RAN Vendor Market Update: 2018

Market dominance of the big three RAN vendors remains for now

Publication Date: 30 Oct 2018    |    Product code: SPT002-000141

Daryl Schoolar
Summary

In brief

The RAN market remains the cornerstone of mobile communications. Without the radio access network (RAN) there would be no mobile communications. In 2017 sales of RAN gear amounted to approximately $32.1bn, with three vendors controlling more than 78% of the market between them. For mobile operators, however, the reliance on a few RAN vendors could change, thanks to the introduction of 5G, along with OpenRAN and virtualized RAN (vRAN).

Ovum view

- **Growth will finally return to the RAN market.** Revenues will start to grow again in 2020, thanks to a combination of LTE and 5G sales. This is very good news for a market that has been in decline since 2015. Growth will help vendors put more funds toward R&D, which in turn helps facilitate continued mobile communications innovation.

- **Changes in technology could lead to more vendor choice and change in market structure.** The introduction of 5G, OpenRAN, and vRAN gives smaller RAN vendors a chance to grow their market share and gives operators more choice in who they work with. It also means the larger vendors could see their dominance eroded. This will not happen overnight, but initiatives such as OpenRAN ecosystem could change things in a few years.

- **The development of new business models and applications will see 5G distinguish itself.** However, that will take time. Initial 5G use cases will be about saving money with enhanced mobile-broadband and fixed-wireless access.

Recommendations

- **Operators need to take a realistic approach to 5G.** Like LTE, 5G is a long-term evolution. The 5G of 2028 will be very different from the 5G of 2018. Operators need to focus on their 10-year 5G strategy rather than worry about being first to market.

- **RAN vendors need to make sure they do not stretch themselves too much in chasing adjacent markets.** RAN vendors understandably need to grow revenues by exploring new but related markets such as private wireless networks, fixed-wireless access, and IoT. However, they need to make sure they do not overextend themselves and neglect their core market: mobile communication service providers.

- **Samsung needs to replicate its US success in Western Europe.** Success in Western Europe will increase the company's global credibility and show that its wins in the US are not totally the result of Huawei and ZTE's being locked out of that market.
RAN market defined

An overview of the mobile network

A simple view of the mobile network divides it into three components: core, radio access (RAN), and backhaul. This report is focused on RAN, where the bulk of mobile operator capex is spent.

The radio access network primarily consists of two elements: base stations and controllers/gateways. Backhaul, while sitting between the base station and controller, is not actually part of the RAN. (See Ovum's report *Mobile Backhaul Forecast: 2014–19* for more on mobile backhaul.)

Figure 1 provides a basic illustration of the radio access network. It includes a 2G/3G macrocell, a 4G macrocell, a metro small cell, a femtocell, and the required gateways and controllers needed to manage those base stations.

![Figure 1: Illustration of a radio access network (RAN)](source)

Both 2G and 3G macrocells require a base station controller (BSC). Technically, GSM/EDGE base transceiver stations use a BSC, while WCDMA/HSPA base stations (NodeB) communicate with a radio network controller (RNC). The two controllers perform the same function; they act as aggregation points for traffic coming from the base stations as it heads into the core network, and they manage inter-base-station relations for functions such as base-station-to-base-station handoffs. Combining BSCs and RNCs into a single controller has become common. CDMA networks use a BSC as well. A single controller can handle over a thousand base stations.

LTE base stations (eNodeB) do not have a separate controller. Controller functions such as handovers are built into the base stations.

Metro cells (picocell/microcell) and femtocells use gateways that act somewhat like a macro BSC. The gateway aggregates traffic moving from those small base stations and passes it on to the mobile network core. Gateways also help to manage those base stations and provide network security. As the metro cell market is still developing, it is not entirely clear whether all deployments will require a
gateway. The size of the metro cell deployment appears to be a major factor in whether there needs to be a specific small cell gateway. The larger the deployment, the more likely it is that a gateway will be used.

RAN market forecast

Thanks to 5G and LTE, growth will return

The answer to the question, "What do RAN vendors need for revenues to grow?" is 5G. Since the market peak in 2015, annual revenues from sales of base stations have declined every year. These declines are not solely the result of the end of large-scale LTE rollouts in China and US. A bigger culprit in the decline in the value of annual base station sales has been rapid pullback in spending on 2G and 3G systems.

Even with large-scale rollouts in some markets coming to an end, Ovum predicts LTE base station spending will not peak until 2019. That remaining growth will be attributed to both continued densification in mature LTE markets and operators that have yet to fully maximize LTE such as in the South & Central America and sub-Saharan Africa regions.

The big story, of course, is 5G. Ovum expects revenues from 5G and LTE will bring growth back to the market in 2020 and for the forecasted years following. Because of the spectrum bands involved, 5G should have a long investment cycle. It can use previously underutilized bands in the 3.5GHz range and above 6GHz, along with existing mobile bands such as 700MHz.

Figure 2: RAN revenue forecast for 2016 through 2023

Source: Ovum
Huawei stays number one in 2017

Huawei once again finished the year with the largest market share at 30.1%. This comes despite it being locked out of the second-largest market in the world, the US. Following Huawei are Ericsson with 26.4% and Nokia with 22.2%. As has been the case for some time, these three vendors control more than 75% of the market. For 2017 specifically, it was 78.7%. ZTE remains an important player in this market as well, with a 12.5% share. The big change in 2017 came from Samsung Networks.

Among the five largest RAN vendors, Samsung had the highest market-share percentage increase in 2017. Its share increased from 5.8% in 2016 to 7.1% in 2017. Overall RAN revenues for the vendor grew 15%, against an overall market decrease of around 5.7%.

Samsung's success comes from several areas, but Jio of India cannot be overlooked. Samsung has been the sole RAN provider for this greenfield deployment. Jio has built a massive nationwide LTE network and has become one of the largest LTE operators based on subscription numbers in the world. Samsung's success in building this network played a big part in its financial success in 2017.

Figure 3 shows Ovum’s RAN market share estimates for the full 12 months of 2017.

**Figure 3: 2017 RAN market share**

Source: Ovum
Market-shaping trends for 2018

5G, OpenRAN, and vRAN open the door for new competitors

Changes in network technology can lead to changes in the vendor hierarchy. Samsung, for example, was at best a niche RAN vendor during 3G’s ascension. The company used 4G and 5G introductions to become a solid market challenger in certain regions. OpenRAN, vRAN, and 5G all provide vendors with a market inflection point that can lead to substantial changes in the vendor-makeup of the market.

OpenRAN and vRAN combined with 5G can change the market by allowing operators to mix base station vendors and connect a radio from one vendor with the base band unit of another. Separating these two RAN elements opens the way for companies such as CommScope, Mavenir, Altiostar, Radisys, and Parallel Wireless to gain a bigger foothold within mobile operator networks. More-established RAN vendors such as Nokia and Samsung have hedged their bets in this area by joining the Oran Alliance.

Mavenir recently announced its own OpenRAN ecosystem. This ecosystem brings together different vendors to expand the addressable market for OpenRAN network solutions. The ecosystem’s goal is to create a single entity that can address multiple deployment scenarios and create easier integration and multiple vendors. This latter feature will make these new network architectures appealing to more operators, as Mavenir will take on the integration and interoperability challenges. Not every mobile operator has the resources to do this internally. Ecosystems like this can move vendors from niche players to market challengers.

5G trials become real contracts setting the stage for the next decade in RAN leadership

As 5G networks move from trials to commercial deployments, RAN vendors start to collect commercial wins. AT&T has announced Ericsson, Nokia, and Samsung as its initial 5G radio partners. SK Telecom announced the same three for its network. T-Mobile in the US has pegged Ericsson and Nokia for its initial launch. Vodacom launched its commercial service in South Africa this summer using Huawei. China’s operators are expected to tender commercial 5G offers before the end of 2018.

The 5G contracts are very important for maintaining and gaining market share. For example, Samsung’s strength in the US should increase its overall share of the RAN market. Winning initial 5G high-profile contracts gives vendors both deployment experience and market credibility. This makes it easier to win future contracts. And as 5G will eventually overtake LTE equipment sales, vendors need to create a solid 5G foundation today to ensure a strong market position going forward.

While early 5G success does not guarantee long-term market success, it will be hard to be a major RAN vendor without some early significant wins. The 5G contracts awarded over the next 12 to 24 months will go a long way to positioning the market winners for the next decade.
Vendor overview

Highlights of market leaders, challengers, and niche players

Ovum segments the RAN vendors into three categories – leaders, challengers, and niche. Selection criteria are

- market share
- global reach of the vendor: how many markets is the vendor competitive in with its RAN solutions?
- breadth of services such as network planning, installation, and management
- breadth of RAN portfolio
- breadth of portfolio of supporting solutions such as fixed network for backhaul and packet core network.

Market leaders

Ericsson, Huawei, and Nokia remain the unequivocal market leaders. They have the broadest product portfolios and global reach along with the strongest service support. It is hard to imagine a scenario in which a mobile operator looking to deploy a new network does not reach out to at least one of these three vendors during the bidding process. Of the three, Nokia leads based on its combination of global reach and breadth of portfolio and services. Ericsson equals Nokia in terms of global reach and service capabilities. Where Ericsson differs from Nokia is in breadth of in-house portfolio. Ericsson lacks some of the routing and transport capabilities of Nokia and uses partnerships to fill those gaps.

As for Huawei, it has the breadth of portfolio and services to match Nokia but lacks Nokia’s global reach. Huawei’s competitiveness remains hampered by politics. Australia has joined the US in blocking its equipment. There has been some discussion that Japan could also join those two countries in blocking Huawei. India’s Department of Communications did not approve Huawei for 5G trials in that country. So, while Huawei is clearly the market leader in revenues and has a portfolio breadth to equal that of Nokia, its inability to sell in certain markets reduces its overall competitive position.

Market challengers

Samsung and ZTE remain the biggest challengers to the three leaders. Samsung has a very strong footprint in the US, South Korea, Japan, and India. The company has not had as much success in Europe but has done 5G trials and/or demonstrations with Orange, Telefónica, and Deutsche Telekom. Samsung Networks so far remains absent from the largest market in the world, China.

ZTE has a long history in mobile networks, with the China market being its strongest. The company has a broad portfolio of not only base stations but also backhaul, routing and transport, and packet core. Also, as noted above, ZTE faces sales obstacles in several significant markets. This year was especially challenging for ZTE, as the US ban on its components essentially killed the company for three months. ZTE must now work on regaining operator trust, something the company has been aggressively pursuing since the ban was lifted.
Niche vendors

Niche vendors include the likes of NEC and radio specialists such as small cell suppliers SpiderCloud and CommScope, and market disruptors such as Mavenir. The common thread for all these vendors is that they are currently limited in portfolio and/or global reach, and revenue-wise they are a very small percentage of the market. These vendors, however, can over time move from their current positions as niche vendors to being market challengers or leaders. Mavenir clearly has ambitions for a greater part of the market.

NEC is a major supplier of RAN gear in its home market of Japan, but globally is very limited and focuses mainly on enterprise small cell solutions. It does have other solutions available to mobile operators with backhaul and OSS/BSS and network virtualization (Netcracker).

Small cell specialists focus on the enterprise space and compete against the major five RAN vendors, which have their own enterprise small cell solutions. These smaller vendors have very limited breadth of portfolio and limited market penetration. The competitive edge is in specializing in just one area of mobile infrastructure. Where they lack breadth of portfolio, they make up for it by focusing on specific radio domains and technologies.

Mavenir looks to disrupt the RAN market by focusing on OpenRAN solutions for both macro and small cells. A relatively new vendor in the RAN space, the company does have a very strong legacy in supplying operators with IMS VoLTE core solutions.

Figure 4 shows Ovum’s RAN vendor market positioning. Changes of note over the last 12 months have Ericsson moving closer to Nokia and Samsung moving closer to ZTE.
# Table 1: Overview of Ericsson, Huawei, and Nokia

<table>
<thead>
<tr>
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<th>Ericsson</th>
<th>Huawei</th>
<th>Nokia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total 2017 revenues</strong></td>
<td>$23,603m</td>
<td>$92,500m</td>
<td>$26,144m</td>
</tr>
<tr>
<td><strong>Total 2017 RAN revenues</strong></td>
<td>$8,475m</td>
<td>$9,680m</td>
<td>$7,122m</td>
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<tr>
<td><strong>RAN as percentage of total</strong></td>
<td>35.9%</td>
<td>10.5%</td>
<td>27.2%</td>
</tr>
</tbody>
</table>

**Strategy**
- Ericsson's reorganization appears to be starting to pay off; financials are beginning to improve. The vendor addressed the biggest hole in its portfolio with a partnership with Juniper and ECI. This gives it an end-to-end solution. The company continues to strengthen its market leadership with early 5G wins in the US and Europe. Looking to expand its addressable market, the company continues to work on building market interest and platforms for IoT and content delivery with its Unified Delivery Network. The company has also been shedding non-essential business units to allow better focus on its key areas.

- Huawei's big network focus has been on network cloud and cloudification. Its latest base station platform is SingleRAN Pro. The vendor puts a big emphasis on its technology roadmap and how that roadmap can meet mobile operators' evolving requirements. Huawei has become very solutions oriented. Its approach is to look at the problem to be solved, then build the network to solve that problem. The company remains focused on maintaining its LTE business while growing its 5G business. It aims for this by pulling away from some of the hype surrounding 5G and creating a more realistic 5G development timeline.

- The company is very focused on being an end-to-end network vendor and on the benefits it can bring to its clients with this integrated approach. Nokia, unlike its other two major competitors, has been active when it comes to embracing the trend to more openness and is a member of Oran Alliance. OpenRAN plays a part in the vendor's 5G Future X network vision as well. This market disruption could make it easier for Nokia to gain share over its two larger competitors. The company has also differentiated itself through the development of the ReefShark chipset and its focus on improved network energy consumption.

**Challenges**
- Partnerships are not the same as organically grown solutions. The company's Cisco partnership has not been the greatest success. Ericsson must avoid repeating that with Juniper and ECI. Continuing to streamline process and returning to revenue growth and profitability remain its major challenges. Capturing early 5G market share while maintaining its LTE presence is very important in meeting that challenge.

- The lucrative US market remains beyond Huawei's grasp, and now other countries appear to be considering following the US's lead on the company. Huawei has made great strides over the last decade in improving its customer relations and becoming a true market leader. Huawei has real trust issues in certain markets, which, whether justified or not, are impacting its competitiveness.

- Nokia's financials are still a work in progress, and it needs to start showing revenue growth. It should be helped by 5G, but it is important for Nokia to win early high-profile accounts to help build market and thought leadership. Its work in South Korea, Japan, and the US all help with that. IoT and markets outside of its traditional communications service provider customer base are still developing and will be needed to help with revenue growth.

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## Table 2: Overview of NEC, Samsung, and ZTE

<table>
<thead>
<tr>
<th>Strategy</th>
<th>NEC (calendar year)</th>
<th>Samsung</th>
<th>ZTE</th>
</tr>
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<tbody>
<tr>
<td><strong>Total 2017 revenues</strong></td>
<td>$25,346m</td>
<td>$211,812m</td>
<td>$16,108m</td>
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<tr>
<td><strong>Total 2017 RAN revenues</strong></td>
<td>$319m</td>
<td>$2,282m</td>
<td>$4,013m</td>
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<tr>
<td><strong>RAN as percentage of total</strong></td>
<td>1.3%</td>
<td>1.1%</td>
<td>24.9%</td>
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<table>
<thead>
<tr>
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<th>ZTE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy</strong></td>
<td>In Japan, NEC remains an important RAN vendor. The company remains an important partner to the country’s largest mobile operator, NTT DoCoMo. The two companies did a 5G demonstration in 2018, showing inter-base station signal coordination. NEC has a relationship with SpiderCloud for small cells. Other network assets include backhaul and virtualized core assets via its subsidiary Netcracker.</td>
<td>Samsung’s strategy remains focused on LTE and 5G opportunities where technology, not just price, is important. The company has been very successful in the US when it comes to early 5G wins. Samsung recently won a CBRS radio deployment with AT&amp;T for both LTE and 5G, along with 5GNR for other AT&amp;T spectrum bands. In February it was named a supplier to Verizon’s OpenRAN deployment. The company also supplies 5G-ready massive MIMO solutions to Sprint. The company was the sole RAN vendor for Jio’s LTE India network, giving Samsung credibility in handling large-scale deployments. The company has also done well in South Korea and Japan. Samsung is not as strong in Europe but has been involved in some 5G trials there. It has developed use cases around IoT, smart cities, and security to help drive 5G interest and position itself as a thought leader.</td>
<td>ZTE has a well-earned reputation for radio and antenna innovation, especially around TDD radios, MIMO, and active antennas. These technologies are important components of 5G. The vendor also has a well-established history in deploying 2G, 3G, and 4G networks. ZTE, however, is not just a radio vendor. It can deliver backhaul and core networks. The company has also embraced the trend of virtualization and is moving its network elements to a cloud environment. Another element that ZTE brings to the market is its service support around network planning, deployment, and management.</td>
</tr>
</tbody>
</table>
**Challenges**

| NEC has not shown a commitment to selling RAN radio access network outside of Japan. The exception being is the small cells it gets from SpiderCloud. Its Netcracker and backhaul solutions have global accounts. What it builds for NTT DoCoMo is specific to that market. The company will need to make major changes to its RAN portfolio if it wants international success. |
| The company still needs to build its market profile as a major RAN vendor. There is a clear gap in its portfolio when it comes to backhaul and network routing and transport. It does have core network solutions but is not as well known in this area as other vendors. The company also does not have much of a reputation when it comes to operator services, despite its network planning and nationwide massive deployment work in India with Jio. |
| ZTE still needs to build its global image and do better in selling its mobile access solutions to tier-1 operators. The company does this very well in China, but internationally it has been more limited. The company needs to improve its messaging and position itself better as a solutions provider, instead of just a supplier of equipment. Its bigger short-term challenge is overcoming the damage done by the US component ban earlier this year. ZTE needs to build operator trust and assure its customers that it will not happen again. The company also faces politically driven challenges in the same countries as Huawei. This hurts ZTE's overall global competitiveness. |

Source: Ovum

**Other RAN niche vendors**

- CommScope entered the small cell market via its acquisition of Airvana and that company's OneCell portfolio. OneCell uses a centralized RAN architecture for radio management and reduction of radio-to-radio interference. This is a point of differentiation for OneCell versus other small cell options. The company recently announced support for 5G. Indoors is a natural space for CommScope, as the company has a history of selling DAS and other indoor network coverage and capacity solutions. In addition, CommScope already has clients in this area that can be leveraged for OneCell.

- Mavenir as a company is much older than its RAN ambitions. The company dates from 2005. Since then it has gone through several ownership-structure changes and acquisitions. The company's heritage is in VoLTE IMS core solutions, which it has sold into many of the leading global mobile operators. RAN, however, is newer and comes from a merger with two other vendors in 2017. The company has both cloud RAN and small cell solutions. Strategically, market disruption coming from OpenRAN provides the company with an entry into the RAN market. Mavenir has been very active in creating thought leadership around OpenRAN. Its recently announced OpenRAN ecosystem provides an important step forward for the company's strategy of being a market leader in the RAN space as it expands its addressable market. Ovum estimates that access, of which RAN is a part, accounts for approximately 10% of the company's 2017 revenues.

- Parallel Wireless offers a small cell along with a hetnet gateway. The small cells are multi-access, supporting 2G, 3G, and LTE. The hetnet gateway, in Ovum's opinion, is its real differentiating offering. The gateway allows for the small cells to be treated as a single cell by the core network, with the goal of simpler management and integration with other vendors' macro base stations. The company counts BT, Telefónica, Ice Wireless, and M1 as
customers. Parallel Wireless also targets private LTE networks and public safety opportunities.

- SpiderCloud Wireless is owned by Corning. Thus Corning can provide both the cable and the radio at the end of the cable. SpiderCloud provides multiple indoor enterprise small cell options, a service node to manage those nodes, and SpiderNet, a centralized configuration, fault, and performance management tool for use with multiple locations. The company has relationships with Cisco and NEC to expand its reach.

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. Secondary sources include vendor financial reports – both financial filings and investor presentations of vendors and mobile operators – and other industry-related news sources such as 4G Americas and GSA (the Global mobile Suppliers Association).

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 revenues for both macro cells and small cells.

Further reading


“Carrier 5G transformation will capture the IoT opportunity,” SPT0002-000130 (September 2018)

“ZTE looks to make a strong return to the market after US ban,” SPT0002-000110 (August 2018)

Author

Daryl Schoolar, Practice Leader, Network Infrastructure and Software
daryl.schoolar@ovum.com

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