RAN Vendor Update 2019

Market leadership has more than one meaning
Summary

In brief

Five vendors essentially control the RAN equipment market. Their combined market share was 99% in 2018. Of those five, three generated 80% of market revenue. With so much share concentrated among few vendors and limited overall market growth, each vendor works to be perceived as a market leader. Measuring leadership in this market has its challenges as making head-to-head comparisons and even interpreting the results can be tricky.

Ovum view

- **RAN vendors are once again in a period of growth, but that growth will be short-lived with revenue peaking in 2020.** Yes, 5G uptake rate appears to be on track to exceed that of LTE, but that also means peak market investments will happen sooner with 5G than they did with LTE.
- **Huawei retained the top spot for RAN revenue in 2018,** showing that in many markets the vendor remains resilient against US-led political pressures. However, this does not mean the company is immune from those political pressures and their impact on the vendor's future growth.
- **Many market leadership measures are merely marketing tools.** The metrics used to measure vendor leadership often lack clear meaning with each vendor presenting their results in a way that best suits them.
- **There really is no one overall market leader as not every vendor plays in the same market or has the same strategy.** The best-performing 5G network solution or shipping the most 5G radios does not by itself make a market leader. Intangibles such as vendor relationships and reputations play an important role.

Recommendations

- **Vendors should avoid using hyperbole or market puffery in describing their success.** Overinflated claims damage a company's reputation. A company is better served by providing a realistic assessment of its achievements versus trying to twist market results to appear as though it has achieved more than it really has.
- **Operators should focus on vendor 5G development roadmaps, not just current performance.** 5G remains a new technology. Given the variety of 5G markets and their different deployment requirements, not all vendors can be expected to have given equal weight to the same areas of early 5G development. This potentially leads to vendor performance discrepancies and makes the focus on development roadmaps an important factor in arriving at an understanding of any apparent portfolio shortcomings and when those shortcomings will be addressed.
- **Vendors need to continue to leverage LTE to gain 5G business.** Just as important as winning 5G business is winning LTE refresh opportunities. With network solutions that allow for software upgrade from LTE to 5G, winning an operator's LTE business greatly increases a vendor's chance of winning at least a portion of that operator's future 5G network.
RAN market overview

What does RAN include?

The radio access network (RAN) as covered by Ovum includes macro base stations, small cells both indoor and outdoor, radio controllers, and small cell gateways. RAN only covers the access part of the market. Base station fronthaul, backhaul, and packet core are not part of RAN, but are covered in other areas of Ovum research.

Revenue growth returns and will stay for a few years

2018 was a good year for RAN vendors as the overall market grew versus the previous calendar year. Ovum believes this trend of year-over-year growth will continue until 2022. Both LTE and 5G will be catalysts for this growth.

LTE investments continue to be substantial. Plenty of markets are still in transition from 2G/3G to 4G. Lower costs and greater availability of LTE gear and devices are making this possible. Even operators who have had commercial LTE services for many years continue to invest in LTE.

The need for more network capacity and coverage continues to drive 4G investments. LTE users will be the majority of mobile broadband subscribers for many years and their consumption of data does not appear to be subsiding. This requires operators to increase 4G capacity. Better coverage also remains a driver in LTE investments. Coverage is important for a robust VoLTE offering and 5G standalone will use VoLTE for voice fallback in areas where 5G voice is not available. Operators will also want to improve LTE coverage in areas where there is no 5G to help ensure a high quality of service. 5G appears to be ushering in LTE network refreshes.

Figure 1 shows Ovum’s forecast for revenue from the sales of RAN equipment for 2017 through 2024.

**Figure 1: Revenue from sales of RAN equipment ($m), 2017–24**

Source: Ovum
Ovum currently forecasts that the market will peak in 2022, mainly driven by 5G investments in China. China Mobile has already said it expects its major 5G investments to conclude by the end of that year, and since China accounts for around 20% of the market's annual spend, a decline in spending in China has significant impact on the entire market's outlook. The second largest market, North America, is also expected to decline after 2022.

**Different metrics to measure market leadership**

**Market share is one measure of leadership**

Market share provides one way of measuring market leadership. But there are some caveats to basing leadership totally on market share. First, one must decide what to measure: shipments or revenue. Another consideration is how market share fits into a vendor’s strategy. Some vendors might be willing to sacrifice short-term profit margin to gain share; winning business based on price. Other vendors may be willing to sacrifice share in order to maintain margins. While other vendors may have a narrow customer target profile and have no interest in share at all.

Market share does show a company’s ability to scale its business and its effectiveness at gaining operator contracts. The results are not entirely an endorsement of the technical or performance capability of any single vendor's network solutions. Market share can reflect other elements like aggressive vendor financing, regional favoritism, operator service capabilities, and previously established relationships.

For 2018, Huawei maintained its number one position for share of total RAN revenue. This share includes sales of all 2G, 3G, 4G, and 5G macro, small cells, and associated gateways and radio controllers.

**Figure 2: RAN market share for 2018**

![Market share chart](chart.png)

Source: Ovum

2018 rankings are the same as 2017 rankings, but there was some change in percent of market share. Of the three largest vendors, only Ericsson grew its market share in 2018, increasing it by half
a percentage point. Huawei’s declined by one-tenth of a percent while Nokia’s decreased by two-tenths of a percent. Neither decline is that notable as shifting between a few tenths of a percent a year is not unusual. Changes in share for ZTE and Samsung were much more pronounced.

ZTE’s share in 2018 declined an entire two percentage points, going from 12.5% in 2017 to 10.5% in 2018. Extraordinary circumstances drove this decline. The US government ban in 2018 essentially shut down the company for an entire quarter. It speaks to the vendor’s resiliency that its share decline was limited to only two percentage points. Indications are that the company has rebounded and 2019 looks better as domestic Chinese operators are expected to award 5G NR (new radio) contracts before end-2019. ZTE, along with Huawei, is expected to get the largest share of those contracts.

Samsung had the largest percent of share increase for 2018 with 2.1%. The company’s revenue growth continues to come from its LTE rollout in India along with several high-profile 5G wins in its home market of South Korea, and the US.

Vendor market position provides another measure of leadership

Ovum’s vendor market positioning puts RAN vendors into three categories, market leaders, market challengers, and niche RAN vendors. The placement of RAN vendors in those three categories is based on two criteria. The first is the breadth of portfolio and services. For portfolio, Ovum considers more than just RAN portfolio. Routing and transport capabilities for fronthaul and backhaul, mobile packet core solutions, and operator services for design, build, and management of mobile network are considered as well. The other factor of measuring market leadership is global reach; how many different markets does the vendor compete in?

![Figure 3: RAN vendor market position, 2019](image)

Source: Ovum

**Market leaders**

The RAN leaders group consists of three vendors – Ericsson, Huawei, and Nokia. Combined, these three companies generated nearly 80% of total RAN revenue in 2018. A big reason for this is their breadth of product and services portfolio along with their global reach.

Major difference in breadth of portfolio between these three companies is not as distinct as it was in the past. They all provide a mixture of macro and small cells. Multistandard base stations, which
includes 5G, are found with all three as well. No longer does one vendor stand out for not supporting a certain base station form factor or air interface. Only Ericsson's lack of some routing and transport options, due to lack of an inhouse optical network business, stands out. Huawei and Nokia have a greater range of radio network transport solutions. Ericsson relies on partnerships. However, Ericsson's RAN revenue and recent growth indicates this currently is not too much of a hinderance.

When it comes to global reach, Ericsson and Nokia have the advantage over Huawei. Geopolitical issues continue to make it difficult for Huawei to sell into certain countries, the US being the most obvious. However, the US is not alone in being concerned with letting Huawei (and ZTE) sell telecommunications gear. This does not reflect the quality of either Huawei or ZTE’s mobile infrastructure solutions but does impact both of their competitiveness in certain markets.

Of the three, Nokia has the best competitive position when based purely on breadth of portfolio and geographic reach. A competitive advantage Nokia has made part of its market messaging.

**Market challengers**

ZTE and Samsung Networks are both market challengers but hold very different positions.

ZTE has a higher profile than Samsung when it comes to providing network infrastructure solutions. ZTE also has a very broad portfolio of solutions, not just mobile access network. The company has optical, routing and transport, and fixed broadband network solutions. It is the company's global reach that keeps it in the challenger position. Even with its network assets it still trails Ericsson, Huawei, and Nokia in terms of total mobile network contracts and revenue. A stronger market share keeps it from the market leader grouping.

Samsung Networks has had very strong success over the last three years but remains a market challenger. The company by its own admission has kept its global reach limited. The vendor only pursues opportunities in markets where it believes its technology gives it a competitive advantage and where it will not be forced to compete on price alone. And, as for breadth of portfolio, it is more limited than ZTE, not having its own optical or transport and routing solutions. The company is also not as strong or experienced in providing operators with vendor services as its larger competitors. However, it has taken steps to improve in this area, providing extensive vendor services to Jio in India. While Samsung Networks has done a very good job in raising its market profile, it has not yet shown the willingness to take on the challenges needed to scale the business to be in the market leader category.

The companies comprising the leaders' and challengers' categories are currently the key RAN vendors. Combined, the five companies generated approximately 99% of market revenue in 2018. That position should not change for 2019.

**Niche vendors**

The classification "niche" RAN vendor should not be not be considered indicative of the vendor's overall stature. Some vendors Ovum puts in this category have long track records of selling network and communication solutions. This includes the likes of Mavenir, NEC, and Commscope. Other companies that fall into this area have less of a track record, such as Altiostar and Parallel Wireless.

The niche vendors are in this category due to a very limited product portfolio or geographic scope. Commscope for example is a very successful antenna and DAS vendor, but in the RAN space its focus is purely enterprise small cells. NEC has a global presence for backhaul and network virtualization solutions, but it only sells its RAN kit in Japan.
Niche vendors have played an important role in bringing new technologies and solutions to market. With LTE, they helped to pave the way for small cells. Today they plan an important role in pushing forward open RAN and RAN virtualization. While these vendors may not build networks at the largest scale, they do have a market impact through pushing new technologies.

**5G leadership has different measures and meanings**

All RAN vendors are focused on the future – that future being 5G. Currently, LTE is many times greater in value than 5G, but 5G will be the market driver for the next decade. Because of this, the major RAN vendors are all projecting themselves as 5G leaders. Measuring one vendor against another however, is difficult, as there are different ways to measure leadership. The metrics mean different things to different vendors, and what one vendor sees as an important leadership factor may not be important to other vendors.

For example, given the breadth of spectrum bands involved, vendors may be better at addressing certain areas of 5G spectrum than others based on current customer requirements. If a vendor’s first 5G operators are in North America that vendor could very likely have put a development priority on mmWave 5G NR over a vendor focused solely on Europe and China where 3.5GHz and 2.6GHz 5G NR will have initial demand.

Network performance is another possible metric but can be hard to compare across multiple vendors and operator networks. There are multiple factors that go into performance, some within the vendor’s control, others outside the vendor’s control. Ovum has already seen conflicting performance claims coming from South Korea, with more than one vendor claiming to have the fastest network solution.

During the early LTE era, intellectual property (IP) claims and R&D budgets were a common area where some vendors claimed to be a market leader. These measures can be misleading and hard to make apples-to-apples comparisons. A company that sells devices and network infrastructure is more likely to have higher IP and R&D budget claims than a vendor with a more focused product portfolio. Second, not all IP claims are equal. Some are more key to a technology than others. And even key IP technology claims may not each have the same level of market importance. On top of that, some vendors appear to be focused on making as many IP claims as possible, while others are more focused on quality versus quantity.

To give some measures of head-to-head 5G RAN vendor comparison, Ovum selected three metrics – number of commercial wins, 5G shipments, and wins where the vendor was not the incumbent LTE vendor. Those metrics are in the following table.
Table 1: 5G RAN vendor success metrics

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Commercial wins</th>
<th>5G shipments</th>
<th>Number of 5G radio wins where vendor was not incumbent LTE radio supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ericsson</td>
<td>28 named contracts; 20 live commercial networks; 70 operator contracts in total</td>
<td>Over 4 million 5G-ready radio shipments since 2015</td>
<td>5</td>
</tr>
<tr>
<td>Huawei</td>
<td>Over 60 contracts</td>
<td>+400,000 5G radio shipments</td>
<td>8</td>
</tr>
<tr>
<td>Nokia</td>
<td>48 commercial contracts with live networks in US, S Korea, Latin America, Europe, and Australia (14 in total); 70+ technical engagements; 100+ operator engagements; 100% conversion rate of LTE partners selecting Nokia for 5G as well</td>
<td>Did not provide a figure but has been shipping AirScale base stations that are 5G upgradable since 2016</td>
<td>At least 1</td>
</tr>
<tr>
<td>Samsung</td>
<td>9 commercial contracts, 6 live networks; +20 operator engagements</td>
<td>+100,000 carrying live commercial traffic</td>
<td>4</td>
</tr>
<tr>
<td>ZTE</td>
<td>25 commercial wins; 60+ global operator engagements or cooperation agreements</td>
<td>+50,000 (through June 2019)</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: Ovum and vendors listed in table as of October 27, 2019

Even with what appears to be a rather straightforward set of metrics, not everything is the same among the vendors. They had different ways of answering the questions.

**Commercial wins**

All wins for all vendors include 5G base stations, no wins are claimed based solely on packet core or backhaul contracts. Also, each vendor said they only count an operator as a single win, even if they have multiple contracts with that operator. Where things vary is how vendors count commercial contracts.

What counts as live commercial network can be different by vendor or even operator. Some operators say they have a commercial network when its commercial availability is very limited to select customers in limited markets. Other operators, when talking about commercial network, mean 5G services open to the general public on a network they are confident in scaling across multiple markets. How operators classify their commercial networks obviously impact what vendors can say.

Ericsson, Huawei, and Nokia currently lead the market when it comes to claims around commercial contracts. Some of this reflects their success with LTE. Initial 5G deployments use the non-standalone architecture with LTE for signaling and 5G for data traffic. In many cases, the LTE data plane is aggregated with the 5G data plane to increase network capacity. This gives the incumbent LTE vendor a competitive advantage as 5G non-standalone can be built on the current 4G network. As Nokia has pointed out, all operators currently using its LTE kit has also selected the Finnish vendor for 5G.
Radio shipments

Samsung's response to this was very direct, reporting over 100,000 radios in live commercial networks. With China's 5G networks going commercial in early October, most of Huawei and ZTE's shipments should be live now – like Samsung. Given both Huawei's and ZTE's strong position in China, both vendors should continue to report significant 5G radio shipments for the next several years. Huawei now claims over 600,000 5G radio shipments.

Ericsson and Nokia did not provide any data on shipments, despite both having live network deployments. Ericsson references having shipped over four million Radio System radios that can be upgraded to support 5G (these radios would be in the lower FDD bands). While the claim is true – they can be upgraded to support 5G – it does not mean they ever will be upgraded. But it does show Ericsson has a strong embedded radio base that can be used to support 5G if operators want to go that route. Nokia's AirScale can be software upgraded to support 5G as well. Nokia has been shipping these radios since 2016 but has not provided any public data on how many are in use.

5G wins where vendor is not the incumbent LTE supplier

This metric helps indicate if a vendor has gained 5G business at the expense of a competitor. With non-standalone 5G, the operator uses an LTE base station in conjunction with the 5G base station. An operator can use separate 4G and 5G vendors for 5G non-standalone, but it requires a more difficult integration process than if using a single radio supplier. Currently most operators are using the same 4G and 5G vendor, but there are some exceptions.

Of the five major vendors, Huawei leads with claim of eight wins where it was not the incumbent LTE vendor. This is followed by ZTE with seven, Ericsson with five, Samsung with four, and Nokia claims at least one.

Given the tight relationship between LTE and 5G in non-standalone, winning 5G contracts where one does not already provide LTE is a strong endorsement of a vendor's 5G solution. It shows an operator is willing to rip-and-replace an incumbent LTE vendor or go through the headache of interoperability between two vendors to use a different vendor's 5G kit.

Where do vendors see themselves differentiating in 5G

Points of differentiation give vendors a real, or at least perceived, competitive advantage. With the five major RAN vendors all working from the same set of standards, differentiation can be challenging. They need to be able to communicate to their operator partners how they are different and better than their competitors. These points of differentiation can be part of the RAN portfolio, the broader mobile network portfolio, and operator support.

Below, in Table 2, is how the vendors responded when asked what their points of competitive differentiation are.
Table 2: 5G RAN vendors’ points of differentiation

<table>
<thead>
<tr>
<th>Ericsson</th>
<th>Huawei</th>
<th>Nokia</th>
<th>Samsung</th>
<th>ZTE</th>
</tr>
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<tbody>
<tr>
<td>Operator services for network planning and deployment</td>
<td>Experience working in TDD spectrum bands</td>
<td>Broadest network portfolio and geographic reach</td>
<td>Massive MIMO experience</td>
<td>Experience with massive MIMO</td>
</tr>
<tr>
<td>Cost of and ease of 5G deployment in FDD bands</td>
<td>Massive MIMO leadership based on high-level antenna/radio integration and low power consumption; multiuser MIMO performance</td>
<td>Modular network capacity architecture, allows operator to add capacity as needed</td>
<td>Commercial 5G experience in both mid-band and mmWave bands</td>
<td>Early focus on 5G standalone and core network development</td>
</tr>
<tr>
<td>Dynamic spectrum sharing</td>
<td>Full end-to-end network support</td>
<td>Four different ways to implement dynamic spectrum sharing</td>
<td>Support for 5G open RAN fronthaul and fully virtualized 5G base station</td>
<td>Multivendor interoperability</td>
</tr>
<tr>
<td>mmWave technology</td>
<td>Low power consumption and equipment weight</td>
<td>AirScale radios and BBUs can be software upgraded to 5G</td>
<td>5G mmWave and mid-band portfolio support that includes device, radio, core network, and 5G system modems and RFIC using microfabrication processes to help shrink footprint and lower energy consumption.</td>
<td>High power output of its Ultra Radio Broadband solutions</td>
</tr>
<tr>
<td>FWA solutions</td>
<td>Experience with massive MIMO and active antenna units 5G research dating back to 2009 with claim of highest number of 5G patent contributions</td>
<td>Massive MIMO experience</td>
<td>Commercial 5G experience in both mid-band and mmWave bands</td>
<td></td>
</tr>
<tr>
<td>Network interoperability</td>
<td>Overall 5G performance</td>
<td>Full end-to-end network support</td>
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</tr>
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Source: Ovum and vendors listed in table

Appendix

Methodology

Data used in this report came from direct analyst interactions with all the infrastructure vendors covered and with others that play a smaller role in the market, along with discussions with mobile operators. Data in 5G metric section and 5G differentiation was supplied directly by the vendors.

Market share data came from both direct input from the vendors and Ovum data sources for market share modeling, such as our quarterly reports for optical networking, broadband access, and service provider routers.

The radio access network forecast model is a revenue model driven by mobile operator capex and historical market share data for base stations, remote radio units, base band units, BSCs, RNCs, and small cell gateways. This forecast includes revenue for both macro cells and small cells.

Further reading

"LTE and 5G make for a positive market outlook," SPT002-000229 (June 2019)
“Huawei held the top spot again for RAN revenue in 2018”, SPT002-000205 (April 2019)

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