

Mobile video traffic: Alleviating the capacity crunch

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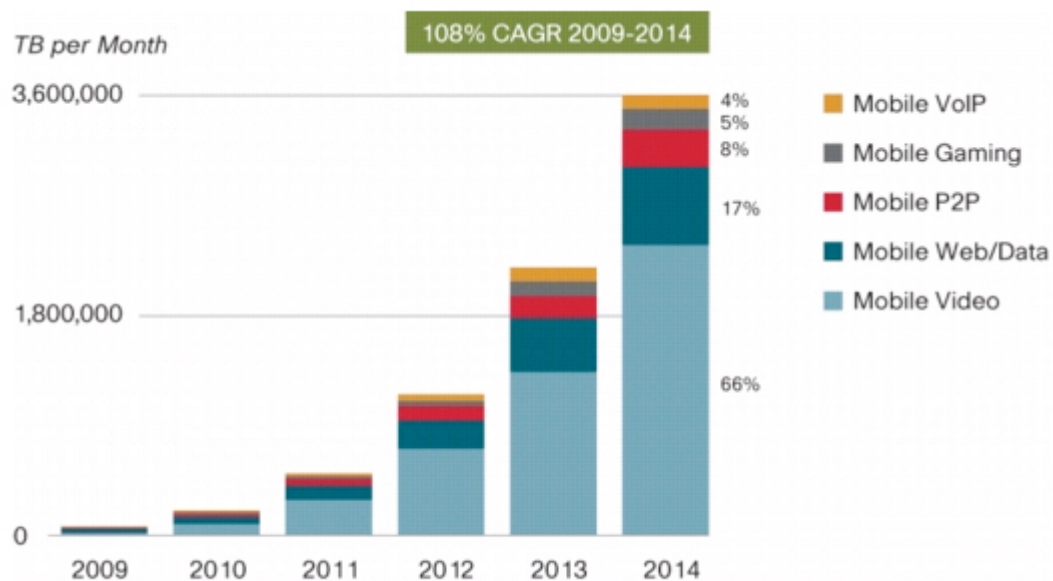
By: *Phil Goldstein*



Hulu, the online service that lets customers access their favorite TV shows from their computer, just went mobile. The company [recently announced](#) [1] that its Hulu Plus service, which comes with a \$9.99 monthly subscription fee, will now allow users to stream TV shows over 3G networks to Apple's ([NASDAQ:AAPL](#) [2]) iPad and iPhone.

This is just the latest example of high-quality video content migrating to mobile. The trend is forcing wireless carriers to turn to video optimization and compression technologies to manage data traffic from YouTube, Hulu and other video providers--an issue that is only going to get more urgent in the coming months and years.

According to [Cisco's Visual Network Index](#) [3] report from February, mobile data traffic will double every year through 2014 worldwide, and in 2014 video is forecast to make up 66 percent of all mobile data traffic. In addition, research firm the Yankee Group reports that the number of global mobile video/TV users will jump from roughly 250 million in 2010 to around 450 million users in 2014.



Cisco forecasts video will account for 66 percent of global mobile data traffic by 2014.

"They [wireless carriers] are addressing this as they feel the pain, specifically with network management and optimization solutions from third parties," said Fritz Jordan, an analyst at ABI Research. "They're band-aiding 3G networks for services the networks weren't even created for."

A perfect storm

Video on mobile is nothing new, of course. Sprint Nextel ([NYSE:S](#) [4]) was an early pioneer of mobile TV with its GoTV service, and carriers have for years promoted their own branded mobile video services, like Verizon Wireless' ([NYSE:VZ](#) [5]) [V Cast](#) [6], [Sprint TV](#) [7] and AT&T Mobility's [Mobile Video](#) [8] service (formerly called CV).

What has changed over time is the rate of innovation in devices, the advances of mobile broadband networks and the proliferation of high-quality video content across the mobile Web.

"It's a perfect storm of three dimensions," said Marc Zionts, the CEO of Ortiva, a vendor that specializes in video optimization. "It definitely intersects the movement from a wired world to a wireless world."

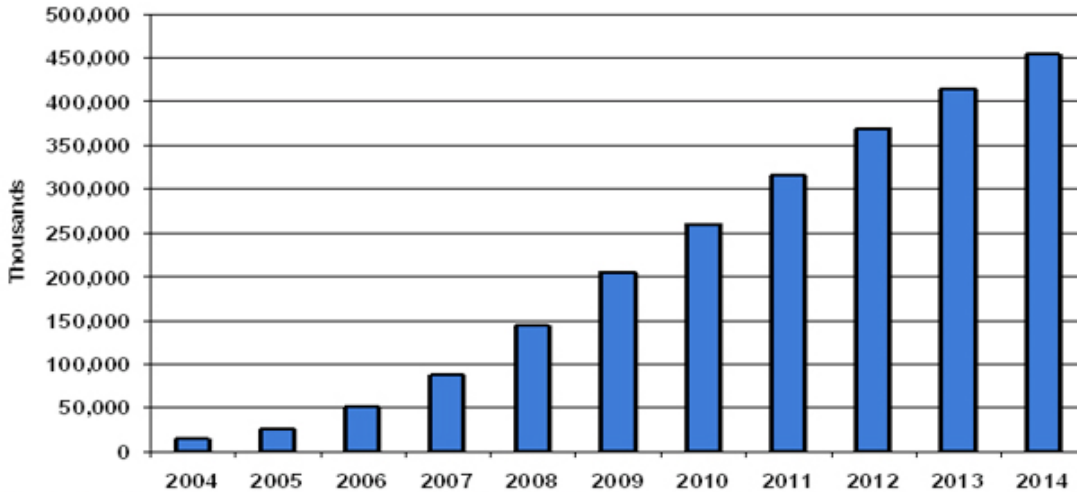
Carriers seem to understand the challenge, and carrier representatives acknowledged they will have to dig into their arsenal of tools and solutions to continue to deliver high-quality video offerings amid dramatic increases in demand for data.

"Delivering video over wireless networks is one of the most challenging issues we face," said Colson Hillier, executive director of mobile video products at Verizon Wireless. "There's multiple places the experience can be impacted, either positively or negatively."

Hillier said Verizon expects video will become a "material" part of traffic on its network, and that within 24 months it could account for the majority of traffic.

Mathew Oommen, Sprint's vice president for technology development and strategy, said the growth of mobile video traffic presents both a challenge and an opportunity. He said Sprint does not necessarily look at optimizing video as a way to deliver network efficiencies and capital savings--though that is obviously a large part of Sprint's motivation.

"We look at it as a way to enhance quality of experience, and through that process enhancing effective network utilization," he said.



The Yankee Group forecasts the number of mobile video/TV users will blossom to more than 450 million by 2014.

Terry Cudmore, an analyst at the Yankee Group, succinctly summed up the Catch-22 operators face with mobile video: "Carriers are trying to get synched up to these great devices that are going to give the customers a great experience. But at the same time that user experience is what's clogging up the network."

Tools in the toolbox

There are numerous methods carriers can use to tackle mobile video and deliver high-quality, low-bandwidth experiences. Each solution, though, has its own complexities and, as many vendors and analysts noted, there is no single solution that effectively deals with the issue.

"Most operators need to look at it in a holistic fashion," said Patrick Lopez, the CMO of Vantrix, another video optimization company. "They need to put in place a number of mechanisms. The problem is that every month that they are not doing something about it, the problem continues to increase."

Here is a quick breakdown of some of the solutions carriers are employing:

Adaptive streaming

The majority of mobile video traffic--67 percent, according to Vantrix's Lopez--is accomplished via HTTP progressive streaming or download. This basically means that once a request for a video is made, the user can begin playing the clip before the download has completed. This approach is simple, but not very efficient for the network.

Adaptive streaming, by contrast, is essentially a handshake between the content and the device that has a mechanism to determine both the quality and speed of the network. In theory, this approach--which is not yet widely used--allows the device to better align a video presentation to actual network conditions. "We are expecting a strategic shift in terms of how this content is going to be encoded, both by the content owners and how it is going to be rendered by

	<p>clients,” said Sprint’s Oommen. “It’s win-win for the customer as well as win-win for the network.”</p> <p>The problem with adaptive streaming is that there is no single defined standard for the technology: Adobe, Apple and Microsoft each have their own approach. “Even with adaptive streaming, the devices are not adjusting bandwidth conditions in real time,” said Ram Venketaramani, a product marketing manager at Openwave, which specializes in data analytics and optimization. “They’re always lagging the actual network conditions.”</p>
Bit-rate throttling	<p>One solution that Vantrix is pushing is bit-rate throttling, which essentially downloads video proportionally to the video encoding. So, for example, a five-minute video encoded at 1 Mbps can take about a minute to download. Lopez said that, sometimes, more than 50 percent of users will stop watching the video within first minute, meaning the network will have downloaded the full five-minute video and fully 80 percent of that video was not watched. Thus, the technique reduces network traffic by not delivering content that will not be watched by the subscriber. The drawback? It works in tandem with the more network-intensive HTTP streaming.</p>
Transcoding and optimization techniques	<p>There are numerous optimization, transcoding, transrating and compression methods. One, which Vantrix employs, re-encodes video proportionally to the bit rate of the download, which Lopez said “can actually guarantee you’re going to increase the user experience without the buffering.” Another method that Openwave uses is called a constant quantization algorithm, which, as it compresses video, increases how much spatial detail is saved for high-motion video frames while decreasing it for low-motion video frames. The upshot? “Even after compression, the end-user will have a very, very good quality of experience,” Openwave’s Venketaramani said.</p>
Smart caching	<p>Still another tool is smart caching, which basically allows for the storage of the source media as well for storage of transcoded versions of the video. This tool pre-fetches and buffers a video at the edge of the network and allows users to play the video when they establish a network connection. Essentially, the video is already queued up for the user, and saves on backhaul and radio-access network costs. "Hierarchical caching structure is going to be a key ingredient going forward for mobile networks," Venketaramani predicted.</p>

Each of these approaches is intended to address a problem clearly in the making: When Verizon launched the Motorola ([NYSE:MOT](#) [9]) Droid X in June, the carrier highlighted the phone's video capabilities as well as a [content deal allowing users to rent and buy movies from Blockbuster via the gadget](#) [10]. Carriers need to use these tools, Verizon's Hillier said, to make sure the "user experience matches expectations associated with these devices."

The bigger picture

Of course, video compression and optimization is just one part of a larger puzzle carriers must sort through as they figure out their network management policies.

"The experience of the consumer is so important, because the carrier is held accountable for the experience whether it's their problem or not, and they have to provide the capacity," Ortiva's Zions said. "It's a dual-edged sword."

Carriers, especially Sprint and Verizon, have touted their move toward next-generation networks as a key advantage. Both mobile WiMAX and LTE will deliver higher throughputs, cheaper cost-per-bits and lower latency, the carriers argue, all of which would seem to augur well for handling mobile video traffic. But the carriers themselves acknowledge wider pipes alone aren't sufficient to address the issue.

"These are all tools in the toolkit," Sprint's Oommen said. "Just going to 4G is only one component. You need optimization, compression, edge service, caching. It is not either-or."

Verizon's Hillier agreed. He said Verizon is already thinking about the move to HD video for mobile devices, and concurrent voice and data streams. "Those things make the delivery more complex, vs. less," he said.

Jordan, of ABI Research, said there is no one-size-fits-all solution to handling rising data traffic, because each carrier has a different approach and assets. AT&T ([NYSE:T](#) [11]), for example, has an extensive WiFi network that it can use to offload traffic, while Sprint does not. Still, he said, the problem remains. "If you're delivering something that is less than a quality experience, it's churn," he said.

"They're aware of what's coming," Yankee Group's Cudmore added. "Whether or not they're going find the absolute best way to deal with this--that remains to be seen."

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