

ABI RESEARCH COMPETITIVE RANKING
OPEN RAN PLATFORMS

NEC



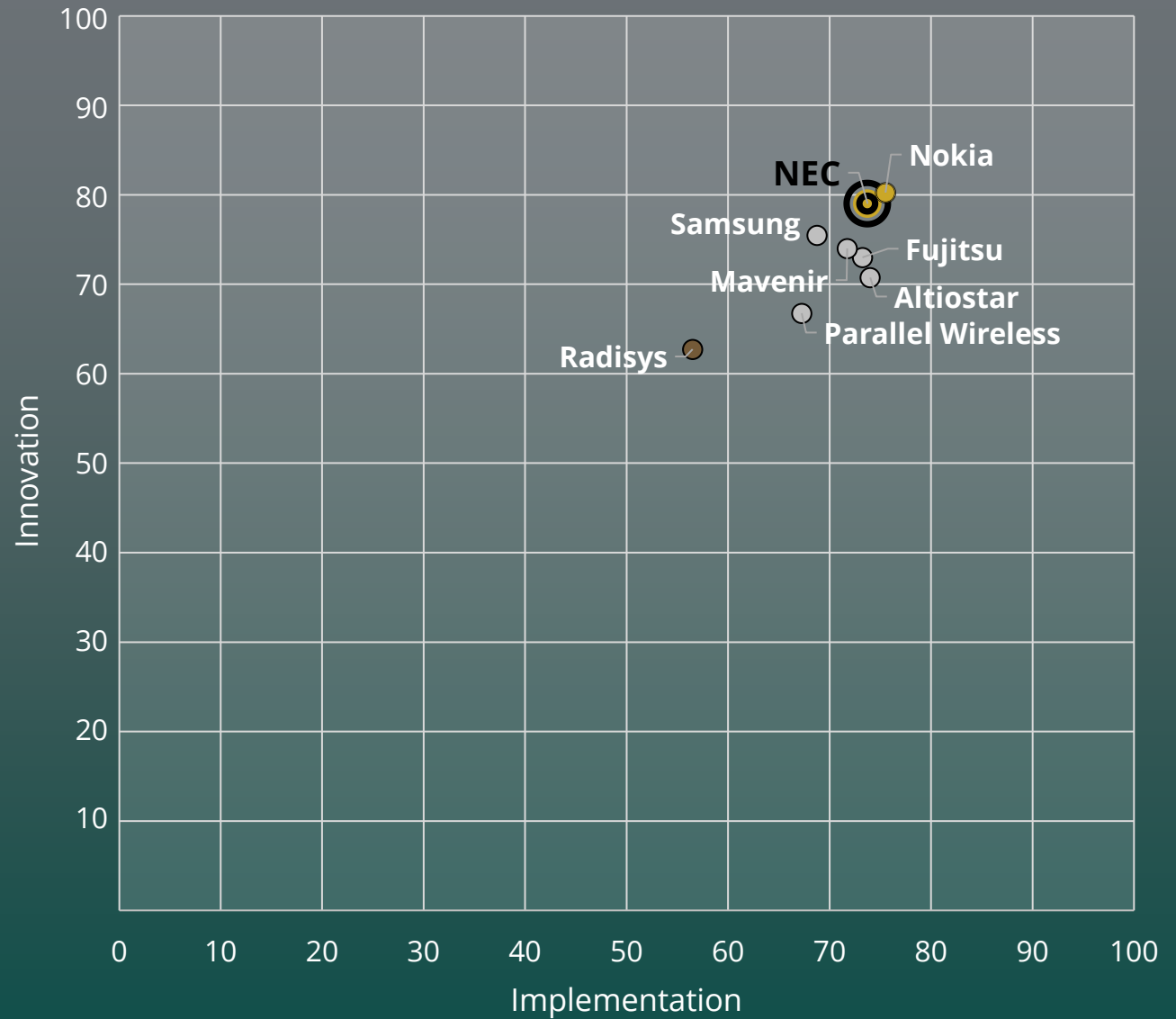
OVERALL: 76.4 | INNOVATION: 79.0 | IMPLEMENTATION: 73.8 | RANK: 2

NEC



NEC
INNOVATION
VERSUS
IMPLEMENTATION
FOCUS

OVERALL: 76.4 | INNOVATION: 79.0 | IMPLEMENTATION: 73.8 | RANK: 2



INNOVATION

NEC



**INNOVATION
SCORE: 79.0**

NEC Corporation is a multinational Information Technology (IT) and network technologies firm based in Japan. Established in 1899, the company has expanded into a multinational corporation with more than 110 thousands employees and more than 300 consolidated subsidiaries. Network Service is one of NEC Corporation's business units which provides solutions to mobile network operators, as well as other enterprise users of network equipment.

NEC's Product Portfolio criterion obtained a great 8.5 points out of 10. NEC's Open RAN product portfolio includes O-RAN compliant radio unit which includes mmWave small cell, sub-6 GHz Massive MIMO, and remote radio units. Netcracker, a wholly-owned subsidiary of NEC, provides NEC with the automation and orchestration solutions across different domains (i.e., RAN, Transport, and Core). The subsidiary, along with NEC, has also collaborated with NTT DOCOMO to advance the development of Non-Real-Time RIC aiming to reduce the operational cost and enhance network performance. Additionally, NEC has started the development near Real-Time RIC to predict and dynamically control networks required for industrial applications. NEC also has the added advantage of being a system integrator which is crucial to operationalize the system with disaggregated technologies within the RAN in the 5G era. At last, NEC has deployed and launched a 5G SA core that is completely cloud native in Rakuten mobile and NTT DOCOMO's networks. It has been also deployed on AWS and is used for over a dozen private networks. It is expected that this product will be a fully converged 4G /5G core in 2022 and available in all markets.

In terms of Standardization, NEC scored a good 7.0 points out of 10. NEC is one of the key contributors in the O-RAN ALLIANCE since its initial establishment. The company is also present in other key advocacy and standards organizations such as 3GPP, Open Networking Foundation, Open Network Automation Platform (ONAP), Next G Alliance, and Telecom Infra Project (TIP), among others.

NEC scored a great 8.0 points for its Network Performance criterion. NEC's performance for its Massive MIMO has been cheered upon and selected by Open RAN's top advocate, Vodafone Group, Telefonica Group, and Deutsche Telekom Group. In addition, NEC's Massive MIMO products are the first in kind to have received TIP's Requirements Compliant Ribbon. These products have to go through TIP's Test and Validation framework. NEC has also been present in trials and deployments with multiple other vendors of the Open RAN ecosystem. While the exact performance result could not be verified, NEC's presence showcases its ability within a multi-vendors environment as demonstrated in the O-RAN Global Plugfest 2021. NEC's Open RAN m-MIMO radio units have been tested and deployed with most ORAN software (CU/DU) vendors in the industry.

¹Based on exchange rate 1 Japanese Yen = 0.009 USD

INNOVATION

NEC



**INNOVATION
SCORE: 79.0**

In terms of Essential IP and R&D Investment criterion, NEC scored a 7.5 points out of 10. NEC's R&D centers are located in seven countries, including the Global Open RAN Center of Excellence in the United Kingdom (UK). For the financial year 2021 (i.e., April 2020 through March 2021), NEC invested in total US\$1.03 billion¹ (114.6 billion yen) in research and development across all business units. Based on preliminary estimates, NEC has about 300 5G related patents.

The company scored a great 8.0 points out of 10 for its Brownfield Related criterion. NEC is prominent among brownfield network deployments around the world for Open RAN. Mobile Network Operators such as Vodafone UK, Telefonica Group (in Spain, Germany, UK, and Brazil), and Deutsche Telekom DE have all employed NEC's Open RAN solutions. Domestically, NEC is also a close partner for NTT DOCOMO, who aims to further advance the deployment of Open RAN in 2022.

¹Based on exchange rate 1 Japanese Yen = 0.009 USD

IMPLEMENTATION

NEC

**IMPLEMENTATION
SCORE: 73.8**

For Major Deployments and Trials, NEC scored a good 7.0 points out of 10. NEC is involved in at least eleven of such initiatives with Mobile Network Operators. Aside from Rakuten Mobile's fully virtualized cloud-native network and the above-mentioned Mobile Network Operators, NEC has also announced prior of its trial with VodafoneZiggo and the UK-government-led 'NeutrORAN' Project, a neutral host solution using Open RAN ecosystem.

NEC scored a great 8.0 for its Financial and Organizational Health criterion. NEC's annual revenue reported for financial year 2021 (April 2020 to March 2021) is US\$26.95 billion (2,994 billion yen). The Network Services Business unit represents about 18% of NEC's total annual revenue, coming in at about US\$4.85 billion (538.8 billion yen), an increase of about US\$500 million (56.1 billion yen) from the previous financial year. Operating profit margin for NEC's Network Services Business unit is about 7%, which places it among in second position in terms of operating profit margin.

In terms of Regional Coverage criterion, NEC scored a great 8.0 points out of 10. As a well-established and multinational corporation, NEC is well positioned globally with its sales offices. NEC is reported to be present in more than fifty countries around the world, providing the company with vital information of the countries' and regions' demands.

The company scored a great 7.5 points out of 10 for its Business Models criterion. A key advantage which NEC has is its capability as a system integrator as well as product and solution provider to meet the demand for the Mobile Network Operators. For instance, NEC has played the role of solution provider in Vodafone UK's deployment, while taking on a more dominant system integrator role in Telefonica's deployment. This showcases the vendor's flexibility to operate and work within a multivendor, interoperable environment.

NEC scored a 6.5 points out of 10 for its Partnerships criterion. NEC partners closely with leading Japanese operators NTT group and Rakuten Mobile which extend to global partnerships. NEC also has been expanding on its ecosystem of partners such as AltioStar, AWS, Cisco, Dell, Red Hat, among others. Additionally, NEC and Fujitsu both are partners with Japanese Mobile Network Operators NTT DoCoMo and Rakuten Mobile. NEC and Fujitsu also have established collaboration for Open RAN interoperability testing for 5G in their respective labs in the UK and USA. Other partners of NEC include Xilinx with for its 5G Radio Units, Microelectronics Technology for collaboration for Open RAN radio solutions, and Qualcomm for 5G open and virtualized distributed unit (DU).



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 their overall ranking

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

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

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

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

INNOVATION CRITERIA

Product Portfolio: The wide range of product portfolios can offer customers a great opportunity to deploy bespoke network solutions to meet specific connectivity needs. Meanwhile, it can also prove the vendor's capability to do innovative research and product development. This criterion measures RAN related solutions, including RAN Intelligent Controllers (RIC).

Standardization and Multi-Vendor Interoperability: Standardization can help broaden network deployments. It is the process of forming a consensus from different parties and creating a universal solution for the community. The company that makes influences on standards indicates its capability to drive innovation and lead development trends. Moreover, multi-vendor interoperability can also be used to evaluate how robust and flexible the vendor's solutions are, therefore offering CSPs innovative network architecture with high flexibility and sustainability. Vendor present in more standards-setting organizations and/or Open RAN related associations/groups will score higher.

Network Performance: The ability of the vendor to support the use of critical technology of the generation, for example, Massive Multiple Input Multiple Output (MIMO) for Open RAN. Vendors who can offer support for Massive MIMO or supply Massive MIMO will be able to meet the higher network performance requirement of mobile operators. A vendor which can provide both a Massive MIMO product and support other vendors' Massive MIMO product will obtain a higher score.

Essential IP and R&D Investment: This criterion counts for the number of IP contributions to cellular technologies, which can also be linked with R&D investment for innovation and transferred to Open RAN development. The larger the number of IP and R&D investment, the higher the score.

Brownfield Related Solutions: Considering Open RAN deployment in brownfield scenarios, the compatibility with existing infrastructure indicates the vendor's capability to provide CSPs with more flexible network deployment strategies and help expand its global footprints. Vendors with more brownfield deployments will score higher.

IMPLEMENTATION CRITERIA

Major Deployments and Trials: The size of deployment and/or trial projects which the vendor has reflects its Open RAN activities and the success of the business. The more operators a vendor works with the better the scoring for the vendor.

Financial and Organizational Health: This criterion shows the company's financial strength to run business and capability to fund internal operations and R&D for Open RAN. Vendor is assessed through its financial metrics (e.g., annual revenue, operating profits).

Regional Coverage: The vendor with a global footprint indicates its better understanding of regional-specific network deployment requirements. The accumulated experience can also help the company position itself well towards business sustainability and robustness.

Business Models: More dynamic and agile business models can help the company be well-positioned in the market for profitability and reduce time to market. Vendors who have the capability to deliver hardware, software, and management services will score higher in this criterion.

Partnership: The capability to deploy multi-vendor interoperable end-to-end network solutions to meet CSPs' requirements can help the company position itself in the marketplace. This requires the company to have a strong vendor partnership for comprehensive product/service provisioning. This criterion assesses the number of partners and business relations a vendor has.



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