Visual Networking Index: The Zettabyte Era

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VP Consumer Marketing

July 18, 2008

Building the Foundation

Over the Past 10 Years, Consumers Have Become Connected to the internet…

…and More Connected to Each Other

Now It's About Getting These Devices Connected to Each Other to Share Content…

…and Create Communities of People

Next It Will Be About Driving a Deeper Connection Between People and Their Communities of Friends and Content

Building Blocks for Deeper Connection

Video

Characteristics

- Hi-Definition
- Multiple Screens
- On Demand
- Immersive/Emotional

60% of All internet Traffic Will Be Video by 2011 —RBC

Social Networking

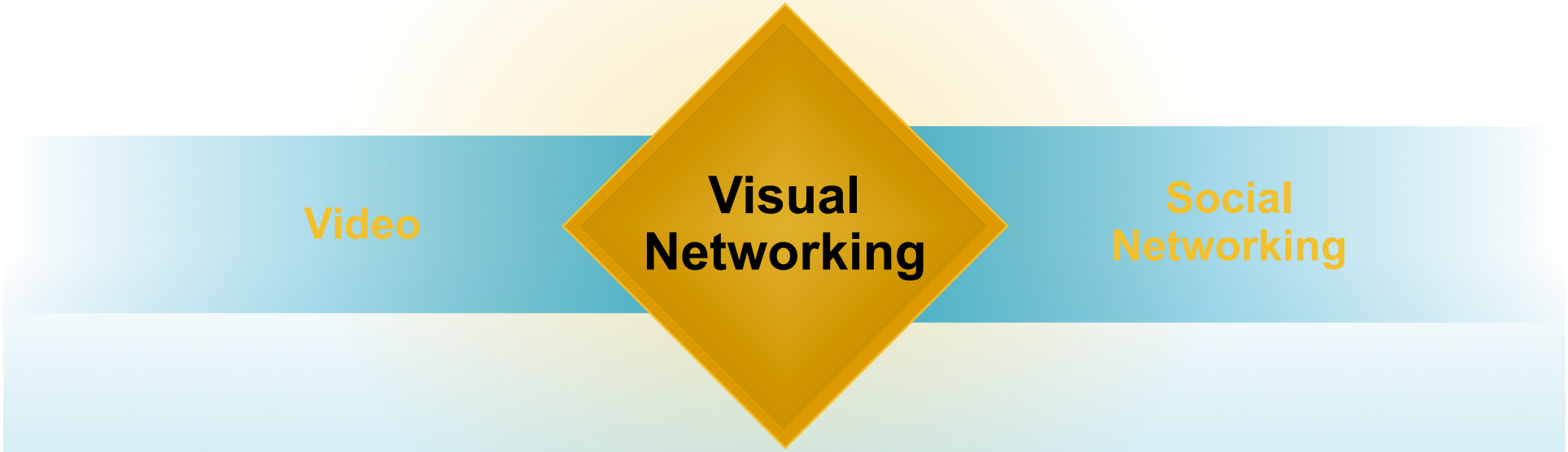
Characteristics

- Communities of Content
- Communities of People
- Personalization
- Discovery

87% of Online Consumers Use Social Networking Features —IDC

New User Experience

As Social Networking and Video Expand They Converge…



An Output of This Convergence Is "Visual Networking"

Things Are Changing

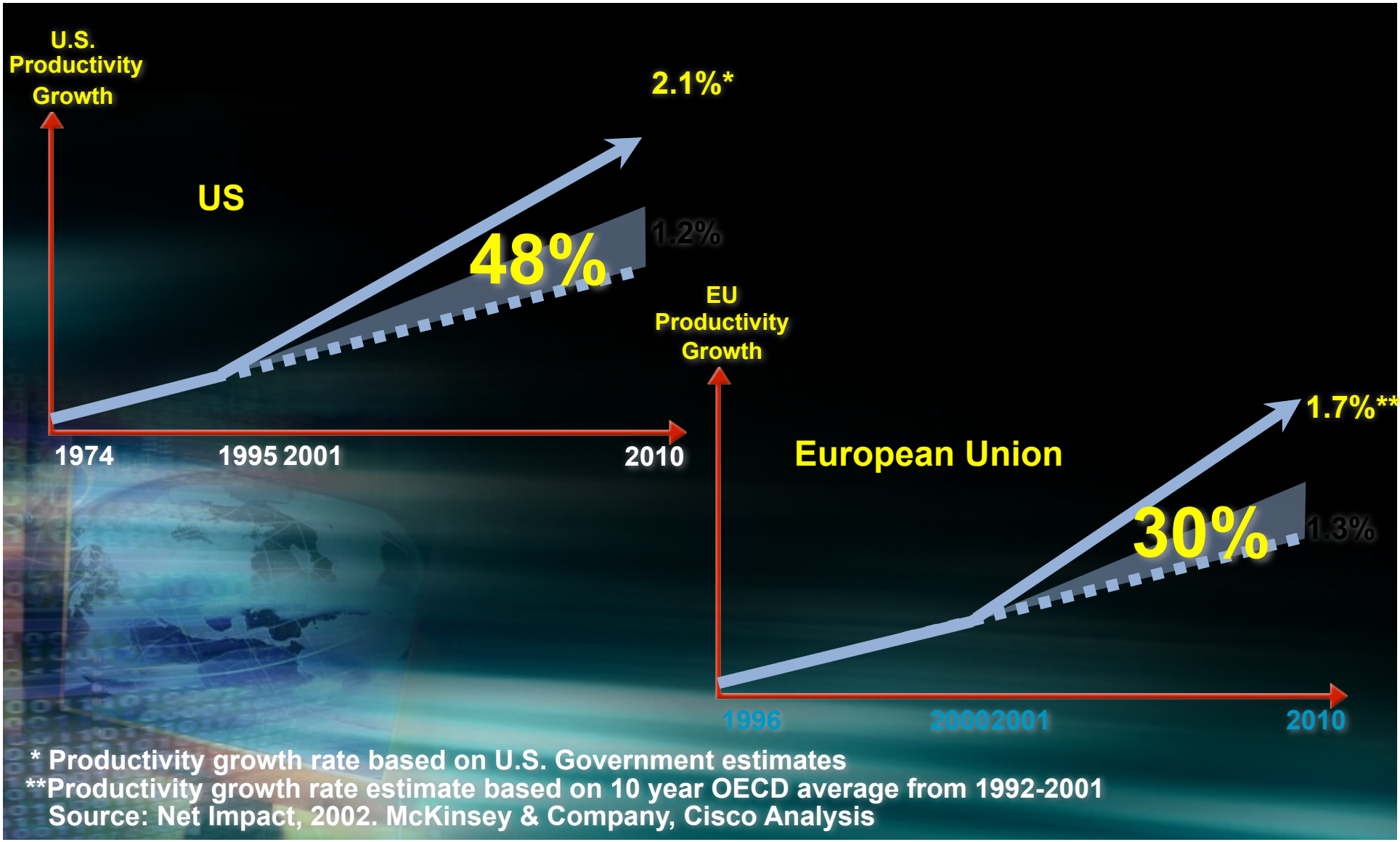
Today

- Video primarily used for entertainment
- Video quality on the internet is still poor
- Voice/Data communications can't replicate in-person experience
- Video stuck on a single device
- Search is fine if you know what you want

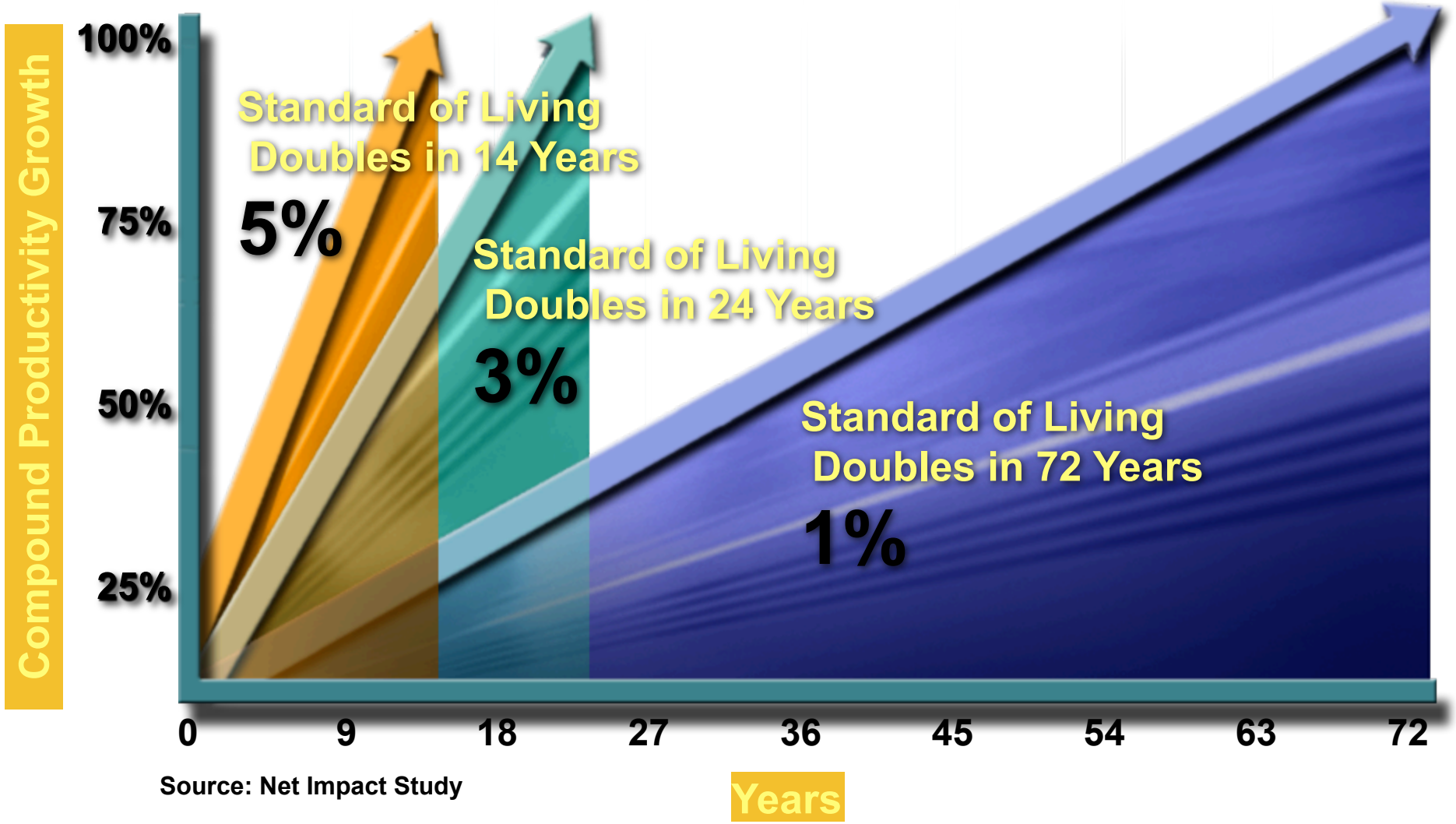
Visual Networking

- Video is widely used across entertainment, communications, and information applications
- internet video is Hi-Def
- in-person experiences possible over the network
- Video is available on device of choice
- Community based discovery personalizes content

Broadband connectivity is a fundamental element to support productivity growth and competitiveness

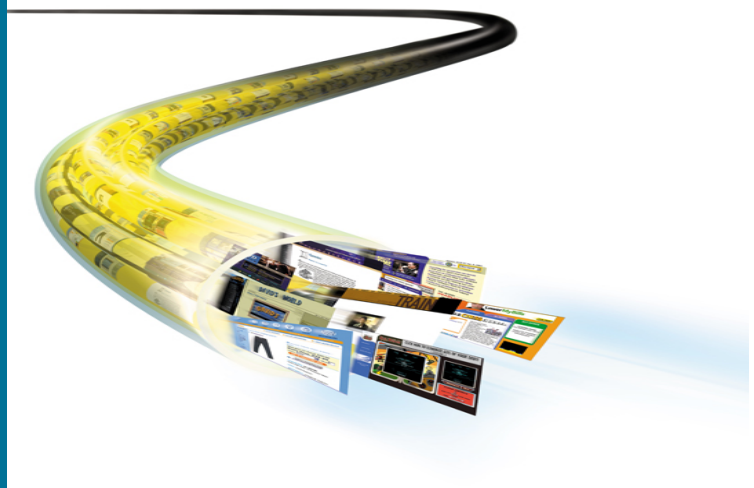


Productivity Which Drives Standard of Living



Source: Net Impact Study

Cisco Visual Networking Index Forecast, 2007-2012



June 2008

What is the Cisco Visual Networking Index (VNI)?

The Cisco Visual Networking Index is an initiative to track and forecast the suite of visual networking applications.

The Zettabyte Scale

1 Petabyte
1,000 Terabytes or
250,000 DVDs

1 Exabyte
1,000 Petabytes or
250 million DVDs

1 Zettabyte
1,000 Exabytes or
250 billion DVDs

1 Yottabyte
1,000 Zettabytes or
250 trillion DVDs

200 Terabytes
A digital library of all books ever written in any language

100 Petabytes
The amount of data produced in a single minute by the new particle collider at CERN

5 Exabytes
A transcript of all words ever spoken

100 Exabytes
A video recording of the all the meetings that took place last year across the world

150 Exabytes
The amount of data that has traversed the Internet since its creation

175 Exabytes
The amount of data that will cross the Internet in 2010 alone

66 Zettabytes
The amount of visual information conveyed from the eyes to the brain of the entire human race in a single year

20 Yottabytes
A holographic snapshot of the earth's surface

Source: Cisco Visual Networking Index – Forecast, 2007-2012

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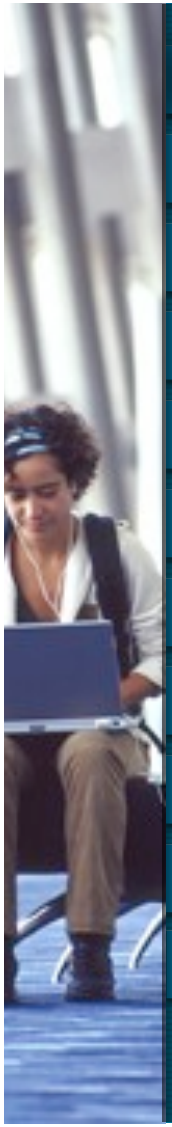
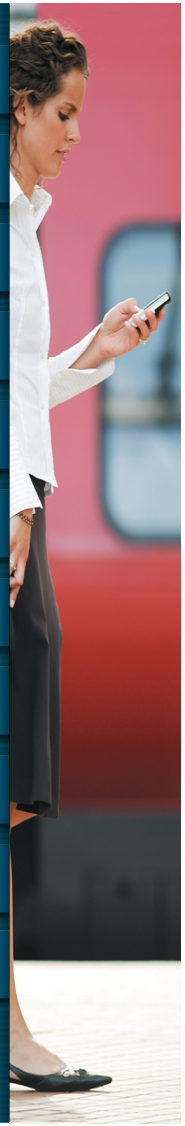


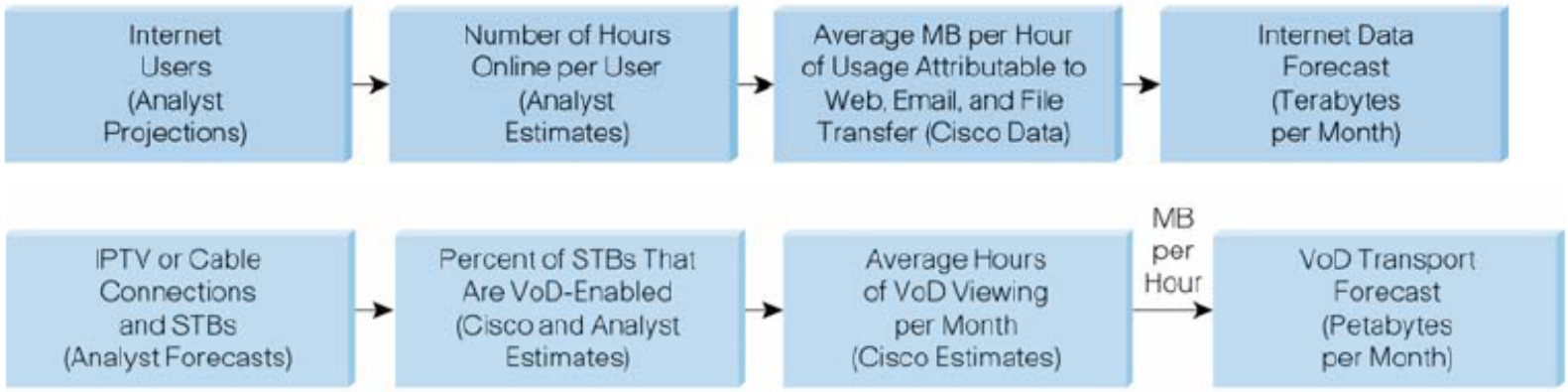


VNI Forecast Methodology – 2007-2012

The forecast relies on analyst projections for Internet users, broadband connections, video subscribers, mobile connections, and Internet application adoption.

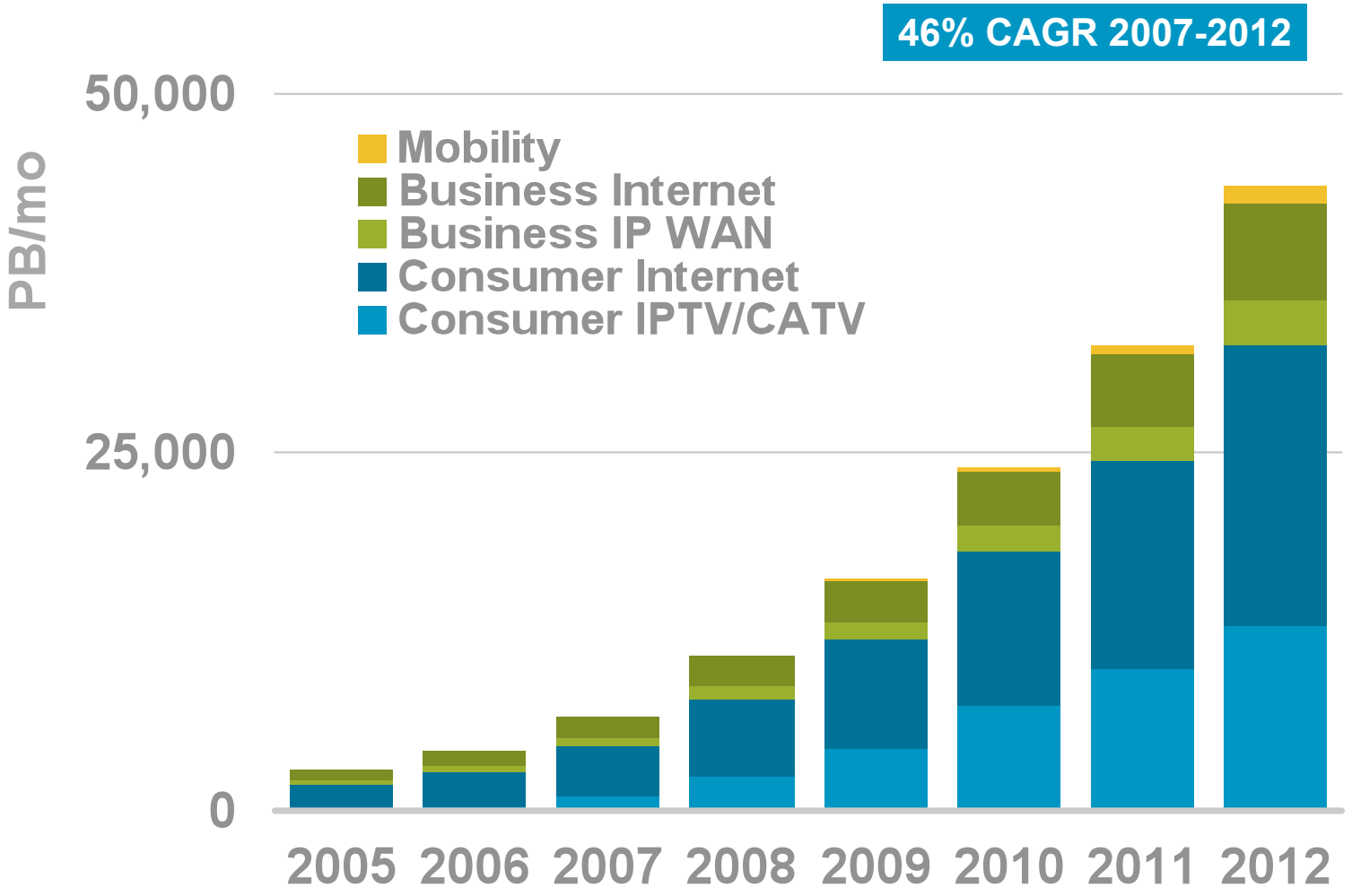
Cisco also collects traffic data directly from a number of our service provider customers, and this data is used to validate and adjust the usage assumptions underlying the forecast model.

Examples of the VNI Forecast methodology:



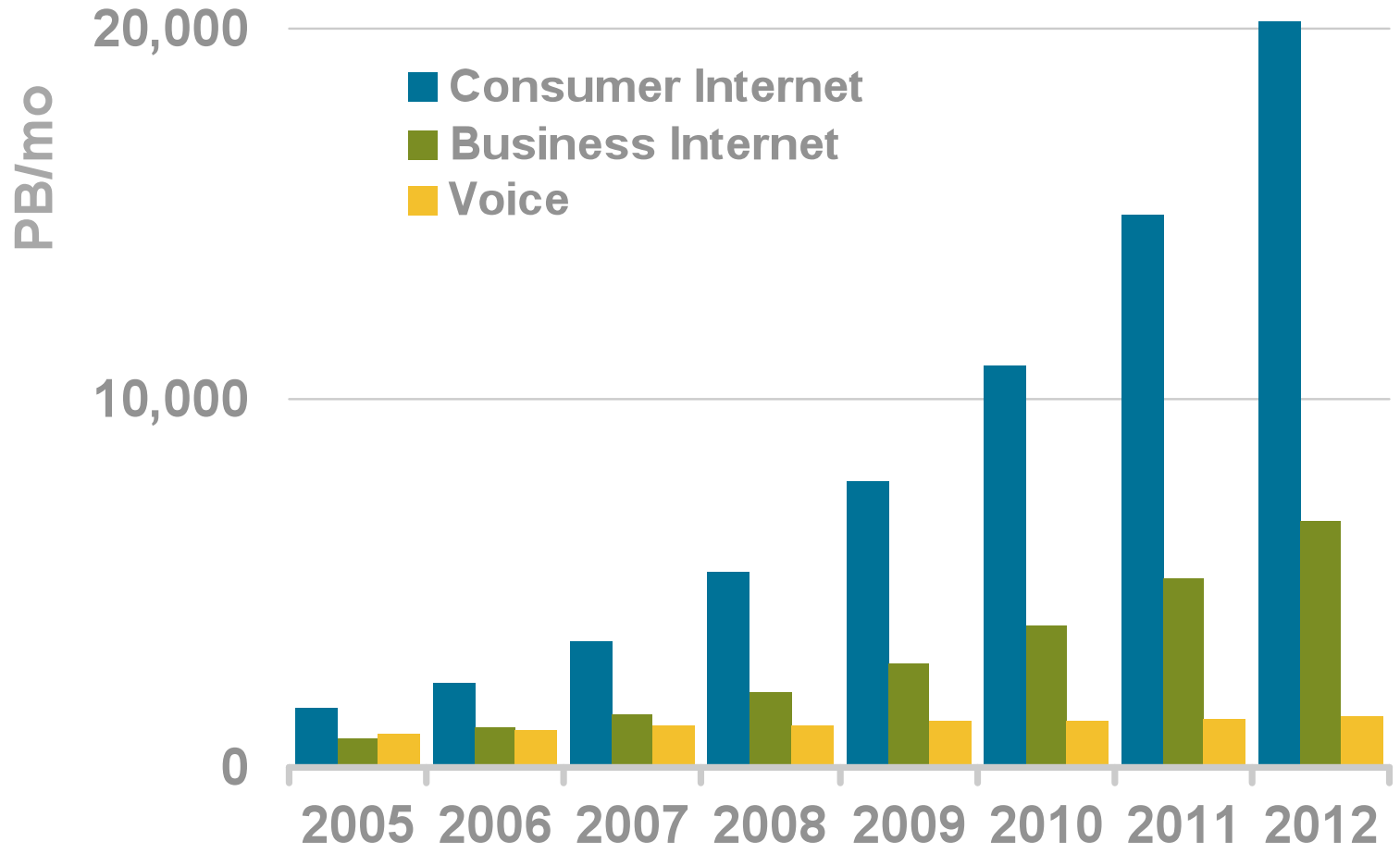
Global IP Traffic Growth

IP traffic will increase 6X from 2007 to 2012
In 2012, half a zettabyte will cross the global network



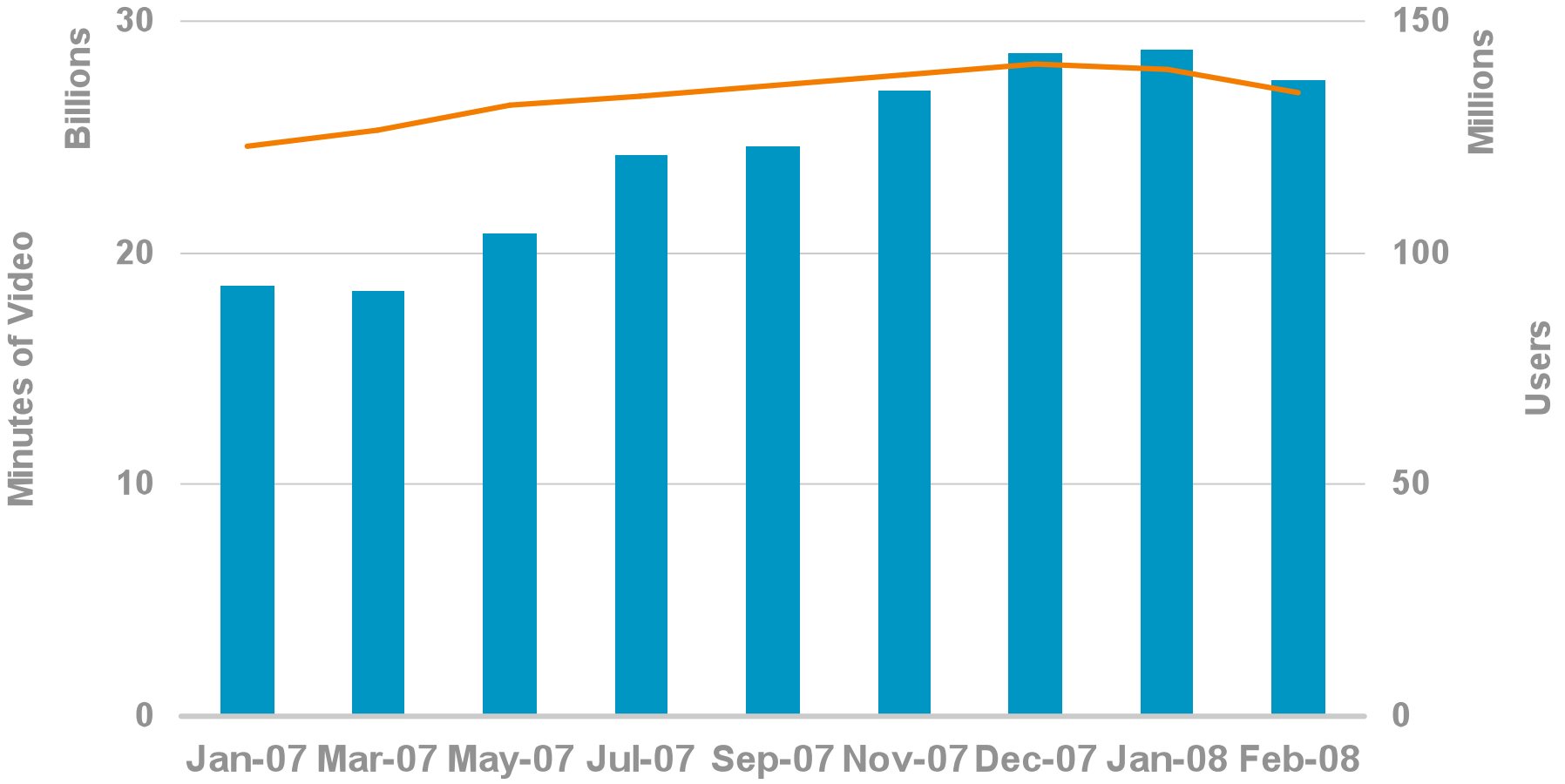
Source: Cisco Visual Networking Index – Forecast, 2007-2012

Data Versus Voice



Source: Cisco analysis of multiple sources, 2008

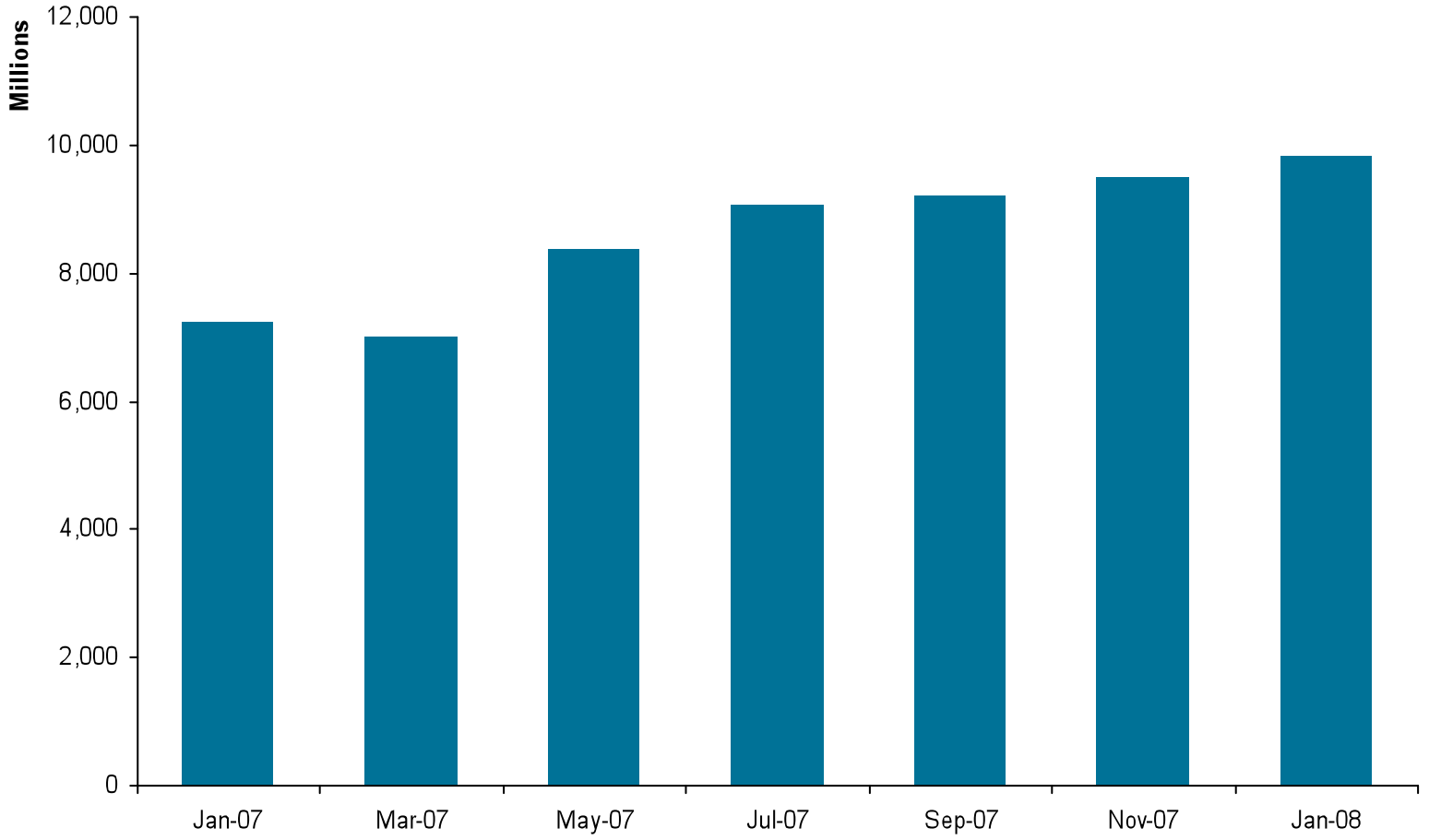
Video Streams (U.S.)



Source: comScore, 2008

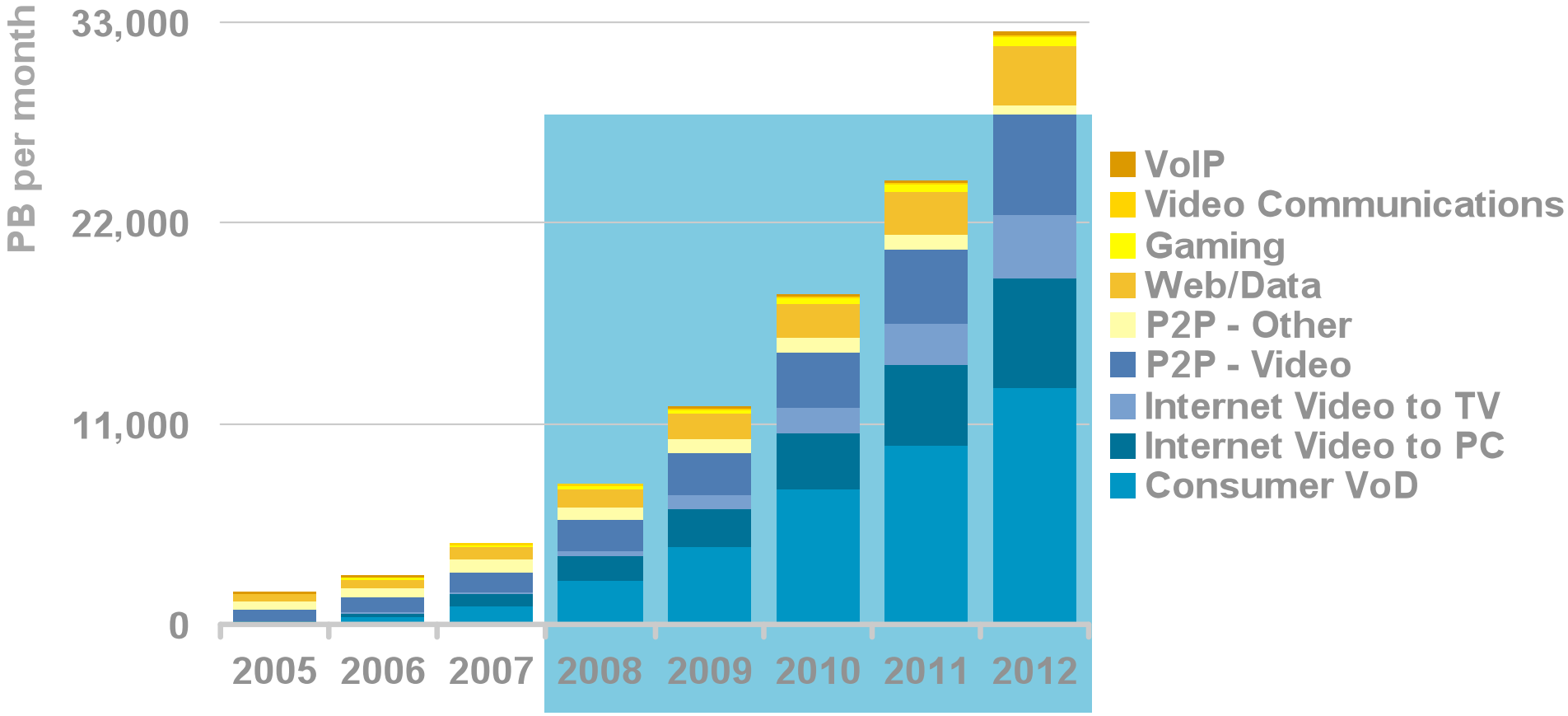
U.S. Online Video Streams Per Month

36% growth Y/Y



Source: comScore, 2008

Without Video, Consumer IP Doubles by 2012
With Video, Consumer IP Quadruples by 2012



Video to reach 87% of Consumer IP in 2012

Source: Cisco Visual Networking Index – Forecast, 2007-2012

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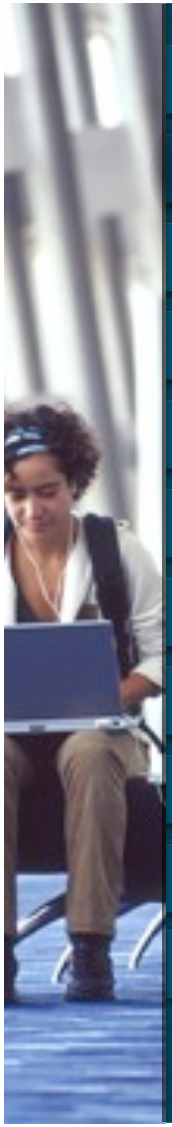
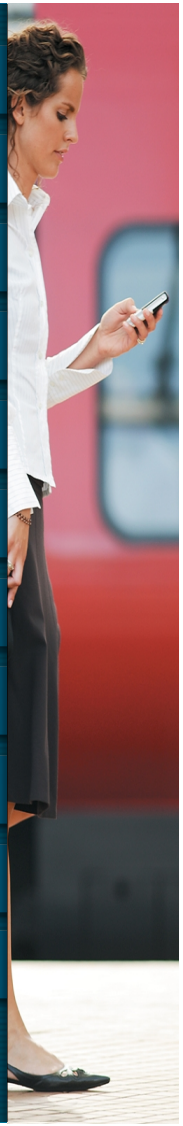
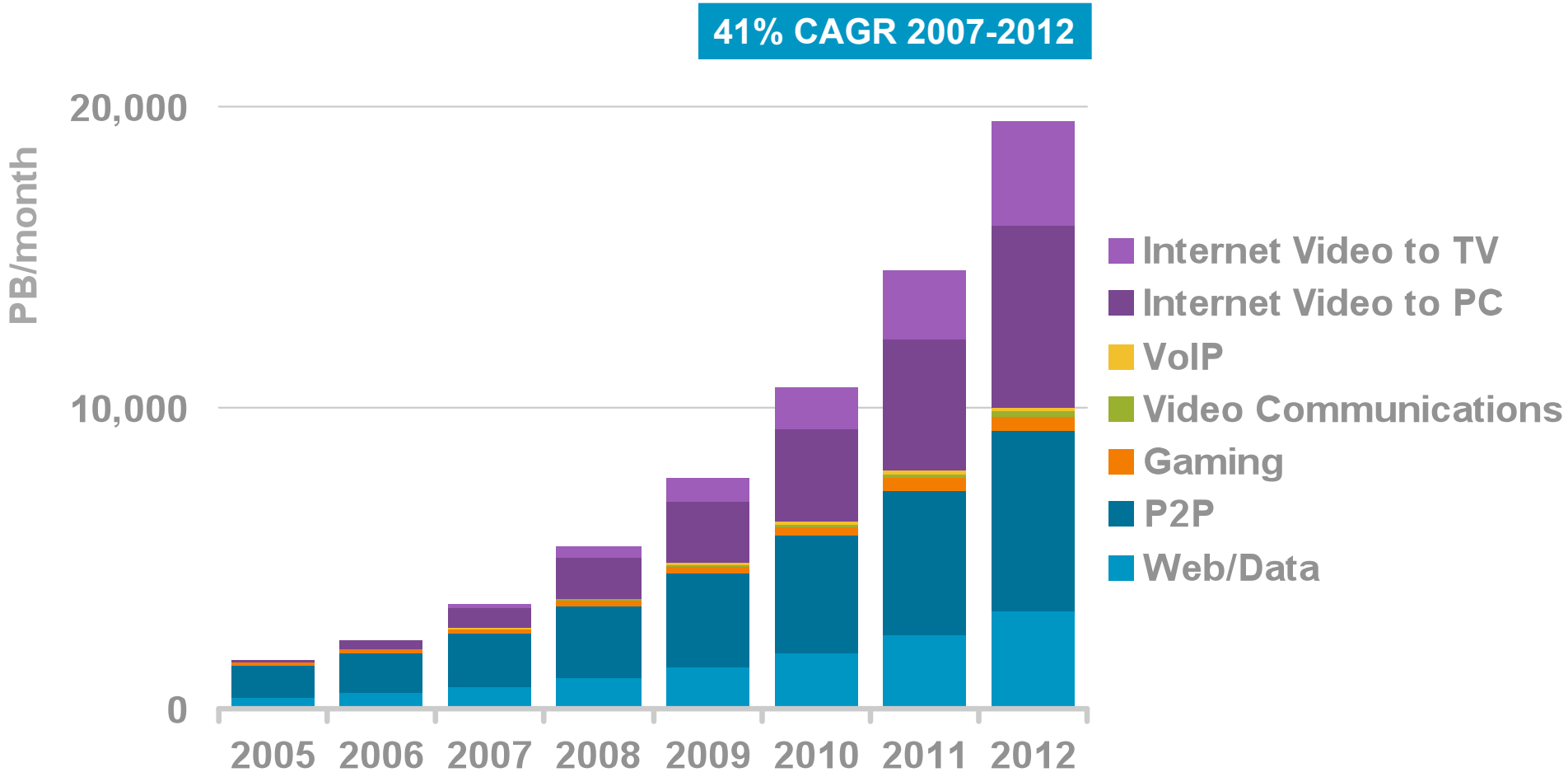




Global Consumer Internet Traffic Mix

Video will be nearly 50% of traffic by 2012



Source: Cisco Visual Networking Index – Forecast, 2007-2012

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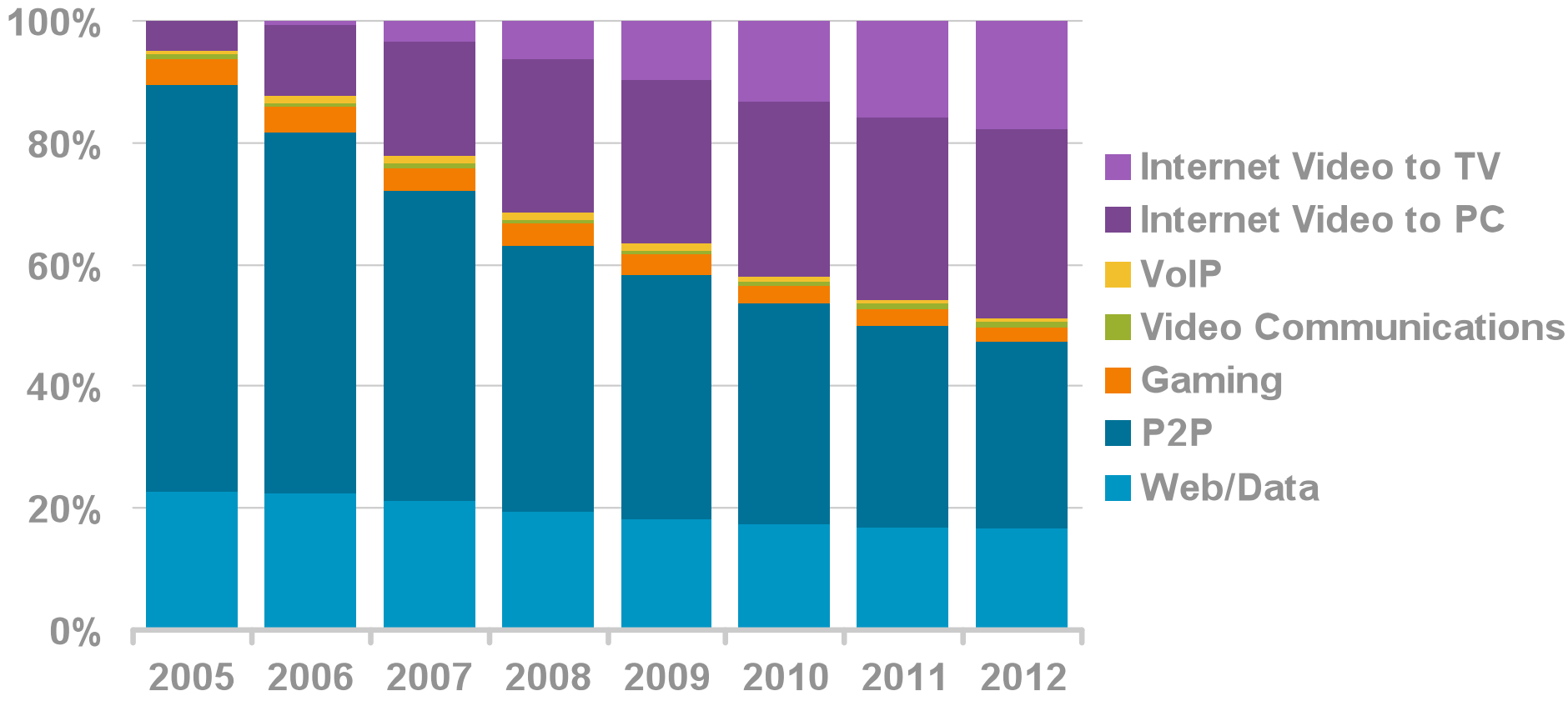

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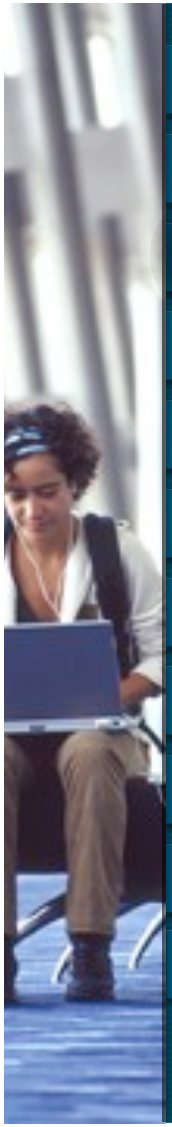
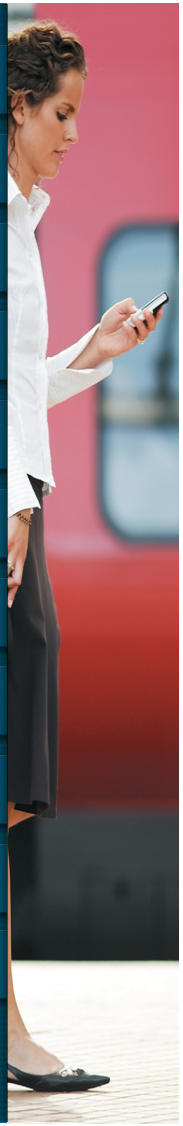
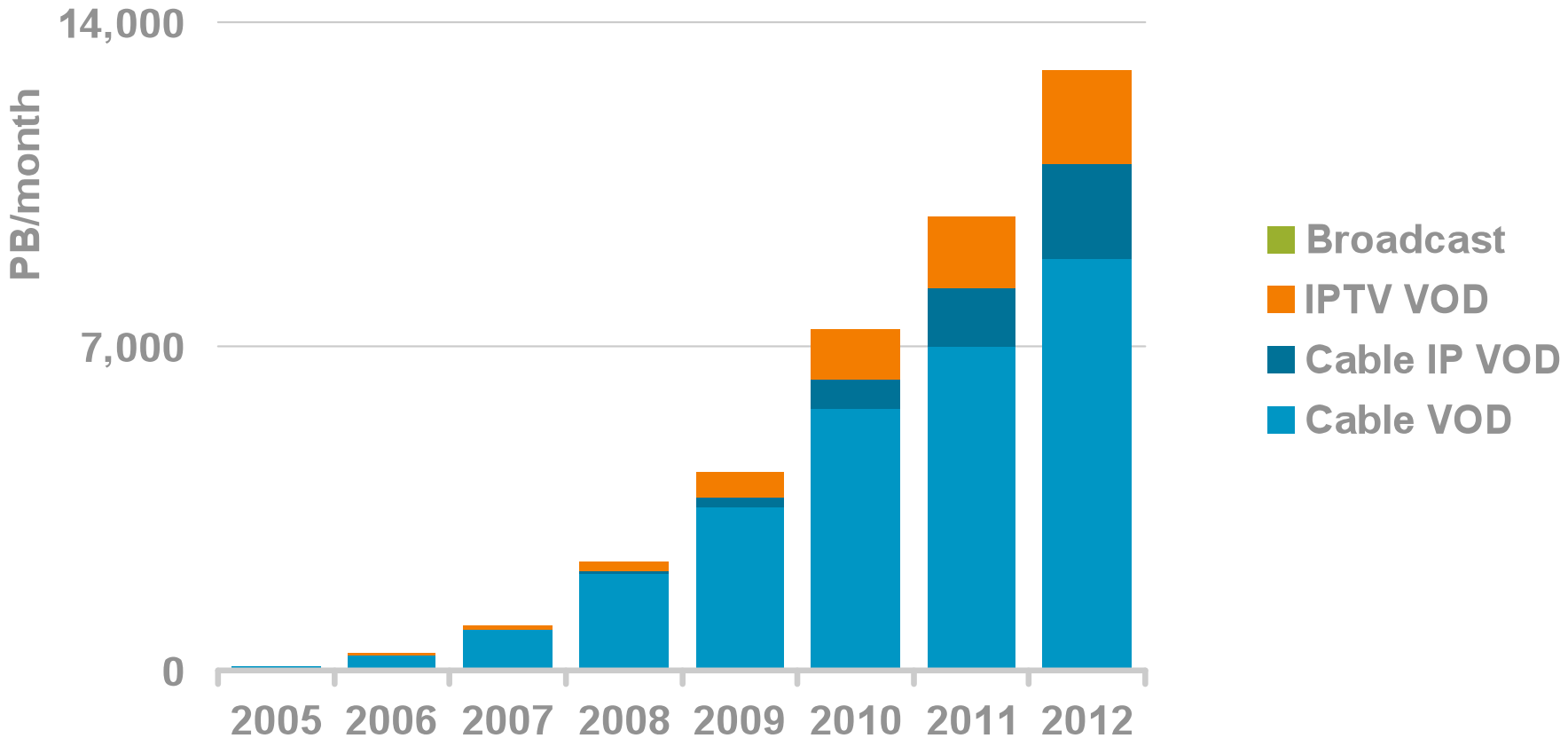




Global Consumer VOD Traffic Mix

Consumer VOD traffic grows at a 93% CAGR from 2007 to 2012



Source: Cisco Visual Networking Index – Forecast, 2007-2012

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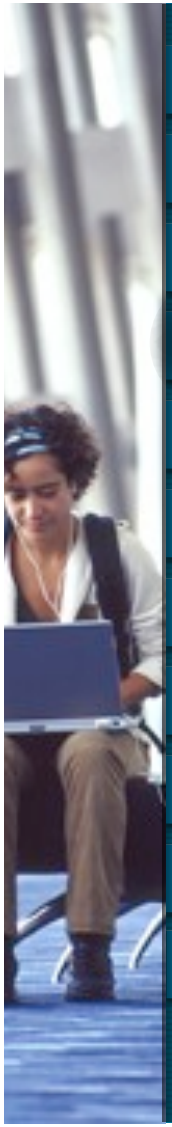
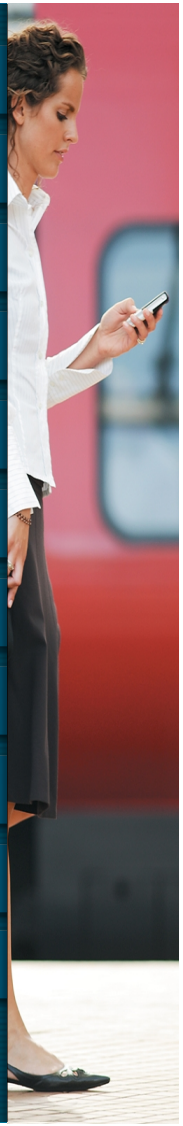
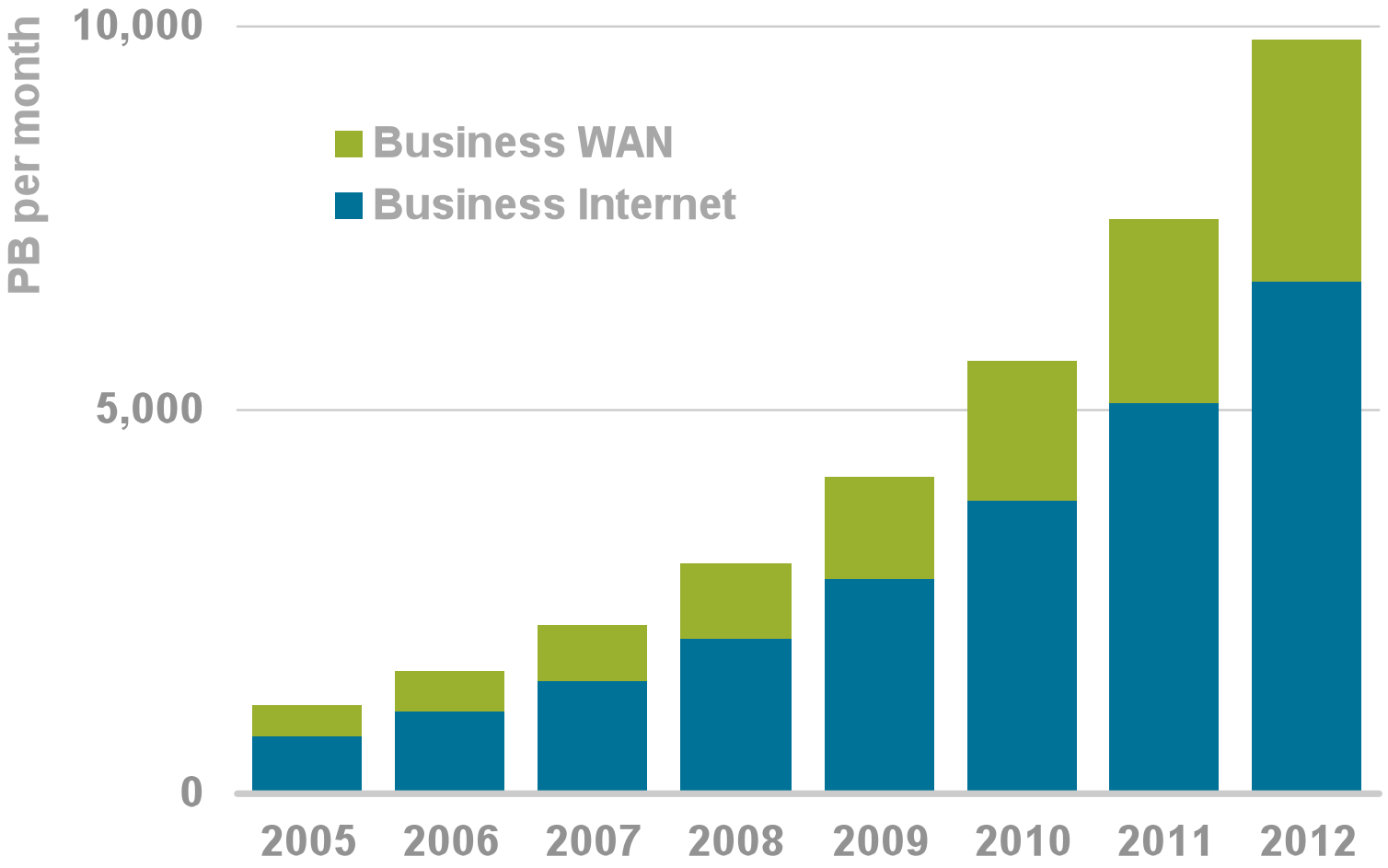




Global Business IP Traffic

Business IP to Grow at 35% CAGR 2007-2012



Source: Cisco Visual Networking Index – Forecast, 2007-2012

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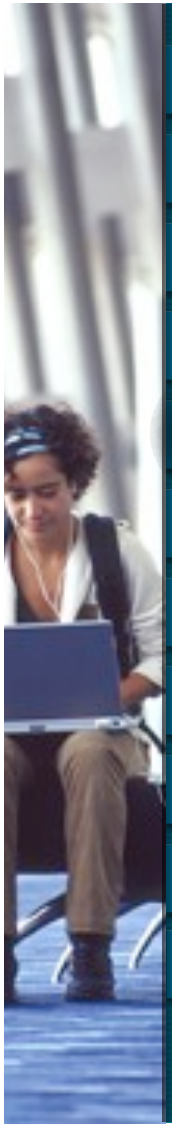
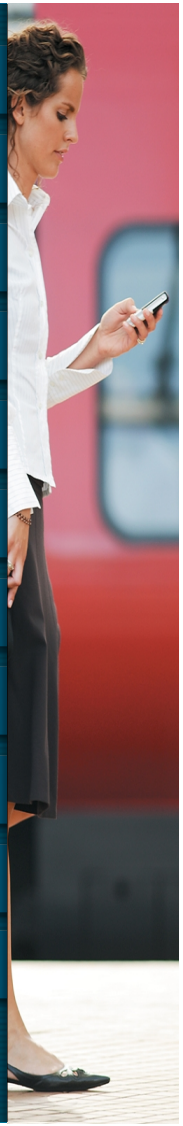
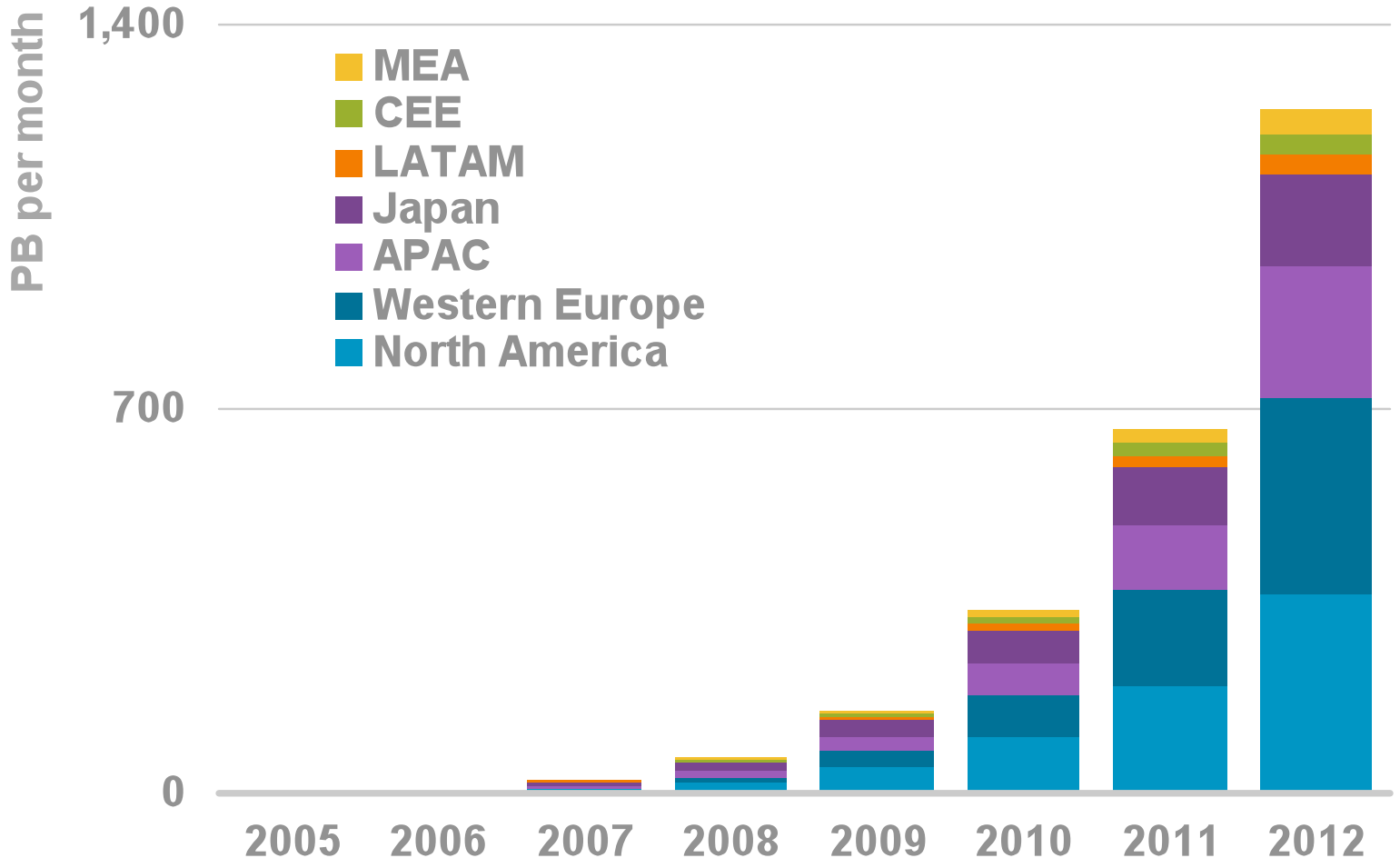




Global Mobile Data Traffic

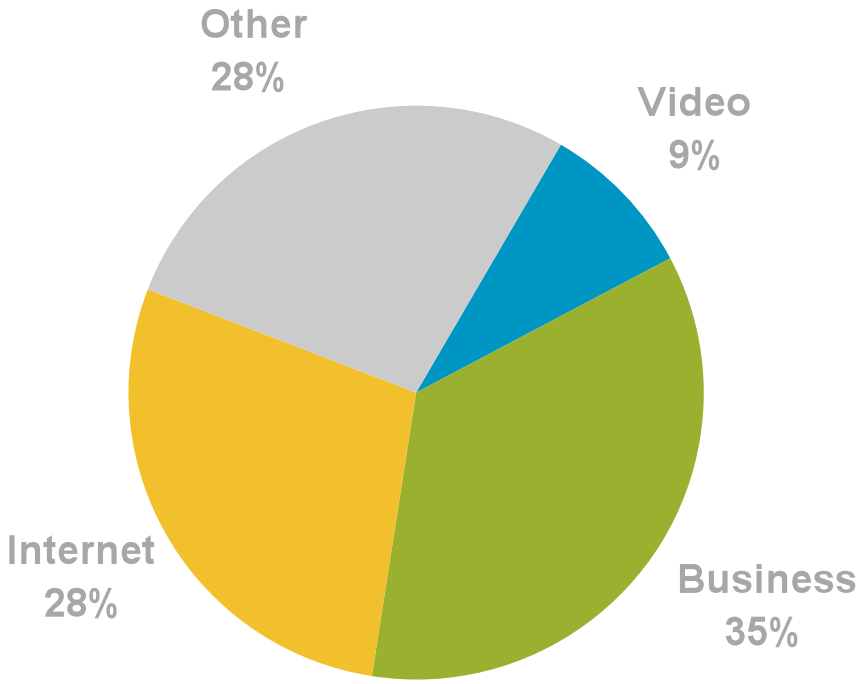
Mobile Data to Grow at 116% CAGR 2007-2012



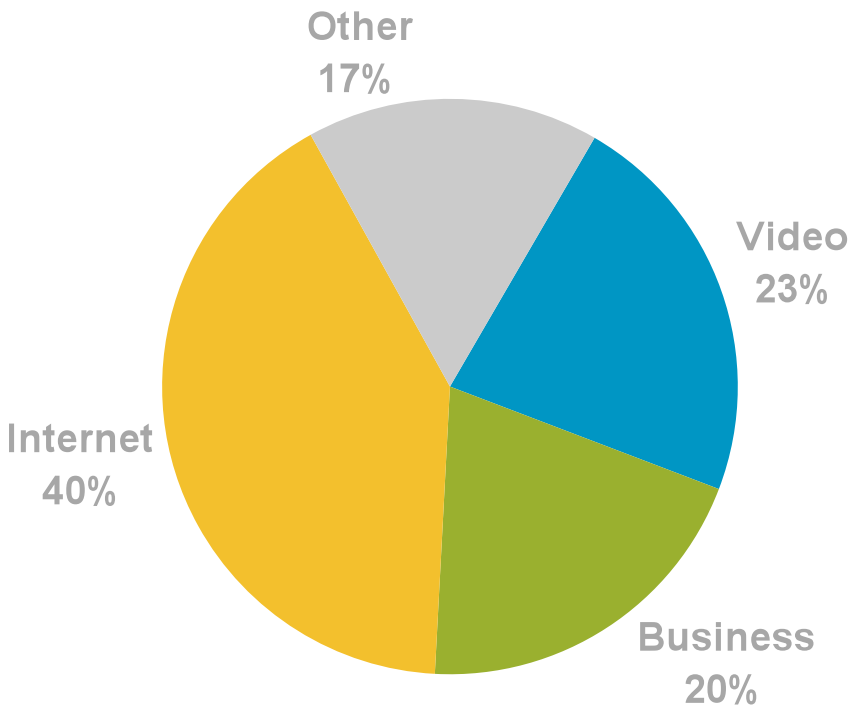
Source: Cisco Visual Networking Index – Forecast, 2007-2012

Mobile Data Traffic by Application

Video to grow to 23% by 2012



2007



2012

Source: Informa Telecoms and Media, 2008

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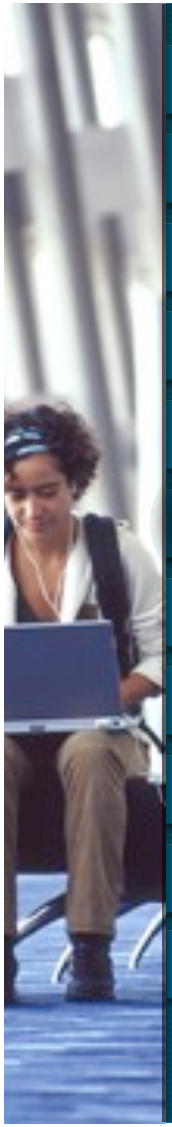
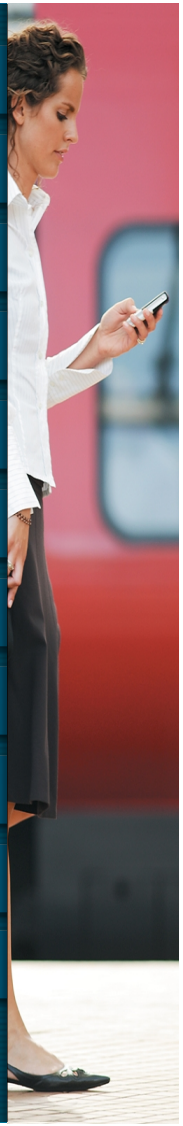
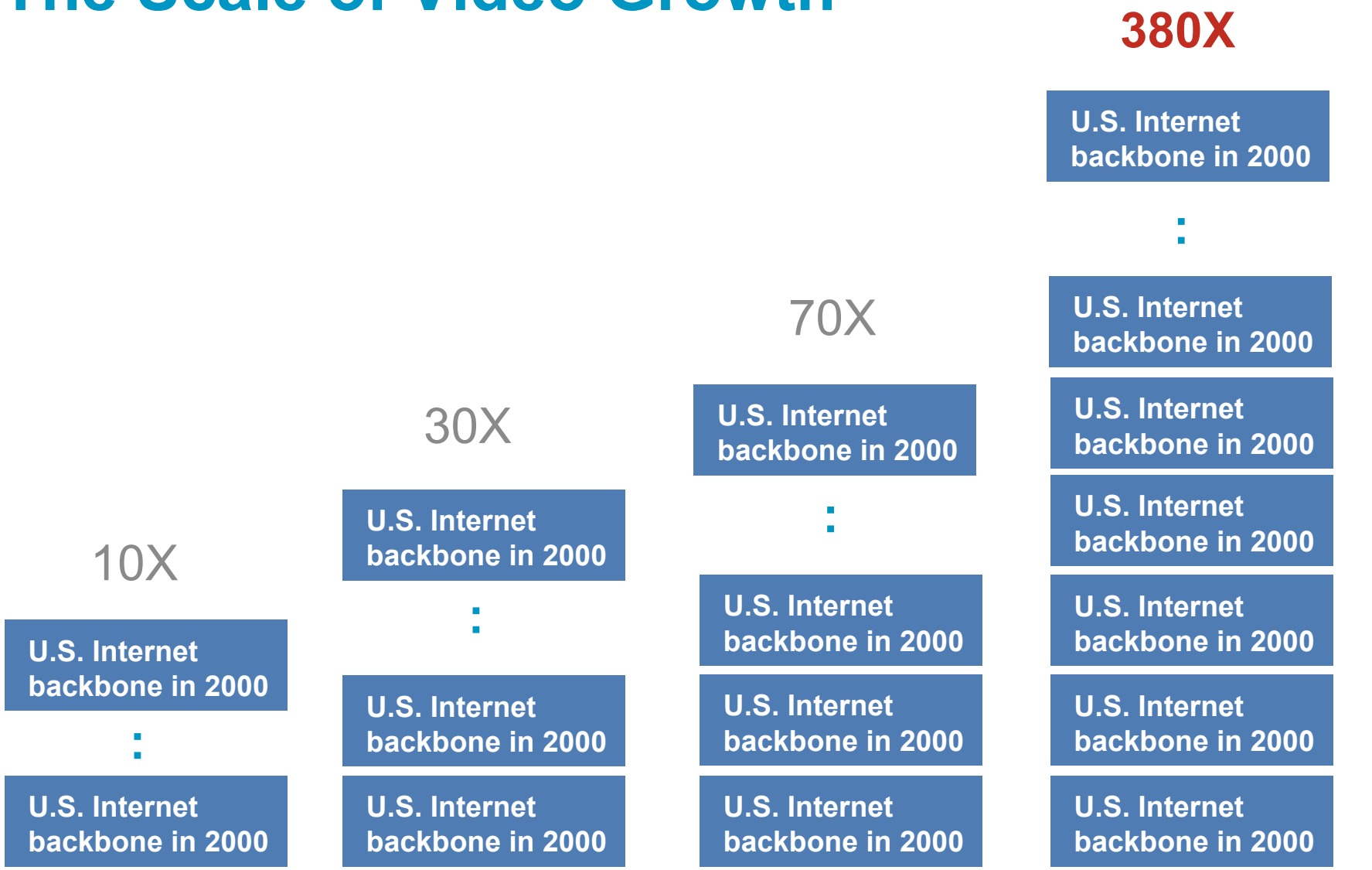




The Scale of Video Growth

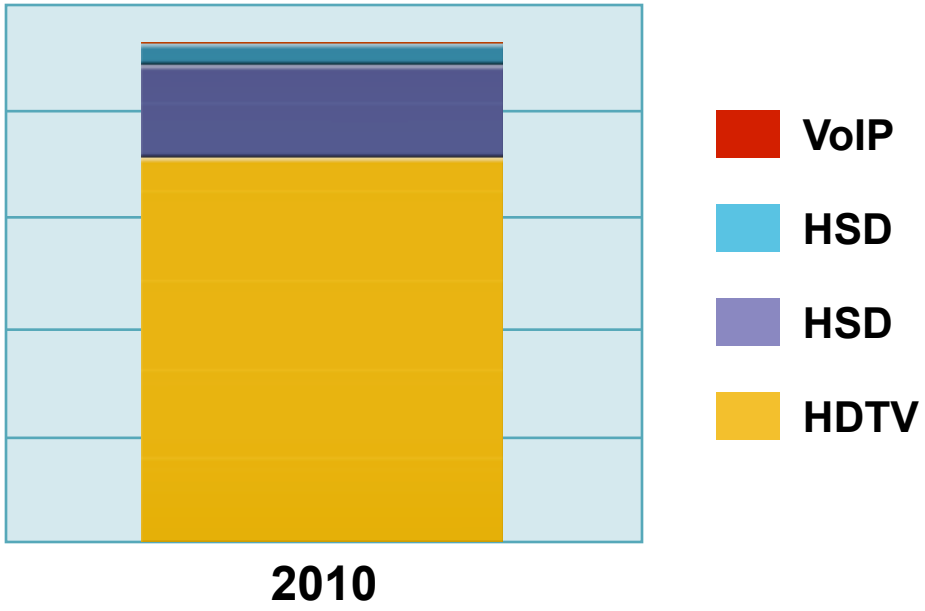


Household Bandwidth to Reach 1.1 TB/mo

Household Bandwidth Needs in 2010 (U.S.)

1x HDTV
+
1x SDTV
+
2x PVRs
+
1x VoIP
w/ 2 Dual Mode Handsets
+
1x HSD
w/ 2 PCs

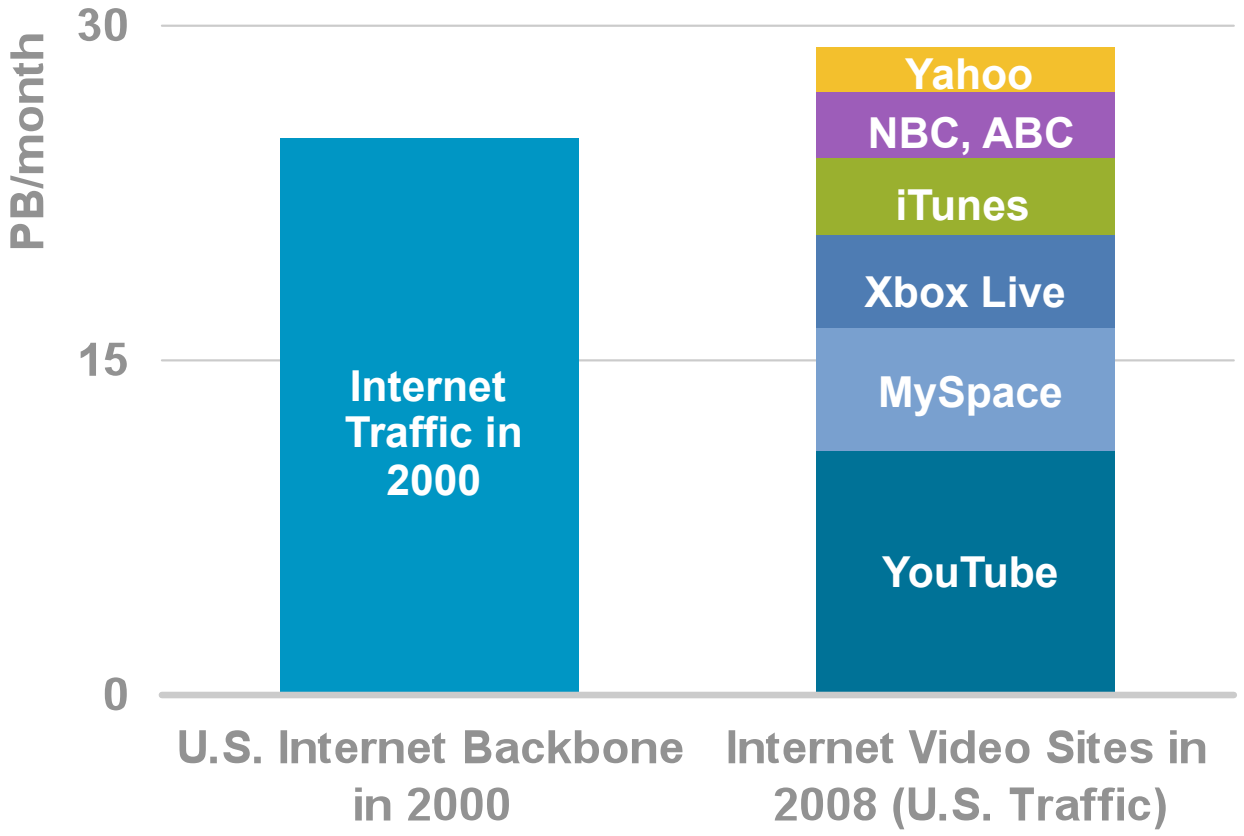
=



Twenty such homes would generate more traffic than traveled the entire Internet backbone in 1994/1995.

Source: Cisco, 2008

Video Already Generates More Traffic than the Entire Internet Backbone in 2000

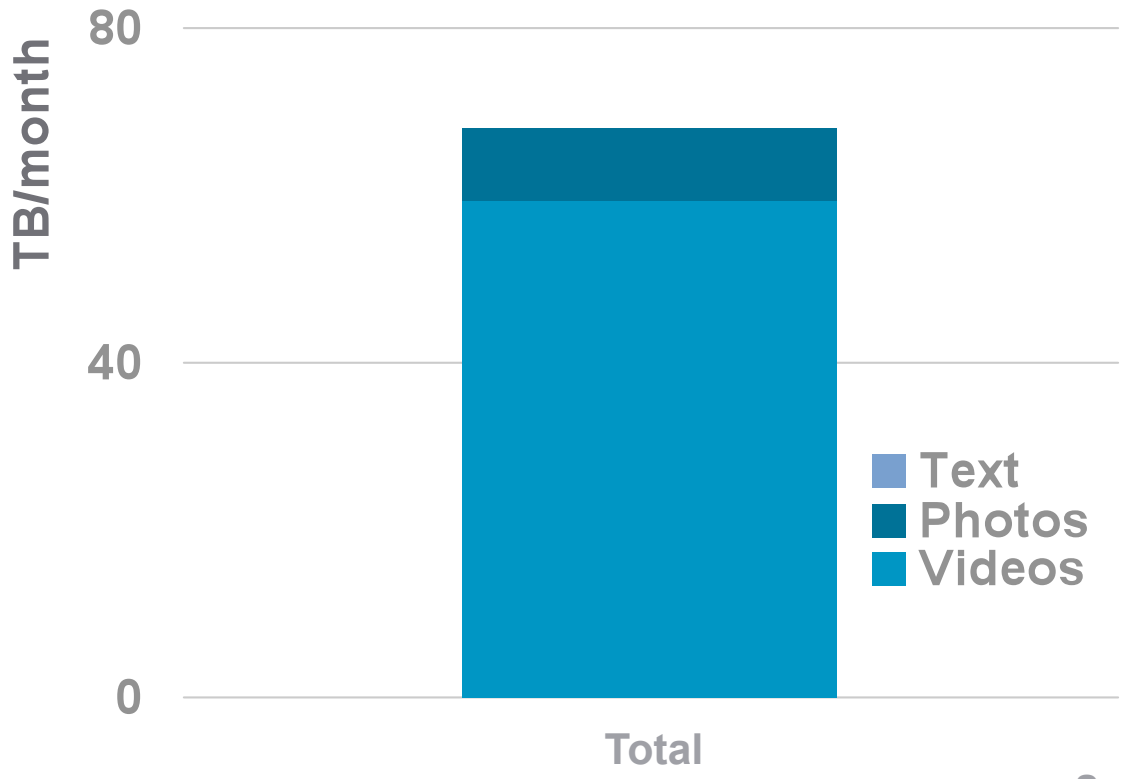


Source: Cisco, 2008

Global Consumer Media Production

A household with a camcorder and camera produces the equivalent of nearly 1.4 GB per month on average.

If all media produced by consumers traveled over the Internet, it would generate about 68 PB per month

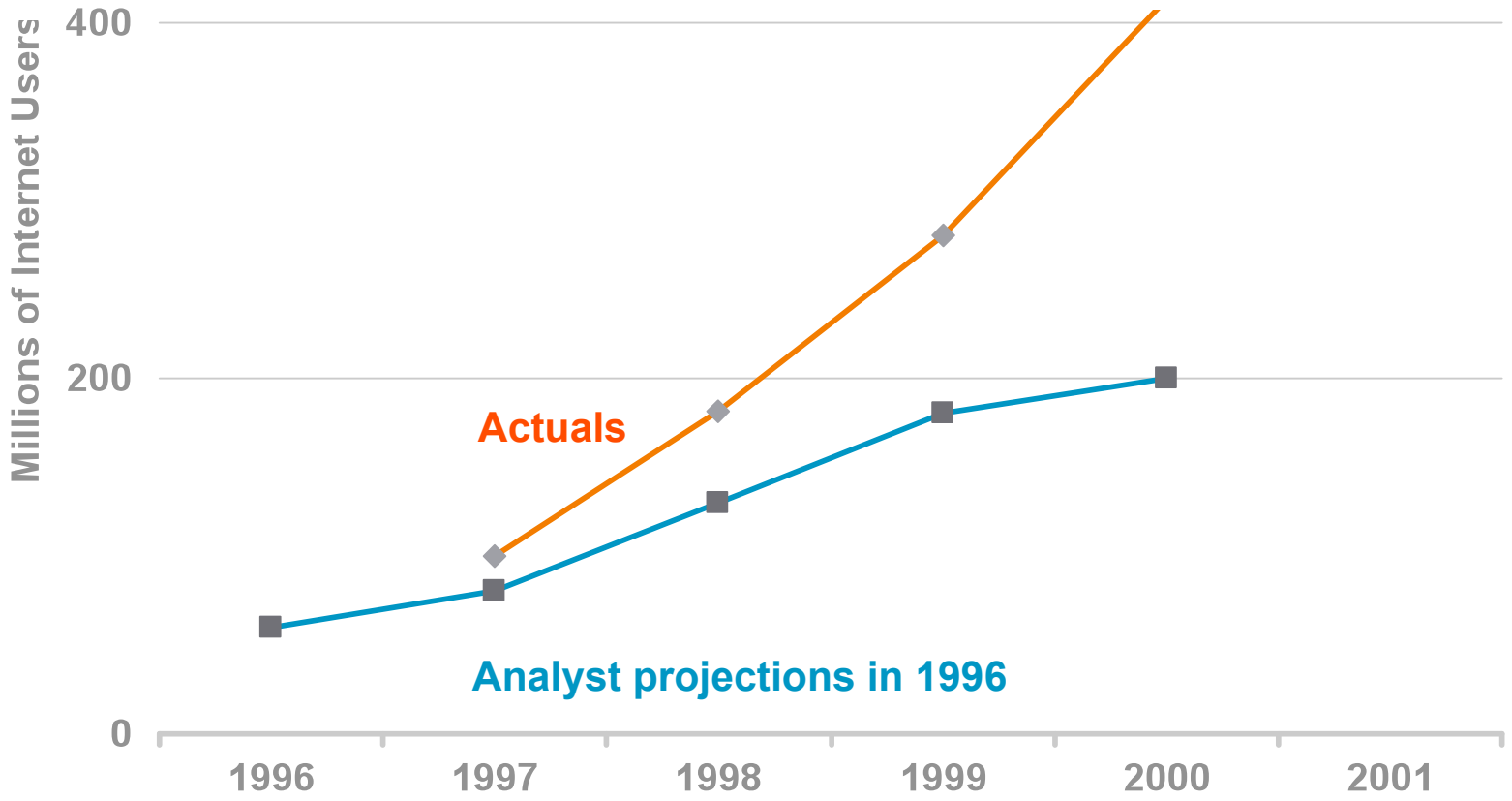


Source: Cisco, 2008

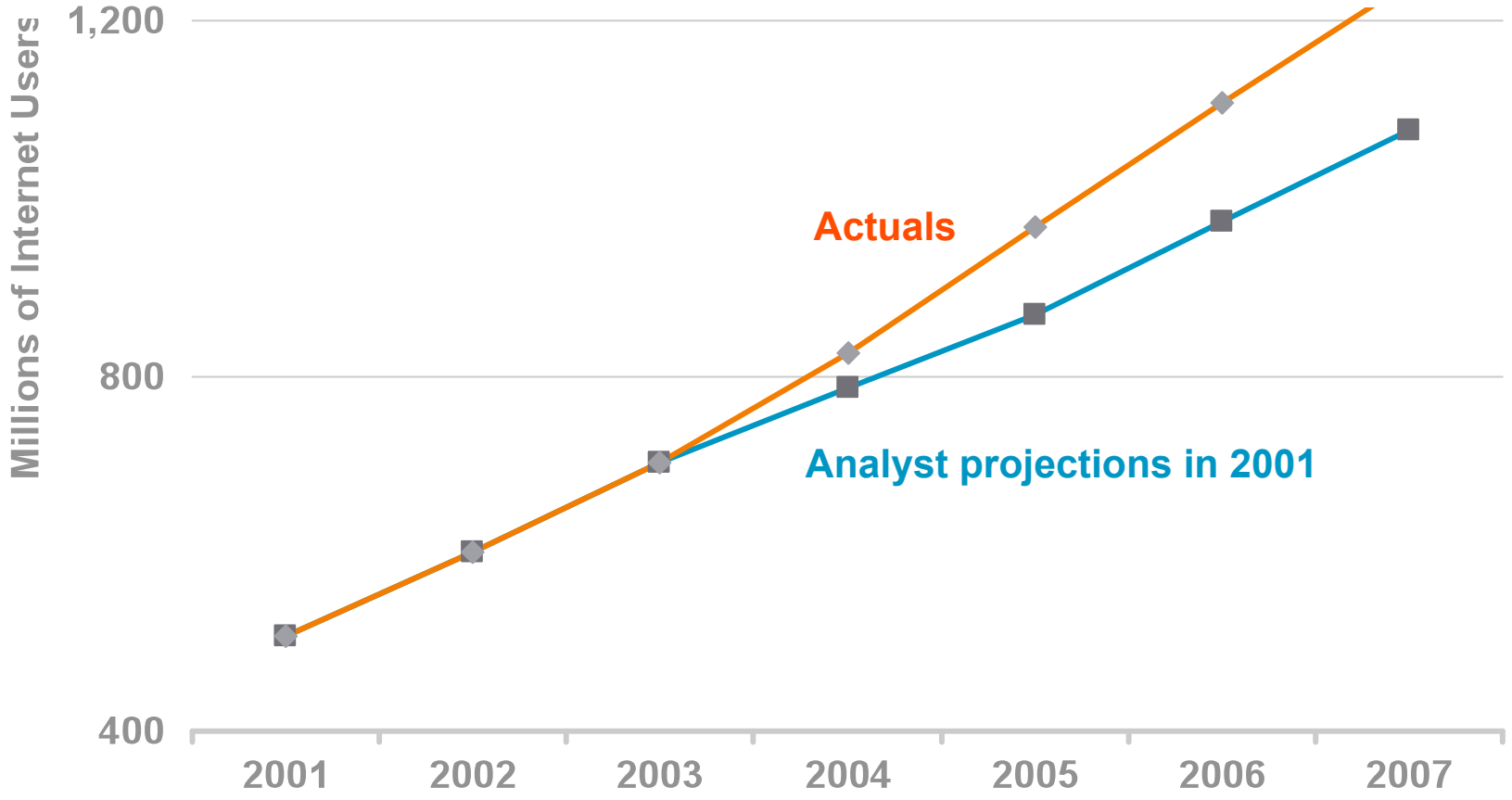
Upstream Examples

CyWorld: 35 TB per month	YouTube: 20 TB per month	MSN Video Calling: 2,880 TB per month
Not only are Koreans spending $300K per day furnishing their virtual homes in CyWorld, they are uploading 6 million photos and 150,000 videos per day.	YouTube users are uploading 64,000 videos per day. While many uploads are clips of professional content, over half of the most popular YouTube videos of all time are true UGC.	MSN Messenger users make about 1 billion minutes of video calls per month, exceeding the number of Messenger audio minutes.

The History of Internet Projections, Part I



The History of Internet Projections, Part II



Cisco Consumer Vision

transforming
life's experiences
by helping people
live a connected life
that is
more personal
more social
and more visual

enabling
formerly solitary experiences
to be shared
by people
across devices, locations
and across applications

Cisco Differentiation

an end to end
media-optimized network
that extends from
the **head-end**
over the **SP network**
through the **home network**
to the device

California Broadband Task Force

The State of Connectivity:

Building Innovation Through Broadband

Final Report of the California Broadband Task Force

January 2008

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California Broadband Task Force

Findings

- 96% of households in California have access to broadband
- Base level considered 500 kbps combined up and downstream
- 1.4 million Californians lack broadband access at any speed.
- Barely more than half of Californians have access to broadband at speeds greater than 10 Mbps
- In some areas of California, broadband is only available to 57% of households.
- If California were its own country, it would have ranked 3rd among OECD countries for broadband adoption in 2001. Today, California ranks 10th.
- Prices differ throughout the state. For example, services between 500 kbps and 1 Mbps range from $14.99 to $79.99 per month.

California Broadband Task Force

Task Force Recommendations

- Build out high speed broadband infrastructure to all Californians.
- Develop model permitting standards and encourage collaboration among providers.
- Increase the use and adoption of broadband and computer technology.
- Engage and reward broadband innovation and research
- Create a statewide E-Health network
- Leverage educational opportunities to increase broadband use
- Continue state-level and statewide leadership

Lessons Learned

- **Market-based competition works**

  But the path to competition may be different in each market

- **Deregulation with facilities based competition can lead to investment**
- **Deregulation without facilities based competition can lead to foreclosure of markets**
- **Regulator needs enforcement authority**
- **It's difficult to align incentives but new investment is important – "ladder of deregulation"**

Lessons Learned

- Leadership matters
- Success depends on Public-Private Partnership
- Government role
  - Leadership—set concrete goals
  - Establish fair, transparent, competitive framework and market structure
  - Lower entry barriers and costs
  - Support low density deployment and low income use
  - Create/support demand creating government services
- Private sector role
  - Invest in, build and operate broadband networks
  - Compete

Questions?