

Making Mobile Networks As Diverse As The Experiences They Deliver

By Nery Strasman

It's the first day of 2014, a work day here in Israel. I used Waze to navigate my way around traffic and get to the office. Waiting for the elevator, I watched the highlights of Maccabi Tel Aviv's recent two-point basketball victory. While walking through the office, I called my wife to check on our dinner plans for this evening. She reminded me that I had to submit some funds for our son's school trip, which I took care of on the spot with a banking app.

As you've probably surmised, I did all of these things on my smartphone. Were today the first day of 2007 instead of 2014, the call with my wife is about as far as my mobile phone could have taken me. The rest would have involved radio traffic reports, keeping a newspaper tucked under my arm and a bank visit. Those would have been less efficient and generally less rich, effective and personalized experiences. Today, it's all more natural. My phone is even working when I'm not, often automatically updating apps or syncing information for me in the background.

Most in the industry are familiar with the statistics of growing network use and traffic that emanate from such increasingly mobile lifestyles. Operators are making aggressive network investments to keep up with the use of global data services which will exceed five exabytes monthly this year. According to HIS iSuppli Smartphones & Converged Devices Market Tracker [report](#), 2014 will



also see more than 300 million users served by LTE networks, less than just five years since the technology launched commercially. Despite best efforts, it has become commonplace for networks to be fully-utilized almost as fast as they go up.

With good reason, operators are looking for more sustainable ways to invest. An important component is finding better ways to support the diversity of user experiences, such as mine this morning. I engaged with graphical, video, voice and data content. Some of it live and some of it stored. Some if it pushed to me and some of it responding to my interactions. Some for my immediate consumption and some, like app updates, awaiting my later discovery. There are differences in my sensitivity to how these experiences are delivered. For management of scarce network resources, consideration of these differences can drive more efficient use of the resources already in place and investments already made.

Fulfilling this opportunity involves a change in mindset from the mobile legacy. Many networks are architected with a focus on delivering reliable voice communications, which has been the main purpose of mobile services for most of their histories. In fact, it is still common for operators to assess overall network performance largely on those sorts of key performance indicators (KPIs) – whether calls connect, whether they stay connected and how voice quality sounds.



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Those are worthy goals, but such KPIs apply to a shrinking minority of the most important usage during this new year when [revenues from data services are expected to surpass voice revenues](#) for the first time in both the U.S. and the UK. Using Waze isn't based on my connecting to a specific end user; accessing a video that buffers while streaming doesn't have the same sorts of disconnection sensitivity as a phone call, and my banking app simply works or fails in completing the desired transaction. As long as the transmissions happen reasonably quickly, I'm happy. On the other hand, app updating processes are not something I'm measuring from a speed perspective. Historically, every mobile user demanded great call quality. When it comes to data experiences, we're more demanding in some instances than others. Of course, it can quickly become highly capital intensive and increasingly technologically complex to support growing usage that includes such expanding diversity by simply adding capacity to mobile networks.

This approach fails to take advantage of the different delivery requirements of the traffic mix.

Best performance on today's mobile networks with their heterogeneous usage calls on a parallel mix of heterogeneous disciplines. Voice

technologies and practices should be complemented with application of data and video technologies and practices. There should be strong comprehension of all sorts of networked applications in addition to phone calls. There are lessons to be learned from multiple types of networks including those that have driven the onset of IP applications and those that propagate high-quality video programming.

There are decades of well-honed practice in a field like Ethernet about how to determine and apply policies that assure the traffic with greatest user sensitivity is delivered with the right quality of service (QoS) when there's bandwidth contention. Cable and satellite systems multiplex together digital video streams taking statistical advantage of their variable bit-rate nature to assure stream availability at the best possible quality. There's important distinctive expertise from the mobile realm to combine with these, such as the variability in a cell's capacity as devices start and stop sessions, move, and enter and exit.

The key is to apply these various disciplines at the network's edge where the core meets the RAN (radio access network). This is where all of these different media and services come together in a large multiplex of traffic. It is also where the radio-frequency spectrum licensed by the particular mobile operator becomes the governor of capacity, bringing on sporadic congestion challenges. These come from various events such as a couple of large downloads, a group of people simultaneously getting online after breaking from some other activity they were doing together, or when reception conditions for one session suddenly degrade and the network changes allocations among all the other users in the same cell to compensate. Such occurrences could result in a reduction of the overall respective cell capacity.

The RAN is where capacity expansion has tended to be most brute force and expensive, but the edge is where

more clever approaches can extend lives of RAN investments already made. A holistic, edge-based approach to mobile networking, considering all of the applications and media within traffic, can address today's rising challenges.

An example of a trade-off to leverage

is determining and maintaining minimum delivery bit rates for streaming video, to ensure that there are no stalls or freezes. When necessary, extra capacity can be diverted towards browsing and interactive applications to assure low latency. When possible, adding that extra capacity back to streaming video can be done to maximize quality. So, my basketball highlights will always play smoothly, and the resolution will be pristine when possible, as long as that doesn't delay the vital delivery of street traffic information to someone else.

Sensitivity to increasingly heterogeneous mobile network traffic should also evolve industry approaches to reporting and analysis from the dominance of voice KPIs. For streaming, lacks of freezes and interruptions are important to track, including amount of time that at least minimum quality levels are met as well as how frequently higher quality levels are met. For browsing and interactive applications, latency thresholds should be determined and tracked. Prioritizations across these different kinds of

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traffic can drive preferences for which ones should most exceed these threshold levels when capacity allows.

Intelligence across multiple types of applications and media, including the techniques used in networks that have historically delivered them, can come together for a new era of mobile network management. The results are better use of investments already made for capital efficiency today and insightful analysis of performance to guide better decisions going forward.