



Why it is time to tackle RAN congestion with machine learning (Reader Forum)

By [Matt Halligan, CTO and Head of Engineering, Openwave Mobility](#) on MARCH 6, 2019

MWC 2019 was peppered with artificial intelligence (AI) robots and references to machine learning (ML) across the various halls. For a show aimed at mobile operators, very few of those applications of AI and ML actually impact the network. The Radio Access Network (RAN), which can make or break subscriber Quality of Experience (QoE), was almost void of any AI solutions.

Tackling congestion in RAN has always been an essential element in managing a wireless network. Today, however, operators are finding it increasingly challenging, especially in light of the advent of 5G.

Many operators will currently be heavily involved in preparing the architecture for their own upcoming 5G networks. But, as they do so, and as the demand of their subscribers for ever more data continues to grow, their 4G networks – and 4G RAN in particular – will begin to burst at the seams. Quality of Experience (QoE), the measure of customer satisfaction, will suffer as a result.

To reduce potential impact of this congestion on QoE, operators must therefore employ efficient, cost-effective solutions to ease this congestion as they manage their existing 4G networks while simultaneously laying the groundwork for 5G.

Video revolution

RAN congestion will affect the QoE of video streaming in particular, with users typically gauging the quality of a network based on their video experience. In recent years, mobile video traffic has grown at a phenomenal rate, with regularly unpredictable peaks, often during live occasions such as sporting events. During the 2018 World Cup, for example, data consumption during a match was found to be twice as high as any “busy hour” for the remainder of the year.

The [Mobile Video Industry Council](#) predicts that video will reach 90 percent once 5G is established. What's more, over the same period, VR and AR traffic is expected to increase 12-fold. When you add the demands of encrypted OTT traffic into the mix, and consider that, since 2015, growth in mobile video has come significantly as a result of a move to HD content, which requires up to four times more bandwidth than standard video, the scale of the issue quickly becomes clear.

The important question, therefore, is what can be done to alleviate the congestion this huge demand for data could cause.

Applying machine learning

Video optimization is a key factor in helping operators enhance the capacity of 4G RAN, and ensuring good QoE. Given the amount of encrypted HD and UHD traffic flowing across the network, however, optimizing the video content alone is no longer enough.

There are a number of RAN congestion management solutions on the market. Traditionally, though, they tend to require manual configuration of static values such as peak times or congested cells – some may require the use of external RAN probes. Advances in AI and machine learning technology, however, mean that operators now have the ability to dynamically detect and even predict localized congestion at each network connection point – without the need for external probes – thereby enabling them to optimize only the necessary traffic.

By monitoring IP packets on the data plane to provide network operators with a complete and clear view of congestion across the RAN, such a solution will enable them to deploy video optimization technology where required to balance radio resources. By delivering fair and consistent video quality to all users in this way, operators will not only have relieved congestion on the RAN but also enhanced subscriber QoE.

Indeed, in addition to significantly improving operational efficiency, early tests of these fully automated, machine-learning driven congestion manager solutions have already seen a 20 percent drop in congested cells during peak hours.

The streaming wars heat up

Video content on mobile has never been so popular. In the second quarter of 2018, the proportion of viewing that started on a mobile device exceeded 50 percent for the first time ever. And this year will see the launch of yet more streaming services, with Apple, WarnerMedia and Disney+ all set to join Netflix, Amazon Prime and YouTube.

While this is great news for millions of subscribers, it's a sobering prospect for the mobile operators faced with handling the huge increase in traffic and the ensuing encrypted protocols that, on a 4G network, will overwhelm the RAN and adversely impact QoE. Optimizing this traffic and managing the accompanying congestion is therefore vital in providing the best possible QoE to each and every customer.

It's worth noting too, that at a time when operators are investing heavily in 5G infrastructure, an effective RAN congestion management solution can help them to save on unnecessary additional RAN capacity, backhaul networks, or new spectrum.

The dramatic increase in traffic on mobile data networks means operators need to maximize network capacity without sacrificing the end-user experience. Applying Machine Learning and automation would be a logical next step to substantially reduce RAN congestion, maintain QoE, and balance efficiencies and costs during what is a particularly disruptive time for the entire industry.

Indeed, in this new dawn for the mobile sector, it's those operators who are savvy about tackling RAN congestion while preserving CAPEX for 5G deployments that will come out on top.