

Smart devices need smart networks - and smart operators

by Rajeev Suri, CEO, Nokia Siemens Networks

Few in the telecommunications sector expected the phenomenal growth of social networking sites and, based upon the traffic generated by notebooks with dongles, fewer expected the signalling that traffic smartphones would generate. No one expected that smartphone applications would take the network equivalent of 1000 short phone calls per day, or more, to keep updated. In addition, this many connections quickly drain battery power. Efficient architectures, networks optimized for smart devices and properly configured smartphones will save both signalling and energy.



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The future isn't what it used to be

Five years ago, those of us in the telecommunications industry clearly understood the importance of networks, mobile phones, the Internet, and computers. We knew we had to build out networks to meet growing demand, we could see the importance of wireless communications, and there was a growing awareness that computer social networking sites were developing. We also knew that mobile phones were rapidly moving from a business tool to an integral part of everyday life - not just in developed countries, but in the developing world as well.

But few understood or could predict the impact of smart devices (smartphones and iPads) five years ago. At that time we still believed in messaging-based communication. Who would have thought that Facebook would become one of the most popular Internet sites in existence?

The reality is that it often takes a long time for business models to catch up to technology,

and for toys and fads to be separated from true technological innovations.

Some things that were considered novelties when they were first introduced, like the automobile or television, went on to become integral parts of our lives. We have often seen inventions occur decades before they became even close to a real business. Think about the car, TV, movies, and the videocassette recorder. Although smart devices have been around for two decades (a prototype was introduced by IBM in 1992 at the COMDEX trade show), a relatively recent confluence of technological advancements (faster and smaller microprocessors, better screens, and longer lasting batteries), combined with a younger, more sophisticated user, has driven rapid smart device adoption over the last three years.

Network traffic explosion and customer expectations

There are some 400 million smart device users in the world today. This proliferation, along

with the rapid increase of computer social networking sites such as MySpace, Facebook, Bebo, and Twitter, has created a real challenge for the telecom and networking industries, the magnitude of which few saw coming. In many mobile broadband networks the annual data volume growth rate has been 3- to 4-fold (in some even 5-fold), even though real 'broad' band isn't yet available.

In spite of this huge growth in data, people demand a seamless communication experience, no matter what kind of device they own. The usage patterns of some of our newer end-users have taken some of us by surprise. According to a recent study by Pew Research, a typical 21-year-old in the United States entering the workforce today has played video games for 5000 hours, exchanged 250,000 e-mails, instant messages and phone text messages, has 10,000 hours of cell phone use and has spent 3,500 hours online. If you just calculate the cell phone time on eight-hour workdays, this is equivalent to over four years of constant talk time. The study also stated that communication patterns

of an average young American are not very different from an average young European or Chinese people. These are our future customers and we can expect them to have high demands and high expectations.

Then came the smart devices

Until relatively recently, the mobile broadband industry has been focusing on providing laptop and dongle users with simple data capacity. But the arrival of the iPhone and other smart devices ushered in a brand new world of usage - now people were able to use applications that were always connected to the network and stay in touch with friends via instant messaging, Facebook, and other universally popular applications. At first, operators were pleased when they saw that smart devices were, on average, generating only about one-sixth of the data traffic that laptops were.

Then the trouble started. End-users in the US and Europe began complaining that the quality of their voice and data services had diminished. In some densely populated cities, this issue was particularly obvious, and the end-user complaints particularly loud. Analysis of the network traffic showed that smart devices were the problem. We have learned that the most popular applications used on smart devices can take up to the equivalent of 1000 short phone calls per day to keep updated - and in some cases considerably more than that. Some networks became seriously overloaded in 2009 after the launch of some popular smart devices.

Smart devices don't behave smartly in networks. But how could that be? If the average smart device generates one-sixth of the traffic of a laptop, how can it degrade the quality of an entire network? End-users were also bitter about how short the battery life of smart devices seemed to be.

The answer lies in the different ways that laptops and smart devices are used and how they behave in the network. Laptops consume large amounts of mobile data in big chunks as users browse Web pages or download files. Smart devices, on the other hand, make many small connections to the network, carrying small amounts of data each time. Some push e-mail applications, for example, and can be set to look for new e-mails as often as every 30 seconds, generating many connections to the network, but not much data. Each time any device connects to the network, no matter how much data is involved, there is background-signalling traffic that opens and closes the data session.

All those little pings to the network, looking for the latest MySpace update or instant message,

combined with always-on applications, generate signalling traffic that is, on average, eight times as much as laptops generate. While operators were dimensioning their networks to cope with large amounts of laptop-generated data, no one was planning their networks to cope with large amounts of signalling traffic. When the network elements that handle signalling traffic overload they are no longer able to handle additional data or voice calls - thus leading to the significant degradation of quality seen in many smart device-heavy operator networks globally.

In addition, each connection requires battery power. An application that sends one 'keep alive' message every minute uses the same battery power in eight hours as keeping a handset's backlight on for a full hour - and that is a real power-eater! The more connection setups, the shorter the battery life.

What can be done?

It is a cliché in the telecom industry to say that operators are just becoming dumb pipe providers. In reality, handling the traffic caused by smart devices requires a lot of intelligence in the network. Simply put, smart devices require smart networks.

There are several ways to make networks smarter

First, there are certain radio network features that can help smart devices have a longer battery life and generate less signalling traffic. These features are built into the standards, so it is just a question of the network vendor implementing them in their products. If all devices allowed the networks to use these features, the signalling load on the network would be drastically reduced, and reduced signalling traffic directly translates to savings in radio network hardware for the operator.

Second, network elements should be designed so that the capacity is scalable to match the requirements of the network traffic. If capacity is allocated smartly, there are fewer congested bottlenecks.

Third, choosing the right network architecture can further improve network operator efficiency and the overall end-user experience. So-called flat architectures, with a reduced number of network elements, help set up network connections faster and reduce the delay experienced by end-users between pressing a button and seeing the response. Thus applications originally designed for the fixed Internet can connect quickly and be used more efficiently on mobile devices as well.

All in all, choosing efficient architectures and smart software features results in networks optimized for smart devices that are cheaper to build, simpler to upgrade and that use less energy.

There are also individual network solutions, such as ensuring that smart devices have the right settings. Without the right data settings on a phone, a consumer can't connect to the Internet at all. This is not only frustrating for the consumer, but is also expensive for the operator, as calls about incorrect settings can generate 20 per cent or more of all customer care calls. In addition, incorrect settings can generate large amounts of unproductive signalling traffic. One operator found that a single smart device with incorrect settings polled e-mail 25,000 times a month - all of it unnecessarily. Implementing an automated data setting correction solution reduced signalling traffic by 85 per cent overnight.

A never-ending job

Network planning and optimization play key roles in the mobile browsing experience. The two most frequently performed activities on the mobile Internet are browsing the Web and reading e-mails, according to a recent global survey. One respondent found that when they improved the download speed of their mobile Internet service, users stayed online longer, viewed more pages, and data revenues doubled in only three months.

We shouldn't forget the business model when thinking of the requirements to support a successful customer experience. Operators can act smartly by leveraging the data they have about their customer and network behaviour and by implementing the right billing models and quality of service differentiation: reinforcing fair use of flat rate packages, introducing different packages for business, VIP and best-effort users, and prioritizing the applications they use.

For the foreseeable future, creating telecommunications networks will be like painting the Golden Gate Bridge - as soon as you think you're finished, it's time to start again. Who knows what technological innovations and software applications, either invented or as yet unimagined, will affect the design and structure of our telecommunication networks ten or 20 years from now.

But we know this: we must be more nimble and more forward thinking than ever before. Networks and network operators play an important role in making smart devices smart. ●