

As delivered

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*Introduction by Phil Weiser, Professor of Law at University of Colorado and Executive Director of Silicon Flatirons Center.*

Thanks, Phil, and good morning, everyone.

I’m very happy to be part of this dialogue about imagining the Internet’s future because -- when it comes right down to it -- that’s basically what I do for a living. I’ve been in this business for some 35 years and, over that time, I’ve seen firsthand the dynamic relationship between network investment, technology innovation and economic growth. With broadband speeds doubling every 20 months or so, every advance in network capacity brings equally amazing advances in applications, services and equipment. And every day, our customers find new ways to use technology to make their lives more convenient, productive and creative.

Over the course of my career, I’ve watched digital technologies give birth to three multi-billion-dollar industries – wireless, broadband and cable. I believe the next generation of ultra-broadband networks will generate more growth and spawn more new industries, some which we’re only just beginning to envision.

My job at Verizon is to build those next-generation networks on which the Internet’s future depends.

Today, I’d like to do three things:

- Tell you how we think about network technology,
- Give you a look at our technology roadmap and the applications and services our network innovations will make possible,
- And with all the discussion going on right now of infrastructure and its role in stimulating economic growth, I will say a few words from a technologist’s perspective about public policy’s impact on network deployment.

To put it as simply as possible, Verizon believes in broadband ...

- In the home,
- On the go,
- In the office,
- Around the world.

But it's important to keep in mind that – when it comes to the future of the Internet – all broadband is not created equal.

In the old days – say, 10-15 years ago – the average customer lived in an almost exclusively analog world. They had separate devices for voice, data, music, and video, each of which was considered a stand-alone service. Digital technology has changed all that. Today's consumer may have as many as 30 digital devices in the home, most of which are networked or at least capable of sharing media in some way. As the lines between all these forms of digital content blur, customers naturally want them all to be delivered anytime, anywhere, and to whatever screen they have at hand. To complicate matters further, our customers are moving from being passive consumers of information to active participants in the creative process, through social media and other two-way uses of broadband. And as we look to the future, we see a whole new generation of web-enabled applications, high-definition services, smart devices and smart homes that will embed Internet connectivity into everything we touch.

From a network perspective, this means we need to think beyond today's broadband to "ultra"-broadband ... beyond today's wireless to "big broadband" wireless ... and beyond today's separate networks to an integrated digital environment. At Verizon, we've devoted many years' worth of intellectual and financial capital to innovation in our core networks, and we are now in the process of leapfrogging the current generation of technology to deploy the next-generation networks that will support the growth of the Internet well into the 21<sup>st</sup> century.

Let me tell you about the game-changing technology we're deploying in three areas: wireless, fiber and converged services.

As you may know, I spent a lot of my career in wireless, and we saw, early on, that mobile customers wanted to do much more than just make phone calls. So we were an early investor in CDMA, which gave us the capacity to move to an all-digital packet network. We were the first company to deploy a national 3G wireless data network, using EV-DO technology, which has allowed our customers to very effectively download music, share photos, and surf the web over their wireless phones and other devices.

Now we're revving up the innovation engine once again. Pretty soon, we won't think in terms of a wireless "phone" at all. The next generation of wireless broadband technology will be embedded into everything – from buildings to vehicles to consumer appliances to medical equipment – enabling them to be connected and communicating with one another constantly. This "machine-to-machine" communication has tremendous potential in fields as diverse as health care monitoring, energy management, logistics and security.

Verizon is preparing to lead this next phase of growth:

- Last year we successfully bid on wireless spectrum in the 700 megahertz frequency that gives us a seamless national platform for a 4<sup>th</sup>-generation wireless network.
- This year, we'll begin to put that spectrum to use. We announced our choice of LTE, or Long-Term Evolution, as our 4G wireless technology. LTE is expected to be the dominant global standard for 4G, which means seamless access for Verizon customers around the globe. We're already engaged in multiple trials of LTE technology, in partnership with Vodafone, and are actively planning to deploy an overlay network that will co-exist with our current 3G platform. In the next couple of weeks, we'll announce our LTE vendors in Barcelona, and to add them we need to be running market tests later this year.
- We also launched our Open Development Initiative to be well positioned to stimulate and benefit from the coming explosion of smart devices and machine-to-machine communications. ODI provides a mechanism for other providers to offer their products and services on the Verizon network. We now have nearly 40 devices certified for use on our network and more in the pipeline. As we move to LTE, this process will accelerate, and we are working hard to stimulate this nascent ecosystem right now. There will be more announcements in Barcelona.

Our goal is to prepare our network to be an on-ramp for the next phase of wireless innovation. With our investments in new spectrum, new technology and new operating models, Verizon is in a good position to lead the next phase of growth in wireless.

We're pursuing a similar strategy with our landline network. In fact, Verizon is one of the few last-mile providers capable of supporting the data throughput needs we see arising in the near future.

We began four years ago to deploy a network that takes fiber all the way to customers' homes and businesses. Today, our FiOS network passes more than 12 million homes and we're expanding at a rate of over 3 million homes a year. We are the leading provider of fiber-to-the-home networks in the U.S.

So what makes FiOS different from other broadband networks?

Today's customers are looking for fast Internet connections and high-definition video. FiOS can deliver both ... but then, so can other technologies. But the Internet is evolving into a two-way visual medium. Interactive capabilities are being embedded in very many digital experiences, from 3-D gaming, to video

messaging, to high-definition social networks, to new services like telework, medical imaging, distance learning, and more.

For us, the only technology capable of delivering the flexibility and speeds to meet these needs is an all-fiber solution.

Verizon's FiOS network currently delivers download speeds of 50 megabits per second, with 100 megabit speeds in trial. FiOS can also deliver equivalent upload speeds, which far surpasses what you get on a conventional asymmetrical system. This makes FiOS suitable for the high-bandwidth symmetrical services we will see in the future. Because of the way the system is designed, a fiber node connects just 32 homes – about 75 percent fewer than the average cable system – meaning much more available bandwidth for the end user and none of the “squeezing out” you see on systems that just run fiber to the neighborhood. As demand grows, we can add even more capacity through the simple addition of new wavelengths on our existing fiber – giving us a dynamic system that can keep pace with the rapid innovation in this space and continue to deliver the end-to-end experience on which Internet users depend.

I've talked about what we're doing to equip our wired and wireless networks for the 21<sup>st</sup> century. The holy grail for customer service, though, is “convergence” – that is, the integration of all these networks and digital experiences, in ways that transcend technology and make the customer experience seamless and cohesive.

The true technical solution to the challenge of convergence comes as we make the move to IMS, or IP Multimedia Subsystems, which will provide the common control and protocols for applications to work across our networks. We've been involved in the push for IMS since its inception. In 2006, we drove an initiative called “Advances in IMS,” which was executed by a task force of companies including Cisco, Lucent, Motorola, Nortel, Qualcomm and others. Our purpose was to agree upon worldwide standards for IMS that would make its deployment pragmatic for operators. I'm happy to say that we succeeded. With IMS, the customer will no longer be stranded on separate islands of technology for things like messaging, voice, or video. Instead, we'll be able to build an application once and have the network deliver it to customers wherever they need it.

Two other important points about IMS: this is the only set of standards in place – or even under development – that permits customers to access advanced IP applications while roaming between carriers anywhere in the world. Moreover, network innovation like IMS does not preclude innovation at the edge. In fact, it gives customers the ability to choose services and applications from multiple providers – even pulling pieces from Google, Verizon, Apple and others to create new applications not available from any single provider.

I hope I've painted a picture of how innovation on the infrastructure side of the industry will stimulate innovation throughout the Internet ecosystem. We think these smart, mobile, ultra-broadband networks will play a crucial role in re-igniting economic growth and addressing this country's pressing social issues such as health care and energy conservation.

As you are aware, policy-makers in Congress and the Administration are also looking at network infrastructure investment as part of their larger efforts to stimulate the economy. Now, I'm a technology guy, so I usually leave these sorts of things to you in the audience. But since technology policy is such a big part of the debate right now, I'd like to offer some observations from my CTO vantage point as to how public policy can affect – for good or ill – the technology infrastructure of the United States.

I'll make just three points.

First, for most of my career in this industry, communications policy has centered on managing scarcity. For a 100-megabit world, we need a new mind-set where the focus is on promoting capacity. The public interest can best be served by getting as much broadband in front of as many people, as quickly as possible, and ensuring that investment keeps up with demand.

Second, as I said earlier, all broadband is not created equal. If we really want to jump-start innovation and sustainable economic growth, then it matters what kind of broadband networks we build. Investment incentives that accelerate the transition to next-generation broadband, wireless or wireline, and mobile technologies will ensure that we're not building yesterday's networks for tomorrow's digital cargo.

Third, we need to keep our eyes on real customer needs, not hypothetical problems, as we develop the rules of the road for next-generation networks. This is particularly true when it comes to the highly charged issue of network management.

In the imprecise language of Washington, "network management" is sometimes used to imply the blocking or degradation of data or competing services. The reality is quite the opposite: as network engineers, it's our job to design our infrastructure to provide an optimal customer experience. In the days of the traditional voice network, that meant 100 percent uptime, excellent sound quality, and the capacity to handle all the voice traffic customers could throw at us – all at a price the customer could afford. Even in the analog world, meeting all these customer needs required that we use a variety of network management techniques to balance costs, performance and service quality.

Our task is even more challenging in the emerging IP world. Different forms of traffic from multiple providers are converging on our networks. New real-time

services such as high-definition video streaming are driving data growth and consuming bandwidth. As a result, a very small number of subscribers are responsible for a majority of the traffic on our networks, with our top 20 percent of subscribers accounting for 80 percent of downloads and a whopping 97 percent of uploads on our network. Our job is to assure that everybody in this system – big and small users, each and every service provider – gets a fair shake ... and that requires us to use some forms of network management to optimize the flow of traffic over our networks.

Of course, the best answer to bandwidth scarcity is more capacity. That is the solution, first and foremost. With our leadership in fiber and 4G, I can safely say that no one has done more to invest in increased capacity in the access network than Verizon. In fact, we engineer the FiOS network so that network management mechanisms only engage when we experience severe congestion ... meaning they're not active at all during normal network conditions, which of course is the vast majority of the time.

But even the tremendous capacity of fiber occasionally bumps up against the laws of physics. Hurricane Katrina levels New Orleans. Two million people crowd the mall in Washington DC to watch a Presidential inauguration. A passenger jet lands on the Hudson River in midtown Manhattan. For reasons mundane or monumental, networks get damaged, volumes overload the system, first responders need priority access to the airwaves. No network can be designed to deliver uninterrupted capacity under the worst-case scenario without network management – at least, not at a price anybody could afford.

We'd all like an ideal network in which bits never get slowed down, capacity is unlimited, and costs are always low. But the world we live in is more complicated. It's time we worry less about hypothetical abuses and more about the real-world needs of customers. We believe that network and applications providers can and must work together to find network-management solutions that work for the industry and for our customers, and Verizon has taken a leadership role in doing just that.

Two examples come to mind. The first is peer-to-peer networking, which accounts for around 40 percent of Internet traffic. Rather than fighting against this technology, we are focused on making it work better while reducing its impact on the network. To that end, we co-founded the P4P Working Group in 2007, which has brought together more than 60 ISPs, computer and content companies to work on the issue. Together, we have identified techniques which, in field tests, have dramatically reduced network congestion and improved the customer experience. We expect the techniques developed by our Working Group to be adopted as an Internet standard and that the concepts will be adopted by all major network and peer-to-peer providers.

The second example is our new Partner Peering Program, a service that allows content providers to connect their storage devices directly to our backbone network and bypass the traditional peering process. By cutting out the middleman and locating their content closer to the customer, we can cut down on latency, improve the customer experience and optimize the flow of traffic on our networks – a win-win for everybody concerned.

These kinds of technologically rational, pragmatic solutions will help us to meet our commitment to delivering any and all data requested by our customers, while maintaining our high standards for quality and reliability. They show that the different players in the Internet space can collaborate and cooperate to address the emerging challenges of our industry.

This isn't to say that government doesn't have a legitimate role in helping to define the public interest, establish principles, and adjudicate conflicts. If the market reveals abuses or anti-competitive actions by any player, by all means, those need to be addressed. And it's certainly of paramount interest to our industry that we respond to customers' concerns about privacy, reliability, transparency, and fairness with the utmost of respect and care.

But I think we need to guard against turning technical and business decisions into political decisions. Dynamic industries like ours require flexible solutions that can evolve and adapt to a changing environment – not rigid regulatory solutions that are one step behind the marketplace.

The interplay between investment and innovation has created the Internet as we know it today, as well as the social and economic benefits that come along with it. Going forward, the combination of smart networks, smart devices and smart applications has the potential to help jump-start our economy and open a whole new world of customer benefits. If we let the market work, keep expanding capacity, and use our technology to deliver real benefits to customers, there's no end to what the next-generation of the Internet will do for our society.

Thank you, and now I'd be glad to take your questions.

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