

TYRANNY OF NUMBERS II

Why LTE Won't Solve The Cellular Capacity Crisis

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EXECUTIVE SUMMARY

Every year, more cellular subscribers retire their feature phones and replace them with smartphones. And subscribers with smartphones consume far more data than those with feature phones. To make matters worse, smartphone users demand more data every year.

Seen in this light, it's not hard to see what's causing the capacity crunch that has wireless carriers struggling to meet demand, and why the gap between supply and demand is growing. Fortunately, the carriers are deploying LTE, the consensus 4G implementation. That will solve everything, right?

Wrong.

LTE won't solve the problem. It won't even keep things from getting worse than they are today, when capacity is already so strained that AT&T and Verizon are alienating long-time customers by curbing bandwidth bloat with limits on so-called "unlimited" data plans.

The carriers are highly aware of the looming crisis they face. But the problem threatens to ripple far beyond them, impacting hardware and software developers, providers of cloud services – every corner of the ecosystem that depends on smartphone sales.

So what to do?

There is a solution. But it will require industry-wide cooperation, and a change in the way that the carriers handle data traffic.

CONTEXT

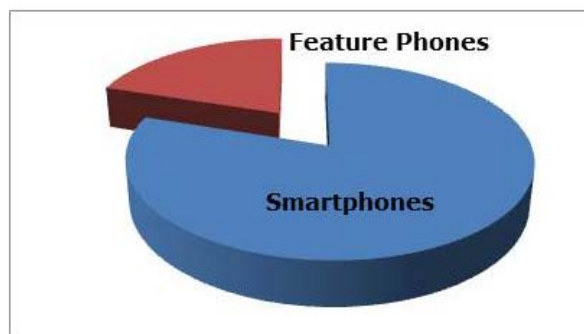
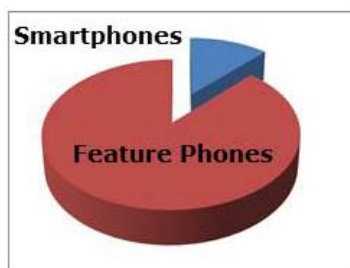
Just how bad will the capacity crunch get? Let's run through the math.

Smartphones represent 12 percent of the mobile device volume today, but 80 percent of overall data demand. That tidbit comes from Franco Bernabe, Telecom Italia's Chairman and CEO, who cited those figures in his keynote speech at Mobile World Congress in Barcelona, Spain, earlier this year.

From that, we can infer that the average smartphone consumes about 30 times more wireless bandwidth than the typical feature phone.

Cellular Data Demand

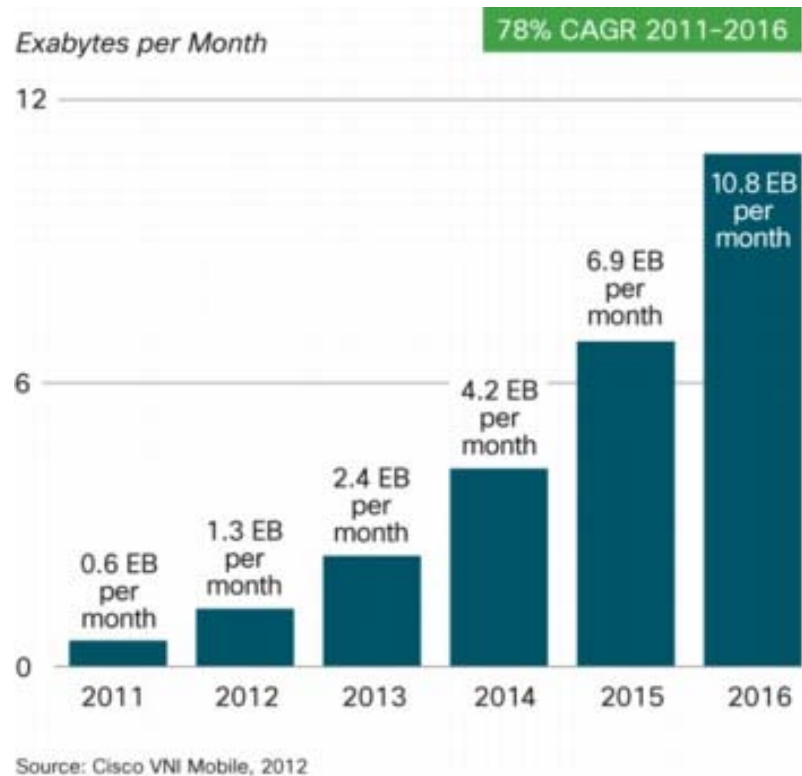
Cellular Subscribers



That disparity is widening as creative apps drive new and varied reasons to draw content from the web. A 2011 Nielsen study, for example, reported that the average American smartphone user consumed 435MB per month -- 89 percent more than the 230MB a month they consumed a year earlier.

Couple that with the growth trajectory of smartphone shipments -- Gartner says they grew 59.1 percent globally in 2011, to 472 million -- versus that of feature-phone sales, which are flat and forecasted to dip slightly over time.

With that as a backdrop, it's not hard to see why Cisco is forecasting that mobile data consumption per user will mushroom in 2016 to 18 times what it is today. Combine that with Gartner's mobile device forecast and you end up with overall data demand in 2016 of more than 26 times what it is today.



So that's the demand side.

On the supply side, LTE promises improvements in peak data rates of 30x or more over the same time period. But that's just for an individual connection. In the aggregate, capacity improvements will be far less. A study commissioned by Ofcom, which oversees the UK's airwaves, forecasts improvements in spectrum efficiency in the 3x range by 2016.

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ANALYSIS

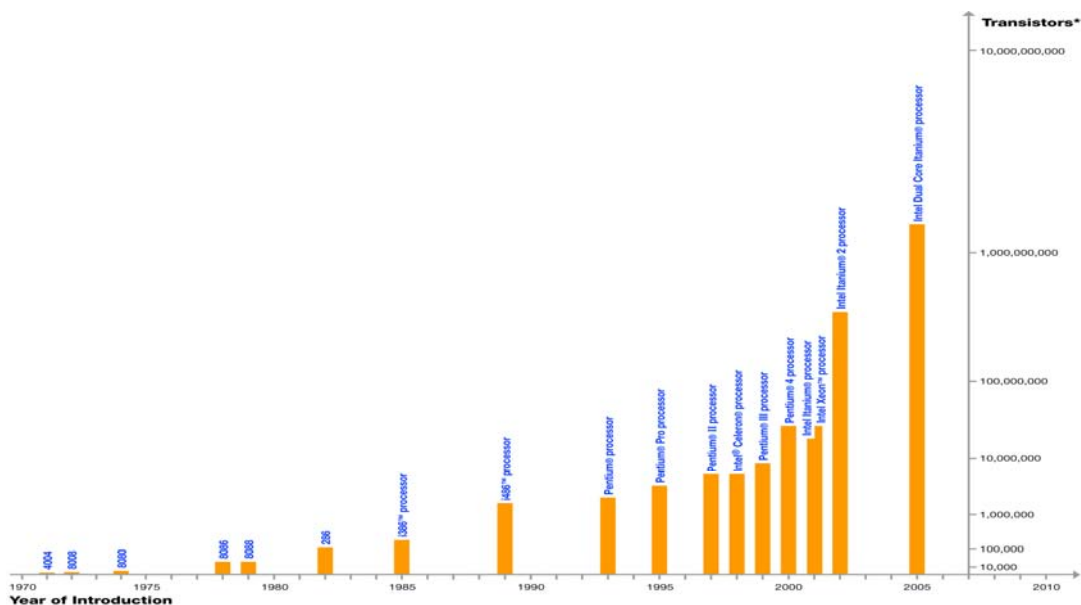
Data demand growth of 26x, but capacity growth of only 3x?

Call it the Tyranny of Numbers Two.

The original Tyranny of Numbers was the name given to the wall that the microelectronics industry was hurtling itself toward in the late 1950s. Everyone understood the math. Like the wireless industry today, the applications were progressing far faster than the plumbing was capable of supporting. Programmers contemplated ever-more complex routines that could solve ever-greater problems. But what good were these sophisticated operations if they required more real estate than the city of Barcelona and more solder than a trade school?

It was a problem solved -- independently and at roughly the same time, so the story goes -- by Bob Noyce, then of Fairchild, and TI's Jack Kilby. The solution: integrated circuits, or multiple, inter-connected electronic elements on a single chip. Like a pilot from movie "Top Gun", the chip pointed the jet skyward just a few yards ahead of the mountainside.

That new trajectory has held to this day. It's known as Moore's Law, named after Gordon Moore, the industry pioneer who first graphed the new pace of advance.



Moore, who co-founded Intel with Noyce and Andy Grove, declared decades ago that the chip industry was on a path to double the number of transistors it can place on a single chip every 18 months. It still holds true today, more than 30 years later.

Without the chip, it would probably take all of Barcelona to lay out a smartphone.

No need, though. Thanks to the innovation that broke through the Tyranny of Numbers.

So how do we break through the Tyranny of Numbers II?

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RECOMMENDATIONS

The Tyranny of Numbers II.

The carriers understand the conundrum, as they should. But in order to solve it, they're going to have to tap into the plentiful bandwidth available from the world of wired broadband. That means that they'll need to allow more of their customers' data and voice traffic to leak outside of their purview. To leak outside of their control.

That's not something they typically agree to willingly. That's for good reason. Because when it comes right down to it, the carriers are little more than the wireless counterparts of the regional Bell operating companies. And they are doing everything in their power to avoid the same path that the RBOCs have traveled. Which is to say that the carriers want to avoid having their role whittled down to little more than vessels of data, rather than owning the innovation, and controlling it. And also profiting from it.

Thus far, the carriers appear more interested in lobbying for more spectrum than in investigating more revolutionary alternatives. That's primarily because more wireless spectrum would help them retain control over the data traffic.

It's not enough. Remember 26x versus 3x?: There is not enough spectrum available to provide the capacity to fill that void.

So what to invest in? Technologies that offload the data traffic from the wireless networks. The most promising of the wireless offload options today is WiFi, because it's already so well deployed, and because it's already a standard feature in smartphones.

The carriers are slowly swallowing their reluctance to adopt WiFi. They'll need to move faster, though, because there are still some hurdles to overcome. And because data demand continues to grow unfettered.

If they don't hurry, the Tyranny of Numbers Two will kick all of us where it hurts the most: in the bottom line.

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