Critical Internet Infrastructure Protection in the EU

Kurtis Lindqvist
Kurtis@netnod.se
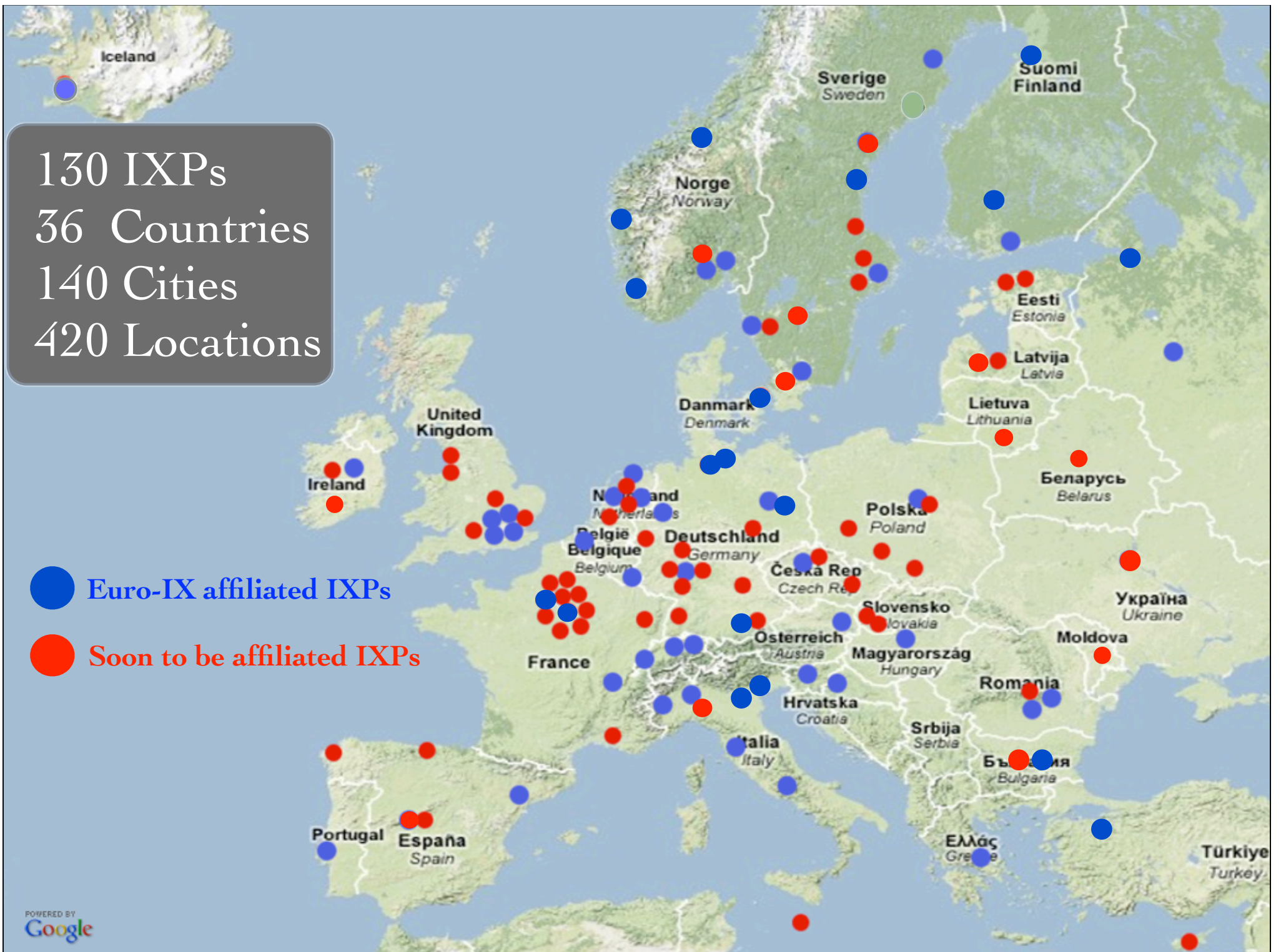
netnod

But first…

netnod

What is Euro-IX?

130 IXPs
36 Countries
140 Cities
420 Locations

● Euro-IX affiliated IXPs

● Soon to be affiliated IXPs

What is Euro-IX?

- European Internet Exchange Association

- Formed in May 2001

- The association's aim is to further develop, strengthen and improve the Internet Exchange Point (IXP) community

- Since January 2005 Euro-IX has invited IXPs outside of Europe to join the association

5

Current Euro-IX affiliates

- Currently 59 affiliated IXPs:
  - ▸ Europe: 47 affiliates (27 countries)
    - — Operating 70 separate IXPs
  - ▸ 12 IXPs from the rest of the world

- 11 affiliated patrons:

Arista	Brocade	Cisco
Extreme Networks	Force10 Networks	Interxion
Juniper Networks	MRV	TelecityGroup
Telehouse	Transmode	

What Euro-IX offers (1)

- Biannual two day meetings known as the Euro-IX Forums where more than 40 IXPs and switch vendors come together to discuss a wide range of IXP specific topics:

  - Technical issues
  - Commercial issues
  - Regulatory updates
  - Presentations from industry experts

- Virtual Working Groups (via mailing lists)

What Euro-IX offers (2)

- Representation at meetings around the world
  - Major IXP related conferences in Europe, Asia and US

- Regulatory updates
  - Part time regulatory officer
  - Updates on affairs in Europe and around the globe

- Website listing
  - Euro-IX affiliated IXPs receive self update-able pages on the Euro-IX website which acts as portal for prospective IXP participants

What Euro-IX offers (3)

- Benchmarking club

  - allowing members to compare certain performance aspects of their IXPs

- A number of information repositories:

  - Switch DB
  - Route server DB
  - Euro-IX Staff eXchange DB
  - Member developed network monitoring tools

- A 'closer' IXP community

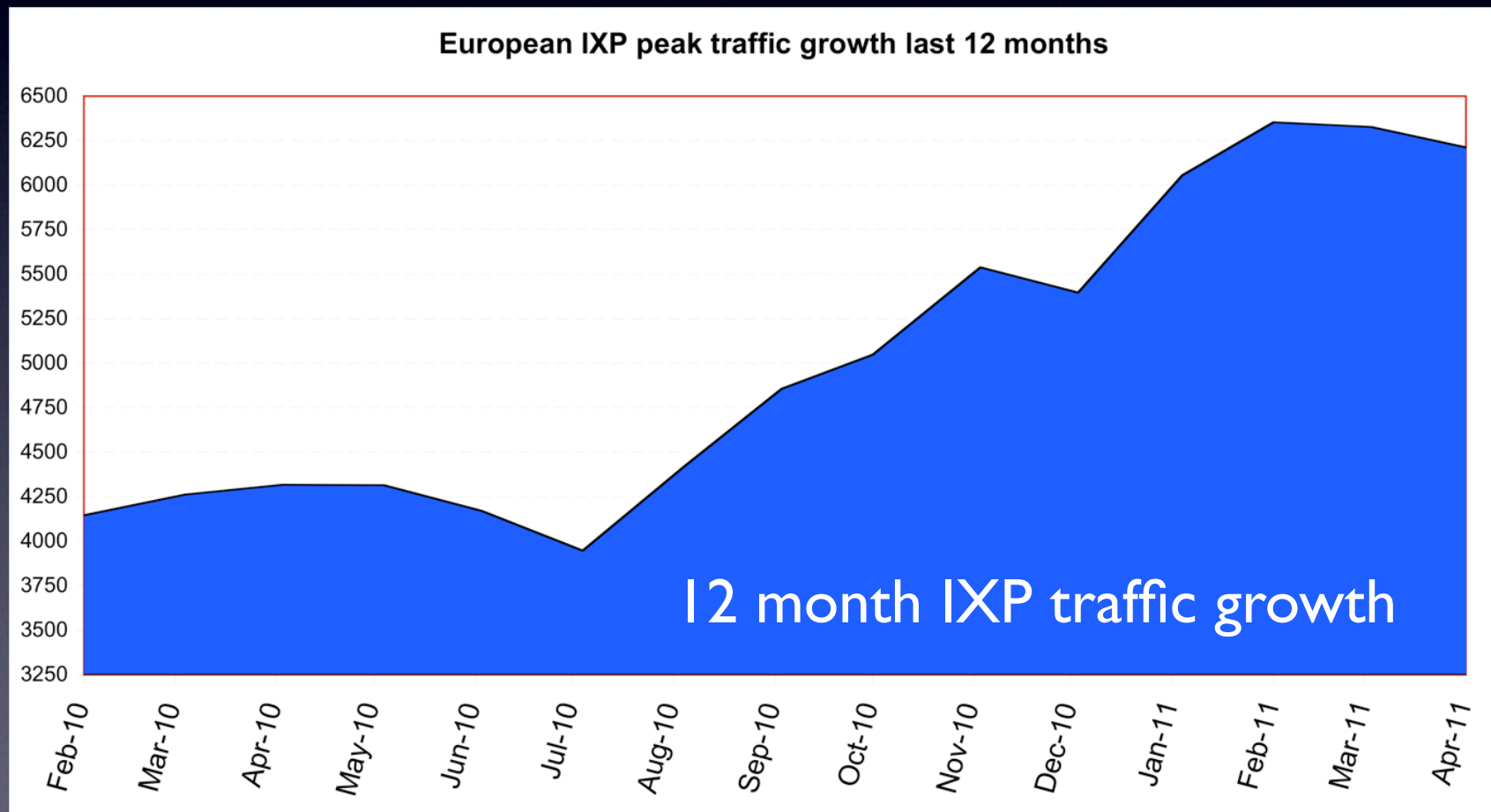 - Contact with 60 IXPs from around the world

Worldwide IXP cooperation

- IXP associations sharing more information with and about each other via the ASN, switch, route server databases and BCP repositories

- Contact between the associations via mailing lists and access to each others meetings

- Project collaboration

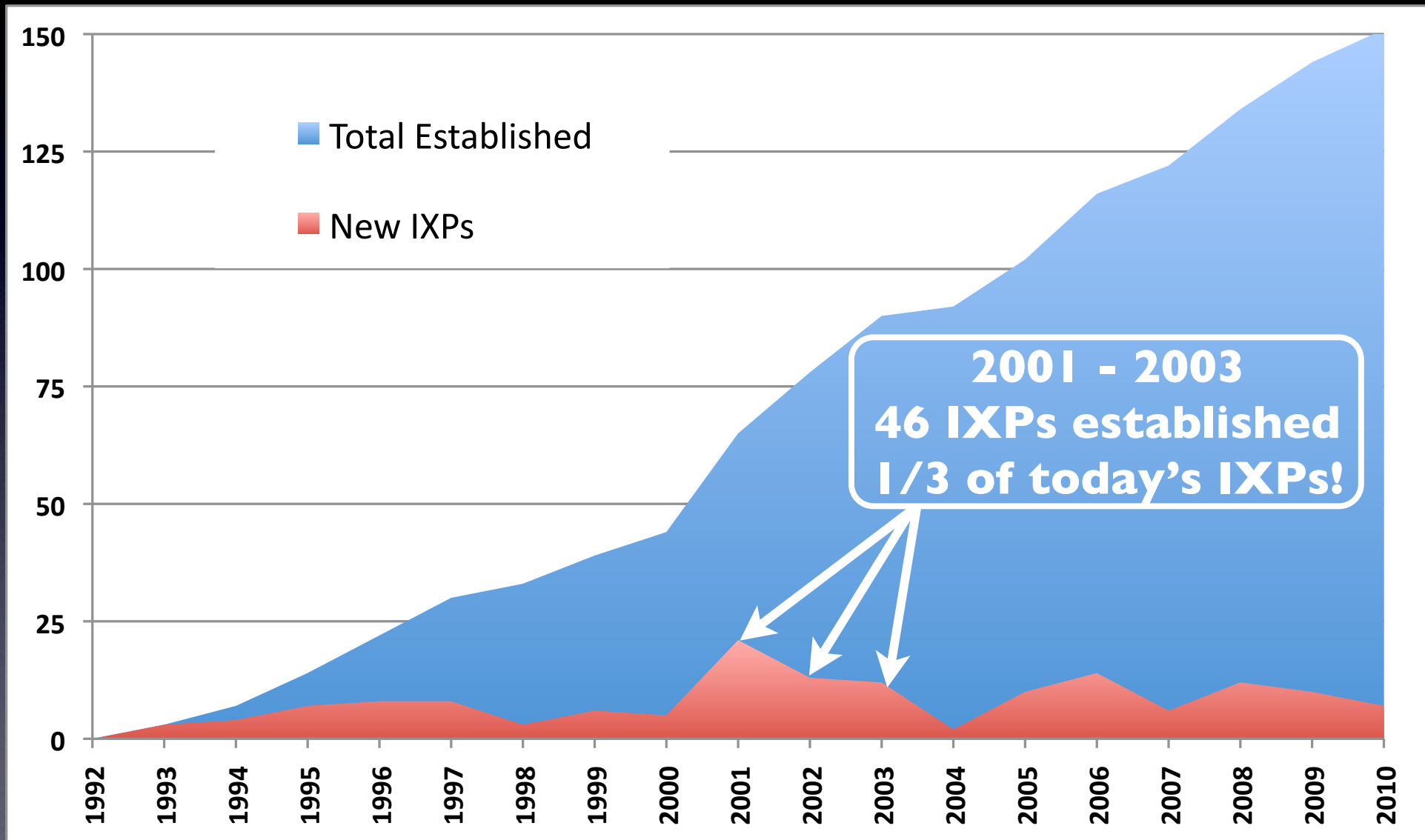- Association's websites could be mirrored and possibly even translated

European IXP traffic

- Combined European IXP peak traffic has risen from:
  - 4.318 Tbps end Apr '10 to _6.204 Tbps_ end Apr '11
  - 1.886 Tbps or 44% increase in the past 12 months

European IXP peak traffic growth last 12 months

12 month IXP traffic growth

Growth of IXPs in Europe

2001 - 2003
46 IXPs established
1/3 of today's IXPs!

European IXP participants

- 6.035 participants at 127 IXPs

- 3.375 with unique ASNs

- 1.056 ASNs present at >1 IXP in Europe

  - Average of 46 participants per IXP

  - Average of 1.028 Gbps per IXP participant

"Estimated" IXP participants globally

Region	Participants	Unique
Europe	6 204	3 329
Asia/Pacific	1 246	677
North America	2 205	934
South America	447	286
Africa	235	122
Global	10 337	5 057

* Data captured on 09 May 2011

10 most common European IXP participants

Participant	ASN		# of IXPs
Akamai	20940		24
E4A	34695		23
Google	15169		23
Leaseweb	16265		22
Interoute	8928		20
RETN	9002		19
Verizon	702		19
Colt	8220		19
AT&T	2686		18
Euro Transit	33926		16
43 ASNs peer at 10 or more IXPs			

10 most common IXP participants "globally"

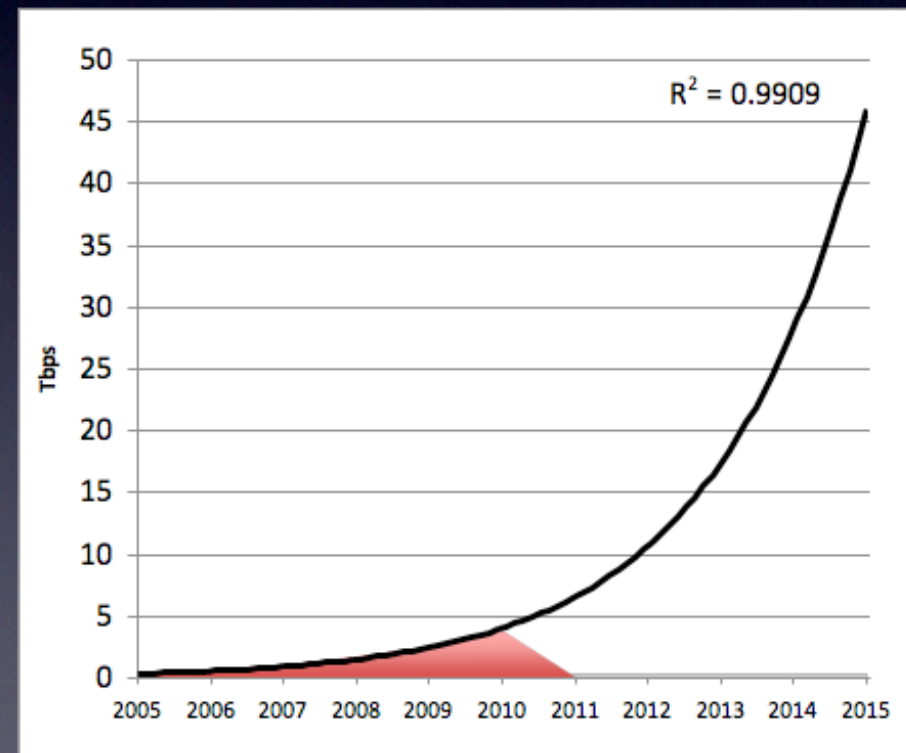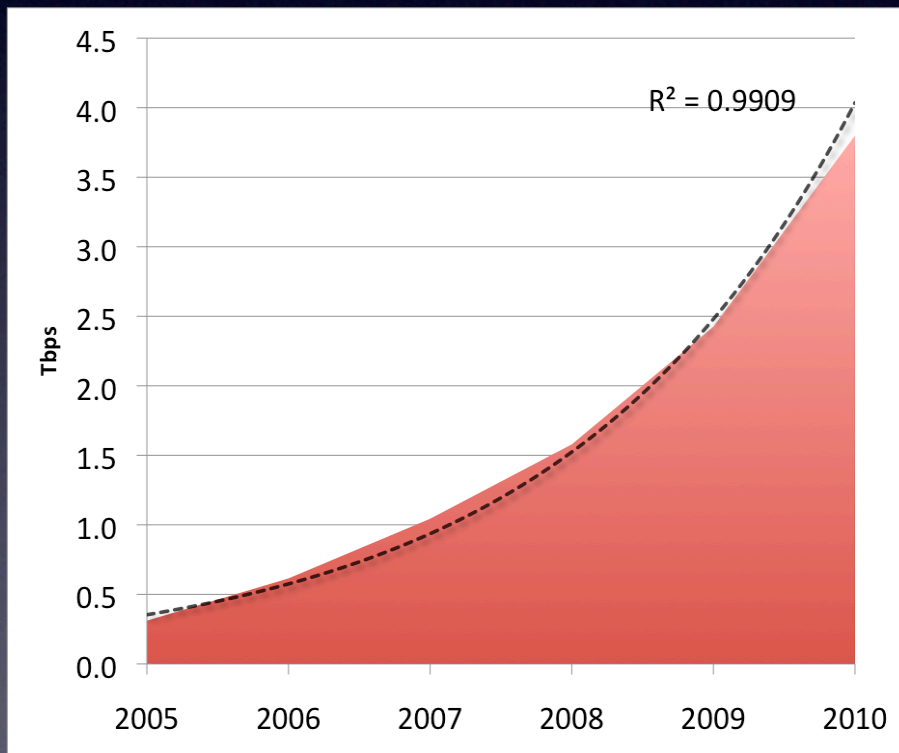| Participant	ASN		# of IXPs
Google	15169		55
Akamai	20940		52
Limelight	22822		42
Hurricane Electric	6939		41
Microsoft	8075		30
Yahoo	10310		30
E4A	34695		29
Mzima	25973		25
BroadbandONE	19151		24
RETN	9002		24
95 ASNs peer at 10 or more IXPs			

European Participant growth

Growth is slowing but not all that much.
Predicting a 7.6% increase in 2015
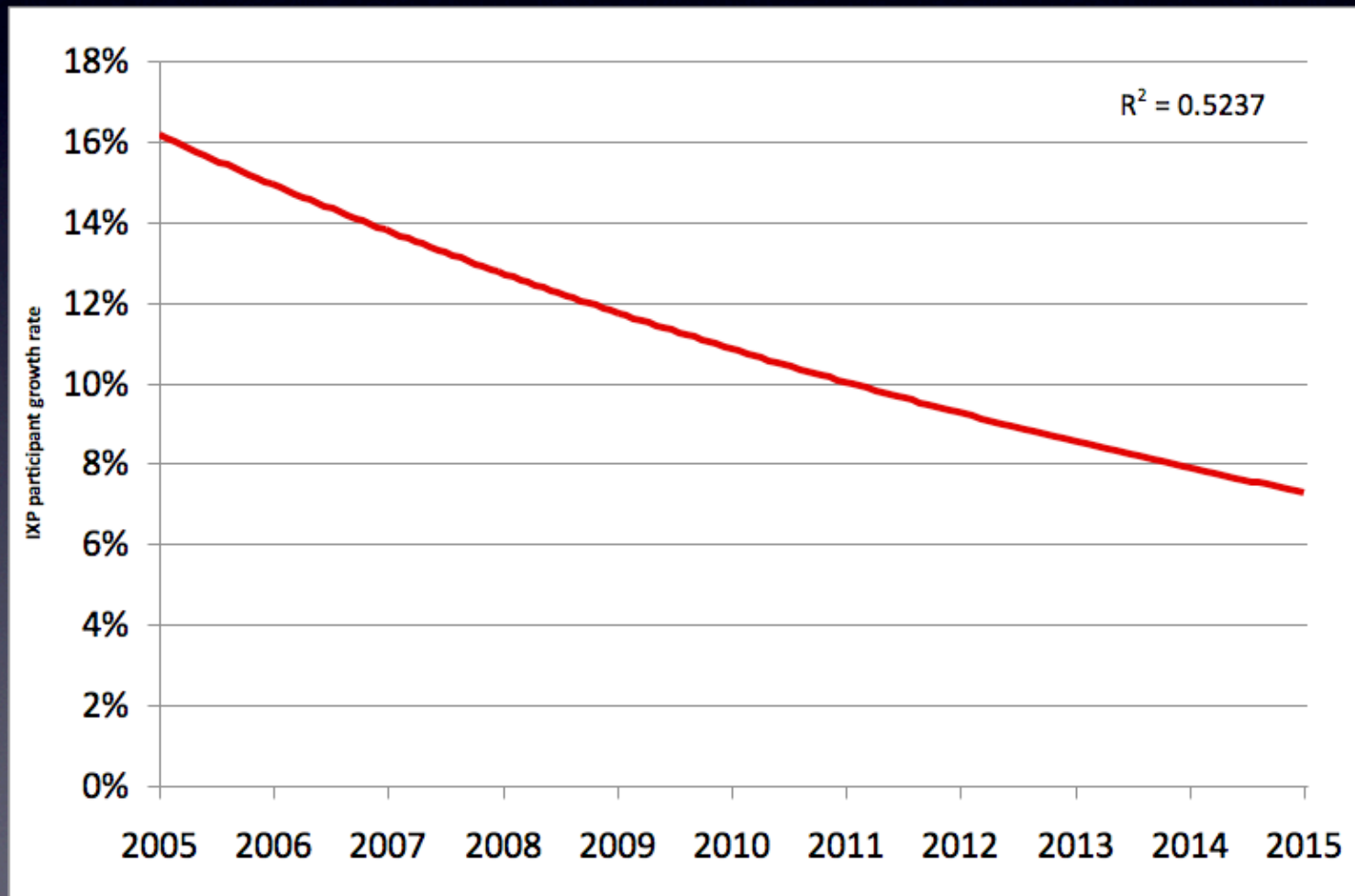
5 year peak IXP traffic projection

- Increase in IXP peak traffic from the end of August 2005 to the end of August 2010 was 12 fold

- Exponential trend line suggests 47 Tbps+ in 2015

The peering scene in 2015?

- Number of IXPs: 145 (130)

- 8.000 (6.204) participants at these IXPs

- 4.400 (3.329) unique ASNs

- Aggregated European IXP traffic: 52 Tbps (6.3 Tbps)

- Average IXP peak traffic: 360 Gbps (48 Gbps)

- Average number of IXP participants: 55 (46)

- Average participant traffic: 6.5 Gbps (1 Gbps)

* Data in brackets are today's statistics

Anyway...

CIIP

- EP3R - European Public Private Partnership for Resilience
  - CIIP Action Plan in its Communication on Critical information Infrastructure Protection – 'Protecting Europe from large scale cyber-attacks and cyber-disruptions: enhancing preparedness, security and resilience' - COM(2009) 149
  - Related to EPCIP

netnod

CIIP

- The aim is to identify and protect critical infrastructure
  - And telecommunications is identified as one CI
  - Five areas : preparedness and prevention, detection and response, mitigation and recovery, international cooperation and criteria for European Critical Infrastructures in the field of ICT.

netnod

EP3R

- Three areas (working groups)

  - **WG1:** Key assets, resources and functions for the continuous and secure provisioning of electronic communications across countries

  - **WG2**:Baseline requirements for the security and resilience of electronic communications

  - **WG3:** Coordination and cooperation needs and mechanisms to prepare for and respond to large-scale disruptions affecting electronic communications

netnod

ENISA

- Mandate extended to 13 March 2012

- Taks

  - Collecting appropriate information

  - Developing 'common methodologies'

  - Enhancing cooperation

ENISA

- Activities
  - Cyber Europe 2010
  - Resilience of the Internet Interconnection Ecosystem report
    - Routing security
    - Cyber Exercise
    - Incident investigation
    - Data collection of Network Performance Measurements
    - Research into resilience metrics
    - Incentives?
    - Transit Market failure
    - Traffic Prioritisation
    - Certification?

netnod

To Summarize

- A lot of on going efforts
- Somewhat unclear outcome
  - Good (and understandable) intentions
  - Regulation?
- Who is paying?

netnod

Thank You!

www.netnod.se

netnod