com
8:00 – 18:00 GMT

Asia Pacific
customersuccess@omdia.com
08:00 – 18:00 GMT + 8