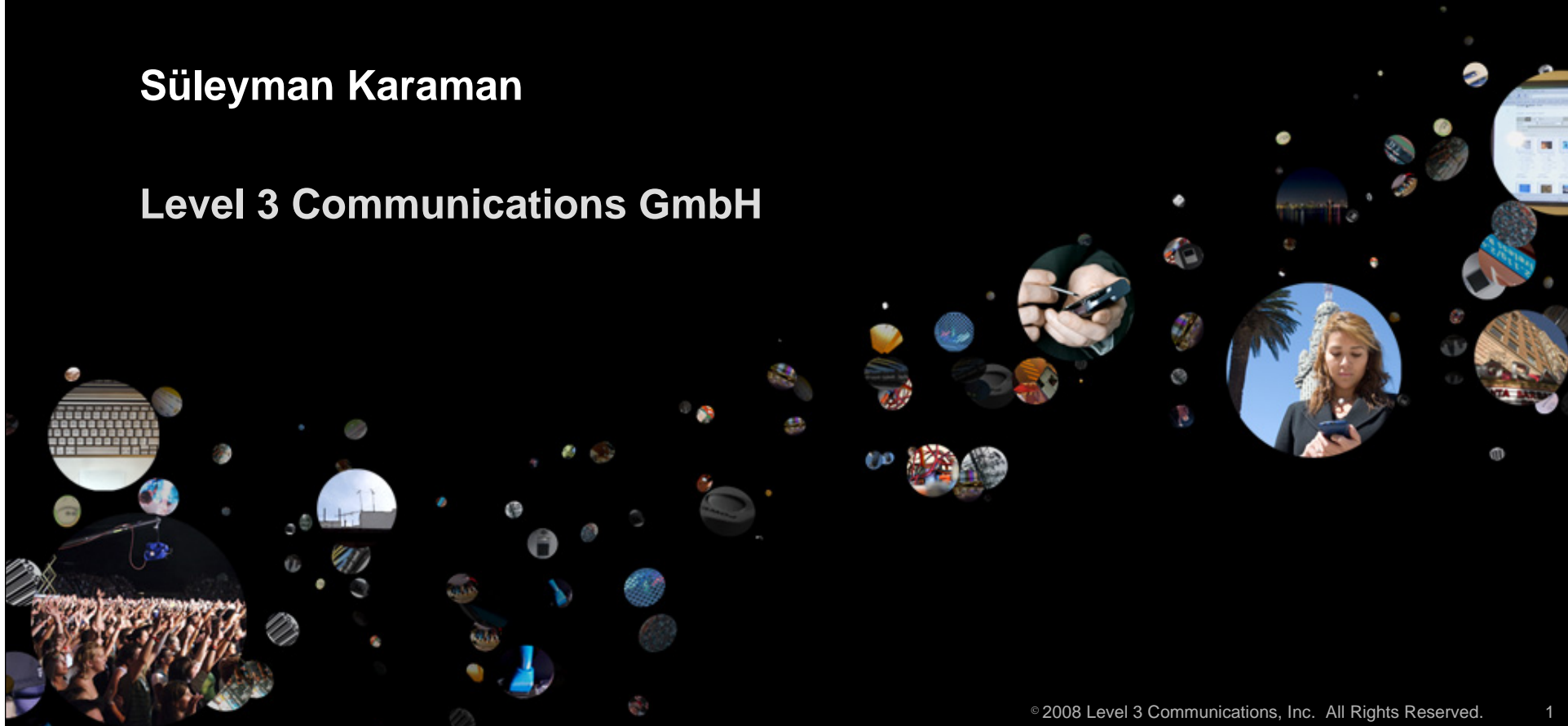




# The Content (R)evolution

Süleyman Karaman

Level 3 Communications GmbH



# Agenda

## ■ Part 1

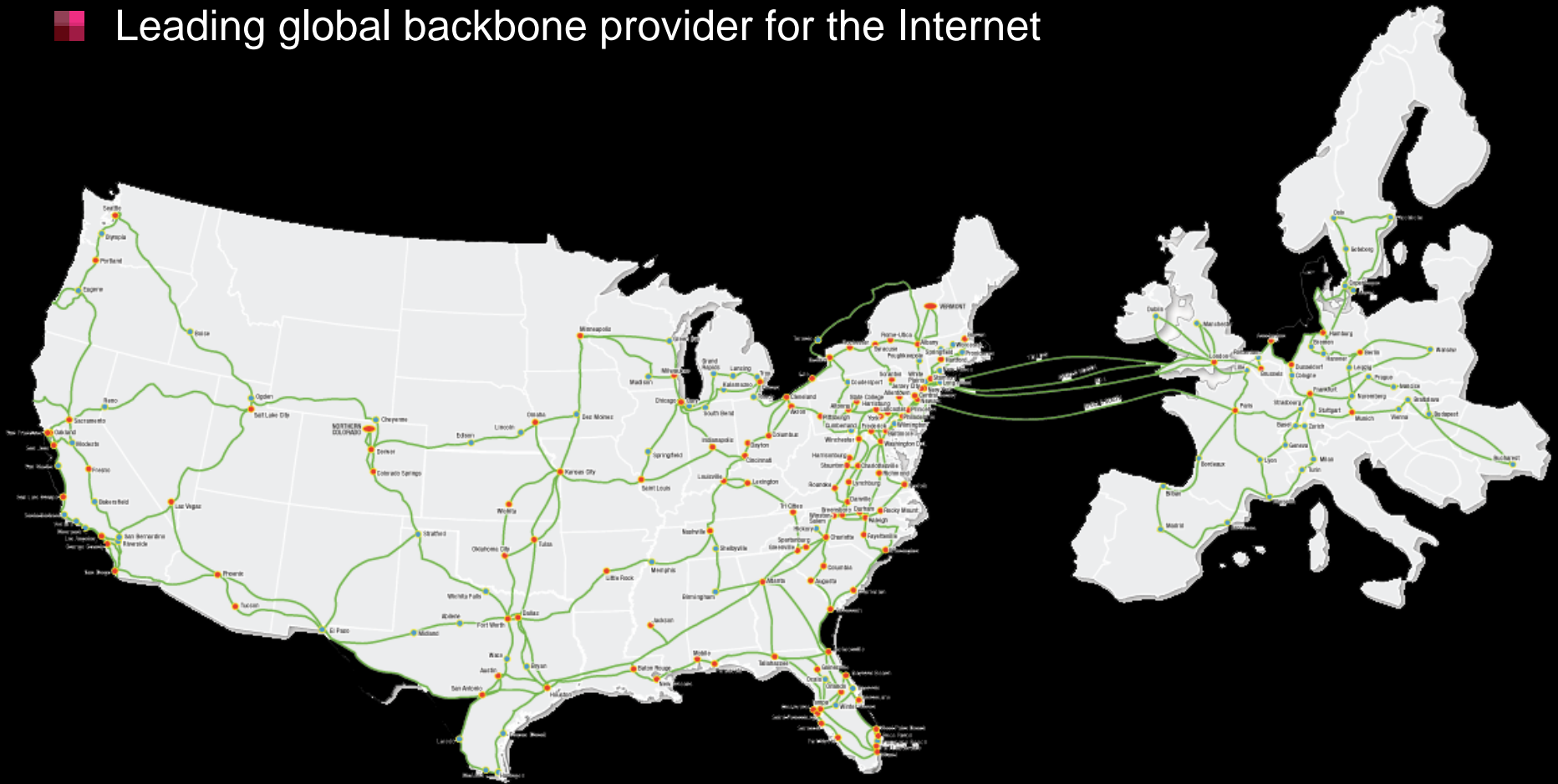
- Level 3 Communications
- The Internet (Industry) today
- Level 3 content services

## ■ Part 2

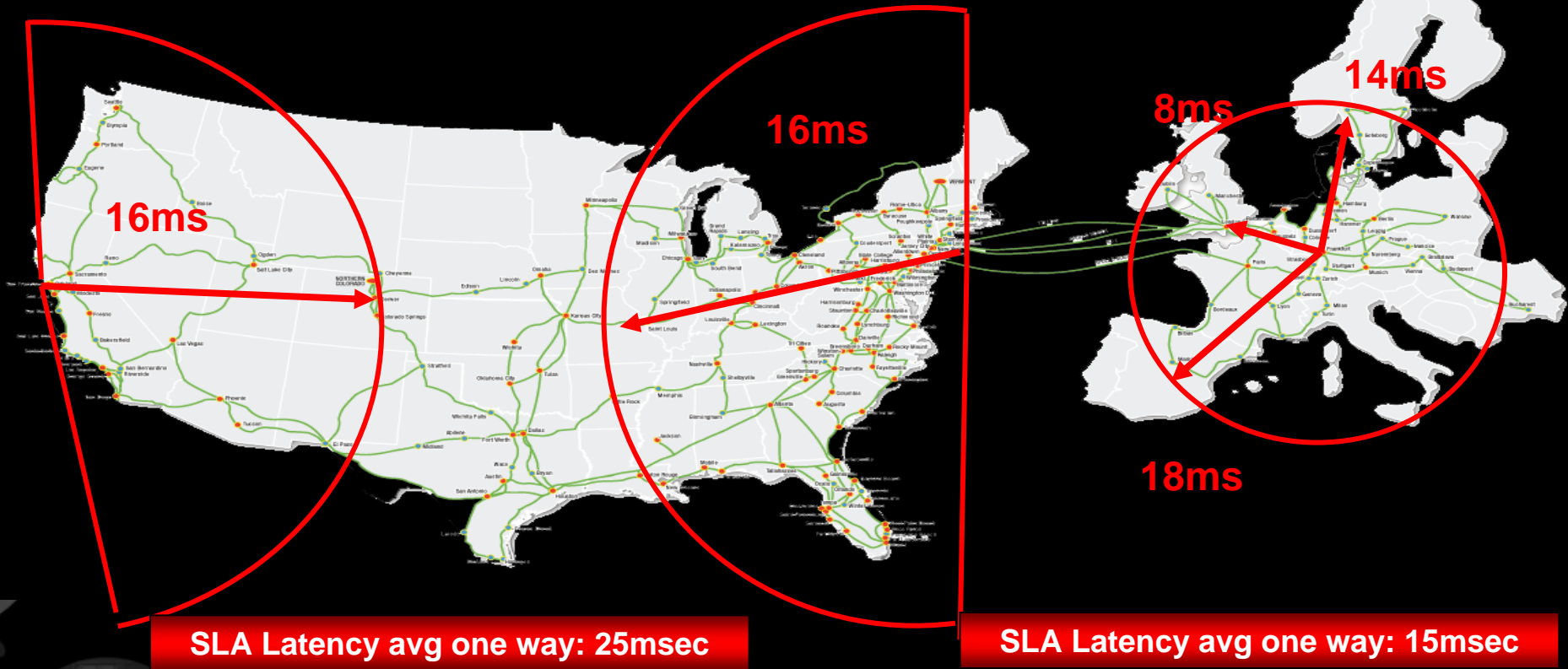
- Your business opportunity- case studies

## Level 3's Presence

- Leading global backbone provider for the Internet



# The Right Network



## Principal Locations:

- Broomfield, Colorado: Corporate HQ and NOC
- Tulsa, Oklahoma: NOC
- London: European HQ and NOC
- Atlanta, Georgia: NOC

# Market Leading Position

## Size, Scale, Quality, Connectivity



### Knodes Index

The Knodes Index is the best measurement of a network's connectivity to the Internet. The Knodes Index is based on a variety of statistics, such as relative size, IP address control and peering arrangements. The index is calculated to indicate the average number of networks, or hops that must be traversed between any IP address on a given network to any other IP address on the Internet.

Rank	Internet Hops	ASN	Description
1	1.76	<a href="#">3356</a>	<a href="#">Level 3 Communications, LLC</a>
2	1.83	<a href="#">1239</a>	<a href="#">Sprint</a>
3	1.85	<a href="#">6461</a>	<a href="#">Abovenet Communications, Inc</a>
4	1.86	<a href="#">7018</a>	<a href="#">AT&amp;T WorldNet Services</a>
5	1.86	<a href="#">2914</a>	<a href="#">NTT America, Inc.</a>
6	1.86	<a href="#">3549</a>	<a href="#">Global Crossing</a>
7	1.87	<a href="#">3303</a>	<a href="#">Swisscom Solutions Ltd</a>
8	1.88	<a href="#">8075</a>	<a href="#">Microsoft Corp</a>
9	1.89	<a href="#">174</a>	<a href="#">Cogent Communications</a>
10	1.91	<a href="#">1299</a>	<a href="#">TeliaNet Global Network</a>



rank	AS number	AS information		degree
		ISP's name	country	
1	3356	Level 3 Communications, LLC	US	1,100
2	701	UUNET Technologies, Inc.	US	728
3	1239	Sprint	US	646
4	174	Cogent Communications	US	596
5	3549	Global Crossing	US	577
6	7018	AT&T WorldNet Services	US	567
7	1299	TeliaNet Global Network	SE	443
8	6461	Abovenet Communications, Inc	US	414
9	209	Qwest	US	370
10	2914	Verio, Inc.	US	369

ranking mode: degree based  
 time period: Sep 25, 2007 to Oct 1, 2007  
 days of available data: 7 of 7  
 Whois: Aug 31, 2005 - APNIC, ARIN, LACNIC, and RIPE  
 AS links: skitter (14 monitors; per-day min:14 max:14 median:14)  
 prefix-to-AS mappings: BGP tables from RouteViews

### renesys | market intelligence™

Customer Base		Extended Customer Base	
1	Level 3 Communications, LLC [AS 3356]	1	Level 3 Communications, LLC [AS 3356]
2	UUNET Technologies, Inc. [AS 701]	2	AT&T WorldNet Services [AS 7018]
3	AT&T WorldNet Services [AS 7018]	3	Qwest [AS 209]
4	Sprint [AS 1239]	4	UUNET Technologies, Inc. [AS 701]
5	Qwest [AS 209]	5	Sprint [AS 1239]
6	Cogent Communications [AS 174]	6	DoD Network Information Center [AS 721]
7	Savvis [AS 3561]	7	Cogent Communications [AS 174]
8	Williams Communications, Incorporated [AS 7911]	8	BellSouth.net Inc. [AS 6389]
9	Global Crossing [AS 3549]	9	Global Crossing [AS 3549]
10	DoD Network Information Center [AS 721]	10	Savvis [AS 3561]

### NetConfigs AS Rankings

Name	Rank	Network
LEVEL3	#1	<a href="#">AS3356</a>
ATT-INTERNET4	#2	<a href="#">AS7018</a>
AMUF50FU	#3	<a href="#">AS701</a>
SprintLink	#4	<a href="#">AS1239</a>
GBLX	#5	<a href="#">AS3549</a>
PSINET-1	#6	<a href="#">AS174</a>
QWEST	#7	<a href="#">AS209</a>
TELEGLOBE	#8	<a href="#">AS6453</a>
BELLSOUTH-NET	#9	<a href="#">AS6389</a>
UNIDO-ECRC	#10	<a href="#">AS1273</a>

# The Internet is Everywhere

## Charts returned as web decides what's on full episodes in HD

2007, 10:54 BST (05:54 ET)  
Special Editor

UK No 1

3.5 Music industry magazine to list Last.fm listeners' habits alongside traditional sales

to upgrade its broadband players to support the streaming of full episodes in high definition.

## Facebook challenges MySpace

as place for the cool set to hang

Facebook users: UK vs US

## HD Streaming Has Arrived

JUNE 25, 2007

COVER STORY

By [Spencer E. Ante](#)

Jemima Kiss  
Wed Video Fixation  
Medi Scott Woolley 10.16.06



As the Internet alters the way we watch and how we watch, the next wave is here.

Steve Chen and Chad Hurley. In May of last year, YouTube, a new video-sharing site, provided a new way to watch and share videos.

## MySpace: your new

## Telecom: Back From The Dead

All those YouTube videos and MySpace pages zipping back and forth on the Net have revived the telecom industry—and charged up the economy

As people stay in touch with friends online has become the latest battleground for moguls

By [Liam](#), communications editor  
June 21, 2007

[Liam](#)

© 2007

June 21, 2007, 03:12 GMT

[Printable version](#)

## g TV viewing'

## 'Virtual theft' leads to arrest

A Dutch teenager has been arrested for allegedly stealing virtual furniture from "rooms" in Habbo Hotel, a 3D social networking website.

The 17-year-old is accused of stealing 4,000 euros (£2,840) worth of virtual furniture, bought with real money.

## WORLD OF WARCRAFT® SURPASSES 8 MILLION SUBSCRIBERS WORLDWIDE

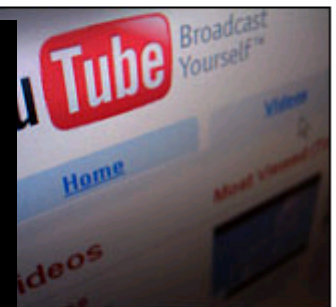
Player population in North America now exceeds 2 million, while Europe and China pass the 1.5 million player and 3.5 million player marks, respectively

IRVINE, Calif. – January 11, 2007 – Blizzard Entertainment, Inc. announced today that **World of Warcraft®**, its subscription-based massively multiplayer online role-playing game (MMORPG), is now played by more than 8 million gamers around the world. World of Warcraft has also achieved new regional subscriber milestones, with more than 2 million players in North America, more than 1.5 million players in Europe, and more than 3.5 million players in China.

Habbo Hotel users create a character and can buy furniture

result.

© 2007 Blizzard Entertainment, Inc. All Rights Reserved.



...aring site YouTube has made online viewing to the masses

## Music Download: Radiohead

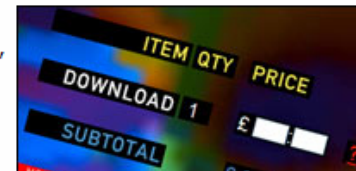
- High profile 'pay what you like' pre-registering for download of Radiohead's latest album
- <http://www.inrainbows.com>
- Business challenge
  - Speed and reliability of download
  - Unpredictable 'flash crowd' style demand
- Solution
  - Pre-deploy 48Mb file download across CDN network

### What is Radiohead's album worth?

By Ian Youngs  
Entertainment reporter, BBC News

**Radiohead have let fans name their price for new album - but is *In Rainbows* worth paying for?**

I ordered the Radiohead download twice. The first time, I paid precisely £0.00 - for research purposes, just to see if it could be done.



And it could process ski section and the confirm

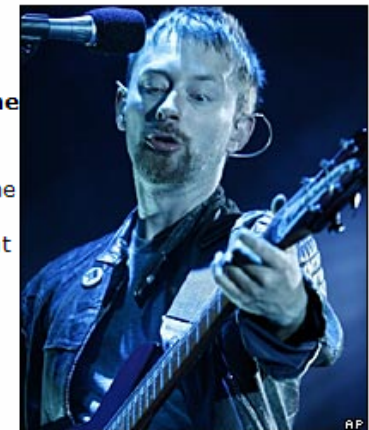
### Have Radiohead marked music's future?

By Fiona Pryor  
Entertainment reporter, BBC News

**The release of the new Radiohead album, *In Rainbows*, has set a precedent for challenging the cost of music.**

Instead of listing a price for the record, the group announced on their website last week that it was up to fans to pay whatever they wanted for it.

The band are the latest in a long line of artists who are reaching out to fans in ways that completely cut out the corporate machine - otherwise known as the record company.

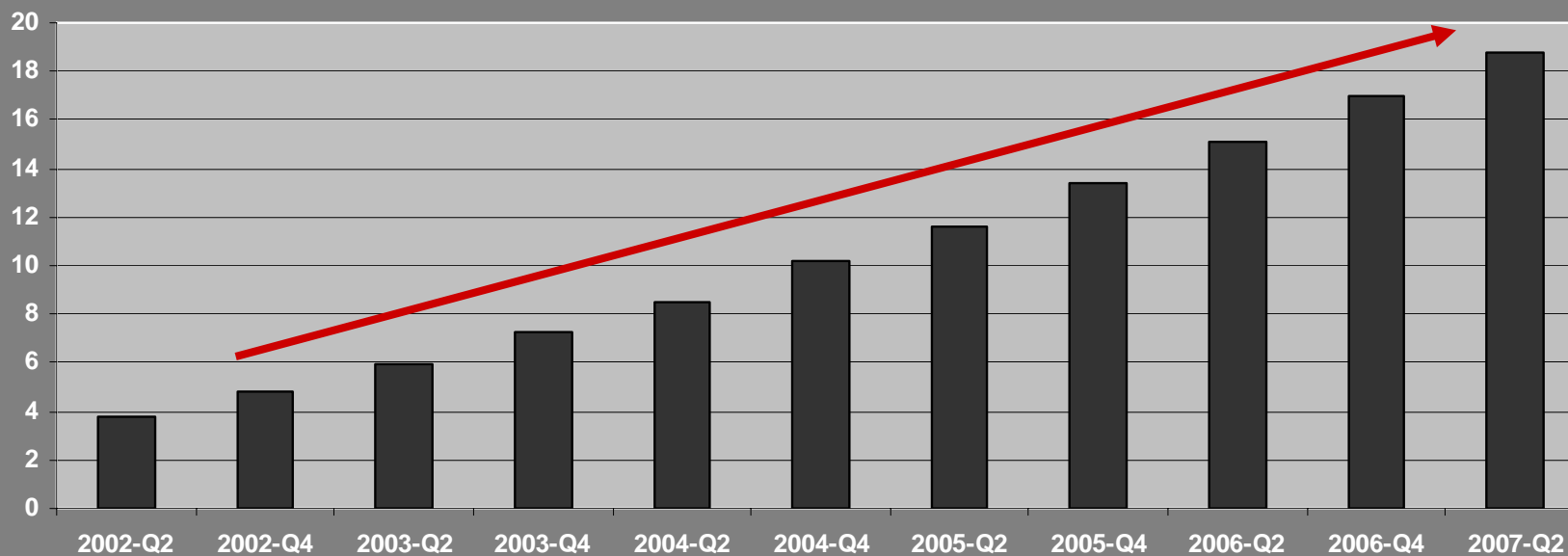


Radiohead's album can only be downloaded from their website

## Growth in Users

- Broadband penetration continues to rise, with more and more users demanding more bandwidth

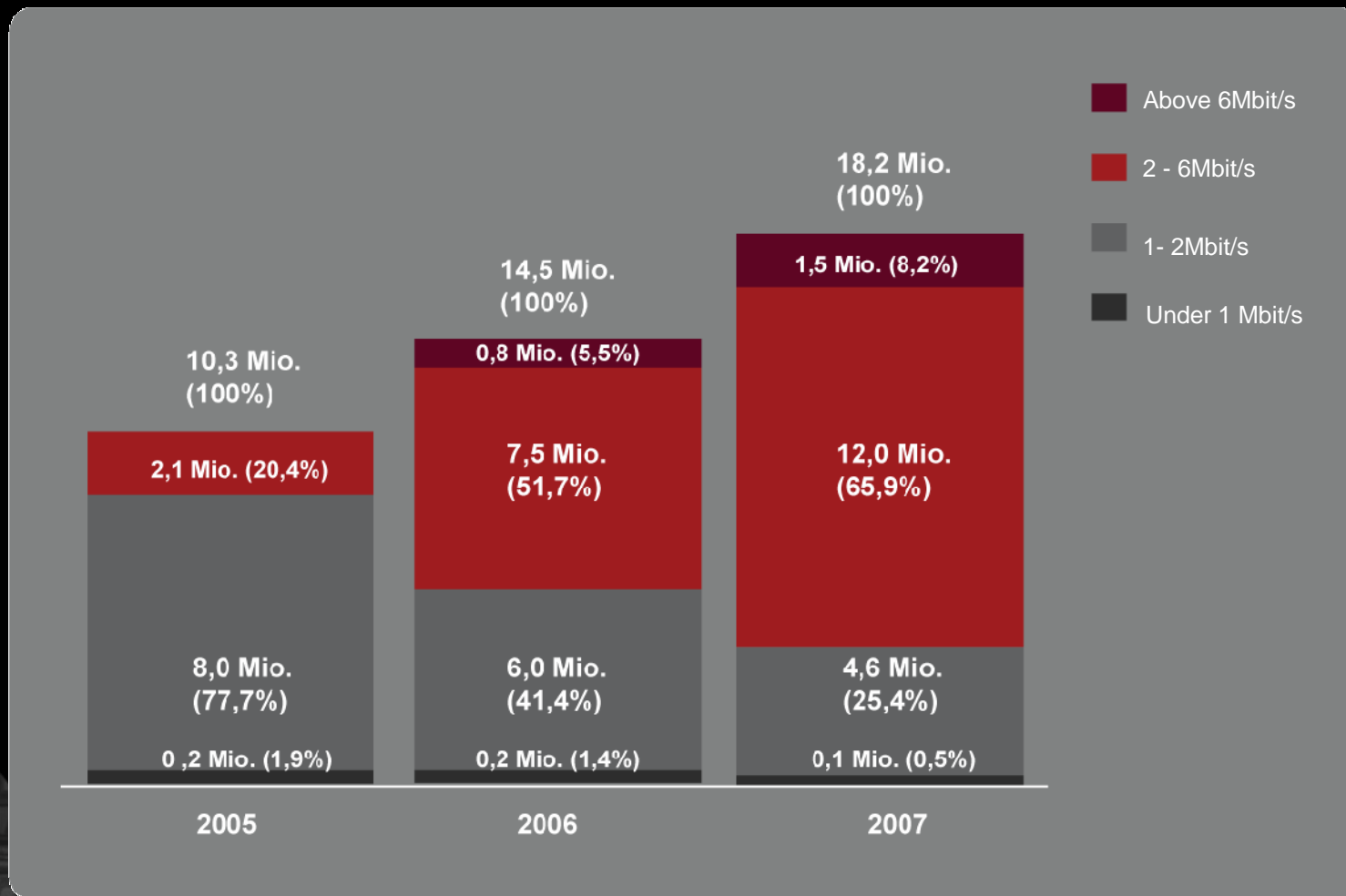
OECD Broadband Penetration rates



Source: OECD

# German Broadband Subscriber Growth

## ■ Downstream bandwidth growth by subscriber numbers

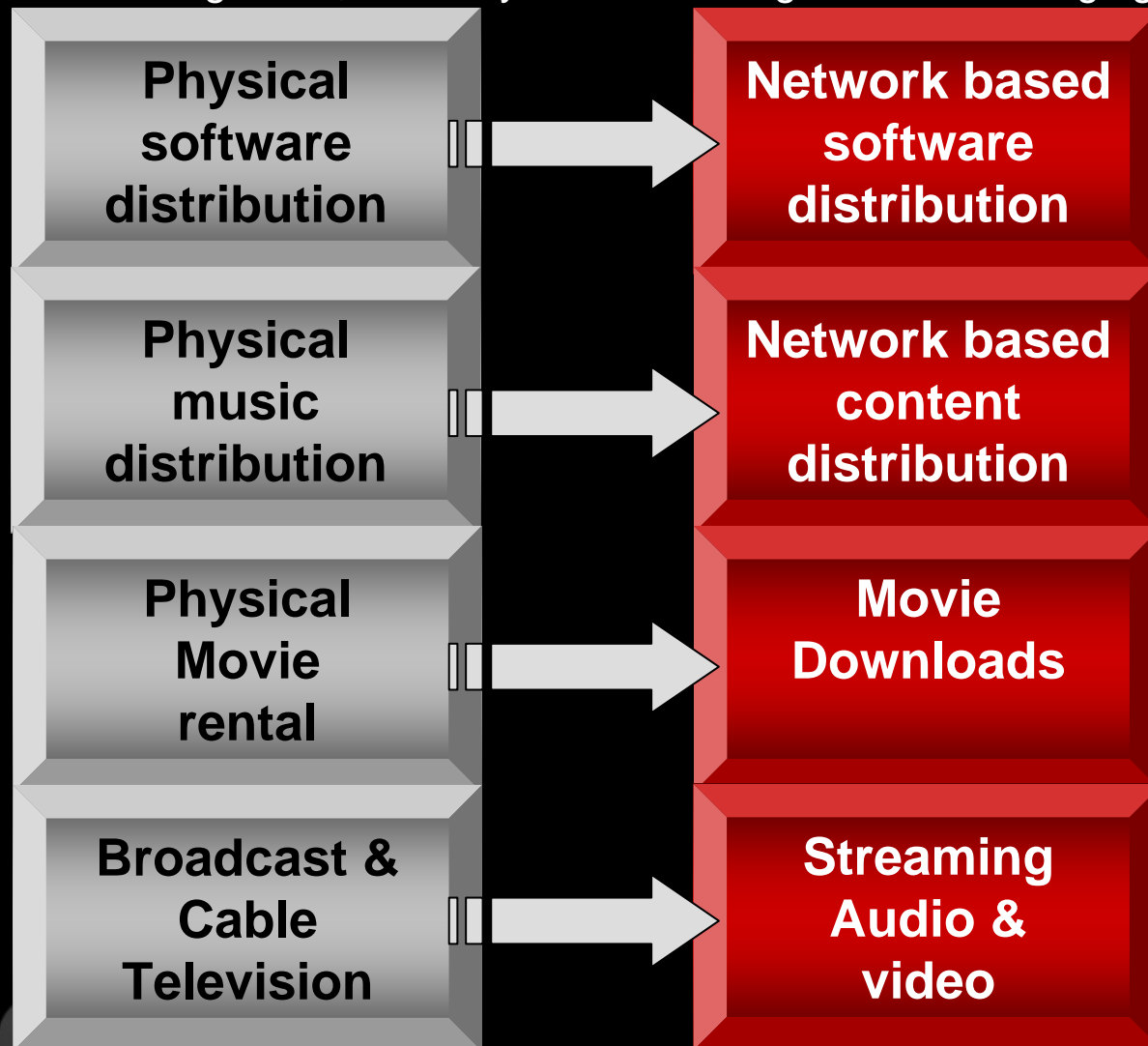


Source: Dialog Consult/VATM Analyse Telekommunikationsmarkt

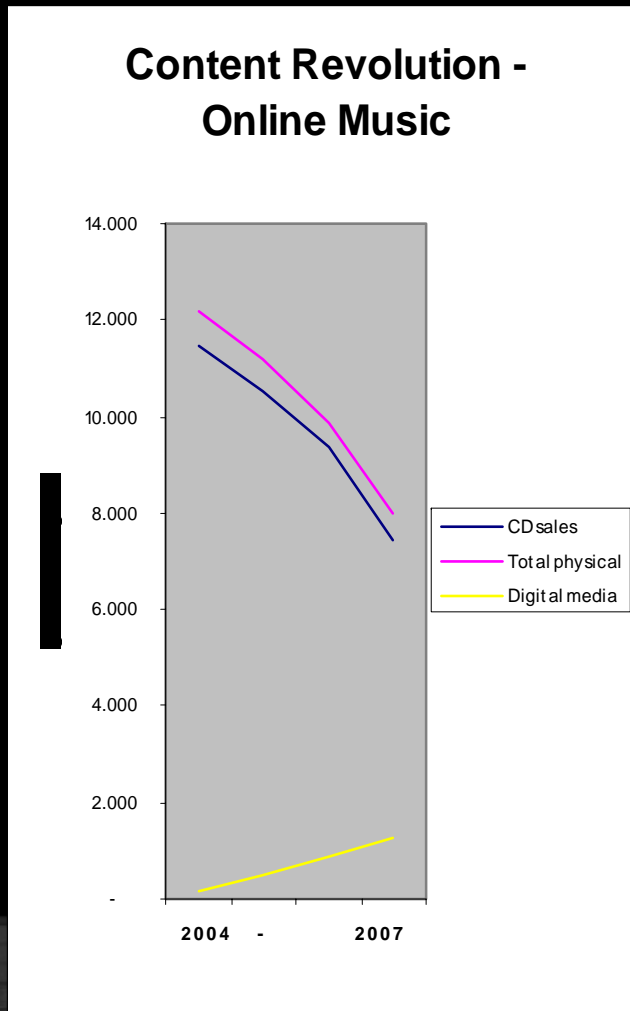
## Why Does This Matter To You?

# Disintermediation a major source of bandwidth demand

Business models breaking down, new ways of conducting business emerging



## Music Downloads: between 2003 and 2007



### Free Fallin'

- Sales decline for CDs and all physical medium accelerating

- Digital sales are growing fast

- 2007:  
16% market share for digital

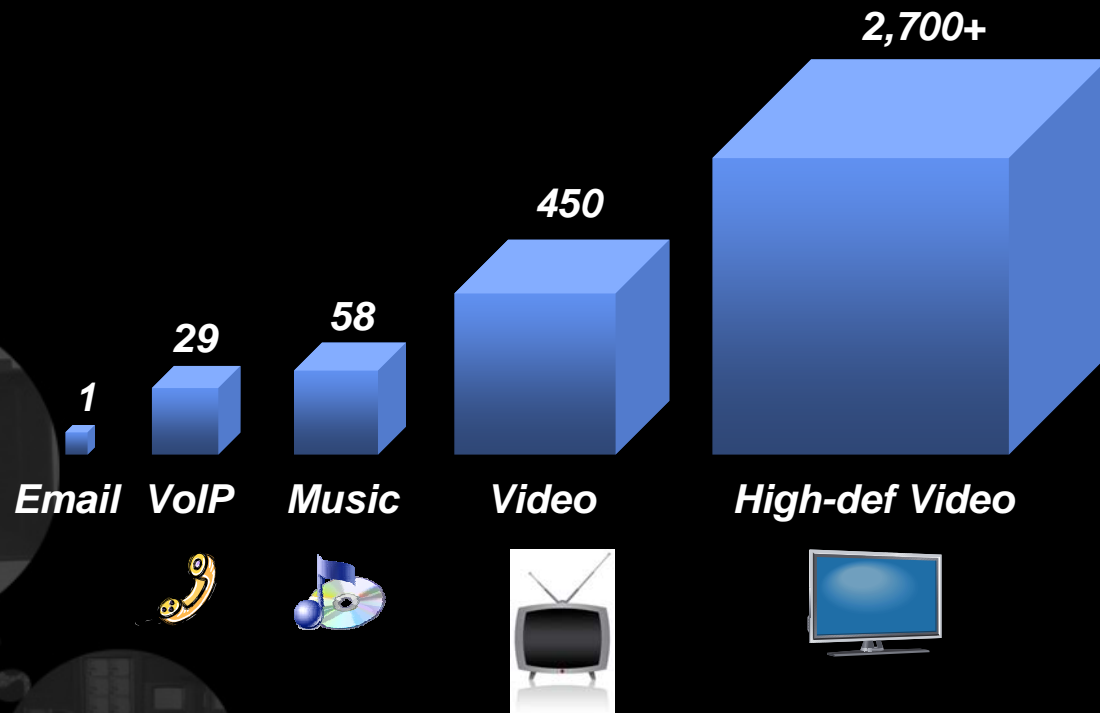
Source: RIAA

## Bandwidth requirements

- Besides the growth in number of users, a main driver for bandwidth demand is the size of transferred files

### Estimated file size for 1 hour of content

MegaBytes\*



- TV watched in the US every day = 40x as much data as Level 3 carries on its network!
- Make that 200x for HDTV
- The small fraction of Internet users who share peer-to-peer videos drive ~ 50% of all traffic

\* Assumes 64kbps for VoIP, 128kbps for Music, 1 Mbps for video, and 6 Mbps for High Def video

Source: Third party research; Level 3 Estimates © 2008 Level 3 Communications, Inc. All Rights Reserved.

# Building Products from Creation to Consumption



See the animated version at

[Click here and select the From Creation to Consumption ' link on the right hand column](#)

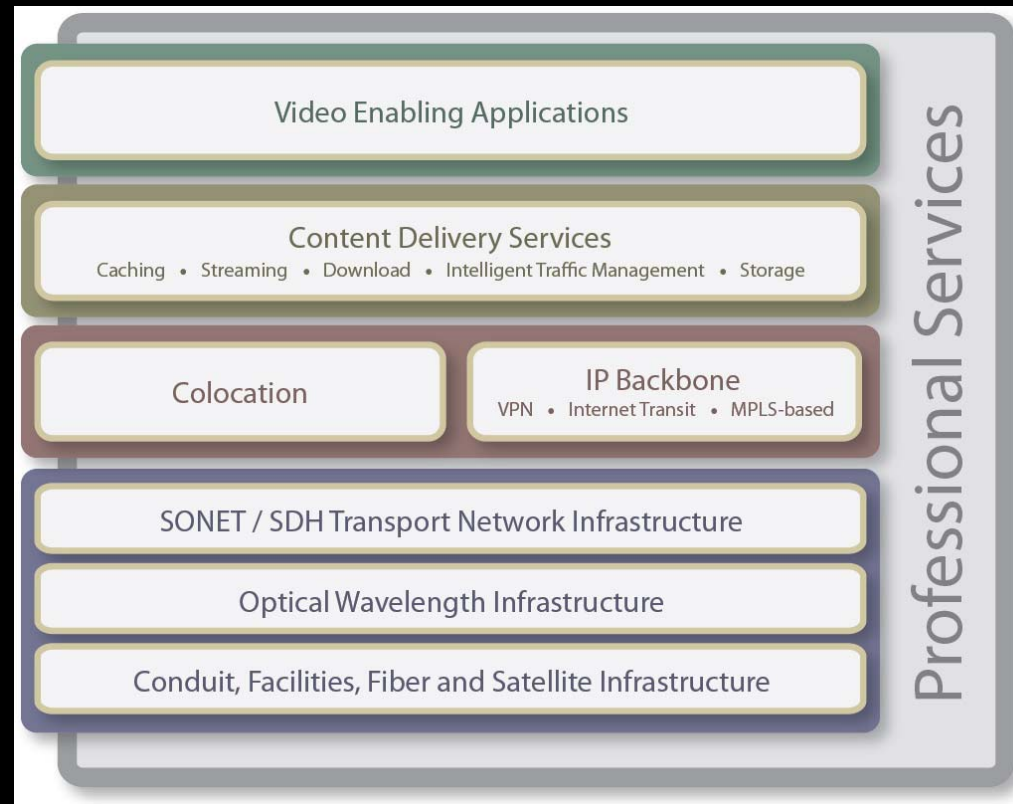
## LVLT content solutions

■ The core content portfolio has 6 main products:

- HTTP Caching
- Streaming
- ITM (Intelligent traffic management)
- Storage
- Applications (Media Studio)
- Vyvx Broadcast network

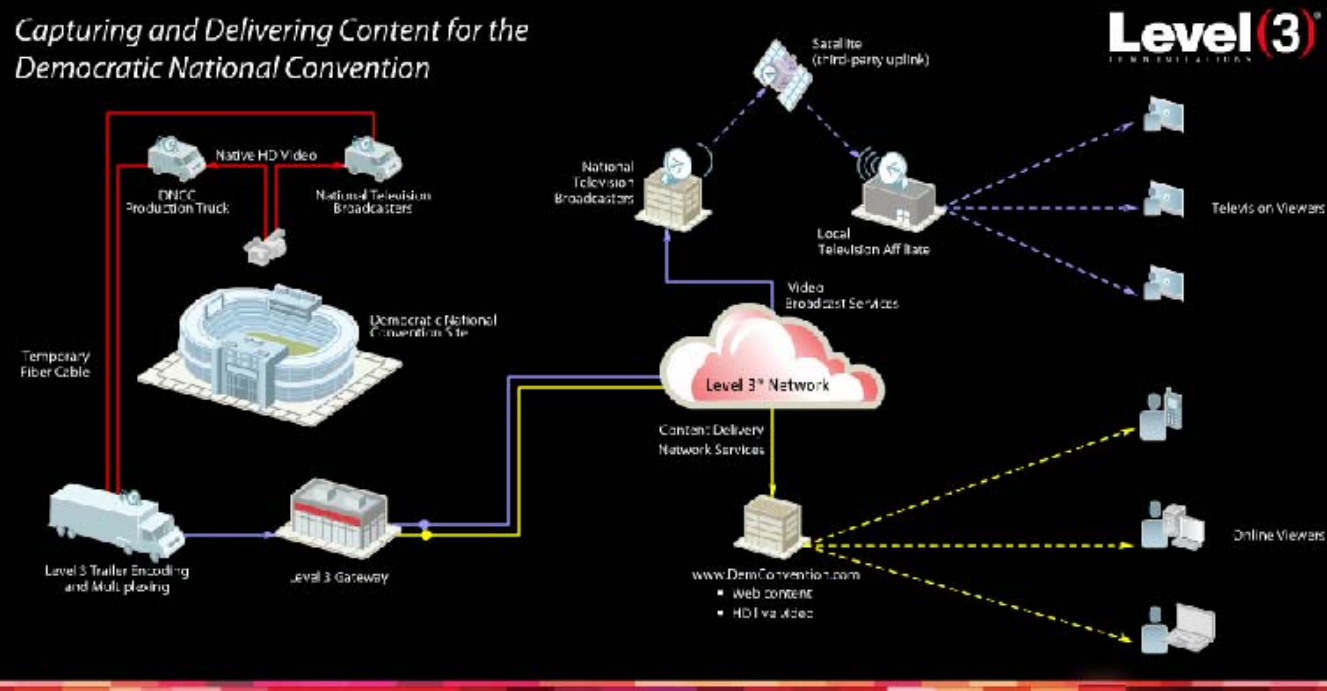
■ Spread across these products are a variety of capabilities:

- DRM
- Geo Targeting
- Reporting / Bench marking
- Professional services
- Asset Management.....etc



# How Does the Content Delivery Network (CDN) Work: Case Studies

*Capturing and Delivering Content for the Democratic National Convention*



## Capturing and Delivering Content for the Democrat National Convention

## Sueddeutsche.de

- Digital portal for Germany's second largest Newspaper requiring more scalable and cost effective solution to manage their online growth of webpage content

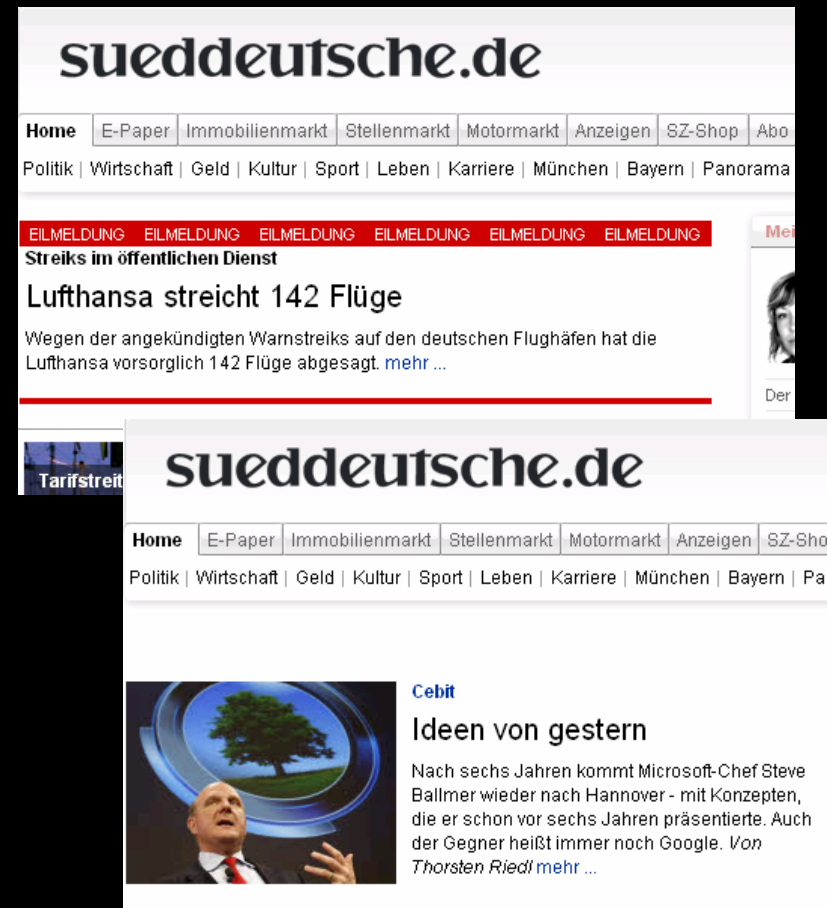
■ [www.sueddeutsche.de](http://www.sueddeutsche.de)

### Business Challenge

- Speed, reliability, quality and cost effective caching solution to deliver pictures and videos to end customers
- Able to cater to unpredictable bursts in traffic
- Global solution for the future

### Solution

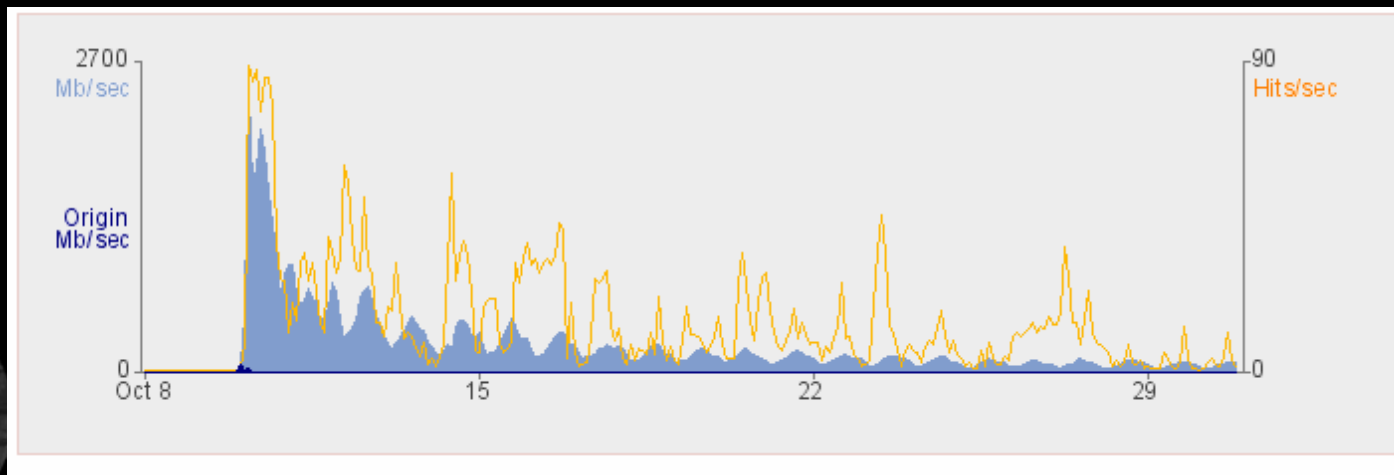
- Level 3 Caching service for objects such as pictures and videos on the portal



## Music Download: once again, Radiohead

### Result

- High day one demand as pre-registered fans downloaded album at same time
- Level 3's scalable network and CDN platform of distributed clusters ensured downloads were delivered reliably
- Quotes from end-users:
  - *"damn impressive.. I don't know how the hell you lot managed to pull this off. It boggles the mind. I'd be interested to know how many servers you've set up to do this."*
  - *"... thanks for your efforts!! Super fast download, easy open on my mac! played perfectly! I'm freakin perfectly happy! :D"*



## Ending Thoughts

- Internet growth will continue: accelerating demand
- Disruption of value chains will impact the way you do business
- Technology in the network is an opportunity
- Delivery at the edge will continue

## Q&A

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**069 50 60 80 61**

**Level 3 Communications GmbH**