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Addressing the Expanding 70/80 GHz Market

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Just as recently as a few years ago, the 70/80GHz radio market was generating a lot of high expectations, but as operators came to understand the limitations of the technology, and that the spectrum was only suitable for a small number of applications, interest in E-Band quickly subsided. Today, however, there is renewed interest in leveraging E-Band, and, unlike early attempts to address the market, it has become a much more viable solution due to a range of technological improvements and new applications, so that the band is now poised for high growth in the coming years.

Having been adopted by FCC and ETSI, the 70/80 GHz band is one that is now readily available in many countries throughout the world. Currently, Brazil is in the process of opening E-band for deployment, with availability targeted for the middle of this year. In fact, the 70/80 GHz band is generally ubiquitous around the world, with only a few major markets, primarily India, left to open the band.

First generation E-Band systems were introduced about 5 years ago. These systems were generally Gigabit systems that used wide amounts of spectrum. They also used basic modulations and early 70/80 Ghz RF modules that resulted in early E-Band systems being limited to about 1-2Km in reach. Additionally, these early systems weren't inexpensive and typically cost between two to four times

more than a traditional 11-38GHz wireless backhaul system. With limited capabilities and a high cost of ownership, the first E-Band products were only suitable for fiber extension, enterprise networks, and campus deployments where very high-capacity, short extensions were required, and the price point offered an alternative to high-priced fiber builds. On the other hand, when addressing the large wireless backhaul market targeting mobile operators, the reach limitations and high cost of early E-Band radios prevented widespread adoption.

That was Then, This is Now

Since the first introductions of E-Band radios, several new wireless E-Band systems have been developed for a similar application space, and third generation E-Band radios are now being developed. The newest E-Band systems have introduced a number of technical innovations that enable two- to three-fold applicable link range increases that can now exceed 5Km in length. The newest E-Band radios incorporate higher order modulations and wider channel sizes, so that new systems are now able to support capacities above 2.5Gbps with limited delays. What's more, smaller packaging and the use of narrower antennas has significantly reduced the physical size of 3rdgeneration E-Band radios, and this combination of new capabilities and a smaller form factor is opening new doors for E-Band radios in the application space.

The advancement in radios operating in the 70/80 GHz spectrum means that operators now have a viable, cost-effective option to replace existing links in the 23-38GHz bands. The number of links that could be replaced varies depending upon the network and country, but studies show that, on average, 75 perecent of these links can be replaced in many markets. The benefit for operators is that they can now replace capacity and spectrum limited links – ones capped at 28MHz and, therefore, 200Mbps capacity – with high capacity links in the 250-500MHz spectrum that are capable of delivering >2Gbps of throughput. This tremendous increase in scale meets the demands for future capacity that will be driven by LTE growth. The value-added benefit is that E-Band spectrum comes at a very low cost and is typically priced less than 1/10 that of 23-38GHz spectrum, meaning

operators realize a major reduction in ongoing operating costs associated with spectrum leases. In effect, a new "Sweet Spot" for E-Band has been defined that is applicable with operators globally, and which likely will see a huge increase in the E-Band market size.

Because E-Band systems are now delivering 2.5GBps and above, as well as very low delay, it becomes possible to natively transport FrontHaul traffic. Some latest generation radios support this by introducing CPRI, and OBSAI interfaces on their high capacity E-Band systems. Provided the interfaces are transparent and capable of sub-10ms delay, they can be used in the FrontHaul configuration. This allows operators to deploy remote radio heads that extend from the basestation controller and then connect back via a wireless connection. This is an industry first and a driver for increased FrontHaul deployments, because, until now, CPRI/OBSAI has only been supported on fiber, and therefore has always required an optical connection, so that distributed antennas were deployed only in stadium and conference centers where fiber is abundant. With E-Band enabling outdoor extensions for FrontHaul, the goal to achieve a Cloud RAN architecture will be further advanced.

A third important application for E-Band systems is the emerging small cell market opportunity. New E-Band systems are primarily all-outdoor systems that can now support antennas as small as 8 inches in some regions. With abundant spectrum available, and delivering high capacities, E-Band is ideally suited for small cell backhaul connections that typically require only short link distances. For aggregation links, E-Band delivers the capacity needed to connect a street level small cell network to building tops or macrocell fiber points. And, while street Level E-band connections are also likely, they will sometimes be limited by region and regulation.

There are two issues that may limit certain small cell E-Band deployments. Firstly, some regulators require a minimum 12" antenna in E-Band, which decreases the likelihood a system would be deployed on a light pole. The second barrier is beamwidth. E-Band systems operate with very narrow beamwidth, meaning they can't tolerate much tower sway. This will restrict them from many light pole and traffic light deployments, so that the alternative will be to only deploy on the sides of buildings and

very sturdy poles. That said, the upside of utilizing E-Band for small cell aggregation, on it's own, represents an important and potentially large market opportunity.

In conclusion, E-Band has evolved significantly over the past few years and the three aforementioned applications represent a non-linear increase in the potential market size for the 70/80 GHz spectrum. By delivering increased technical capabilities, E-Band is becoming viable to a wider customer set that will likely drive an order of magnitude increase of the spectrum being tapped by network operators around the world.

Edited by Blaise McNamee

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