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Thank you, Darrell.

And hello everyone.

It's a privilege to be here, and I'm delighted to see all of you.

Like most people in our industry, I've watched with admiration as Darrell West launched the Center for Technology Innovation at Brookings.

In the short time he's been here, he's put Brookings back on the map as an important forum for discussing public policy and technology.

As Darrell has settled into Washington, he's probably learned for himself the old truism that there are three things that are impossible to find in this city:

- One, a cheap hotel room.
- Two, a legal parking spot.
- And, three --- a unanimous opinion.

Now, of course, unanimous opinions are hard to come by anywhere. And probably the last place you'd look for one is in the Internet policy space.

A few years ago, I might have agreed that even consensus is a long shot when it comes to the issue of managing broadband networks, and what constitutes "reasonable network management."

But recent developments suggest that a consensus among reasonable stakeholders may, in fact, be possible.

We've just been looking for it in all the wrong places...

The courts … the FCC … and the Congress --- All valuable institutions filled with capable, conscientious people … but few of them with the background to work out consensus on what are essentially complicated technical issues.

So over the years, lawyers and lobbyists have dominated the discussion on broadband policy. And they are generally not paid to produce consensus.

No offense to anyone here. I'm a lawyer and have done my share of politics. But that kind of experience doesn't make me, or anybody else like me, an authority on the Internet.

The Internet is a miracle – not of lobbying or politics, but of <u>engineering.</u> And this engineering is all the more miraculous for taking an immensely complex technology… and making it accessible … even to those of us who don't know a terabyte from a mosquito bite.

We can enjoy the simplicity of using broadband internet services, because the complex challenges of delivering broadband are handled by the engineers who manage our broadband networks – reliably, securely, and fairly.

- They need to accommodate the growing bandwidth needs of nearly 2 billion Internet users around the globe and thousands of new applications.
- They need to meet the practical necessity of managing traffic flows 24/7 without raising allegations of unfairness.
- They need to handle all the wonderful new applications that demand extra bandwidth and extra technical attention… and at the same time cope with some not-so-wonderful innovations, including malicious ones that can harm millions of users.
- And they need to do all of this working arm-in-arm with the business people who need to figure out how to finance these incredible networks, in the face of more demand and more competition… and these business people in turn need to convince the investment community to support making these networks bigger, faster, safer, and more sophisticated.

Every one of these challenges involves network management. They're incredibly difficult. And nobody can claim to have all the answers.

That certainly includes Comcast. We're immensely proud of our engineering and technical talent. We have a great new headquarters building in downtown Philadelphia, and fully 12 stories of that space is dedicated to housing engineers and related technologists. Nearly 40% of the entire company consists of technical personnel. That speaks volumes about how engineering-intensive our business is in the 21st century. In fact, we often say the company is now being run by engineers!

And our business is inescapably at the center of the acrimonious but widely misunderstood debate over Net Neutrality. Were you to walk out onto Massachusetts Avenue this afternoon and ask the first 10 people you see to

define Net Neutrality --- you would get 10 different definitions and that's only because this is Northwest Washington, --- where nobody likes to say "I don't know."

I won't add still another definition. But I can tell you that Net Neutrality is, first and foremost, an engineering issue. To be more exact, it is a set of engineering issues that stem primarily from network management challenges.

Unfortunately, the national debate around Net Neutrality and an "open Internet" has been almost exclusively driven by lawyers. For too long now, the debate has paid too little attention to the engineers, without whom the Internet as we know it wouldn't exist.

At Comcast, we get daily reminders of that reality.

For decades, millions of Americans thought of Comcast as "the cable company." And that's OK, because those are our roots, and we're proud of them.

But Comcast has also become *America's* largest Internet Service Provider, and built one of the *world's* largest IP networks. That fact might even surprise some of our customers.

On a typical day, our network handles *48 billion* requests for Internet addresses--- what the engineers call "DNS queries." That's the equivalent of eight queries for every person on this planet… every day… and that's just for one ISP!   And those queries hit the network at a peak rate of one million per second.

Our top service tier offers customers some of the fastest download speeds in the country – up to 105 Megabits per second. In fact, that tier of service is now available to 25 million homes in America. And the information moved by our network reflects changing technology and evolving user demands.

But some of the action inside the network reflects the dark side of cyberspace.

Our security experts fight an unceasing battle to protect customers from spam and malware. This is a vital part of the network management function for Comcast and every other ISP.

Lately, our network's mail servers have been fielding 525 million daily attempts to deliver email. And a stunning *80 percent* of those emails turn out to be sources of spam, attempts to steal customer data or to infect users with destructive viruses. Like our competitors, we keep updating network management technology to keep this ugly stuff out of our customers' mailboxes.

At the end of September, Comcast engineers launched a new technology approach against botnets. These are the hideous viruses that are used to steal intellectual property of American companies and steal millions of dollars from banks, among other things.

We provide our users with a suite of security services that we call Constant Guard™ -- the most comprehensive such suite available on the market.   We've now added a proactive bot detection component to this service – a first among ISPs in the U.S.

Once a bot is detected, the system automatically notifies the customer and provides them with a link where they can get help removing it.

This was a terrific innovative solution executed by our engineers. But as Comcast has learned, innovation isn't enough even when it's technically successful.

Innovative solutions need the force of consensus behind them. Because the Internet community has one thing in common with the stock market --- it doesn't like surprises.

Our education in that sphere began with our Bit Torrent adventure. For anyone here who did not follow this adventure, let me offer you a brief recap.

Bit Torrent is what's called a peer-to-peer file sharing program. It links thousands of computers together to distribute super high bandwidth files like full-length movies… some legally, some not.

Peer-to-peer applications have been around for years, but Bit Torrent was engineered differently. When it came on the scene around 2005, it was a way to consume incredible amounts of bandwidth at once – hence the "torrent" name – and these torrents were soon overwhelming the upstream capacity of our Internet services.

When an incredibly small minority of our customers made use of this aggressive, bandwidth-hungry protocol, the result was slower service for a lot of our customers, as the shared bandwidth in a neighborhood was monopolized by these torrents. We wanted to balance this out, and we felt we had to take action.

So in 2007, we and many other ISPs made a considered judgment. And in retrospect, we made the wrong decision for the right reasons.

Notwithstanding what some have argued, we didn't block all Bit Torrent traffic. And we didn't do anything based on an anti-competitive intent, as some of our harshest critics later conceded. But we did take measures that would redirect or slow down uploads from computers on our network. We didn't implement it in the most elegant way, and the Internet community certainly let us know about it.

This led to an FCC complaint, and to a flawed 2008 finding by the previous FCC that our decision to manage Bit Torrent uploads in this way violated the "principles" of Net Neutrality.

Comcast had no choice but to push back. We thought the FCC decision was unfair and unwise. We took the FCC to court and, this spring, an opinion by a three-judge federal panel unanimously and strongly agreed that the Commission acted improperly.

While the D.C. Circuit vindicated Comcast, it's much more important to consider what we learned from all this.

Some months into the FCC's activities against Comcast, and long before the FCC reached a decision, it became clear to us that the "legal" issue we were debating was, at its core, an "engineering" issue. So our engineers got to work.

They reached out to Bit Torrent to explore how their application and our network could get along better, which led to an agreement and an ongoing and successful collaboration to discuss, refine, and adjust our network management techniques.

They also pursued another, better way to deal with network congestion issues in general. And they wanted to take the pulse of the Internet community before they implemented it.

So our engineers took their technical issues and ideas to the Internet Engineering Task Force – the IETF.

The IETF is an independent, self-governing international standards body that evaluates a wide range of technical proposals. IETF has no ideological bias - just an insistence on transparency and technical rigor.

The IETF is not a forum for filing complaints. It's a forum where engineers and technologists, representing every layer of the Internet, seek solutions… an organization where new ideas can be vetted with some of the world's most accomplished engineers… where deliberations are open to public comment by anyone with the interest and the technical qualifications.

And I might add, the IETF exemplifies the self-governance tradition that's worked so well for the Internet worldwide.

So we went to the IETF with our P2P concerns and some new ideas on how to deal with them. This led us to a traffic management approach that solved the problem in a reasonable way without triggering any complaints of unfairness.

By engaging in ongoing dialogue with the IETF, Bit Torrent, Google and others in the Internet space, we found a way to manage our network effectively, to protect the overall customer experience.

Since this experience, there has been very little said about our network management practices – not because we no longer manage our network, but because any issues are worked out by the engineers – as they should be.

Based on this successful experience, we've taken other new network management ideas to the IETF in recent years -- not after the fact, but early in the planning stage. And as we've tested things, we've openly shared the results of technical trials. That's part of the transparency the IETF thrives on.

This not only helps us, but it also gives us the chance to contribute our experiences back to the IETF for the benefit of others on the Internet. We get to give something back to the global effort.

Working with the IETF on critical matters, such as DNS Security, or DNSSEC, helped us become the first major ISP in the U.S. to start rolling out DNSSEC – another part of our Constant Guard™ comprehensive security suite – that protects our customers from connecting to websites tampered with by hackers or criminals.

Comcast is one of many U.S. companies to benefit from working through the IETF. And our collective experience has convinced us that we would all benefit from a U.S.-focused body modeled on the IETF -- an engineering-based, independent organization devoted to Internet technical issues, including issues surrounding network management.

To address these issues, America needed an institution as innovative as the Internet itself. And now we have one, in the form of the new Broadband Internet Technical Advisory Group, known as BITAG ("Bee-Tag"). Comcast is proud to be a charter member, alongside other leading ISPs, equipment and software companies, content companies, and representatives of the Internet community, including academics and Internet users.

America has never had a similar domestic forum where companies could bring their questions or problems for objective analysis and solutions. But with BITAG, anybody with a legitimate stake in a network management or other technical issue can contribute to a solution.

BITAG will be available to advise federal agencies on the technological aspects of Internet policy issues. The only condition is one required of all participants. Don't send lawyers to BITAG working sessions. Send engineers or other technologists ready to deal with these questions at an engineering level --- in a non-adversarial setting.

For those in this room whose first instinct might be to run to the FCC to challenge a network management practice, I'd ask you to think of it this way – the difference between taking a question to BITAG or taking it to a regulatory agency will be the difference between going to a marriage counselor or hiring a divorce lawyer. The first way offers the possibility of working things through to an equitable solution. The second promises to be messy, prolonged and expensive - even if you win.

BITAG is an idea whose time has come. And this new organization couldn't ask for a better leader than Dale Hatfield. Dale is an engineer's engineer – but also a people's engineer, with the capacity to bring the most complicated issues down to earth.

He's a master at helping people reach consensus, and that's what BITAG is about. BITAG will build on the proven success of the Internet as a largely self-governing, self-healing ecosystem. An ecosystem guided by consensus among the people who live in it, with minimal direct involvement by government.

This isn't lack of governance. This is self-governance built around consensus. And it works.

I've been called many things, but never naïve. And I'm a big believer in consensus-building. Ironically, I learned the power of consensus in the rough, winner-take-all world of big city politics -- during the 5-1/2 years I was chief of staff for Ed Rendell when he was mayor of Philadelphia.

Ed Rendell inherited a city government on the verge of bankruptcy with rising taxes and declining population. And the famous turnaround the Rendell administration achieved in Philadelphia could only be achieved by consensus building -- among the city workforce, city council factions, the business community, civic and neighborhood groups, Republicans and Democrats in Philadelphia, Harrisburg and Washington DC.

The consensus in Philadelphia was driven by <u>crisis</u>. In this case, consensus on Internet policy can be driven by <u>opportunity</u> – and by turning to the experts first.

Consensus along with self-governance is already a hallmark of the Internet around the globe --- let's put it to work for us here at home.

I know the term "self-governance" rings alarm bells in some circles. It stirs images like the recent New Yorker cartoon that showed a suburban house engulfed in flames. Firefighters are racing across the front lawn. But a man with a garden hose is cheerily waving them away, saying: "No thanks, we're libertarians."

Now by no means am I suggesting a libertarian approach to Internet policy in America. Self-governance does not mean chaos.

All of us benefit from having a free and open Internet. Maintaining that is a legitimate government concern.

The only question is "how." And for the good of the whole Internet ecosystem, public policy has to allow for two essential needs. Internet companies must be free to manage their networks in the best interests of their customers. And, they must have the opportunity to make the financial returns necessary to keep expanding and innovating in broadband.

Just before Congress recessed for the mid-term elections, Congressman Waxman made a commendable effort to build stakeholder consensus around a workable approach on these issues. The proposal was supported by a diverse array of stakeholders, including the Consumer Federation of America, Consumers Union, Public Knowledge, and the Center for Democracy and Technology, the entire cable industry as well as AT&T and Verizon, labor and civil rights groups, and many players in the tech and venture capital communities – arguably the most diverse coalition ever to be forged around a telecom issue. I think this showed that reasonable minds can reason together, and I hope that spirit continues to prevail.

I also appreciate Chairman Genachowski's efforts to the same end – to find alternatives to the imbalanced and dangerous regulatory approaches that some have advocated – and in fact demanded, while at the same time attacking him personally. We need to move on from that kind of unproductive behavior.

An open Internet is vital to American interests, here and around the globe. I applaud the forceful stance taken by the Obama Administration in support of a free and open Internet globally, as reflected in the President's September address to the United Nations. Secretary of State Clinton and Ambassador

Verveer have also been clear that the openness that characterizes the Internet in the United States should be embraced by governments worldwide.

The open Internet faces a somewhat different threat here at home. The vitality of this brilliant resource, created by engineers, could be litigated and legislated away piece by piece, by lawyers, lobbyists and organized activists.

They are all entitled to their opinions, of course. But opinion is not a basis for national policy. It must be grounded in engineering principles, based on facts and data, consistent with the public interest and reinforced with the benefit of consensus.

If that test is met, the Internet will remain the driving force for economic growth, job creation, and an ever more free society.

The Internet is too big and too important for government to ignore… and it is too complex and too dynamic for government to regulate intrusively. Let's learn from the Internet itself – it is flourishing as a self-governing, self-healing ecosystem, and the more we can take advantage of that model, coupled with reasonable, consensus-based regulation, the better.
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Thank you all very much.

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