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The Case for Open RAN

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SYNOPSIS

Mobile telephony networks are considered critical infrastructure as we rely on them for the bulk of our communications. Due to market consolidation, the number of large traditional mobile telephony network equipment vendors has unfortunately shrunk to a handful. Open RAN (O-RAN) is an initiative that advocates interoperable radio access network (RAN) equipment for mobile telephony networks. With O-RAN, mobile network operators (MNOs) can use RAN equipment from multiple vendors interchangeably, which will allow for greater flexibility and the entry of newer and smaller players. It has been speculated that the strong support that the US government has for O-RAN is purely because O-RAN would allow for less reliance on Chinese vendors. However, given that O-RAN has received support from multiple other countries, including China, there are clearly other cost-related and inherent network architecture advantages in driving this initiative.

COMMENTARY

Traditional RAN used in mobile telecommunications networks are based on proprietary hardware and software from the world's telecom infrastructure vendors. Although based on globally agreed telecommunications standards, the hardware and software that MNOs use in their RAN in a single geographical area are usually provided by a single vendor, and there is limited interoperability with other vendors' equipment. Simply put, MNOs cannot mix and match equipment from different vendors because they do not use commercial off-the-shelf (COTS) hardware.

O-RAN architecture, however, as the name suggests, is open and interoperable. As long as the vendors comply with O-RAN standards, MNOs can use radio network equipment from multiple vendors that can theoretically work together seamlessly in their networks.

The main objectives of O-RAN are to promote vendor diversity, reduce costs, and increase innovation in the RAN market. By creating an open ecosystem, O-RAN aims to encourage competition and enable operators to select the most secure and cost-effective equipment from multiple vendors.

Inherent Challenges in O-RAN

Multi-vendor interoperability and security are two of the biggest challenges O-RAN faces. Since O-RAN works on the principle of open interfaces and disaggregated environment i.e., components from different vendors, MNOs face the challenge of ensuring the different components are compatible with each other. Hence, heavy duty and regular testing is required, which can incur high costs.

Global Support for O-RAN

The [O-RAN Alliance](#) is global industry group consisting of MNOs, telecom infrastructure vendors, and Institutes of Higher Learning (IHLs) tasked with the mission to transform traditional RAN to be one based on open standards and fully interoperable between different vendors.

The biggest supporters of O-RAN are currently the United States, the United Kingdom, Japan, and China.

Chinese MNOs have been avid supporters of the O-RAN Alliance. China Mobile, the world's largest MNO, is one of the founding members of the alliance. Out of the 11 working groups and 6 research groups, more than half are co-chaired by experts from China Mobile.

Unlike the Western vendors, the two dominant Chinese mobile network infrastructure vendors, Huawei and ZTE, are not actively involved in the O-RAN Alliance. This is likely because they want to protect their current strong market advantage and large equipment footprint in developing countries.

The US government is one of O-RAN's most ardent supporters for two reasons: vendor diversity and military usage. With the sale of US-origin mobile network vendors such as Motorola and Alcatel-Lucent to Nokia, the United States has been left bereft of a credible domestic mobile infrastructure vendor. Out of the four largest vendors in the world, two are from China. However, the United States, along with more than 20 other countries, have banned or heavily restricted the use of Chinese vendors in their nations' mobile networks. Additionally, due to the Ukraine war, it has been speculated that the remaining two vendors, Nokia and Ericsson, which are based in countries in close proximity to Russia (Sweden and Finland), are at risk. All this leaves the United States with a very limited selection of reliable mobile infrastructure vendors, hence the need for vendor diversity.

The US Department of Defense (DoD) currently spends billions on defense-related communications that is not based on COTS i.e., proprietary equipment. They are thus keen to see if there can be more deployment of COTS telco equipment with limited modifications for defense purposes to reduce costs of deployment.

The FutureG & 5G Office under the US DoD launched the [2023 5G Challenge](#), a competition to spur interest and motivation in the validation of O-RAN architecture. As defense forces are traditionally heavy investors in communications services for military purposes, the DoD's main motivation is to bring down the costs of their private 5G and other telecommunications networks for defense purposes.

In May this year, the US National Telecommunications and Information Administration (NTIA) announced a [US\\$1.5 billion grant programme](#) to promote O-RAN, specifically for R&D, testing, and evaluation of trial networks.

The UK government has also long stated support for O-RAN, with a focus on [5G Supply Chain Diversification](#). Multiple funds and competitions have been set up to promote research and development opportunities to spur further work in this area.

In December 2022, the UK, Australian, Canadian, and US governments put out a [joint statement](#) on telecommunications supplier diversity, where they outlined four principles for O-RAN, specifically *open disaggregation* which allows RAN elements to be sourced from multiple vendors, *standards-based compliance* and *demonstrated interoperability* which will ensure that elements from different vendors can work together well, and *implementation neutrality* which would allow some degree of freedom for vendors to innovate.

O-RAN in Singapore

Singapore also supports O-RAN. O-RAN Open Testing and Integration Centre (OTIC) centres have been set up around the world to work on speeding up integration testing and O-RAN commercial deployment. Singapore is currently hosting [South-East Asia's first OTIC](#) at the Singapore University of Technology and Design (SUTD). This OTIC is funded by the Singapore government via the Infocomm Media Development Authority (IMDA) and will focus on security, sustainability, and applications.

Going Forward

Given the importance of mobile telephony networks to the nation's economy and security, Singapore would do well to further support O-RAN for several reasons. Firstly, O-RAN will provide a more resilient and secure wireless supply chain by introducing vendor diversity as Singapore currently relies on only two major vendors. Secondly, O-RAN's cost-saving efficiency offers a good alternative to the high capital and operating expenses (CAPEX and OPEX) that are incurred when building and running mobile telephony networks in Singapore. As interoperability testing and integration are very resource-heavy, the OTIC in Singapore can focus more on these areas of development to make a stronger business case for Singapore MNOs to deploy O-RAN. Thirdly, O-RAN can be considered for deployment in defense-related and other sensitive communications in Singapore to reduce the CAPEX and OPEX of private mobile telephony networks.

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