STATEMENT OF RICHARD R. GREEN

Good morning. I am Dick Green. For 21 years, I was President and CEO of CableLabs, the cable industry's research and development consortium. Before that I was the CTO of PBS and earlier served as the Director of the CBS Advanced TV Laboratory. I started my career in television in a production capacity at ABC Hollywood. Thank you for inviting me here today to discuss cable's experience with, and plans for, video over the Internet.

Companies in the cable industry account for a majority of customers of broadband Internet services in the United States. To bring these services to Americans, cable companies have invested over $145 billion in private capital since 1996 to build fiber-rich two-way interactive networks. Cable led the way into broadband in America – but there are now multiple broadband platforms as the result of hundreds of billions of dollars of investments by competing providers like telephone companies and wireless and satellite providers. Content and applications providers, in turn, have been able to utilize these platforms to create multi-billion-dollar American businesses, including online video services.

Video on the Internet has grown at a dramatic rate. In February 2008, nearly 135 million U.S. Internet users viewed 10.1 billion online videos, averaging nearly three and a half hours of viewing each. YouTube represented 34% of those online videos, or nearly 3.5 billion in total. More recent statistics indicate that online video usage has continued to grow. In July 2009, 158 million U.S. Internet users watched online video, the largest audience ever recorded. Online video reached another all-time high in July with a total of 21.4 billion videos viewed during the month, or more than twice as many videos as were viewed in February 2008. Today, the amount of total traffic traveling over the Internet is increasing by 30% each year, driven primarily by increased video transmission. Probably the most interesting prospect is for growth in two-way

Internet video for education, health care, and other purposes. As our networks grow faster, smarter and bigger, and as these applications are engineered to be better and more efficient, we think these are exciting possibilities.

Consumers can watch video over the Internet through numerous means, and the variety of video content already available over the Internet is remarkable. They can download movies and television shows from iTunes, Blockbuster, Vuze and other sites. They can stream them free from Hulu, Fancast, and YouTube. They can pay to stream movies and TV shows from Netflix and Blockbuster and Amazon. Music videos can be streamed from MTV and VH1; news videos, including live newscasts, are available from CNN, Fox News, the BBC and others; and the four major television networks, as well as programmers like Comedy Central, History , and Nickelodeon, make video clips and sometimes longer video available over the Internet. A list of current online video sources could easily go on for several pages.

The evolving uses of the Internet place changing demands on the cable broadband network. In particular, as video on the Internet grows more popular, the demands for bandwidth increase. Recognizing these challenges, cable companies consistently have increased both the available bandwidth and data transmission speeds to meet the demands of consumers. They have invested more and more in their networks, consistent with good economics and actual consumer demand, so millions of consumers can have their needs met.

The basic technology building blocks for cable Internet access service are contained in the Data Over Cable Service Interface Specification (DOCSIS) standard, a common standard developed by CableLabs and its partners beginning in 1995. The most recent version is DOCSIS 3.0 – let me call it "D3" for short. D3 was designed to significantly increase transmission speeds to meet growing consumer demand for all kinds of applications, including entertainment video,

teleconferencing, and new applications in health, education, and other fields. Many cable operators, including several of the largest, are already offering D3, and many others have announced plans to launch it in the near future in some or all of their markets.

D3 utilizes something called "channel bonding." Cable bandwidth comes in 6 MHz "slices" – each the equivalent of a single traditional analog TV channel, which was cable's primary business for over 50 years. Today, the terrific speeds cable delivers are generally accomplished using a single 6 MHz channel. Now, by combining multiple 6 MHz channels into a virtual single wideband transmission path, cable operators can dramatically increase speed and capacity. For instance, bonding four downstream channels together delivers up to 160 Mbps to the node; bonding four upstream channels delivers up to a maximum of 120 Mbps. Current equipment allows for bonding up to four channels, which do not need to be adjacent. However, new modems and CMTSs are being developed for commercial release in 2010 that will enable bonding of up to 8 channels, achieving a maximum download throughput of more than 300 Mbps.

Clearly, D3 can support cutting-edge speeds today, and even faster speeds in the future. But D3 has other benefits as well. Channel bonding and statistical multiplexing – a technique that smoothes out the peaks in a multistream transmission – allow cable systems to accommodate more users simultaneously with less risk of congestion. D3 also allows operators to provide multicast services from one source to many subscribers, allowing operators to save bandwidth by delivering the same video to a group of destinations simultaneously using the most efficient network routing. Finally, D3 is more secure. Specifically, D3 supports the 128-bit Advanced Encryption Standard, as compared to DOCSIS 2.0's 56-bit Data Encryption Standard. Every bit that is added to security doubles the time it would take a hacker to be able to break it.

In addition to using D3, cable operators are also increasing network efficiency by using switched digital video – a technique where only the channels currently being viewed, not every channel in the line-up, need to be sent to the subscriber's home. Because switched video allows cable operators to use digital video bandwidth more efficiently, they are able to make more capacity available for other uses.

Enhancing network capability is only one aspect, albeit an important one, of cable's drive to make Internet connections more robust to support video and other bandwidth-intensive applications and services. Cable broadband providers also must actively manage the network to maximize network efficiency, to ensure that bandwidth is allocated fairly, and to ensure that customers can access and use applications and services, including video. In the online video area, cable operators will need to continue working with applications developers and content providers at places like the global Internet Engineering Task Force. This collaboration is important to find common ground that makes the transmission of video over the Internet work well.

Another critical piece of providing the wideband service necessary for Internet video is ensuring that cable operators can reclaim bandwidth from traditional but inefficient uses so that there is sufficient capacity on the cable network available for broadband service. The ability of cable operators to continue to migrate their core cable services from bandwidth-inefficient analog over to efficient digital, and to introduce technologies like switched digital video, is necessary to achieve our shared goal of bringing advanced competitive broadband services to the public.

Cable operators were there at the start of the broadband revolution, and the cable industry is committed to assisting the Commission in formulating and implementing the National

Broadband Plan. We look forward to working with you to bring faster broadband to more Americans, not just so Americans can be entertained, but so they can be informed, connected, and benefited by everything broadband has to offer.