All satellite solutions deliver the same mobile broadband experience!

By Richard Swardh, Senior Vice President, MNO for Comtech EF Data

The third piece in my myth buster series focuses on the notion that all satellite bandwidth delivers the same network performance when used for mobile backhaul. In today's competitive landscape, it is not uncommon to read about satellite ground infrastructure providers, operators or integrators, marketing backhaul services to mobile operators claiming that all satellite solutions are basically equal and deliver similar levels of performance. But that is not always the case. The impression that 1Mbps from one satellite platform is always equal to 1Mbps from another platform does not hold true when you look beyond the physical layer and start to look at the application the transmission is actually there to support.

As I wrote in my first myth buster piece, "Challenging Perceptions" (see the May/June issue of Satellite Evolution), it is important in any mobile network design to first and foremost look at the application to be used end-to-end and then choose what underlying transmission technology has the capability to support the service in the most efficient way. In the case of mobile backhaul, this goes beyond looking at just megabits per second on the transmission link between the base station and the core network. Instead, it focuses on how the mobile services as experienced by the consumer are actually working and meeting the expectations of the end user. This holistic end-to-end approach goes beyond just looking at data sheets and rate cards and instead, has a deep understanding of mobile network protocols and Quality of Experience as a center piece.

Being a mobile network executive is a very demanding job and there are many things that can keep you up at night. Not only are you tasked to stay

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ahead of the latest technology trends like software defined networking, virtualization and 5G, but also be up to date on new applications and the constant threat to the bottom line from over the top (OTT) services. In addition to this, you are tasked with growing and scaling your network cost efficiently with the highest degree of quality while you cater to an explosion in mobile data services. And, you are asked to do all of this while there is also ongoing, intense competition for new customers based on price, speed and network quality.

It is a well-known fact in the mobile industry that how a customer perceives the network performance on his/her smartphone greatly affects the perception of the mobile network operator (MNO) delivering the service. There is also a direct correlation between customer satisfaction, churn and profitability. All MNOs understand this well, and it is therefore a common practice to have performance bonuses of senior executives tied to network quality.

As highlighted by McKinsey & Company in their report "Everywhere, all the time, really fast: The importance of network quality," the use of smartphones and the rise of mobile broadband make network quality a key topic as data-savvy customers increasingly select their carriers based on network coverage and speed. Price remains the most important factor for customers when selecting a mobile plan, but of the 11 decision factors used in a McKinsey consumer survey, network quality now occupies spots 2 through 5.

Key performance indicators

To be able to drive a mobile network to maximum efficiency and provide the best Quality of Experience to end users, there are a few Key Performance Indicators (KPI) that mobile network executives like to closely watch. In the case of satellite backhaul and 3G networks in particular, one such KPI is Radio Resource Control (RRC) Accessibility Rate. In a mobile network with fiber or microwave based backhaul, the goal of this parameter is 100 percent. When the RRC Accessibility Rate KPI is not meeting this expectation, Quality of Experience for end users goes down and re-transmissions start to occur in the backhaul. This translates to loss of revenue for the mobile operator and a decrease in customer satisfaction. For more details on this behaviour, I encourage you to read this white paper: *Performance Challenge of 3G over Satellite - Methods for Increasing Revenue & Quality of Experience.*

But, mobile network operators are not the only ones taking a keen interest in KPIs. Telecom regulators across the world keep a watchful eye on how mobile networks perform, and in many countries spectrum licenses that MNOs need to provide their services are tied to meeting a certain performance criteria. These regulations usually follow a model where there is an element of network coverage required, as well as KPI targets for call completion rate and throughput. The RRC Accessibility Rate plays an important role here. If these KPIs are not met, the MNO is in violation of the terms of the license and the Regulator may hand out a hefty fine, revoke the license or in some cases even imprison MNO executives! See reference 1, 2 and 3 for recent examples of regulators enforcing these rules in Africa, Asia as well as Latin America.

The bandwidth sharing technology used in Comtech EF Data's Heights Networking Platform is based on SCPC technology that is an assured access technology. When using Heights, jitter and latency is kept at a minimum and the RRC Accessibility Rate KPI will come very close to its 100 percent target. However, shared access technologies like TDMA cannot meet the same KPI target because of its additional jitter and latency. The reason for this is that TDMA uses a time plan to send information, i.e. data has to wait for a time slot to be transmitted which introduces variable delay. Furthermore, if the data does not fit in an assigned frame in a given time slot, a segmentation and reassembly (SAR) process is invoked causing further jitter and delay.

The difference between the Heights Networking Platform's jitter of less than 10ms and TDMA's much higher jitter may sound insignificant and is many times overlooked. However, it represents a significant difference in how a mobile network actually performs.

Over the past year, Comtech EF Data has collected statistics from mobile operators all over the world running hundreds of sites backhauled over satellite using both competitors' solutions, as well as Comtech's. Due to the confidential nature of the

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information, we cannot provide names and exact details. However, the examples are based on actual and recent measurements from mobile operators running production Comtech and TDMA networks under load with real customer traffic.

Example 1 – Mobile Network Operator running a 3G base station over satellite using Comtech equipment:

- The RRC Accessibility Success Rate is around 99.95 percent.
- In simplistic terms, this can be translated to 1 out of 2,000 voice or data call attempts fail to be set up.
- This is an acceptable performance according to most mobile network operators.

Example 2 – The same Mobile Network Operator as example 1 with a 3G base station connected via TDMA vendor 1:

- The RRC Accessibility Rate KPI is around 96.5 percent on average.
- In simplistic terms, this can be translated to 1 out of 28 voice or data attempts fail with TDMA.
- This, of course, will result in a considerable reduction in end users' Quality of Experience beyond what many mobile network operators find acceptable.

Example 3 – Asian based Mobile Network Operator running a 3G base station over TDMA vendor 2:

- The RRC Accessibility Rate KPI is 70 percent on average and this is far outside any acceptable level of performance.
- Needless to say, and after much regret, this mobile network operator closed down the TDMA solution and moved to SCPC.

Example 4 – Middle Eastern based Mobile Network Operator adding 3G base stations to an existing 2G network over TDMA vendor 3:

- The RRC Accessibility Rate KPI is 65.9 percent on average for the 3G traffic.
- Solution being moved to Heights to fulfill both 2G and 3G KPIs.

While most satellite backhaul solutions appear to deliver a similar service on paper, the examples above clearly demonstrate that not all satellite technologies can deliver the same network performance when used for mobile backhaul. The technical specifications developed by 3GPP and used in mobile networks are not designed with satellite in mind and many of them are very sensitive to latency and jitter, especially when it involves delivering 3G services. The negative impact of jitter is real as shown in the difference in RRC Accessibility Rate KPI and poor performance reflects badly on everyone. Comtech's solution has been designed with this challenge in mind and are well suited to deliver the superior mobile network performance needed to achieve happy end users who are satisfied with their mobile service experience and stay loyal to their mobile operator. Satellite service providers and integrators that understand this will keep a competitive edge and retain more satisfied customers who keep coming back for more all while enabling the MNO to satisfy the terms of the mobile license as set forward by the Telecom Regulator. ■
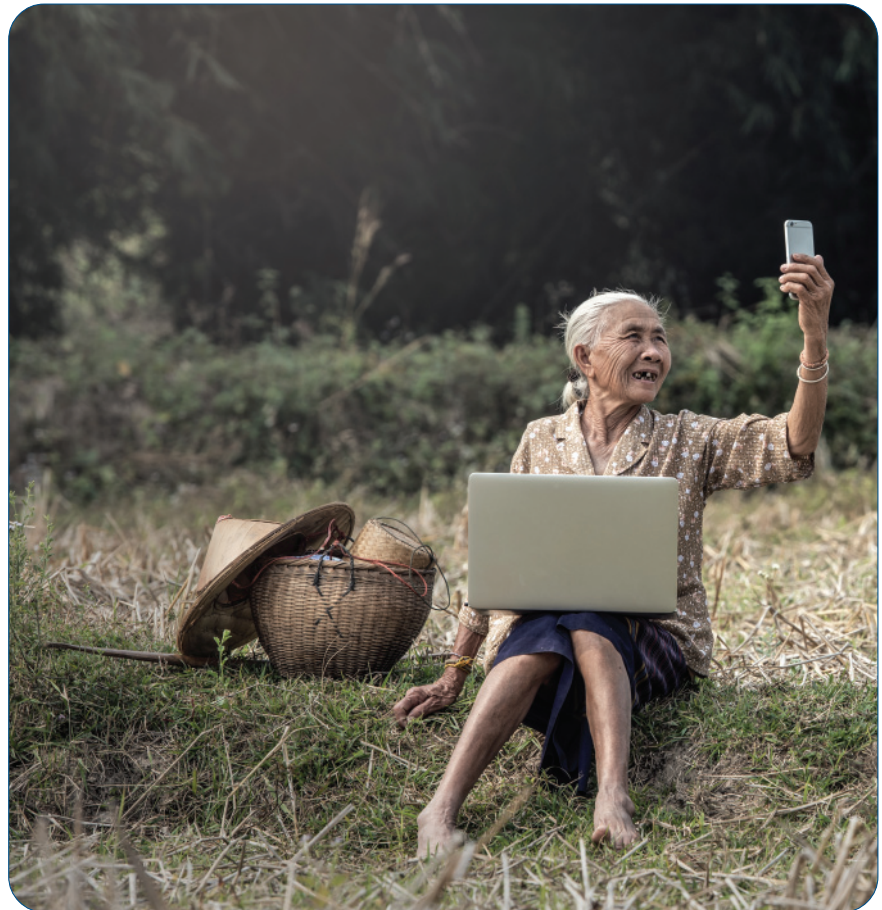

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