

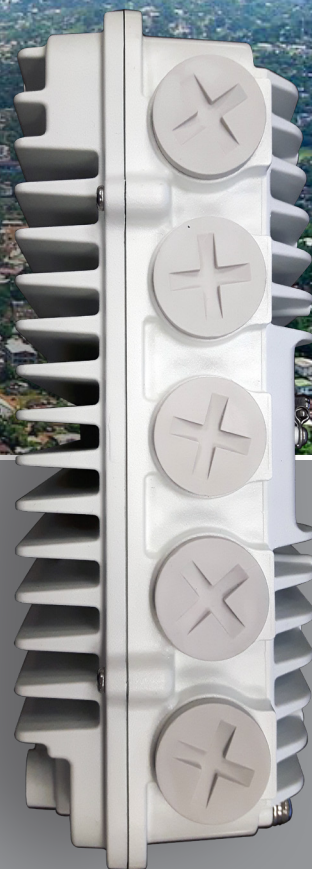
CASE STUDY

HOW AFRICELL SIERRA LEONE ENHANCED THE CAPACITY OF ITS 26 LINK BACKBONE WITH 4X4 MIMO



Africell Sierra Leone struggled with the lack of spectrum in their region and their subsequent inability to provide high capacity to their radio access network. They needed a cost-effective alternative to connecting fiber to their sites.

Aviat proposed solving the capacity constraint using MIMO technology to get the most out of the available spectrum without degrading any performance of the microwave network.



CHALLENGE

Africell Sierra Leone is a mobile network operator in West Africa with over 4 million subscribers who had just launched 4G in 2018 on their radio access network. This launch caused capacity constraints on the transport layer of their network.

Because fiber was inaccessible and microwave spectrum was scarce, there was a concern that they would be unable to obtain extra capacity on their long microwave links.

Africell Sierra Leone

A mobile network operator in West Africa with over

4M
subscribers

SOLUTION

The WTM 4200 with MIMO support was offered as a viable solution to enhance spectral efficiency and get the most out of the available microwave spectrum.

ABOUT MIMO

MIMO or Multiple-In-Multiple-Out, technology is a method for multiplying the capacity of a radio link using multiple transmission and receiving antennas to exploit multipath propagation. MIMO has been the standard in mobile RAN and Wi-Fi systems for many years, to increase throughput efficiency with limited available bandwidth. LOS MIMO uses the same techniques and applies it to point-to-point microwave.

As shown in Figure 1 below, two antennas are used at each site. One WTM 4200 is attached to each antenna, and operates in 2+0/XPIC mode, as in a regular CCDP system. The second WTM 4200 and antenna are then added to double the link capacity again to approximately 2.2 Gbps, all within the single 56 MHz channel allocation.

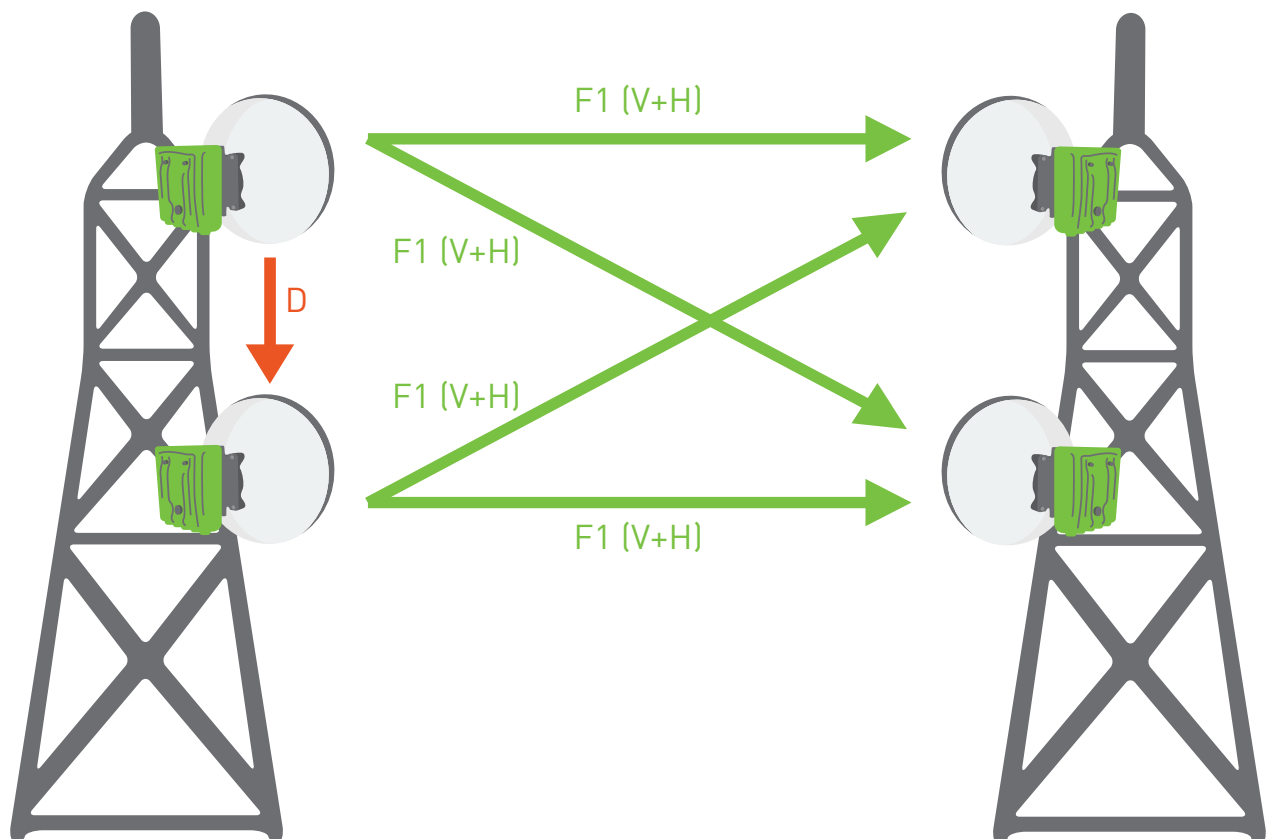
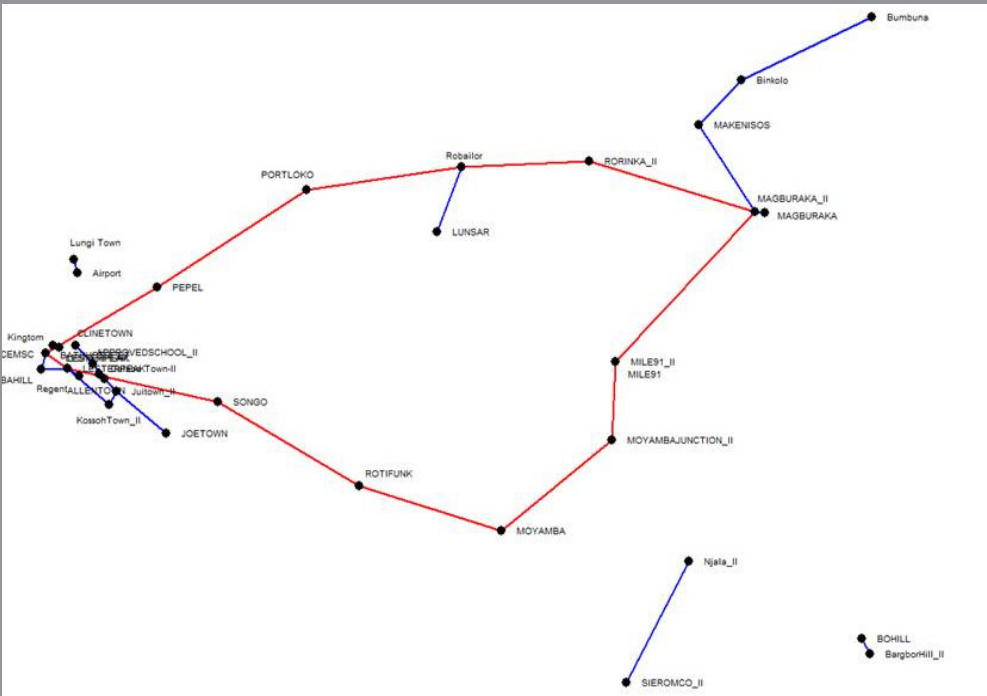


Figure 1

TAKING A CLOSER LOOK AT THE DEPLOYMENT

The MIMO links were deployed in a ring configuration around Freetown, the capital of Sierra Leone, as seen in Figure 2.



The backbone deployment consisted of **26 links** all utilizing the same 4x4 MIMO configuration.

Figure 2

The links deployed in the ring are all long distance 7 GHz links with some of the deployed links spanning greater distances than traditionally advised for MIMO, such as the link in Figure 3 which spans 40.5 km. With the high system gain of the WTM 4200, the link can perform at 1024 QAM delivering 2.2 Gbps from a single 56 MHz channel.

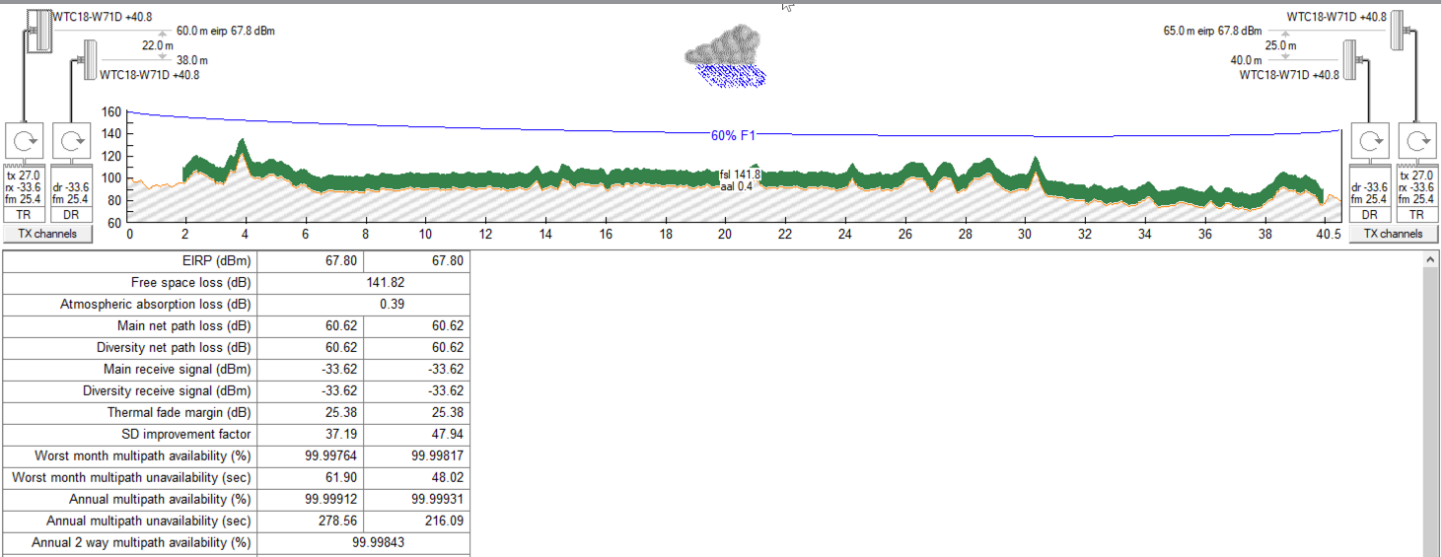


Figure 3

MIMO requires precise antenna separation to function optimally, as seen in Figure 4.

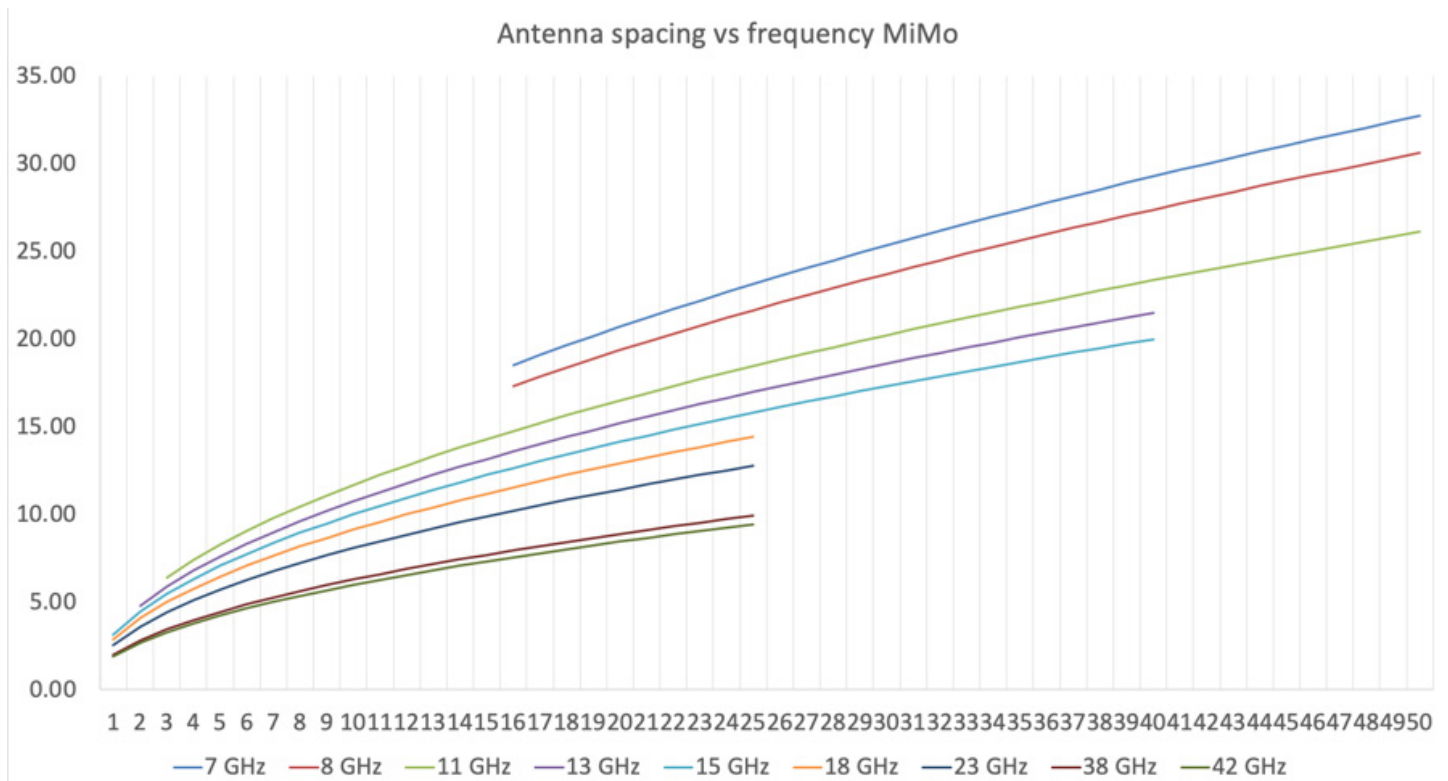


Figure 4

The MIMO link performed as planned, as seen in Figure 5.

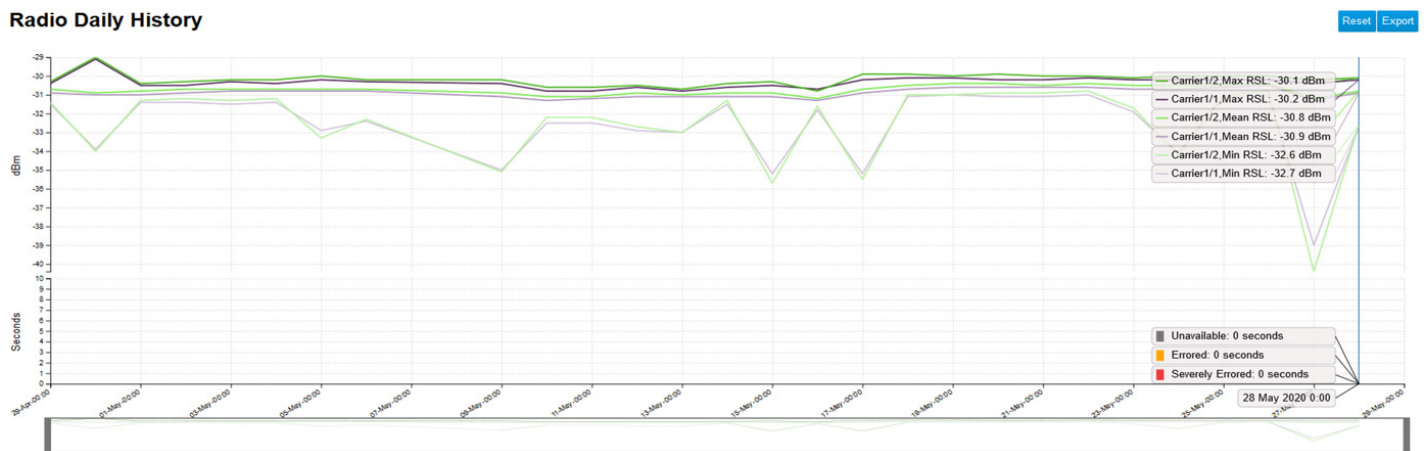
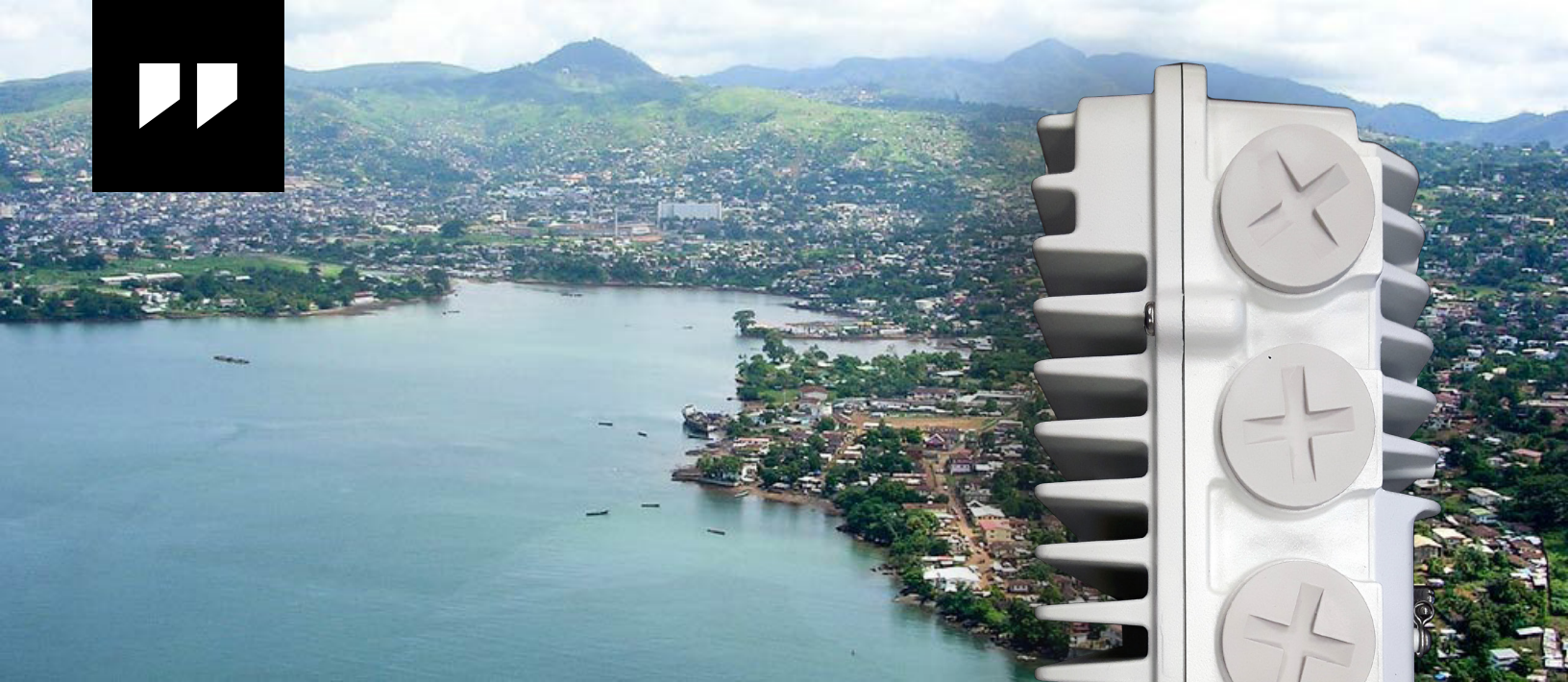


Figure 5

CONCLUSION

Africell Sierra Leone was able to successfully deploy 4x4 MIMO on WTM 4200 to solve their capacity constraints on a long link. Utilizing a single 56 MHz channel, they were able to gain 2.2 Gbps of capacity. This example shows that LOS MIMO, when combined with the exceptional system gain of the WTM 4200, is the best solution for this scenario.



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