

Transit services practices

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- Cisco Systems

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Presentation Outline

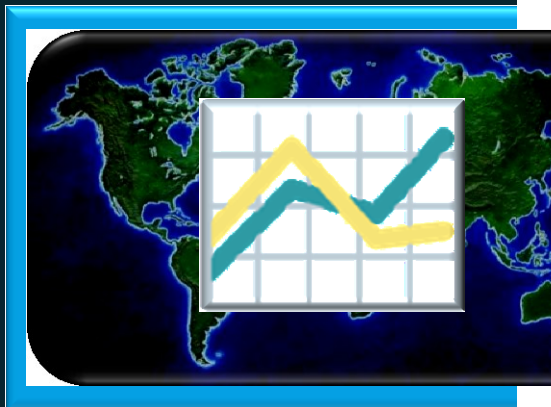
- What is this presentation about?
 - Present latest Cisco Visual Networking Index Update
 - Review Effect of the forecast on interconnections
 - Review Transit services practices

Cisco Visual Networking Index (VNI)

Sharing Global IP Traffic Growth Projections & Analysis

The **Cisco VNI Global Forecast** methodology is built on independent analyst projections; fixed/mobile usage reports and verified with real network data.

Global Forecast Data



Global Usage Trends



Global, ~~to country~~ modeling
of consumer/business usage trends.

Cisco VNI Global IP Traffic Forecast, 2010–2015

Key Takeaways / Summary



Total IP Traffic **80.5 Exabytes per month by 2015**

By 2015, annual global IP traffic will almost reach a zettabyte



Fixed Internet **59.4 Exabytes per month by 2015**

By 2015, one million video minutes cross the network each second



Managed IP **14.8 Exabytes per month by 2015**

Business IP video conferencing will grow six-fold from 2010-2015



Mobile Data **6.3 Exabytes per month by 2015**

Mobile video will increase 26-fold from 2010 to 2015

Source: Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015

Entering the Zettabyte Era

- By 2015, global IP traffic will reach an annual run rate of 966 exabytes per year

966 Exabytes is equal to:

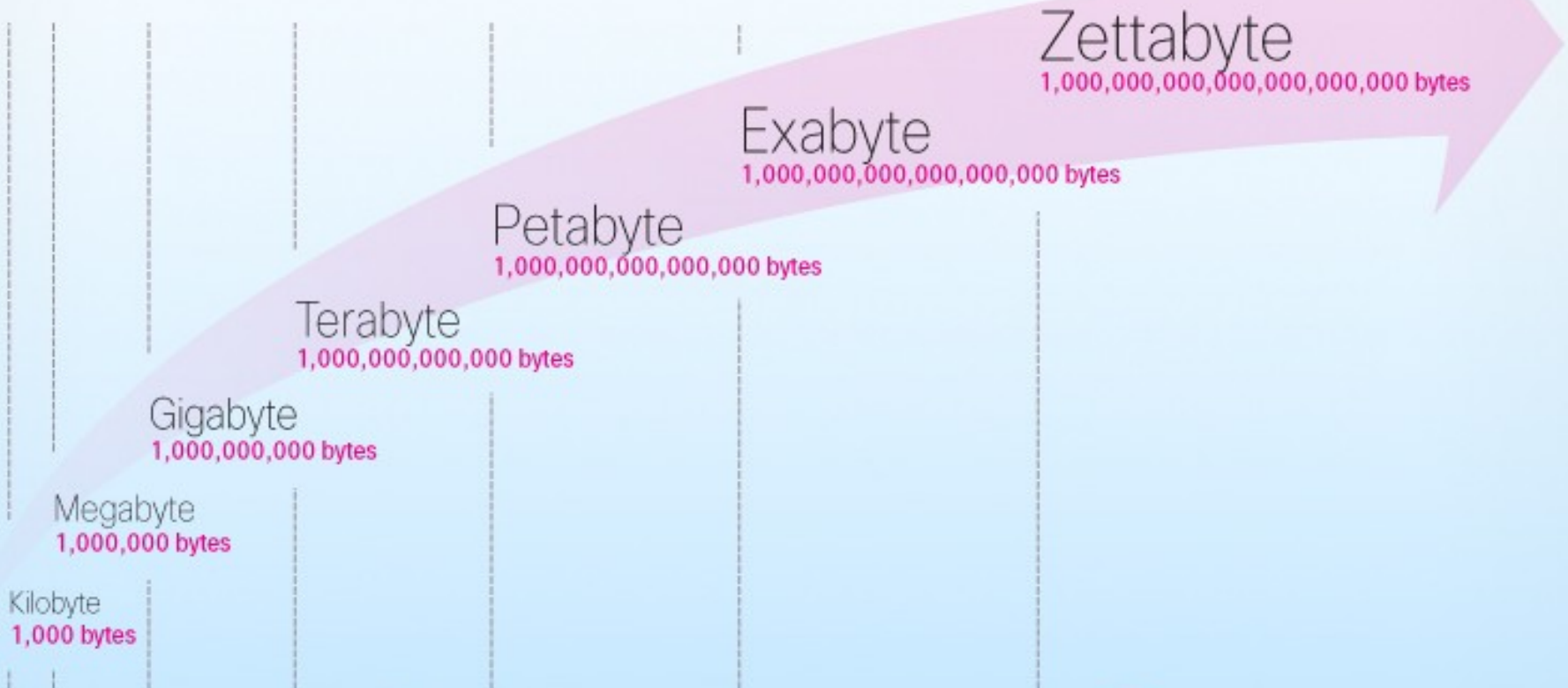
- 8X more than all IP traffic generated in 2008 (121 EB)
- 28 million DVDs per hour

What is a zettabyte?

- One sextillion bytes
- Approximately 10 to the 21st power (1,000,000,000,000,000,000,000) bytes



Source: Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015



capacity
of 3.5"
floppy disc



capacity
of single
layer DVD



capacity of
human being's
functional
memory

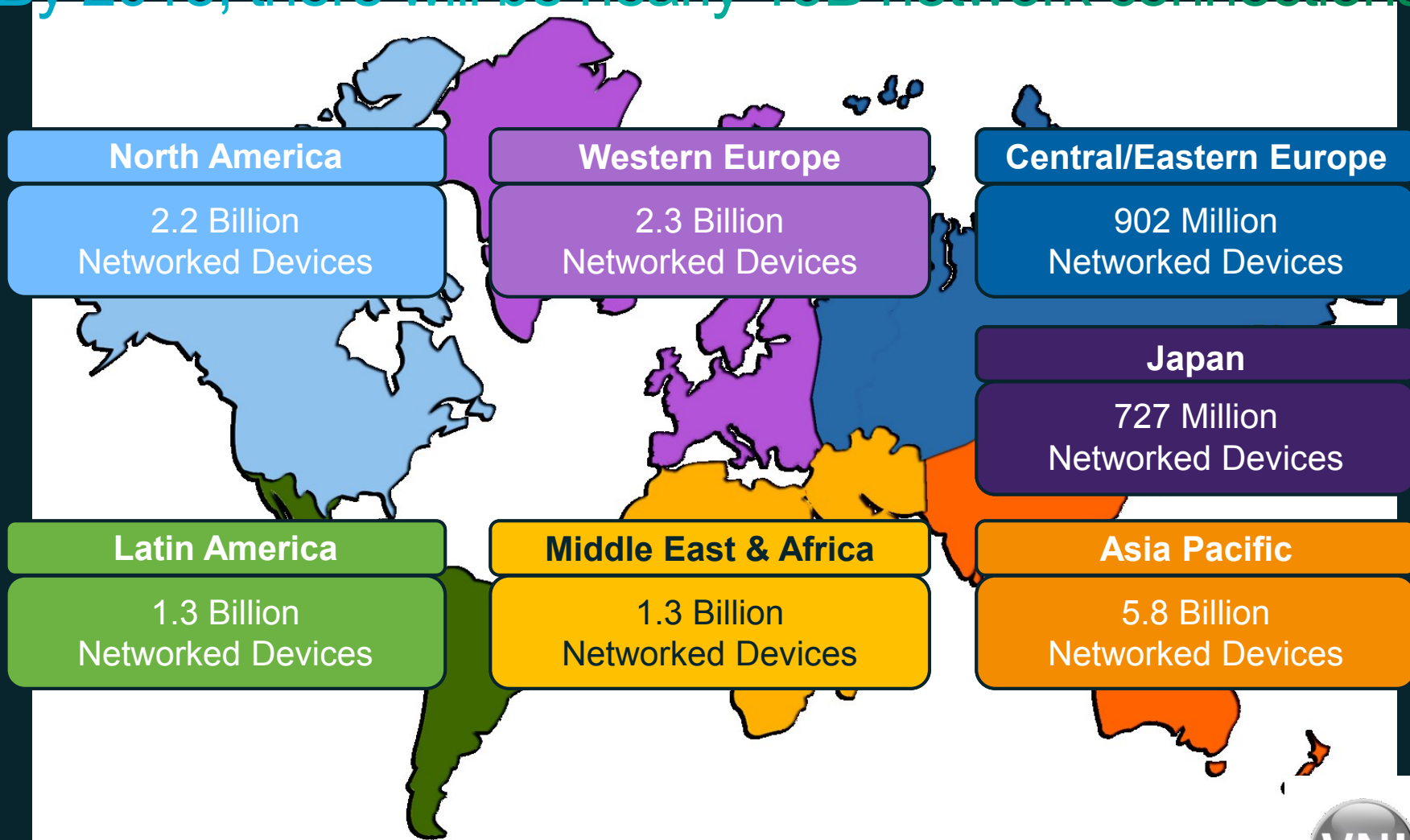


amount of all digitally stored
information in the world (2010)²

20 Yottabytes
A holographic snapshot of the earth's surface

Global Device Growth, 2010–2015

By 2015, there will be nearly 15B network connections

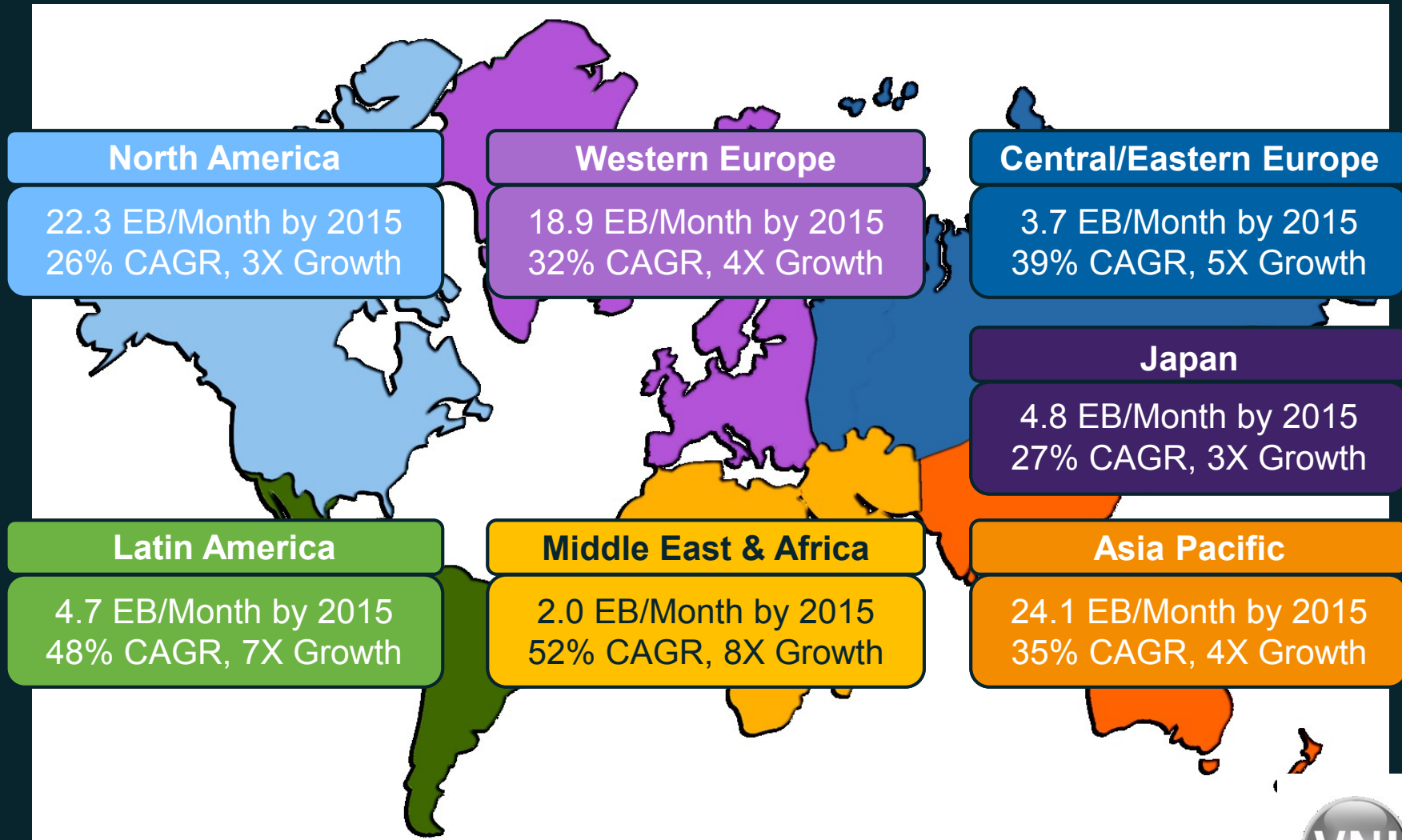


Source: Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015



Global IP Traffic Growth, 2010–2015

Regional contributions to the Zettabyte journey



Source: Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015



Global IP Traffic Drivers, 2010–2015



More Devices

Nearly 15B Connections



Faster Broadband Speeds

4-Fold Speed Increase

More Internet Users

3 Billion Internet Users

Key Growth Factors

More Rich Media Content

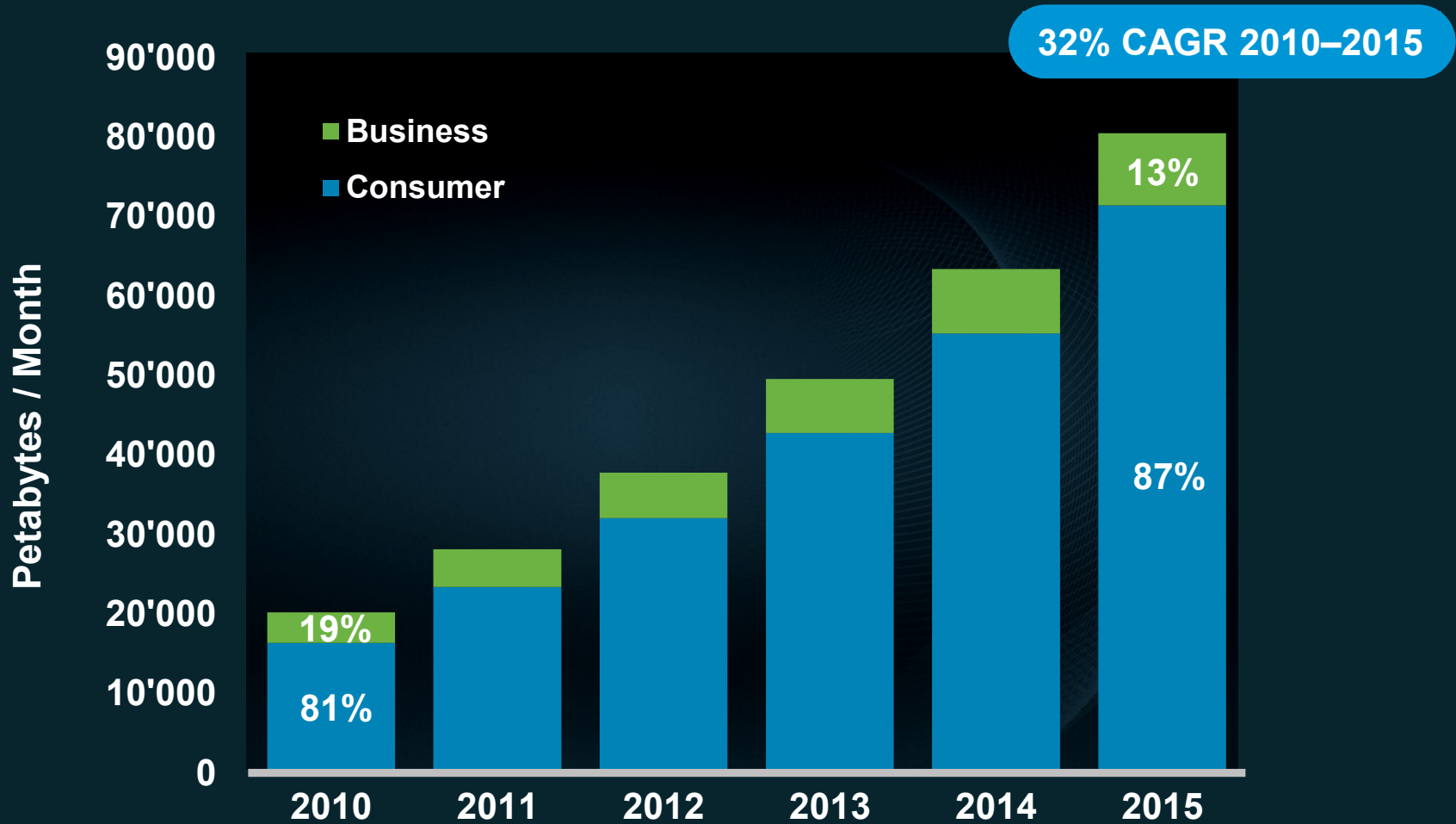
1M Video Minutes per Second



Source: Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015

Global IP Traffic Growth by User Segment

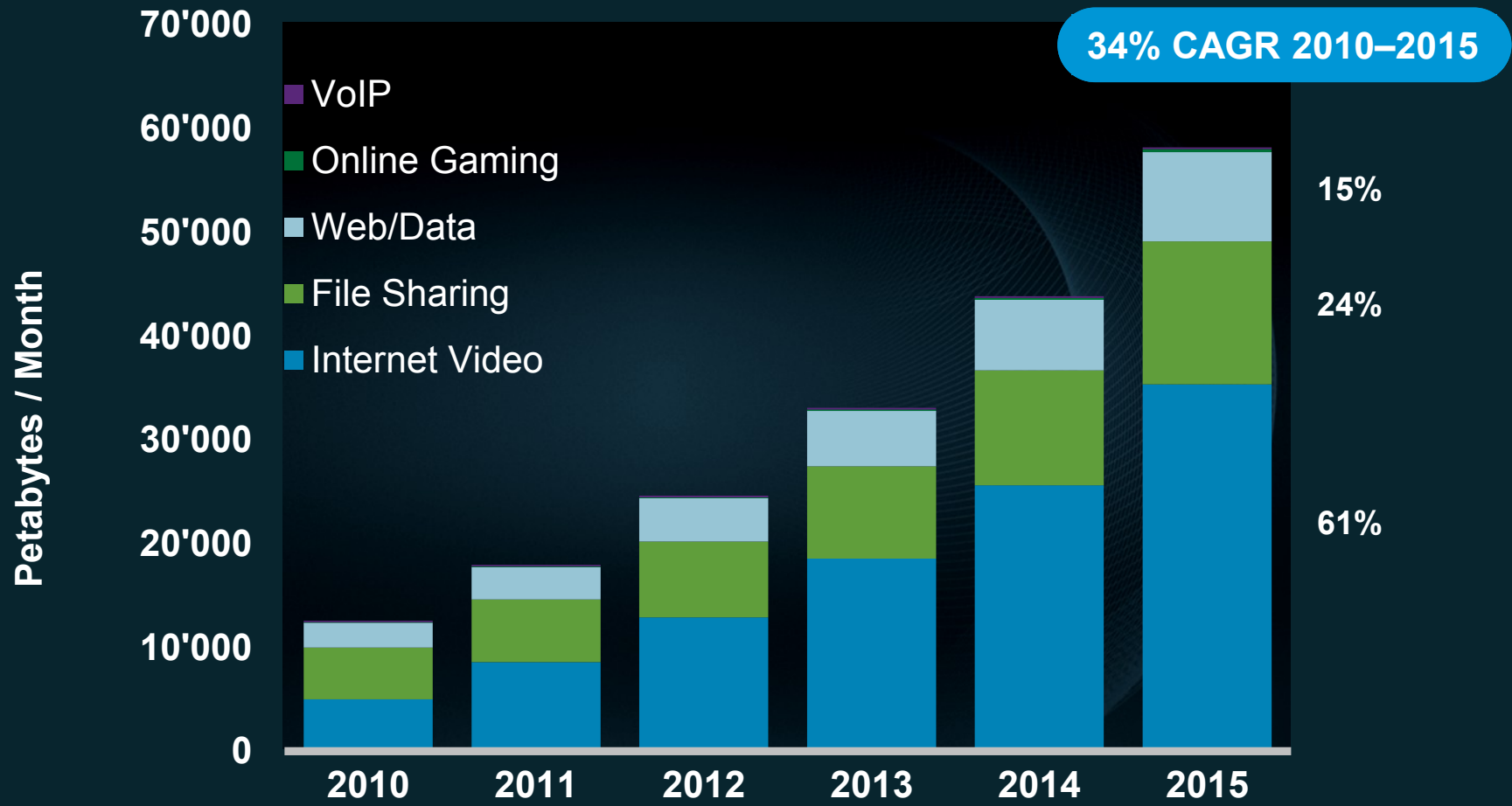
Consumer CAGR 34%; Business CAGR 21% (2010 to 2015)



Source: Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015

Global Consumer Internet Traffic / Applications

Internet Video dominates consumer Internet traffic



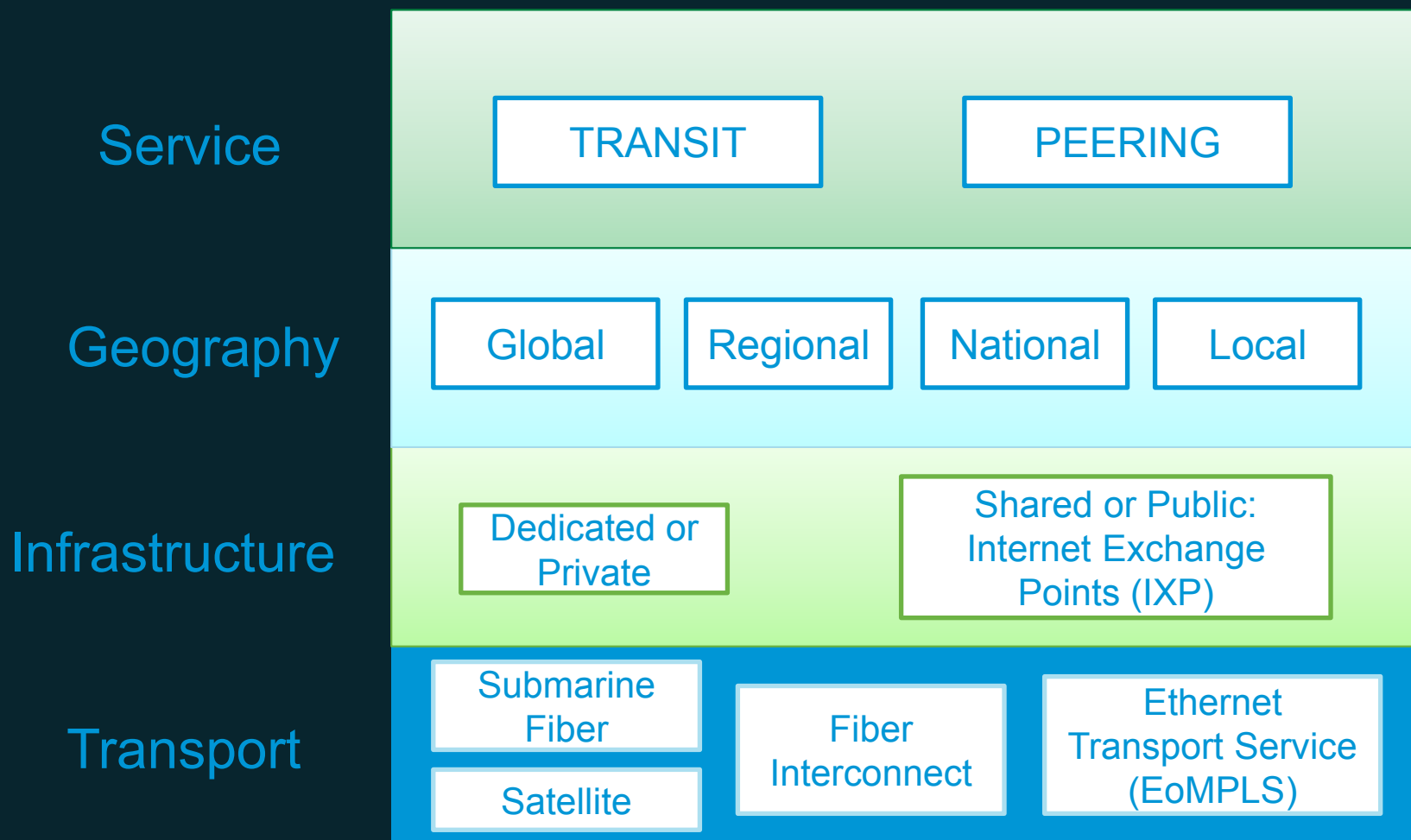
Online Gaming and VoIP forecast to be 0.79% of all consumer Internet traffic in 2015

Source: Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015

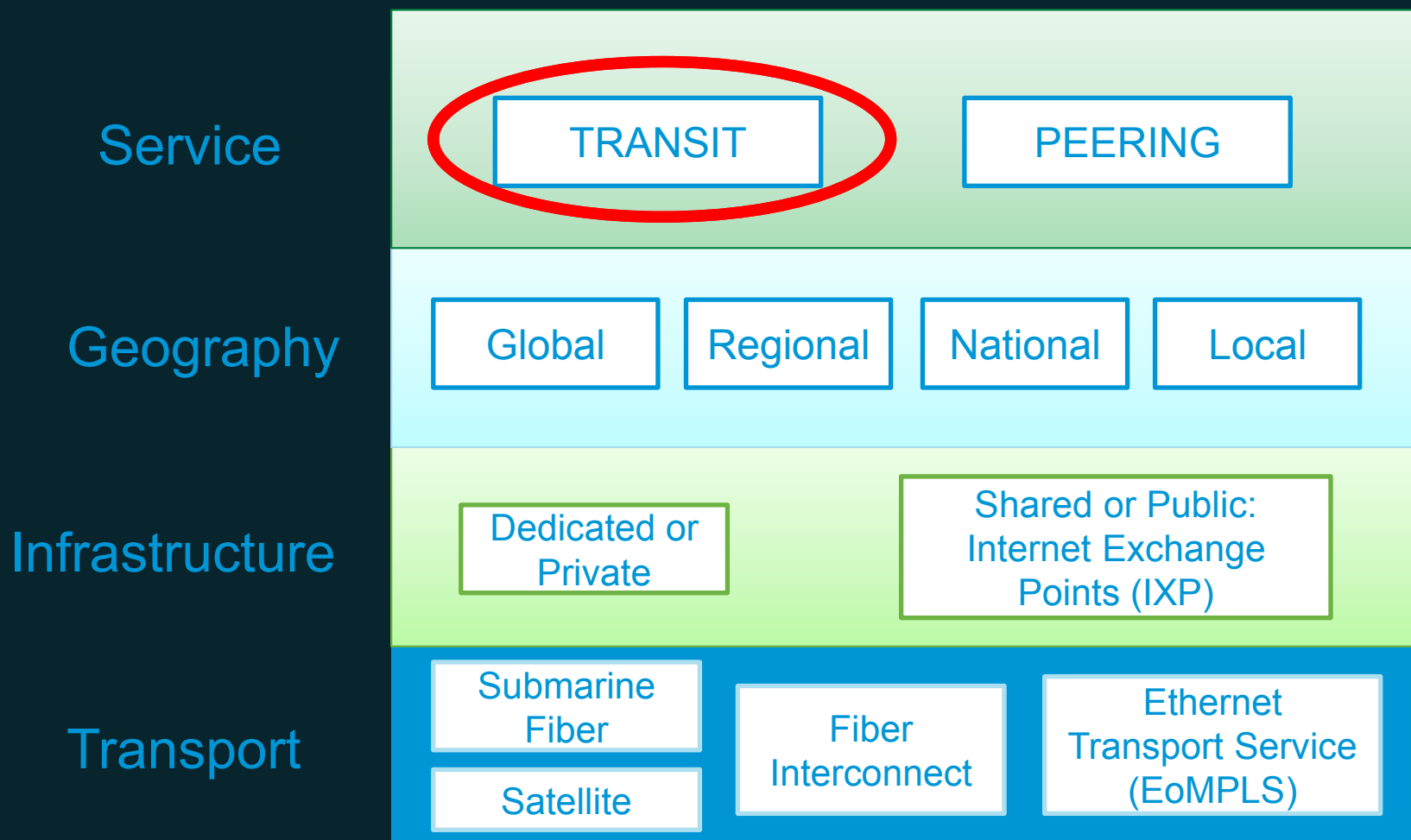
What this predictions means to traffic exchange?

- Continuous growth of interconnection requirements, probably making the Internet even more dense
- Internet Video as the application driving the traffic increase. Internet video has particular interconnection requirements:
 - Low tolerance to packet loss
 - Lower tolerance to very dissimilar parallel paths (jitter)
 - Low delay for interactivity
- Emerging markets will outperform the rest of the world in growth of traffic and devices connected

Interconnection Ecosystem



Interconnection Ecosystem



Internet Transit is

“Internet Transit is the **business** relationship whereby an Internet Service Provider provides (usually sells) **access** to the global Internet.

From a high-level perspective, Internet Transit can be thought of as a pipe in the wall that says "Internet this way". Customers connect their networks to their Transit Provider, and the Transit Provider **does the rest.**”

Source: “The Internet Peering Playbook”, William B. Norton, ISBN 978-1-937451-03-5

How Internet Transit pricing has evolved over time

Model	Description	Adoption	Use-case
Access Capacity	Customer Pays for full bandwidth in access port	Medium	Low speed interconnections
95 th Percentile	Statistical measure of traffic that allows burst without penalties	High	High speed connection port
Transit Commits	Two-tiers price model with a minimum commit BW at low cost	High	Multi-homed organizations. Critical infrastructure to prevent Denial of Service attacks

Observations about Internet Transit

- It is a simple access service: You pay, you get access and the right to demand access
- It is typically a metered service: the more you send or receive, the more you pay
- It has commits and discounts
- Contracts have a term duration
- Prices has historically dropped every year

Particularly there are some known techniques to decrease transit cost

1. Multi-homing: Avoid been locked-up to only one provider.
2. Regular contract re-negotiations: ISP re-negotiate transit cost very regular as capacity needs to be augmented frequently.
Even re-negotiation on multi-year contracts
3. Interconnect with Content and Access providers
4. Optimal Internet Transit: study traffic and commit earlier to the next higher commit level

Reference and full list of playbooks available at: “The Internet Peering Playbook”, William B. Norton, ISBN 978-1-937451-03-5

And a typical consequence is the building of capacity outside of your local area

5. Build into cheaper transit Internet locations

What does it mean?

Install equipments outside of your market to decrease your transit costs

Advantages: Cheap transit, lot of peering and possible additional services using the same infrastructure: business private networks, VoIP trunking and IPTV access.

Examples:

LATAM: Miami

Eastern Europe: Frankfurt

Africa: London or Paris

Key Takes Away

- Cisco Visual Networking Index (VNI) helps understanding and forecasting traffic trends
- In 2015 we will be entering the zettabyte era with Internet Video as the predominant application
- Emerging countries will see the highest relative traffic growth
- In the search for lower transit options, more networks will continue building capacity outside of their local markets and new “meeting points” will be created in places such as Africa, LATAM and Southeast Asia

Further Reading

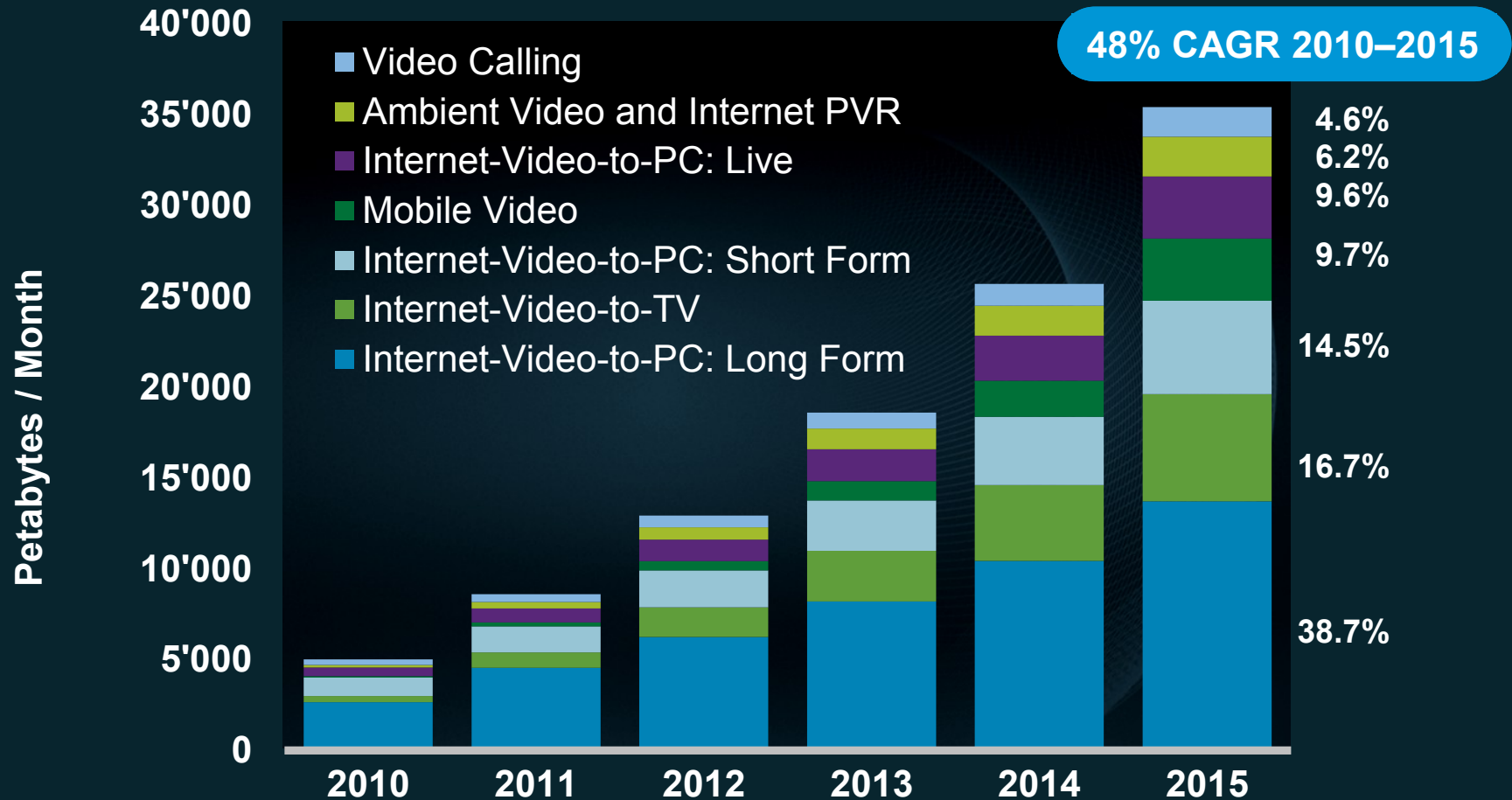
- Cisco Visual Networking Index: <http://www.cisco.com/go/vni>
- “The Internet Peering Playbook”, William B. Norton, ISBN 978-1-937451-03-5
- Regional Interconnection forum for LATAM – NAPLA 2011: <http://lacnic.net/sp/eventos/lacnicxv/agenda/napla.html>
- Dr Peering, The Internet Peering Knowledge Center: <http://drpeering.net>
- EuroIX (European Internet Exchange Association): <http://www.euro-ix.net>

Thank you.



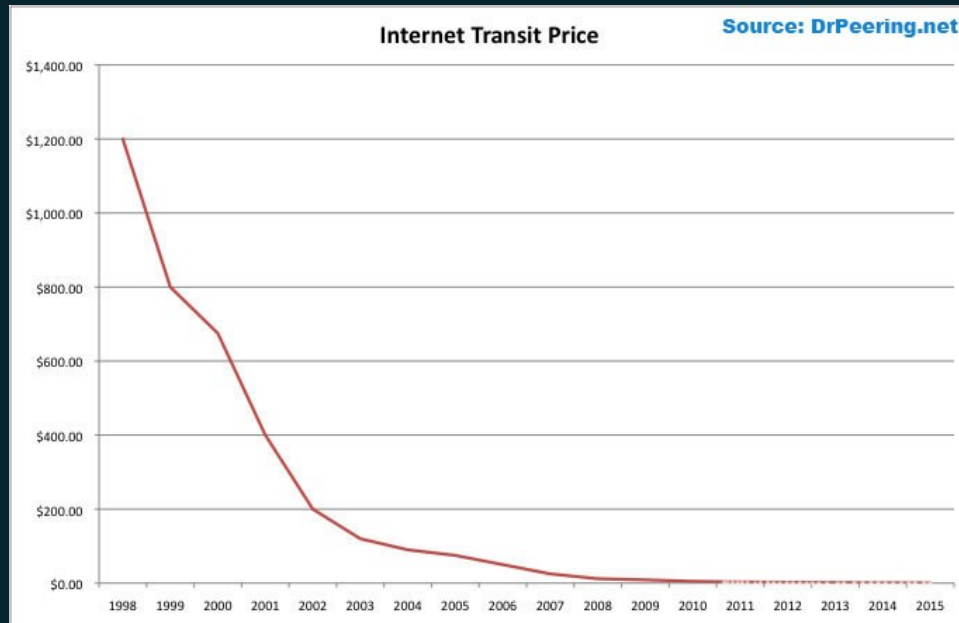
Consumer Internet Video Composition

Video traffic increasingly driven by long-form video



Source: Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015

Transit and CDN Costs Comparisons



Video Delivery Pricing For Q4 2011

For quarterly pricing updates visit: www.cdnpricing.com

Volume 250TB: High \$0.10 per GB, Low \$0.05 per GB
Volume 500TB: High \$0.06 per GB, Low \$0.02 per GB
Volume 750TB: High \$0.05 per GB, Low \$0.02 per GB
Volume 1PB: High \$0.025 per GB, Low \$0.015 per GB
Volume 3PB: High \$0.02 per GB, Low \$0.01 per GB
Volume 5PB: High \$0.015 per GB, Low \$0.0075 per GB

- This is per GB delivered pricing, not per Mbps sustained
- Volume commits vary from monthly, quarterly and yearly
- Cheaper prices can be found for customers who have smaller volume
- Customers have different needs and requirements which determines the final price
- Pricing is from major CDNs (Akamai, Limelight, Level 3, Amazon, EdgeCast, AT&T, Highwinds)

Pricing data can be used by anyone, but please credit Dan Rayburn, cdnpricing.com

Transit Negotiation Factors:

- Commit traffic amount
- Geographic location
- Geographic diversity (buying transit from different locations)
- Contract duration
- Customer relationship: other services such as transport, roaming or telephony transit been discussed
- Traffic profile