

Airspan: the evolution of small cells

The small cell market is evolving rapidly, and a quick scan of the most recent market forecasts shows that any number of research analysts are predicting it will take a great leap forward this year. ABI Research for example forecasts a 43 percent compound annual growth rate for the technology. Mobile Experts estimates enterprise small cells will grow by 270 percent in 2016, and urban small cell shipments will increase 150 percent. The overall small cell market will have revenues of \$6.7 billion by 2020.

You might think that we've heard this all before. The small cell market has yet to live up to best expectations, and this has been down chiefly to the cost of installation, site rentals and backhaul. However, there's good reason to think that this time around it should be different – and that's because of the rate at which mobile carriers are deploying LTE networks and the role that small cells have to play in densifying these networks.

One technology company poised to benefit from this huge growth is small cell vendor Airspan, whose co-founder and CTO Paul Senior also sits on the board of the Small Cell Forum. "LTE networks are seeing huge growth as people become addicted to mobile data," he says. "Mobile carriers have no choice but to make sure every nook and cranny of their network has LTE coverage, and that's what we're about."

Senior acknowledges the challenge of providing backhaul from the small cell to the core network has been a big factor in holding up growth in small cells, but he says that Airspan has comprehensively resolved this issue with its iRelay and AirUnity products, which were launched earlier this year and use a technology called LTE Relay.

Not only does it solve the small cell backhaul problem, LTE Relay also resolves any in-building coverage issues that are common with LTE networks. "Almost every mobile carrier has launched an LTE network using macro cells," Senior explains. "They've used a different range of frequencies – low frequencies like 800MHz, high frequencies like 1800MHz - but most have also used frequencies like 2.6GHz or even 3.5GHz for LTE. As the frequencies get higher so the penetration inside buildings gets worse, meaning that LTE performs poorly inside buildings."

Carriers commonly find that while they have great speeds outside a building, once inside it there are many areas where there are capacity and coverage issues. This is no good for all the users for whom LTE is all about fast download speeds. And this is doubly important because the inside of a building is not only where the majority of network's users are, but it is also where they want to use their smartphones.



Airspan CTO Paul Senior

Where small cells are really coming into their own is in enterprises

Indoor improvements

Operators are consequently looking for ways to improve the performance of their LTE networks inside buildings – hopping on to Wi-Fi only works for those users who have permission to do so and typically comes with restrictions on the services available to use. LTE Relay technology has the effect of taking cell edge users and shifting them so that they appear to be standing directly under a macro cell. Airspan's AirUnity is an indoor product, designed to sit on a window sill, while its iRelay box is an outdoor product.

Senior says: "With LTE Relay we've found a way for carriers rapidly to deploy LTE small cells without the constraints of a conventional approach like running fibre to a pole in the street or trying to find a way to persuade the IT manager to give a broadband connection to a small cell inside the premises."

He adds that the economics of the Airspan LTE Relay products are "fabulous". He says: "For a box costing about \$1,000, carriers can gather together 100 users and improve their indoor capacity in one fell swoop." He says that Airspan is getting about 2,000 m² of coverage from the products – this is the size of a fairly large corporate office – giving operators the ability to collect a large number of smartphones together and move them from poor edge-of-the-network performance to really good performance.

He adds: "The Achilles' heel of small cells has always been backhaul, but this technology means that there is backhaul anywhere there is existing LTE coverage. It's just a matter of putting a box in the street or a box on a window sill, and operators have an almost instant way to deploy small cells and enhance the capacity of their network."

LTE Relay works so well, says Senior, because users at the cell edge consume 100 times more capacity than those standing under the macro cell, so shifting them so that they appear to be standing directly under a macro cell can have a huge impact on performance. For example, Senior explains, an LTE macro cell may be working at 800MHz or 1800MHz and that can be used to provide backhaul for a small cell in the 2.6GHz band used for indoor small cells.

"The trick is that we use that to connect to either an outdoor or an indoor box. The outdoor box has a very good connection to the macro cell because it's outside. We use a very high gain antenna and very advanced LTE UE technology - typically two transmitters and four receivers.

"We've put a lot of effort into the size of the antenna and the complexity of the UE technology so you get a really spectacular connection to the macro cell. At the

same point also we connect to a small cell very close to the user so you get a perfect connection between the user and the macro cell even though there is this double hop.

"It means that rather than the user being a cell edge user working at very low modulation schemes and consuming lots of resources off the macro cell, they shift from that position and become as if standing directly under the macro cell."

Winning the Relay race

What sets Airspan apart from other small cell providers is that it is LTE only and its mission is to provide an holistic solution, says Senior. "Airspan is the only vendor to tightly couple LTE small cells and backhaul solutions. Our competitors tend just to provide the small cell element. iRelay and AirUnity are end-to-end plug and play solutions that automatically provision themselves."

Although the LTE Relay products were officially launched at this year's Mobile World Congress, Airspan has been working on mass deployment with a couple of as yet unnamed large Tier 1 customers. "We're talking about very large numbers, tens of thousands of boxes in each case," comments Senior.

Senior says he increasingly believes there is no longer a place for legacy 2G and 3G small cells, particularly as voice over LTE gains ground. He cites Indian operator Reliance Jio, whose 4G only network across India includes up to 40,000 small cells supplied by Airspan, and China Mobile, which has recently deployed a million plus LTE outdoor cells as operators who are demonstrating the way forward. "Clearly there are niche markets where legacy technology will keep going, but the mass markets are moving very rapidly to LTE. We're pure play LTE. We're not some small femtocell vendor delivering products with a subset of features, we have a very large R&D team and we can match the features you get on a traditional macro cell on an LTE small cell. Densification is what we're focused on and where we'll be successful."

Founded in 1992 and now boasting a staff of 500, Airspan's headquarters are in the US, and it has R&D teams in the UK, India and Israel. The company focuses on technology rather than services and engages directly with operators, using partner companies in the field to fulfil its contracts. Airspan's products are to be found in over 1,000 networks in more than 100 countries and they cut across all sectors, says Senior, adding that the company's business as much addresses the corporate market as it does public spaces and residential: "Airspan is

You are transforming the troubleshooting time from days or hours into seconds

about improving the quality of LTE so there is seamless connectivity and capacity no matter where you are."

Airspan's products also mean that the mobile network operator is less likely to over-invest in order to improve its capacity and coverage, as building a new macro cell is both a time consuming and an expensive business in comparison. Moving forward a few years, a major component of any 5G network is likely to be ultra-dense network configurations, particularly in metro areas, so Airspan's small cells will without doubt continue to play a crucial role.

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