_telecom
_internet
_media

Evolution of the CDN market
CDN World Summit 2010

Understanding
the
Digital World

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Consulting & Research
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Our approach to the Internet Network and Technologies

As more and more services are migrating to the Internet, overall Internet traffic is becoming huge. As a consequence, advanced architectures are required to deliver online video (with CDN and/or P2P) or software and SaaS products (through cloud computing) with a certain level of quality of service, reliability and security. They are also a key element to develop sustainable and profitable business models.

Those advanced architectures are currently deployed in the open Internet but can also be deployed in ISP networks, especially as managed services, as telcos are looking for new revenue streams. Numerous tools and solutions can help ISPs to handle congestion, to optimize traffic consumption or to comply with various laws (piracy, child pornography, etc…), but also to provide segmented end-user offerings based on volume or quality of service. All these initiatives need to be put in perspective with the Net Neutrality debate.

Our skills : CDN, Video delivery, QoS, DPI, Traffic Management, Net Neutrality

We combine in-depth expertise in the Internet network and backbone market with IDATE's core skill sets in telecommunications and video markets.

The core team members have been advising industry players for more than 5 years

We assist the globe's largest telecom and technology providers but also major European public bodies with market analysis, data & forecasts, innovation roadmaps & business modelling

Agenda

Traffic Explosion

- Video as the leading source of traffic

Market trends

- More competition, more traffic but not enough revenues

Telcos positioning into CDN

- Backbone and access networks

New opportunities with the cloud?

- A more profitable option?

1 Internet traffic explosion

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Traffic explosion : solid growth

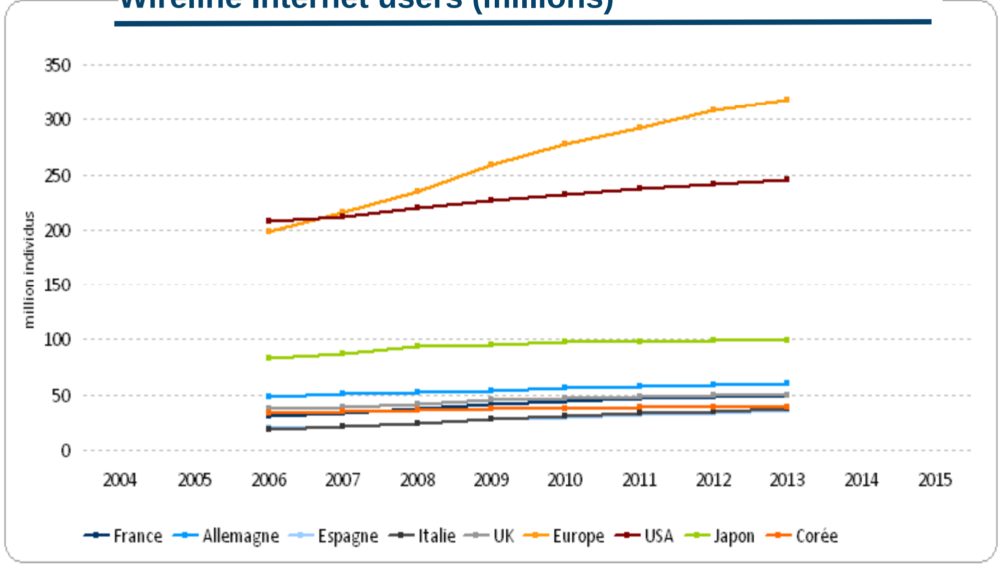
Internet traffic growth is still exponential, for multiple reasons

- Internet adoption
  - Growth close to 10% in advanced countries
  - Mobile Internet now significant
- Broadband diffusion
- P2P (peer-to-peer) activity
- More applications and services moving online
  - SaaS development
- … and video content explosion
  - Development of video-sharing platforms

Growth between 45 (Arbor) to 75% (Level3) according to different sources (average at 50 to 60%)

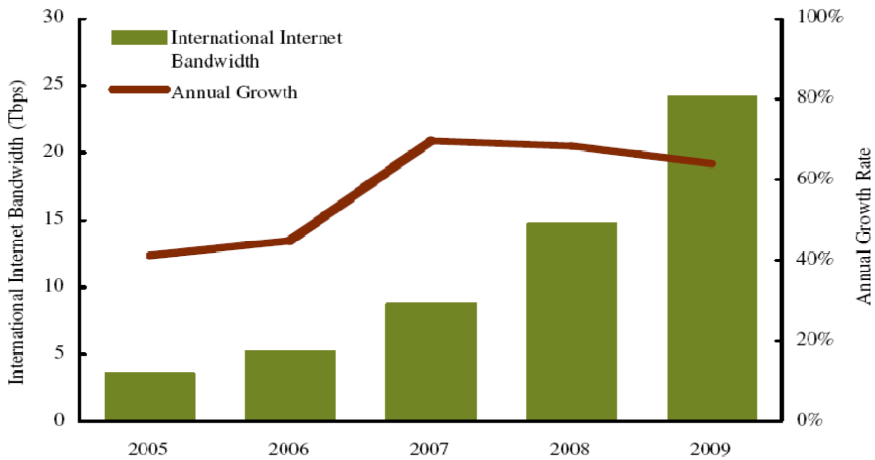
- Above 100% for video

Wireline Internet users (millions)



Source: IDATE

International Internet bandwidth evolution



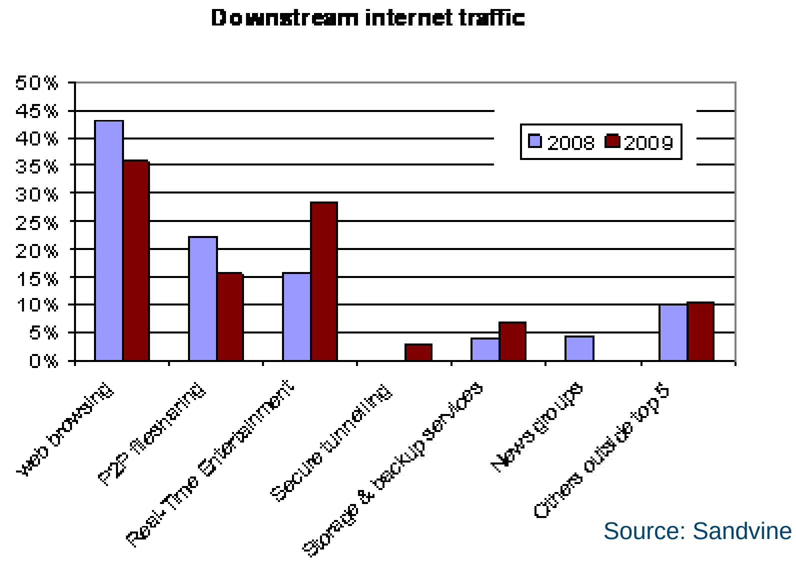
Source: Telegeography

Traffic explosion : still some digital divide

Disparate growth of internet traffic from 08 to 09 (in relative share of traffic):

- Web browsing
- P2P file sharing

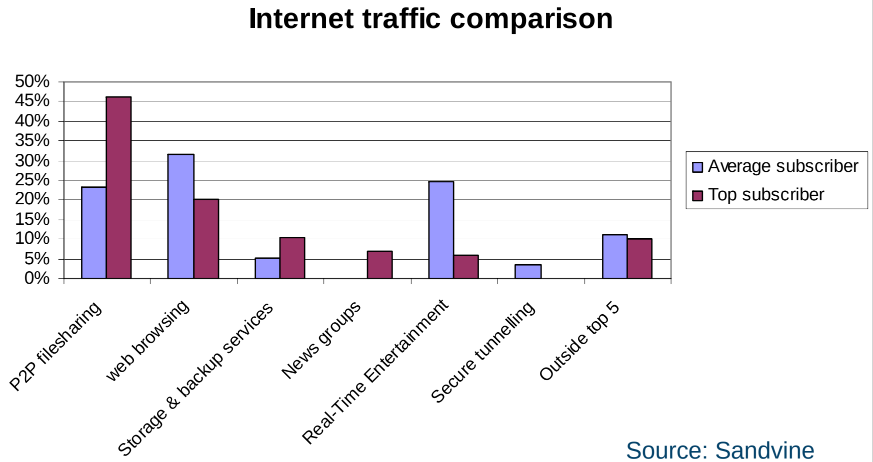
- Real time Entertainment
- Secure tunnelling
- Storage & back-up services



Source: Sandvine

Top user vs. average user: Digital divide

- 1 top user = 200 average users (in data consumption)
- Different usage of techniques according to user profiles:
  - Top user: P2P, usage all day long
  - Average user: more and more real-time traffic
- As market matures, traffic gets more concentrated toward top users



Source: Sandvine

Traffic explosion : online video

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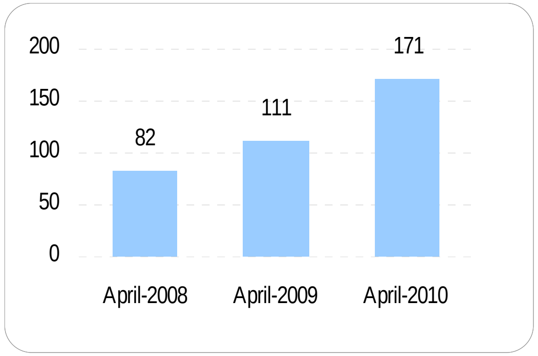
Many reasons behind online video traffic growth

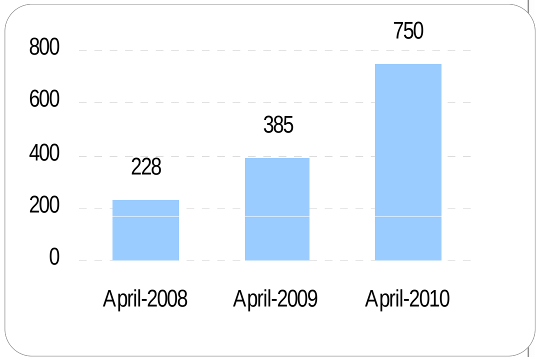
- More users watching videos
- Number of videos x2 per user in 2 years
- Overall time per user x3 in 2 years
- Higher encoding bitrates (especially for Internet TV in the medium term)
- Availability of new contents

Diversification of online video

- Success of catch-up TV (iPlayer, Hulu, etc…), even moving to connected TV sets
- Streaming platforms like Megavideo
- Live streaming, more niche for now but intensive usage by its users
- Emergence of premium VOD, especially with Netflix

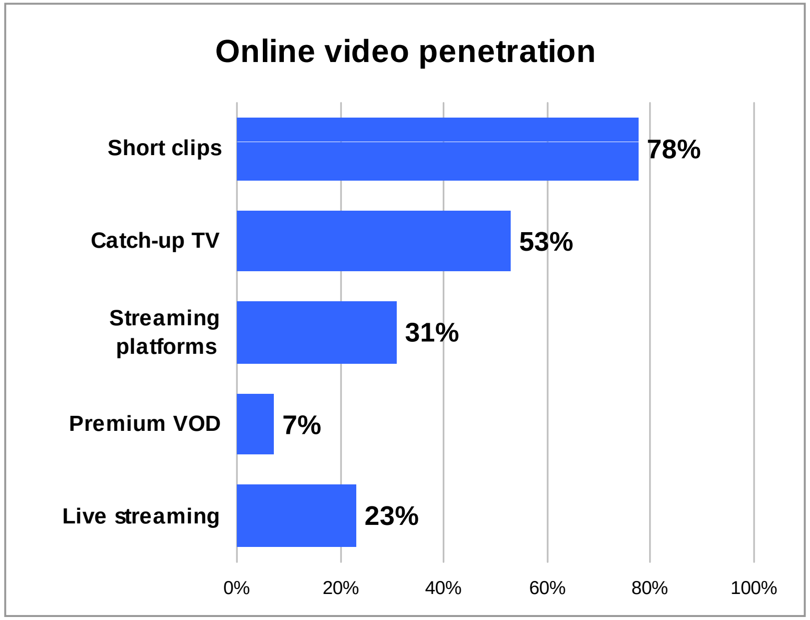
Videos viewed per user and average time of video per user per month in the USA





Source: Comscore

Penetration of online video (UK, USA, France)



Base: whole sample, n=1 200 Source: OCEAN FP7

Traffic explosion : online video

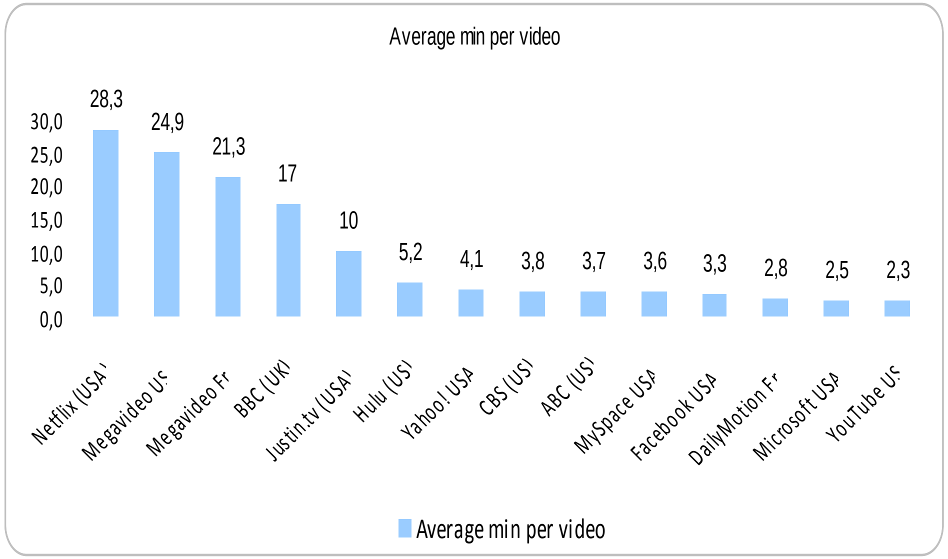
Key services currently behind the traffic growth for video

- YouTube, leading in all Western countries
- Hulu
- BBC iPlayer with a very wide reach in the UK, especially for non-PC consumption
- Other catch-up TV services developing really fast (M6, TF1, 4oD, ITV, CBS, etc…)

Other key video services to take in account

- Netflix
  - Encoding above 2.3 Mbps
  - Above 500 min per viewer per month
  - Expansion outside the US? (first steps in Canada)
  - 1/3 of subs giving up on cable
- Megavideo
  - #2 in terms of traffic in France
  - Above 800 min per viewer per month
- Facebook
  - Still marginal in terms of traffic, but now #2 or 3 in terms of penetration
- Live sport events (Olympics, World Cup)
  - Huge QoS requirements
  - Through broadcasters and ESPN3
- TV Everywhere & Epix
  - Complements to TV-based services

Average duration of a video per service



2 CDN Market trends

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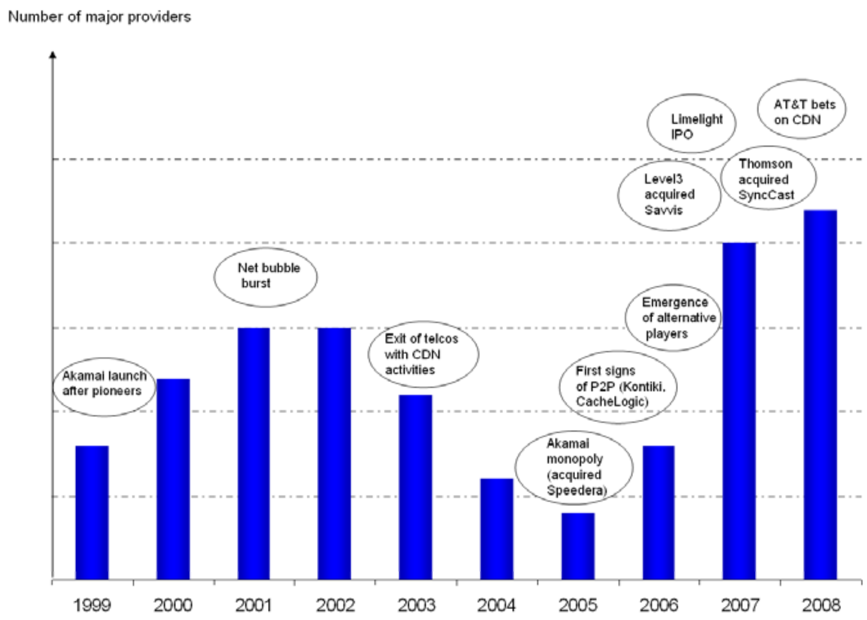
CDN Market trends

The CDN market is composed by a myriad of players, with different strategies

- Leading CDN are mostly pure players
  - Akamai (US based)
  - Limelight Networks (US based)
  - Edgecast, Highwinds
  - ChinaCache, CDNetworks in Asia
- Consolidation in progress within pure players
  - Panther Express, Velocix
- … from telcos …
  - Level 3, AT&T leading players for backbone
  - BT, KPN most advanced for access
- … and even the Internet players
  - Building internal solutions (Google, Microsoft, DailyMotion, etc …)
  - Or even offering solutions for third-parties (Amazon CloudFront)
- Equipment and solution vendors also positioning
  - Traditional vendors : Cisco, Juniper, Alcatel-Lucent (Velocix), etc…
  - Specialized players : JetStream

Number of active players in the CDN industry



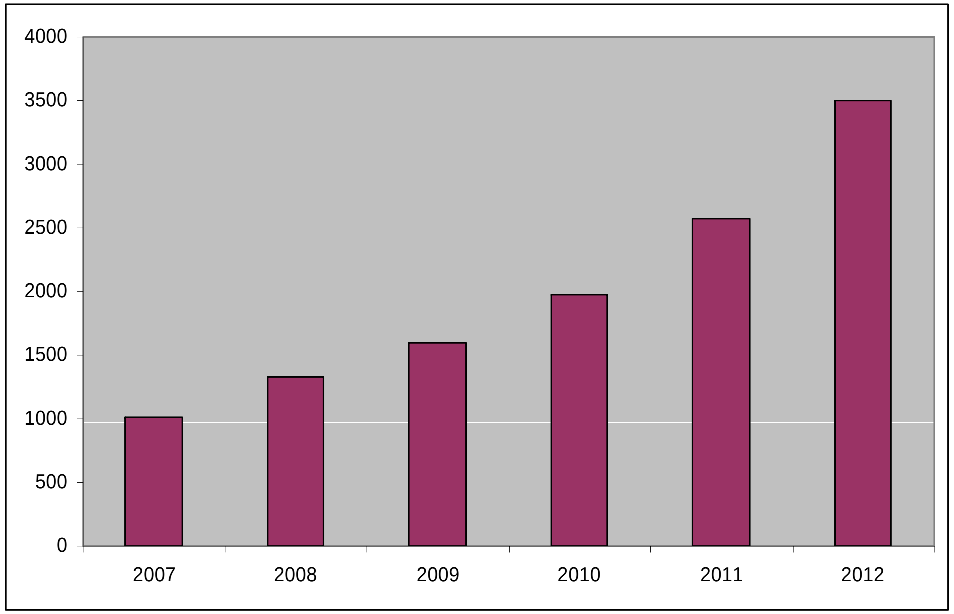
Source: IDATE

CDN Market trends

Market sizing and forecasts

- The CDN market represented around $1.6 billion worldwide in 2009 (video and non-video)
  - A large part of the market is non-video but more about small objects
- It should reach $3.5 billion by 2012
  - 28% CAGR
- Still not enough
  - CDN market growth < traffic growth
  - CDN market growth still limited for an emerging market
  - Strong price competition

Worldwide CDN market size (in million USD)



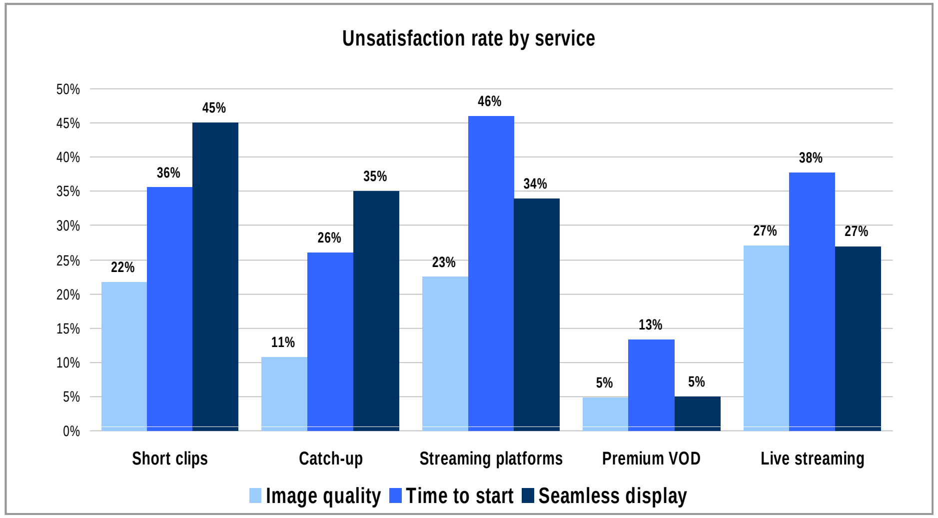
Source: IDATE

CDN Market trends

Market drivers of the CDN market

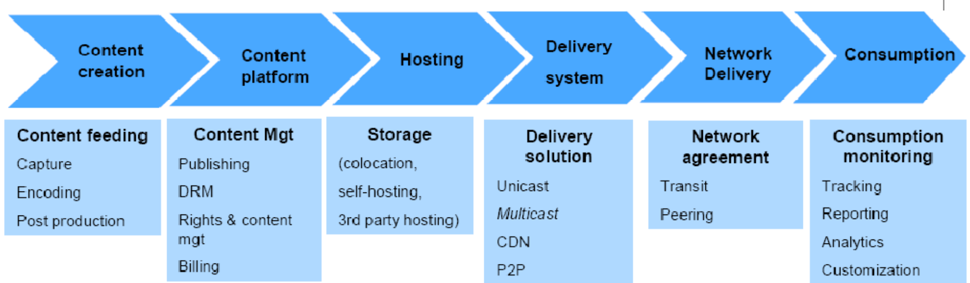
- Growth of Internet consumption and markets
  - Good availability and uptime of services (e-commerce players)
  - E-commerce growing by 15-25%
  - Online advertising up by more than 10%
- Growth of media consumption
  - Usage itself
  - HD video (higher bandwidth requirement)
  - QoS requirements for premium content and live, especially with the move towards connected TV
  - Involvement of players with revenues outside the online world (broadcasters, DVD rental players, cable providers in the USA etc…)
- New screens with the TV set and the mobile phone
- New video and QoS technologies
  - Adaptative streaming technologies (Move, Adobe, Microsoft, Adobe)
  - SVC?
- Services and marketing tools
  - CDN is way more than just traffic
- New pricing schemes

QoS needed for online video services



Source: IDATE & OCEAN FP7

Services around content delivery value



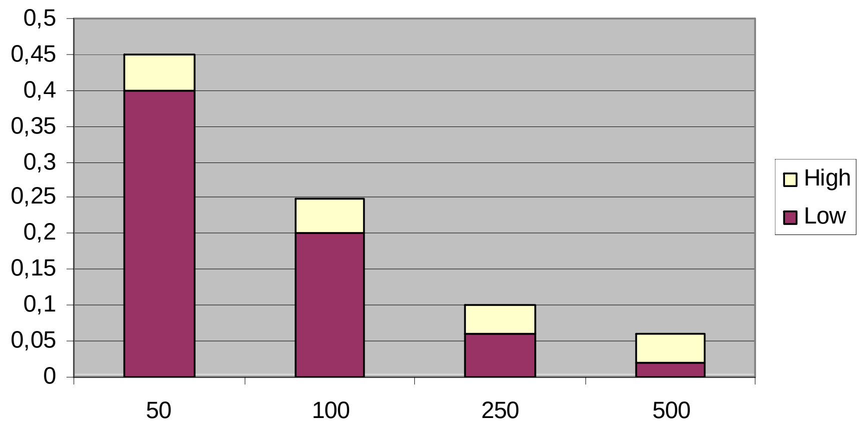
Source: IDATE

CDN Market trends

Market barriers of the CDN market

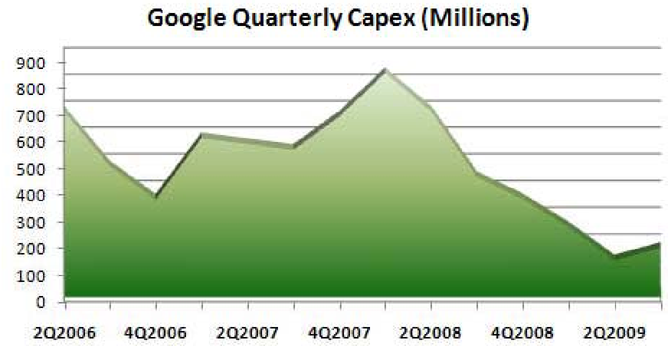
- Profitability of CDN business falls off
- Unclear business models for significant video providers (ad-based mostly)
  - Premium video content already profitable for some players (live events, some catch-up, VOD)
- Price wars depress revenue
  - Intense competition imposed by challengers of Akamai plus new entrants like Amazon and telcos
  - -25 to 40% per year
  - Netflix paying as low as 1.5 cents per GB
- Content providers launch in-house initiatives
  - CDN providers could lose important content providers, which contribute a large part of their revenue
- Increasingly personalized consumption
- Evolution of the nature of congestion?
  - Traffic more local with video?
  - How to get closer to the user without getting deeper in ISP networks?
  - Traffic management from ISPs

CDN costs per GB in USD for a commitment in TB



Source: StreamingMedia

Investments in datacenters (Google)



Source: Google

3 Direct implication of telcos

Direct implications of telcos

Telcos entered the CDN market for different reasons

- A natural extension of their infrastructure
  - Natural players for managing bandwidth issues for web players, as Internet traffic is going through their backbones (Tier 1) and/or their last-mile networks (ISPs).
- Difficulties to monetize their network pipes due to the earlier developments of the Internet.
  - Services distribution with limited bandwidth costs, thanks to peering agreements.
  - Low transit prices inherited from the telecom bubble (over-capacity)
- Telco CDN to reduce the cost of traffic rather than to generate significant new revenues
  - Additional OPEX savings
  - Harsh competition in the short term with pure players
  - More QoS for the end-users
- A few players are still reselling CDN within their wholesale offerings (old practice)

Positioning of a few telcos on CDN

Player	Other elements
TP	Launched a CDN in 2008
AT&T	Launched a CDN late 2008 (ICDS)
Deutsche Telekom	Edgecast partnership
TeliaSoneraIC	"CDN-like" targeting mainly gaming Focus now on HD Video
Global Crossing	Partnership with Limelight and EdgeCast
France Telecom	Currently investigating with a RFP Studying interconnections within FP7 OCEAN
BT	CDN offer through BT Wholesale (Content Connect Network)
KPN	Launch a CDN in 2009 with JetStream Working on different inteconnection projects
Level 3	Savvis CDN unit acquisition Partnership with Pando Networks
Telecom Italia	CDNetworks reseller (partnership)
Telus	Edgecast partnership
Telefonica	Launch a CDN in 2010 Member of P4P working group
Telstra	Launch a CDN in June 2010
Verizon	Member of P4P working group Partnership with Velocix
Virgin Media	Separate trials with Cachelogic and Level3 Study to build an internal CDN

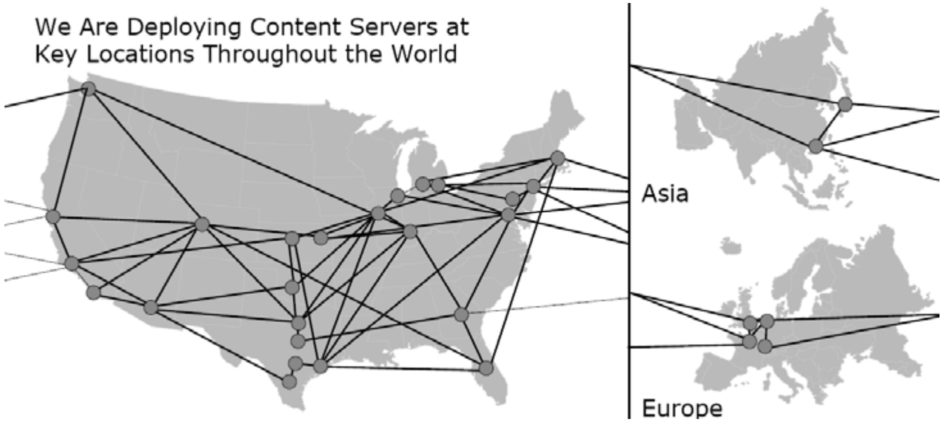
Source: IDATE

Direct implications of telcos

Positioning of telcos

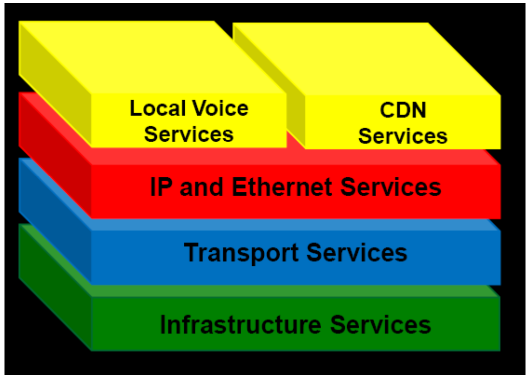
- Competitive advantages
  - **Network expertise**
    - Core Business
  - **ISP business**
    - QoS management for their subscribers
  - **Network tools user**
    - Network equipment improvement benefits
  - **Huge financial power**
    - Acquisitions and data center investments possible
- Major issues
  - **Deployment**
    - No existing infrastructure
    - Build from scratch
  - **Business models**
    - Low margins while huge investments
  - **Technical Performance**
    - **Offering more QoS than traditional CDN**
  - **Net Neutrality**
    - **Unclear framework yet on the capacity for ISPs to offer different levels of QoS**

AT&T Network map



Source: AT&T

Level 3 core network services



Source: Level3

Direct implications of telcos

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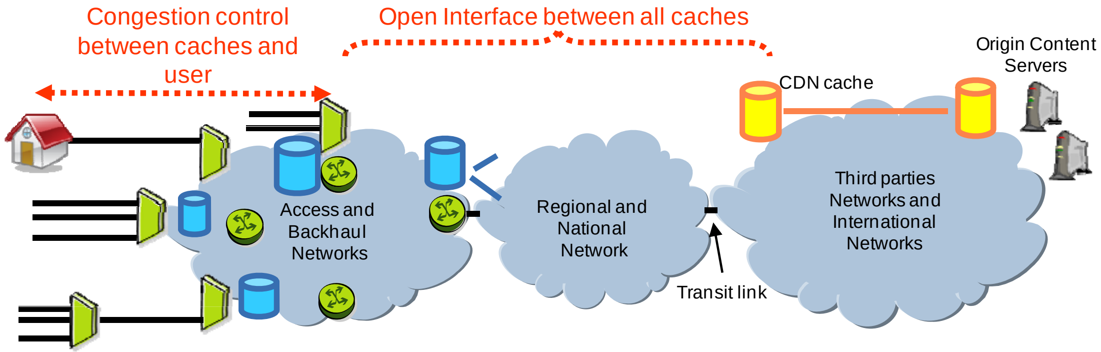
Deployments of cache servers

- In the backbones
- Further in the access and backhaul networks
  - Telco CDN
  - Or Private CDN based on technology from traditional CDN players (close to white label)

OCEAN principles



Providing QoS will require interconnection (de facto or interoperable) between all those cache servers

- Local experiments in Netherlands
- OCEAN FP7 project (Disclaimer : IDATE is involved in it)
- Standardisation at ETSI

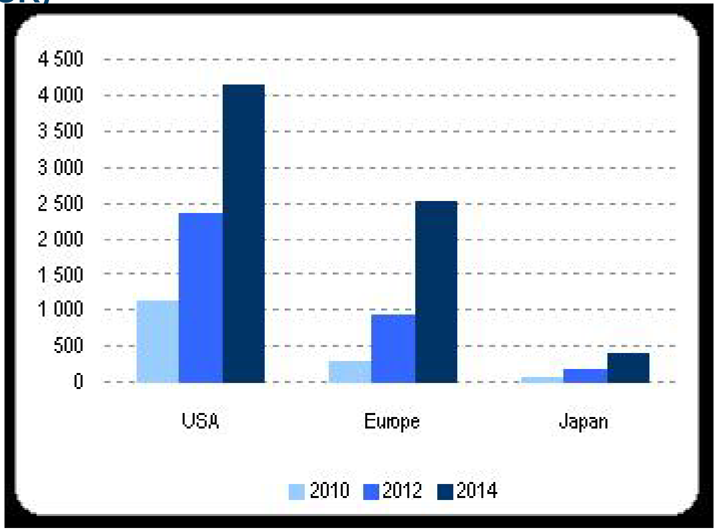
4 New opportunities with the cloud computing?

Towards cloud computing?

Moving from focus on video delivery to cloud computing?

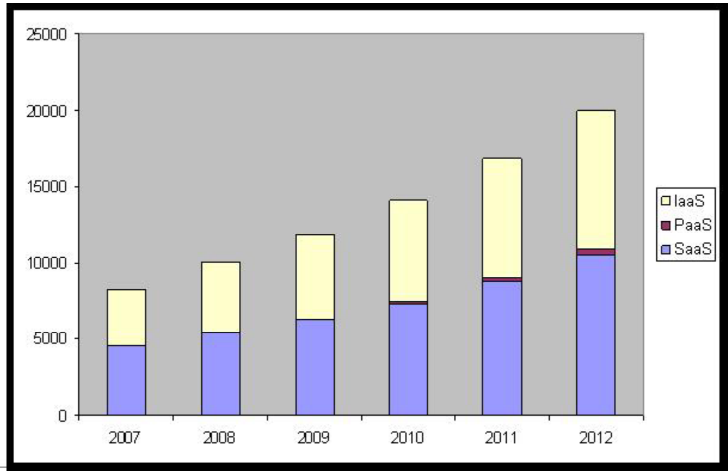
- Difficulties to generate revenue
  - Most content providers struggle
    - Advertising is small compared to traffic for video
    - VOD has limited reach on the Internet
  - While SaaS might offer better opportunities (already more than 5 billion USD)
  - Content providers pressure CDN players to lower prices
  - Sometimes, QoS is established backwards
- Development new major types of usage of Internet for business and corporate users around the software industry in the meantime
- Advanced infrastructure requirements by Cloud computing (distributed servers within the Internet)

Ad revenues from online video providers (billion EUR)



Source: IDATE

Worldwide Cloud computing market (in million USD)



Source: IDATE & PAC

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Comparison of both architectures : CDN vs. Cloud Computing

Common points

- Datacenters/servers based architecture
- Decentralized architecture
- Network dependency
- Content replication
  - Mirroring feature for CDN
  - "Duplication/replication" feature for cloud services.
- Acceleration capabilities: both players provide route optimization and low latency services.

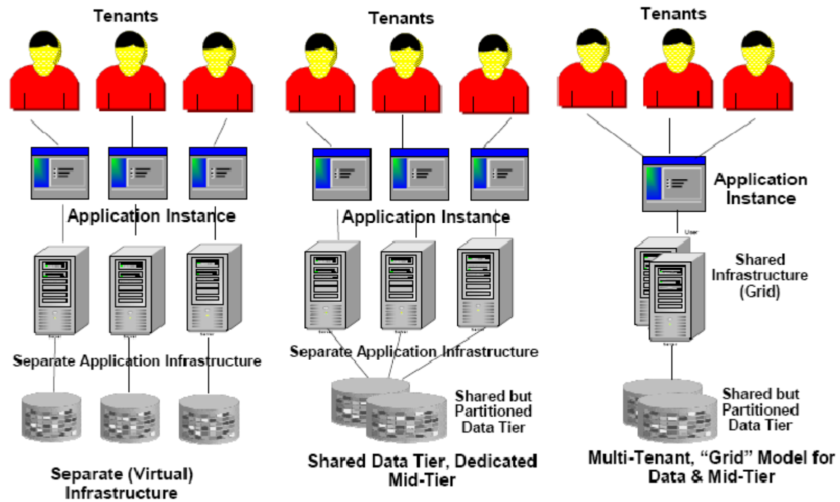
Main differences

- Types of services/applications:
  - Data delivered by CDNs is mainly content (static images, Flash animations and video),
  - Cloud computing services mostly deliver content related to business applications.
- Virtualization
  - Unlike computing services, CDN services are not really based on virtualization technology.
- Traffic patterns

Amazon Web Services (AWS) datacenters map

Source: Amazon

Cloud delivery models



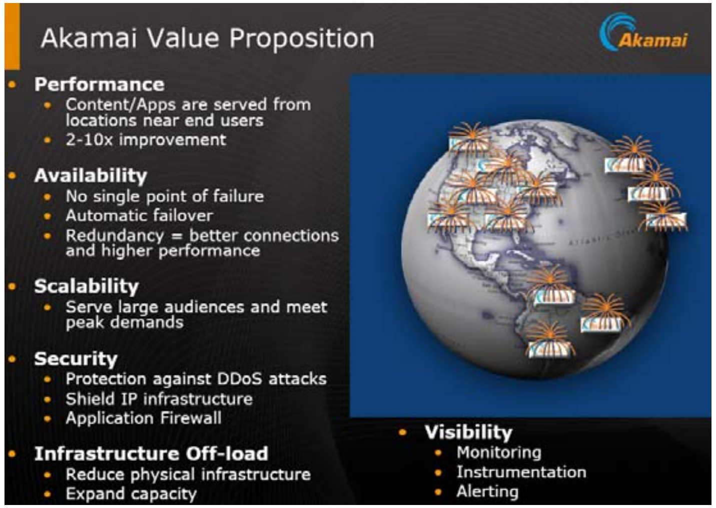
Source: Oracle

Towards cloud computing?

Key players starting the diversification

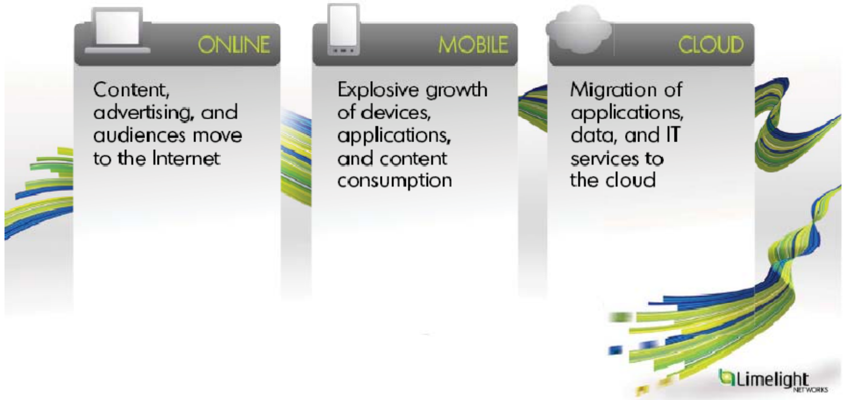
- Akamai EdgePlatform
- Limelight
- Amazon coming from cloud rather than CDN
- Telcos revamping their business offerings to integrate cloud computing solutions

Cloud proposition of Akamai



Source: Akamai

Limelight strategy



5 Takeaways

Takeaways

More traffic to handle in the future, still mainly around video

More expectations for QoS, especially around premium video

More players involved in the market as all telcos will offer some form of CDN solutions

More segmentation within the CDN market, with new products around cloud and private CDN

0 More on IDATE

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IDATE Consulting: Who we are

IDATE Consulting & Research helps decision making of our private and public clients through consulting and market research services.

- We gather a team of **30 experts in ICT markets** - Telecom, Internet, Media - with a comprehensive approach to converging services and technologies.
- We have a strong focus on **innovation**: technologies, products & services, markets & usage, business models.
- We are fully **independent** from ICT market players.
- **Our assignments include** techno-economic assessment**,** market sizing & forecasts**,** international benchmarks**,** and business modeling**.**
- We advise **public bodies,** and especially local authorities, to define their ICT strategy.
- We deliver **customized training,** strategic briefings and workshops**.**

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Selected references

Innovation

Piracy technologies, IP detection solutions and ISP technical measures

Deep packet inspection technologies

Opportunities in digital content delivery in CDN and P2P

Smart grid impacts

Video content tracking platforms

Market analysis

Assessment and forecast of CDN markets

Analysis of cloud computing architectures of Google, Amazon and Salesforce

Business models of online video services

Demand and supply analysis for Open Content Network Aware (FP7 funded project)

Public policies

Technical and economic stakes of Net Neutrality

Economic impacts of Internet on future software and software-based services

Clients

Operators: Deutsche Telekom, Swisscom, Orange, SFR, NTT, TDF, Easynet, SES, SK Telecom

Service and content Providers: Qualcomm, Bitband, UER, Mediaset, Technicolor, SACD

Public Bodies: Ofcom, Ministry of Industry (DGCIS), Ministry of Culture (DGMIC), CDC, European Commission, CNC, NCAH