

ABI RESEARCH COMPETITIVE RANKING

TELCO API PLATFORMS FOR INTERNAL EXPOSURE

NOKIA

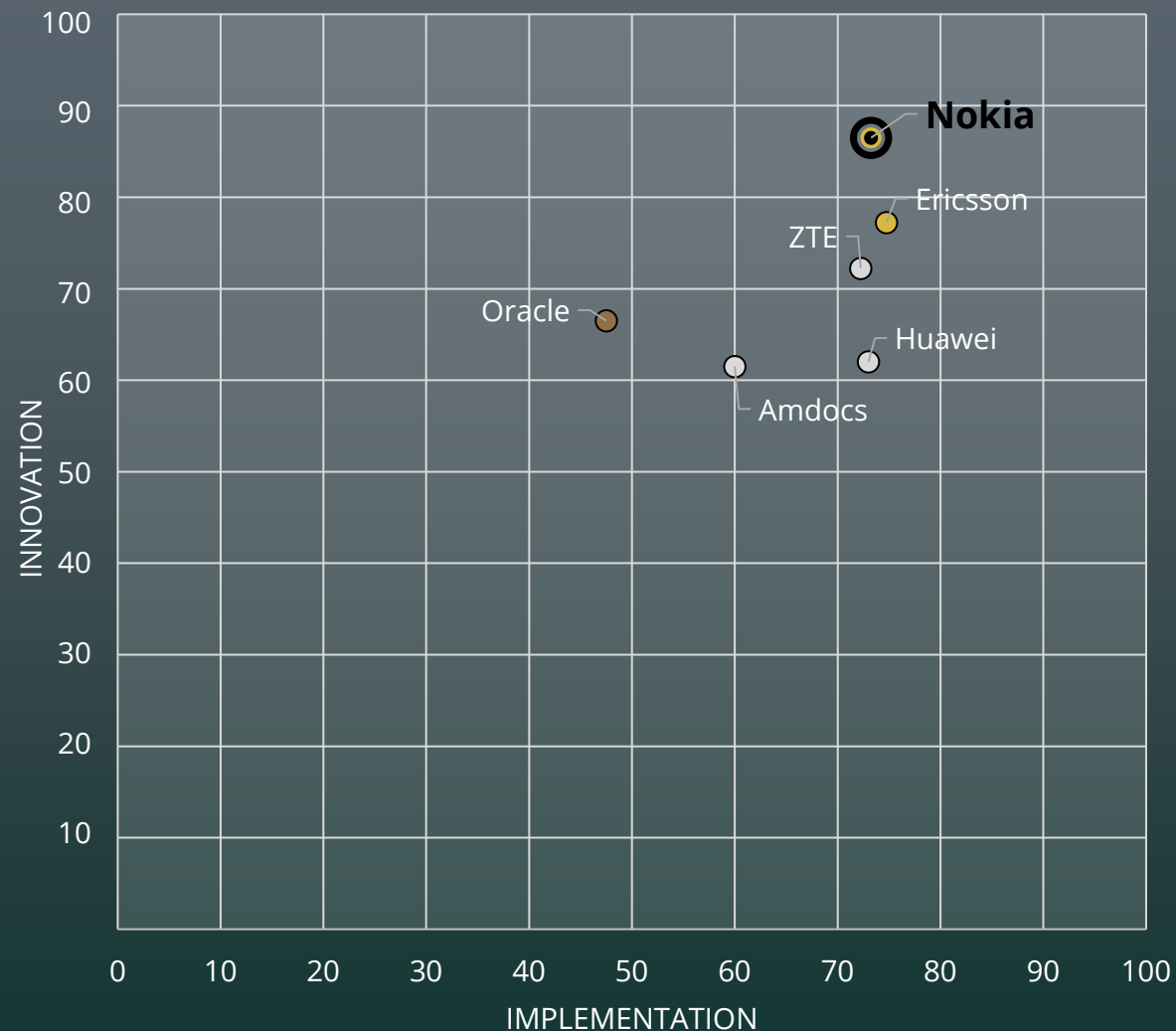


OVERALL: 80.1 | INNOVATION: 86.5 | IMPLEMENTATION: 73.3 | RANK: 1



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INNOVATION
VERSUS
IMPLEMENTATION
MATRIX



INNOVATION



**INNOVATION
SCORE: 86.5**



Nokia is a multinational telecommunications and technology company headquartered in Finland. It operates in more than 130 countries around the world, with more than 86,000 employees. The company's primary area of operation focuses on mobile, fixed Internet Protocol (IP) and optical networks, and cloud and network services, supported by Nokia Bell Labs.

Nokia excels at internal network API enablement. This starts from the features of the Network Exposure Function (NEF), through the Network Exposure Platform and API management layers, and finally to the Network as Code aggregator platform. Nokia's deep API portfolio offers more integration points across the telco stack than any other vendor, and these are architected to maximize customizability, while adhering to industry standards.

The Nokia NEF is multi-vendor and can be used for consolidating network resources across legacy and modern infrastructure, as well as between various vendor environments. On top of the Nokia NEF is an abstraction layer called the Service Mashup Layer, which intelligently and dynamically mediates between 3GPP standards (southbound) and CAMARA or TM Forum standards (northbound). This means that operators can create custom combinations of APIs and API components at high levels of abstraction (e.g., API management layer), and a transformation engine will carry out desired changes at the network protocol layer. Such mashups could be used for monetizing APIs, or to curate API offerings for desired industry verticals. Conversely, mashups may be used for network simplification, as when operators consolidate multiple APIs from different core functions into a simplified, distributable API.

Network Exposure Platform is the first industry implementation of the GSMA Operator Platform. In addition to offering native support for CAMARA, TM Forum, and GSMA Edge standards, Network Exposure Platform supports operator-specific APIs and offers customizable API functions within GSMA guidelines. Operators may quickly build interface adapters for standard or operator-specific APIs. This is all achieved through centralized API controls, reducing API management overhead.

In September 2023, Nokia launched its Network as Code platform and developer portal. The platform enables application developers and Communication Service Providers (CSPs) to accelerate production of software applications for new enterprise, industrial, and consumer use cases, monetizing 4G and 5G network assets. Through the developer portal, Nokia offers CAMARA's hallmark APIs (Quality on Demand (QoD), device location, connectivity status, number verification). Additionally, Nokia provides APIs for "specialized" networks, facilitating the logical separation of applications and devices from the public 5G network to guarantee stable connectivity. This is done, for instance, by network slicing and is supported through an API and Software Development Kit (SDK) for slice management and configuring devices. Other specialized APIs are available to retrieve network insights where developers can make their applications network-aware and responsive to real (or anticipated) network conditions.

Nokia's success in creating a cohesive network API portfolio that directly addresses operator needs for configurability and standardization, and internal exposure and external exposure earned it the position of Top Innovator.

IMPLEMENTATION



**IMPLEMENTATION
SCORE: 73.3**

Nokia currently has 27 partners in Europe, North and South America, and Asia that utilize its platform, including operators such as BT, DISH, Orange, Telefónica, and Telecom Argentina. Nokia's partnering expands well beyond the operator base to include hyperscalers like Google Cloud, CPaaS platform providers like Infobip, large system integrators, and vertical Independent Software Vendors (ISVs). Notably, Nokia is trusted by several of the most 5G-progressive Tier One operators in the Americas and Europe as evidenced by the meshed ecosystem concept; many of these CSPs and platform partners also connect to other aggregator platforms. Telefónica selected Nokia's NEF for API generation and Network as Code platform for opening up networks in Germany and Spain to develop new 5G SA use cases. Deutsche Telekom (DT) selected Nokia for its Quality-on-Demand (QoD) API and has pushed the limits of the QoD API through collaborative testing of Beyond-Visual-Line-of-Sight (BVLS) drones during flight in network-congested locations. Nokia also supports 5G SA greenfield operator DISH Wireless to improve network programmability with the Network as Code platform. Network API services for DISH include programmability for network slicing, QoD, and edge cloud, as well as subscriber and device status and billing. DISH also testifies to Nokia's support with API simplification on its cloud-native 5G network, reducing from hundreds of APIs so that developers can easily select APIs based on service intent.

Operators focusing on enterprises will find Nokia's extensive enterprise footprint, amassed through its private wireless offering, supporting its alignment with enterprise use cases, skill sets, and in-house demands. For enterprise developers, Network as Code presents a viable aggregation point for gaining access to the capabilities of private and public networks. Enterprises may further benefit from the close integration of Nokia API platforms with network connectivity and business application platforms.

Alignment with enterprise demands occurs at the level of platform integration, including API mashup and configuration, but not API design. For Nokia, APIs represent network capabilities, rather than enterprise capabilities. As network capabilities, the value of individual APIs extend across industry verticals and enterprise use cases. Moreover, Nokia APIs express network capabilities through API standards. So, while operators' Business-to-Business-to-Business (B2B2B) commercialization may benefit from configurability provided by the NEF and Network Exposure Platform, it is not at the exclusion of commercial aggregation or Business-to-Business-to-Consumer (B2B2C). This is still made possible by adherence to standards and integration with the Network as Code platform.

Nokia holds a close collaborative partnership with Google Cloud for network APIs. However, it is noteworthy that Nokia follows a policy of impartiality across public cloud providers, giving operators freedom to select their preferred hyperscaler partner.

A photograph of a telecommunications rooftop. In the foreground and middle ground, there are several tall metal towers and structures supporting various antennas, including vertical arrays and circular satellite dishes. Some of the equipment is mounted on cylindrical metal bases. The background shows a vast landscape under a sky with soft, orange-tinted clouds, suggesting a sunset or sunrise. The overall scene is a technical and industrial setting.

CRITERIA AND METHODOLOGY



VENDOR MATRIX

Methodology: After individual scores are established for innovation and implementation, an overall company score is established using the Root Mean Square (RMS) method:

$$\text{Score} = \sqrt{\frac{\text{innovation}^2 + \text{implementation}^2}{2}}$$

The resulting overall scores are then ranked and used for percentile comparisons.

The RMS method, in comparison with a straight summation or average of individual innovation and implementation values, rewards companies for standout performances.

For example, using this method, a company with an innovation score of nine and an implementation score of one would score considerably higher than a company with a score of five in both areas, despite the mean score being the same. ABI Research believes that this is appropriate as the goal of these matrices is to highlight those companies that stand out from the others.

RANKING CRITERIA

Leader: A company that receives a score of **75 or above** for its overall ranking

Mainstream: A company that receives scores **between 60 and 75** for its overall ranking

Follower: A company that receives a score of **60 or below** for its overall ranking

Innovation Leader: A company that receives a score of **75 or above** for its innovation ranking.

Implementation Leader: A company that receives a score of **75 or above** for its implementation ranking.



INNOVATION CRITERIA

Network API Portfolio: Network APIs are increasingly standardized through the CAMARA project, an open API initiative founded by a consortium of operators and vendors. CAMARA defines common network API features, such as network slice management, Subscriber Identity Module (SIM) swap detection, and API access controls. Open standards help to build developer expectations and knowledge, and support API interoperability. However, some vendors will exceed CAMARA standards to create highly competitive network API products. There are two broad types of network APIs assessed for this report:

Connectivity and Network Management APIs: Network APIs are integrated with the 5G Core, providing critical capabilities for managing and optimizing connectivity and network services. While they can access metadata about the network, such as device statuses and data flows, they are most impactful when used as tools that directly control and orchestrate network resources. Network APIs enable the management of network slices, Quality of Service (QoS) parameters (including latency and bandwidth allocation), dynamic load balancing, and network topology discovery and configuration. This ensures that the network is meeting the needs of specific applications and services. This is especially important as 5G expands the use of mobile connectivity to new, demanding applications.

Device and Subscriber Management APIs: Telco applications often require insights into subscriber and device activity on a network. Network APIs facilitate this by enabling functionalities such as number verification, SIM swap detection, and device connectivity status retrieval. These capabilities are crucial for use cases like fraud detection, ensuring data privacy, and maintaining network security. An effective API in this domain will retrieve and deliver this information reliably and quickly, allowing applications to act on real-time data.

We value the overall network API portfolio at 25% of the total innovation score.

Network API Platform(s) Internal Performance: More than the APIs offered, vendors contribute value through network exposure, API mediation and management, and preparation for external exposure. These services are facilitated through internal application platforms for network and service APIs. These platforms vary in how they manage API capabilities, extend API functionality with adjacent applications internal to the vendor application ecosystem, and their levels of abstraction from the network to allow varying degrees of interaction with it, including interaction based on business logic or service-intent.



INNOVATION CRITERIA

While ABI Research considers service API platforms, we assess them for internal and vendor partner integrations, e.g., BSS/OSS operations; we do not assess open gateways or service API platforms in their capacity as open developer portals for network service. **We value the network API platform at 45% of the total innovation score.**

API and API Platform Customizability: While APIs are increasingly standardized, vendors may enrich with additional parameters or integrate with third-party tools. For example, network APIs might specify how telemetry data are reported (e.g., frequency, scope, and information included). Mission-critical applications for industrial automation might benefit from frequent, highly detailed reporting, whereas for gaming, network APIs might only need to report occasionally on relevant measures like latency. In such a way, network API parameterization may support customizability, while still aligning with industry standards. Likewise, API platforms may support customizability through API management, as when APIs or API components are permuted or bundled according to operator needs. **We value this criterion at 15% of the total innovation score.**

Security and Network Access Management: Operators require assurance that network exposure will not increase security vulnerabilities or invite improper use of their network. APIs must be secured to ensure that only permitted users have access and that access is limited to what is allowed by the mobile operator. Security innovation may include advances with Role-Based Access Control (RBAC), authentication, or policy enforcement. Additionally, innovative network APIs will dynamically adapt rate limits and API-request quotas based on network conditions and user behavior. **We value this criterion at 10% of the total innovation score.**

Ongoing Research and Development (R&D): The network API market is still in its early stages. In addition to evaluating existing innovations in network API products and services, we also consider vendors' plans and progress in developing new technologies for network APIs. **We value this criterion at 5% of the total innovation score.**



IMPLEMENTATION CRITERIA

Commercial Reach and Impact: We assess to what extent vendors have supported operators through internal network API exposure and enablement. This often involves a wide range of factors beyond the advancement of the network API portfolio, such as the level of 5G progress and readiness of operator partners for exposure, as well as operators' distinctive requirements for internal exposure given how (and by whom) applications are seamed together within their stack. Amid all these factors, commercial reach and impact provides an overall indication of the experience of the network vendor with these services and the market attractiveness of their network API product. **We value this criterion at 40% of the implementation score.**

Market Alignment and Readiness: Vendors may design network APIs for enterprises' use within controlled environments or private networks, or they may prepare for a wider public distribution. The intended deployment scope will require alignment with the network API technology: commercial and enterprise deployments come with different requirements for API abstraction, standardization, and security. We consider the intended deployment scope and the alignment of the technology to this deployment type. **We value this criterion at 15% of the implementation score.**

Monetization Enablement: Network API monetization is a critical priority for mobile operators. As part of their network API solutions, vendors must integrate BSSs that allow operators flexibility in how network API usage is charged (e.g., subscription or use-based charging), 2) streamline paid access by developer customers, and 3) enable revenue sharing or settlement for multiple parties. We assess how such systems are integrated with the network API functionality. **We value this criterion at 25% of the implementation score.**

Go-to-Market Strategies and Commercial Partnerships: The network API market is fragmented, and strategic collaborations will boost implementation for network APIs. Specifically, vendors with enterprise footprint, highly competitive 5G Standalone (SA) market conditions, or possessing API-related or adaptable assets (Communications Platform-as-a-Service (CPaaS)) may leverage these circumstances into dominant market positions with operators. We assess vendors' commercial engagements and their enablement for market reach. **We value this criterion at 10% of the implementation score.**



IMPLEMENTATION CRITERIA

Accessibility and Interoperability: Regardless of whether operators or developers are consuming the network APIs, network abstraction should afford consumers an easier, streamlined way of interacting with network resources. It should increase accessibility by allowing consumers to operate at the level of business logic or service intent without requiring the special knowledge of network protocols. Successful implementation will make network API usage intuitive and consistent with expectations. Accessibility may also involve adhering to API standards, which supports interoperability of the network with various third-party applications consumed internally. **We value this criterion at 10% of the implementation score.**



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