

# The History of Peering in Europe and What This Can Teach Us About the Future

[kurtis@netnod.se](mailto:kurtis@netnod.se)

First a very quick Déjà vu

# History of peering in Europe

Basically divided into three phases

1. Early and mostly academic days, 1993-1995
2. Early commercial days, mid to late 1990's
3. Modern times

# Early and academic days

- No competition
- People 'wired up' where possible
- Great co-operation among all parties
- Traffic mostly UUCP email and news

# Early commercial days

- Educational network funding shifts to universities
- Players are starting to form peering policies
- The basic rule of “both networks that peer must benefit” is emerging
- The first commercial service offerings are starting to use peering as service differentiation

# History of peering in Europe

- Emerged as a way to save on costs
  - For transport capacity (that was kept 'artificially' high by ex/PTTs and half-circuit pricing)
  - For transit / transatlantic costs
- International circuits where low bandwidth so delay was less of an issue in the early days

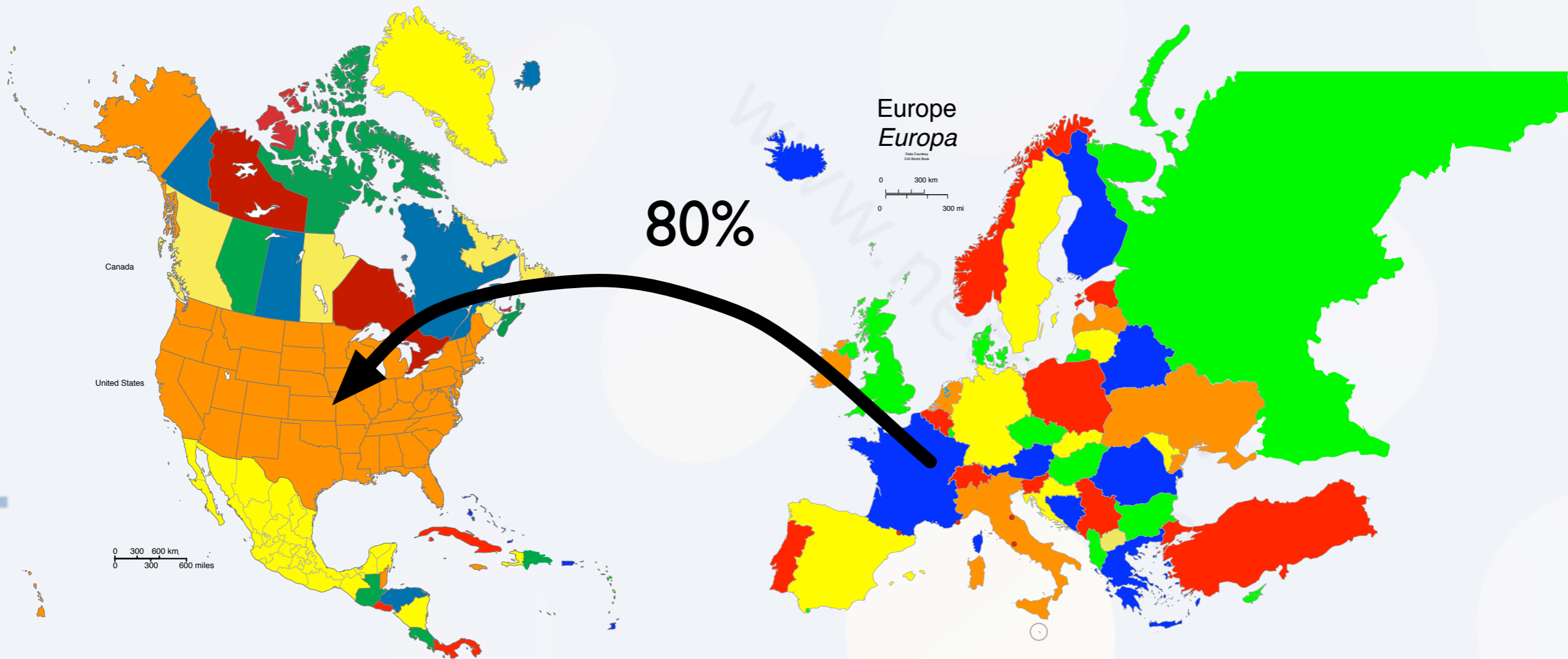
# History of peering in Europe

- In the early European Internet, most traffic was destined for the US as most content was US based
- Over (modern) time, more content was developed in Europe
  - Mainly to meet localized interest, culture and language
- Local content changed the traffic flows, and most likely changed the interconnect landscape

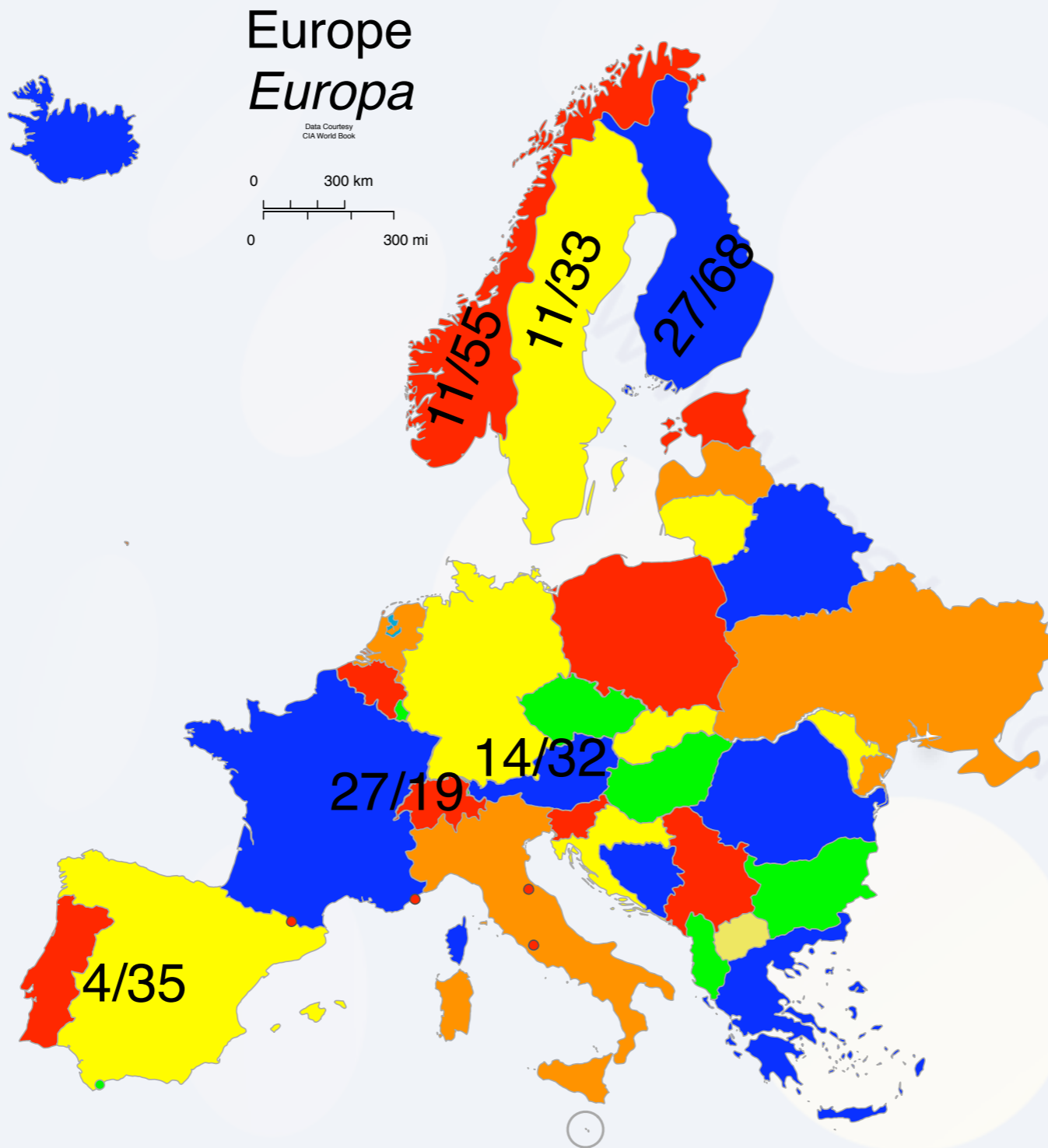
Put another, and more  
graphical way



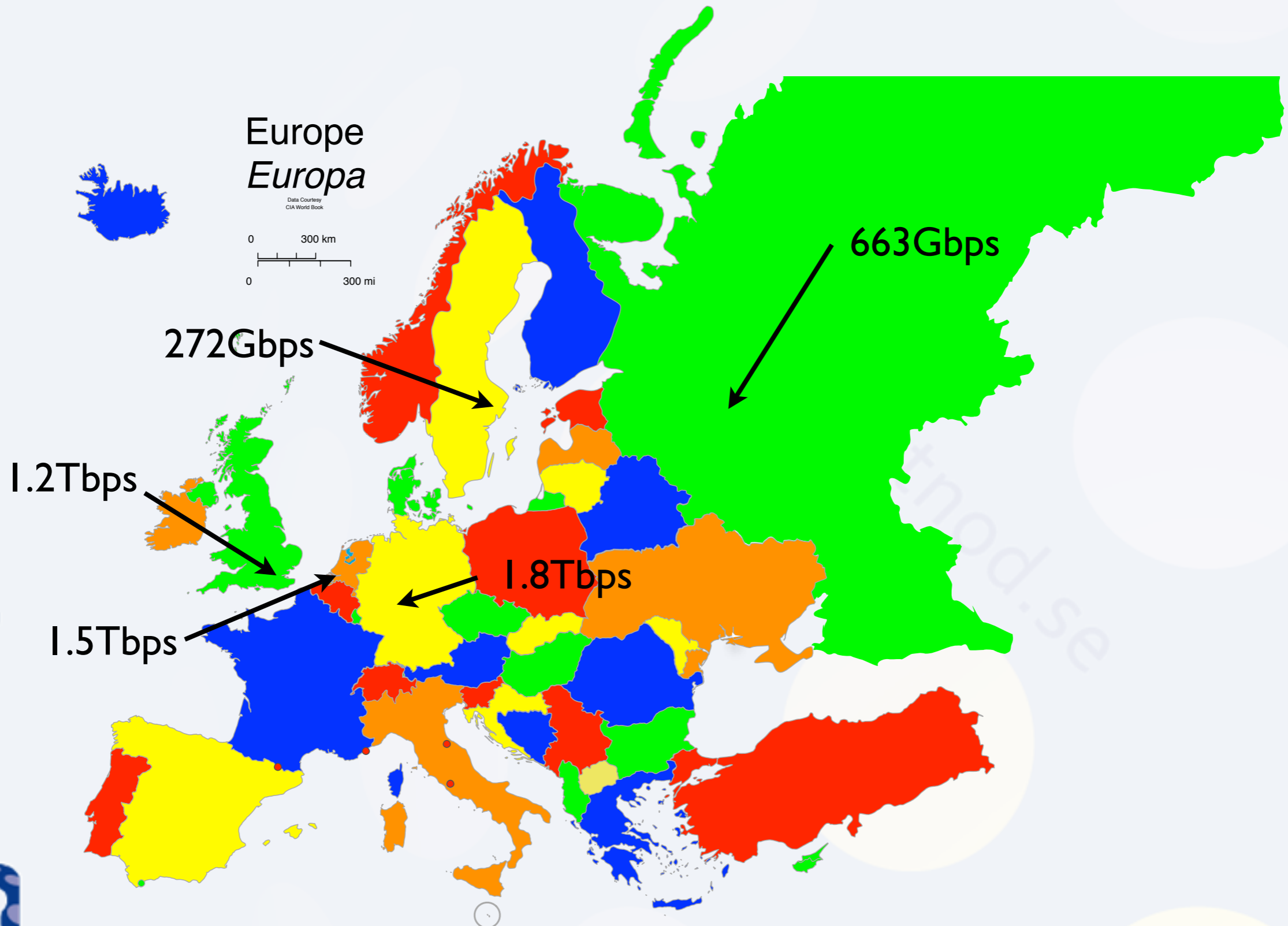
# We went from this....



# ...to this...



# ....to this!



# History of peering in Europe

- As can be seen on the previous slide traffic shifted to be localized to language regions around 2001
- Keeping traffic local helped with “customer experience”, and became (at least partly) a goal in itself
- Hot potato routing helped and meant that transport costs were shifted to the peer as quick as possible

# History of peering in Europe

- While hard to prove, the dense interconnects in Europe helped innovate services and content
- At a time when transit prices and transport prices were high, peering provided a way to lower end-user costs and stay competitive against mostly foreign (US based) providers



[www.netnod.se](http://www.netnod.se)

Let's take a random  
example country

www.netnod.se

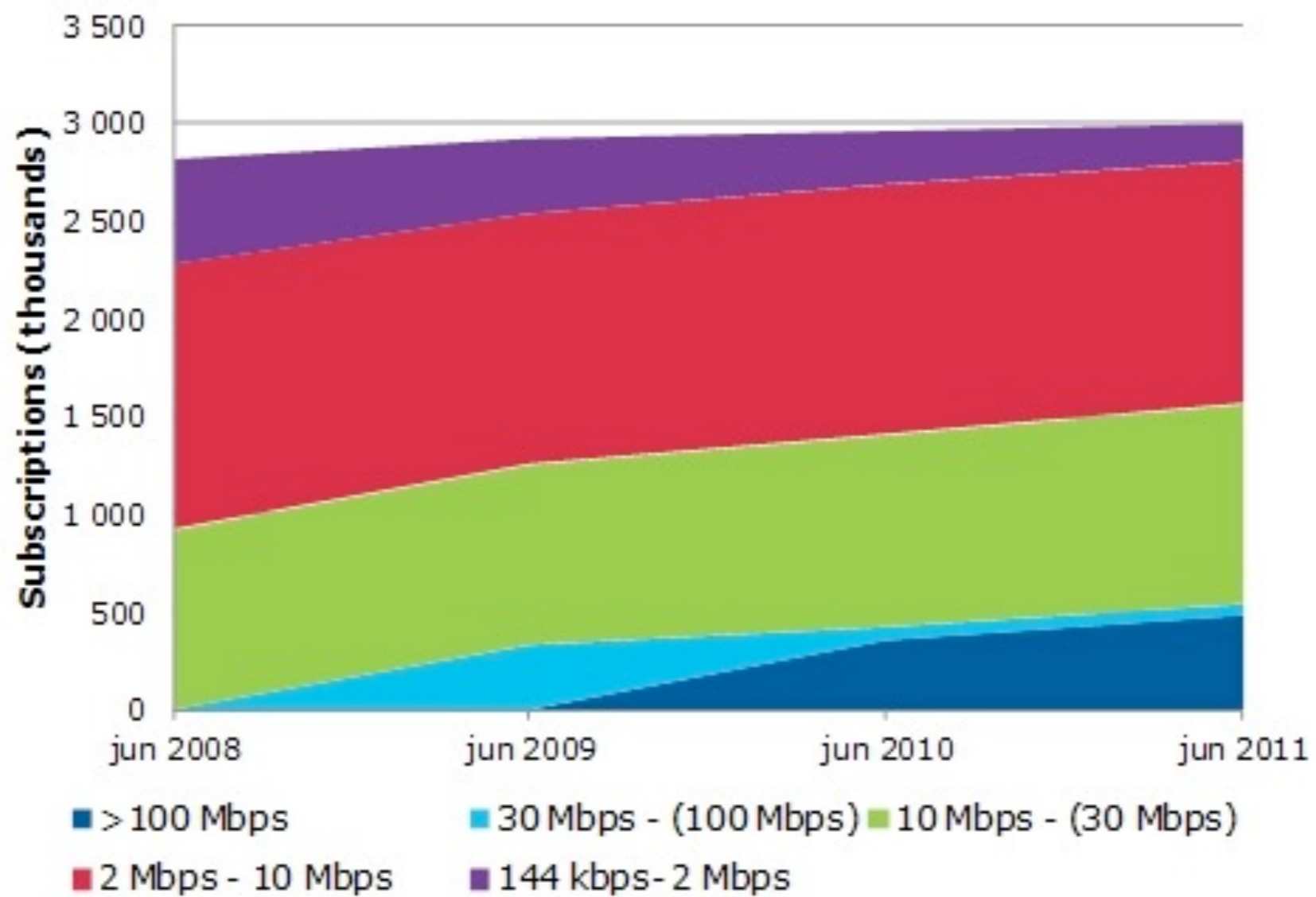
www.netnod.se



Let's take a random  
example country

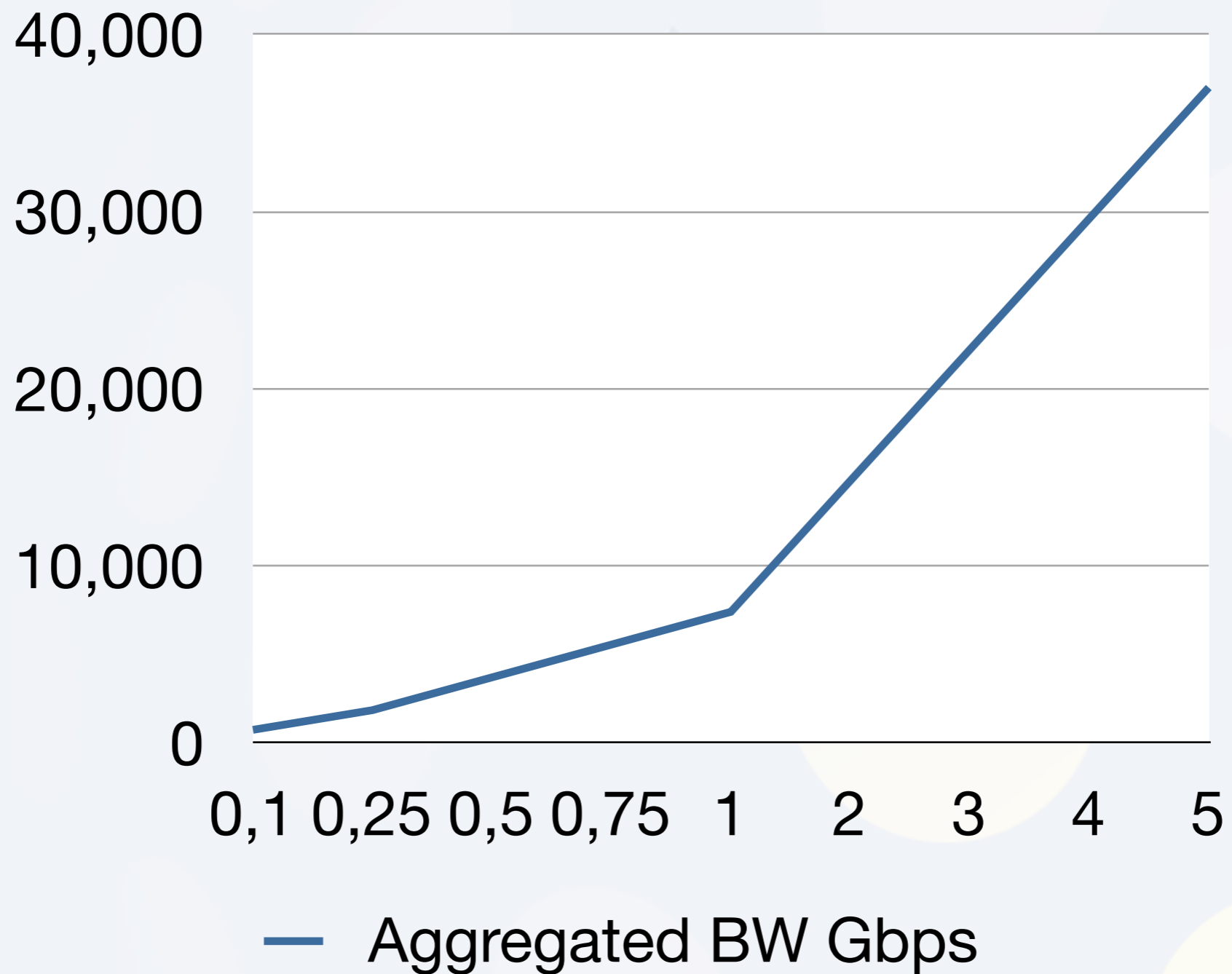






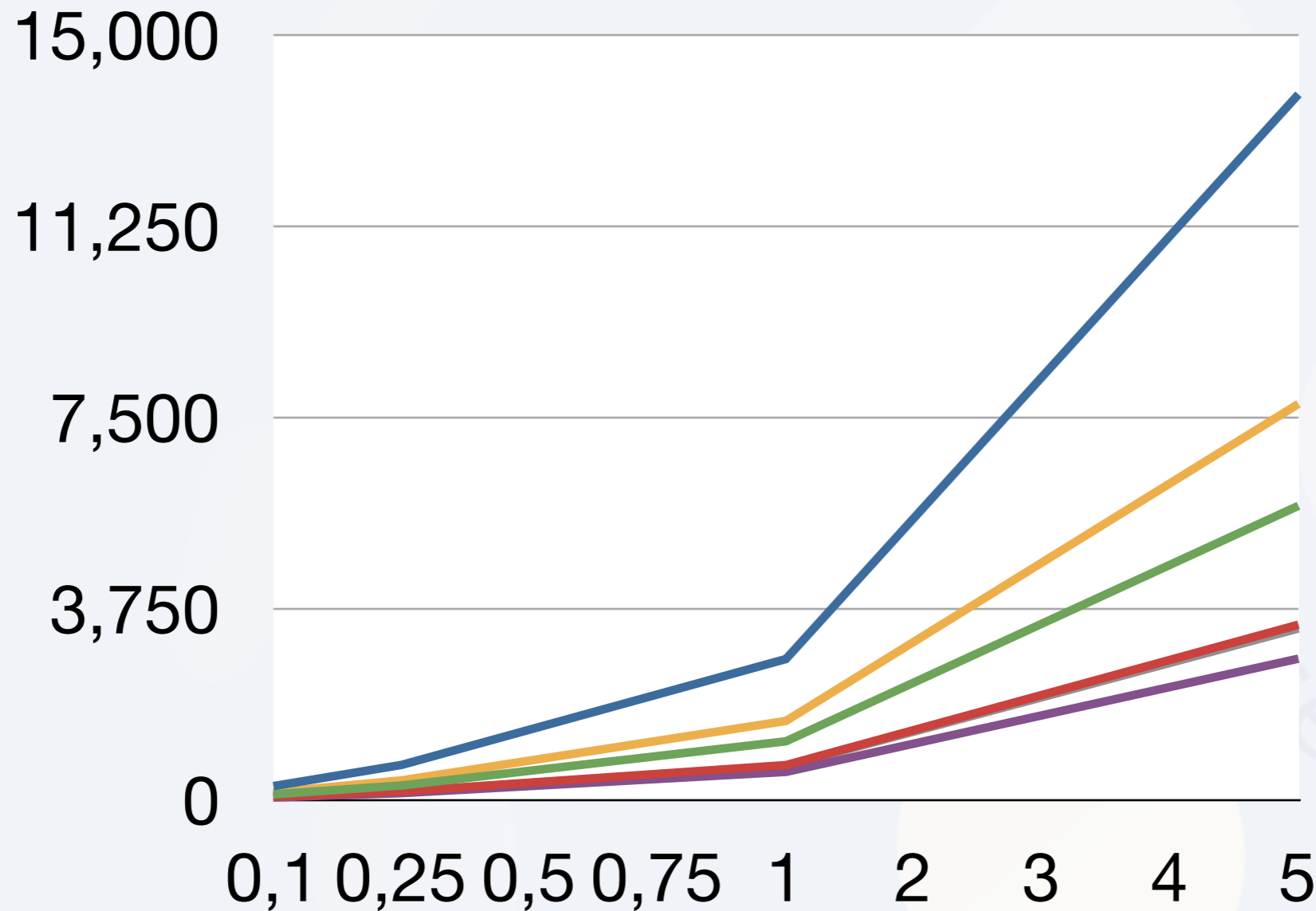
# 7 400 000 Internet subscribers

“Potential Peak traffic for various avg Mbps”



# Total data per ISP

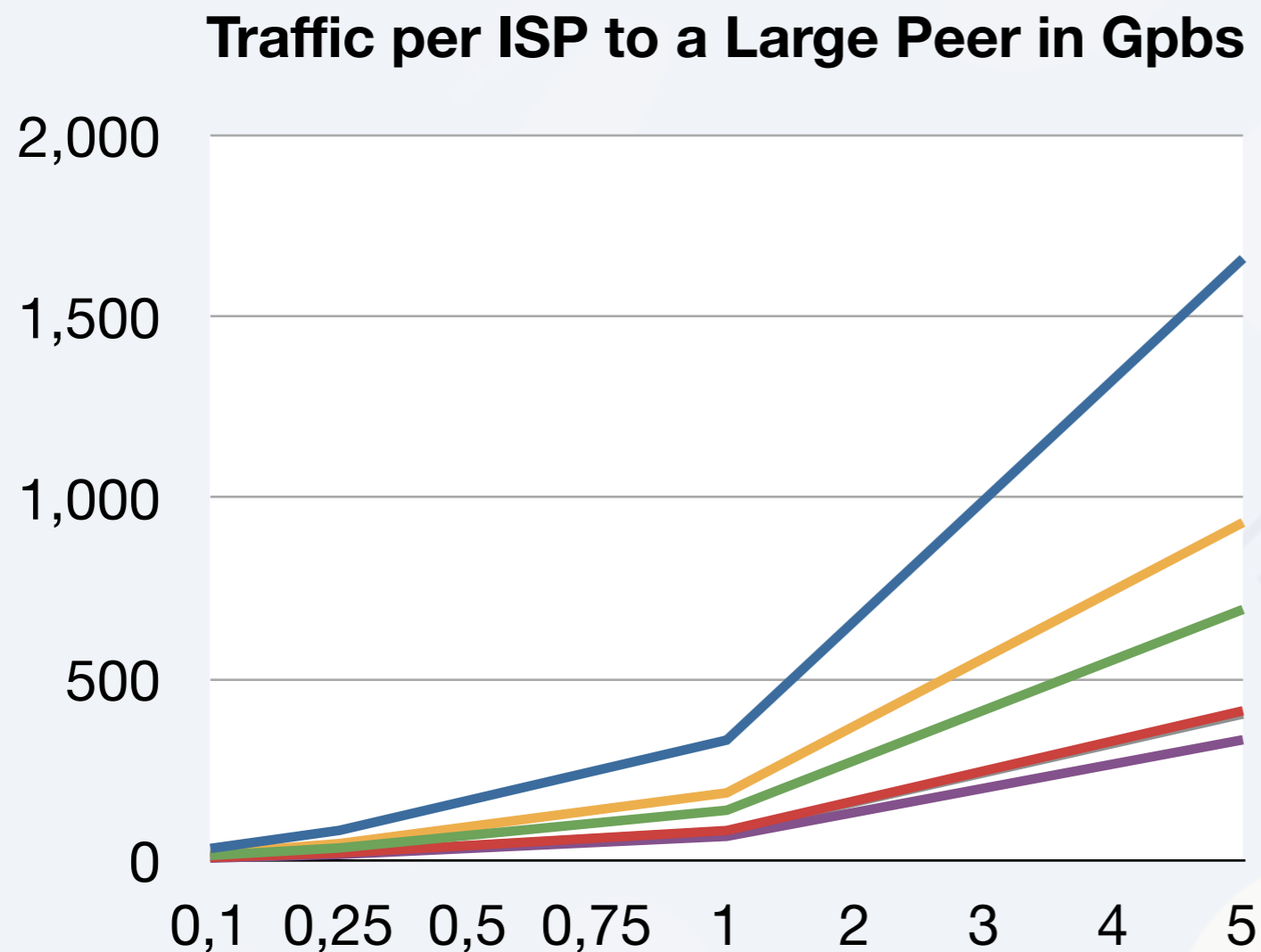
## Traffic by ISP in Gbps



— ISP1 — ISP2 — ISP3 — ISP4 — ISP5 — ISP6

**Warning! Very Hypothetical  
example to follow!**

# Data per ISP / Large peer



According to <http://ddos.arbornetworks.com/2010/10/google-breaks-traffic-record/> Google then had 8-12% of the Internet traffic. Let's assume 12%, and that that is true in general

ISP1    ISP2    ISP3  
ISP4    ISP5    ISP6

# Is this a problem?

- No!
  - We got 100G coming
  - We peer at so many points
  - We have so much transit
- Yes!
  - 100G will be too much shared faith
  - We can't back-haul this
  - We can't afford to send this over transit...
  - Our customers will kill us over the latency

Is there another  
solution?

**Yes!**

[www.netnod.se](http://www.netnod.se)

[www.netnod.se](http://www.netnod.se)





# Another random example...

www.netnod.se

www.netnod.se



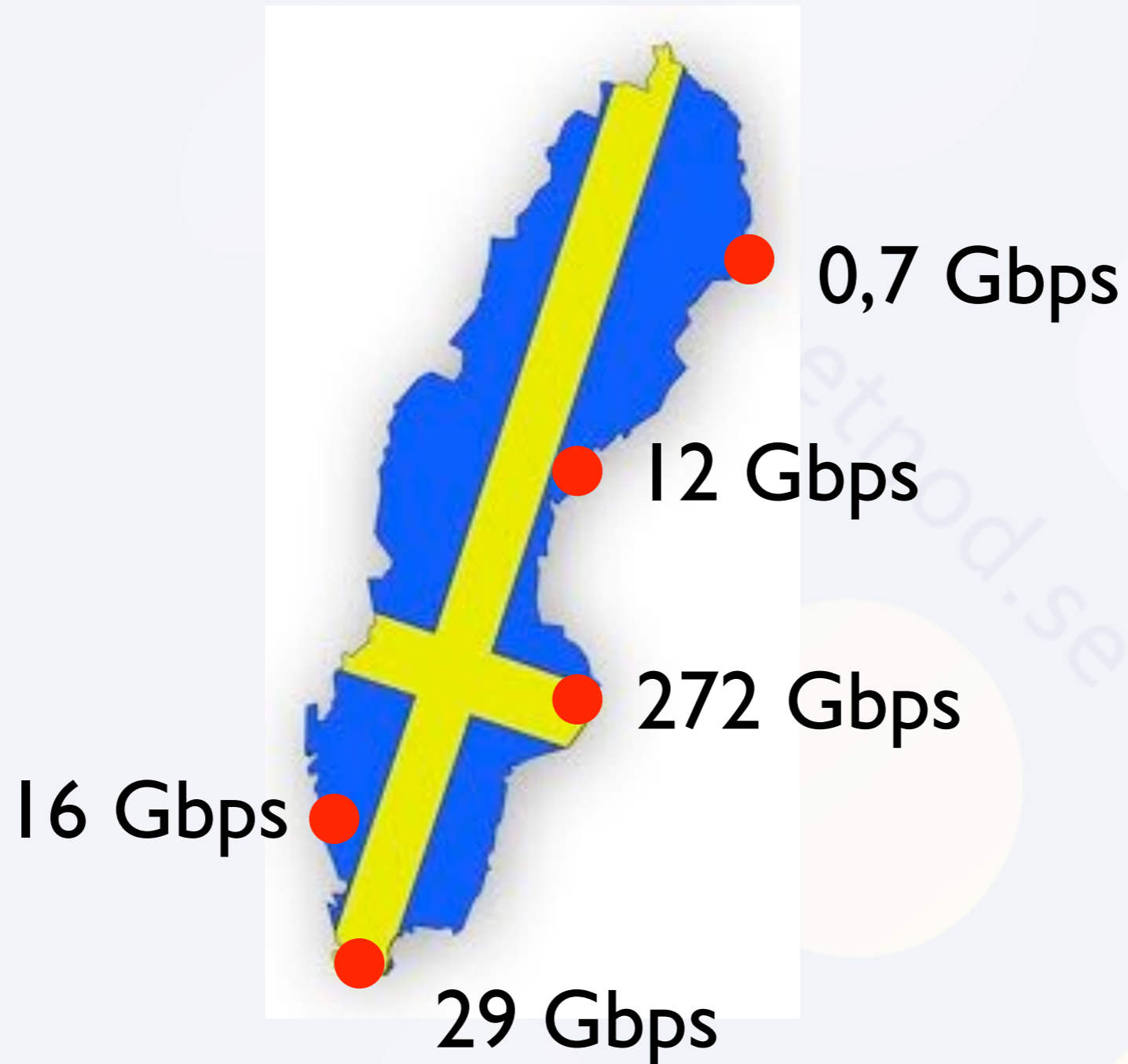
# Another random example...



# Another random example...



# Another random example...



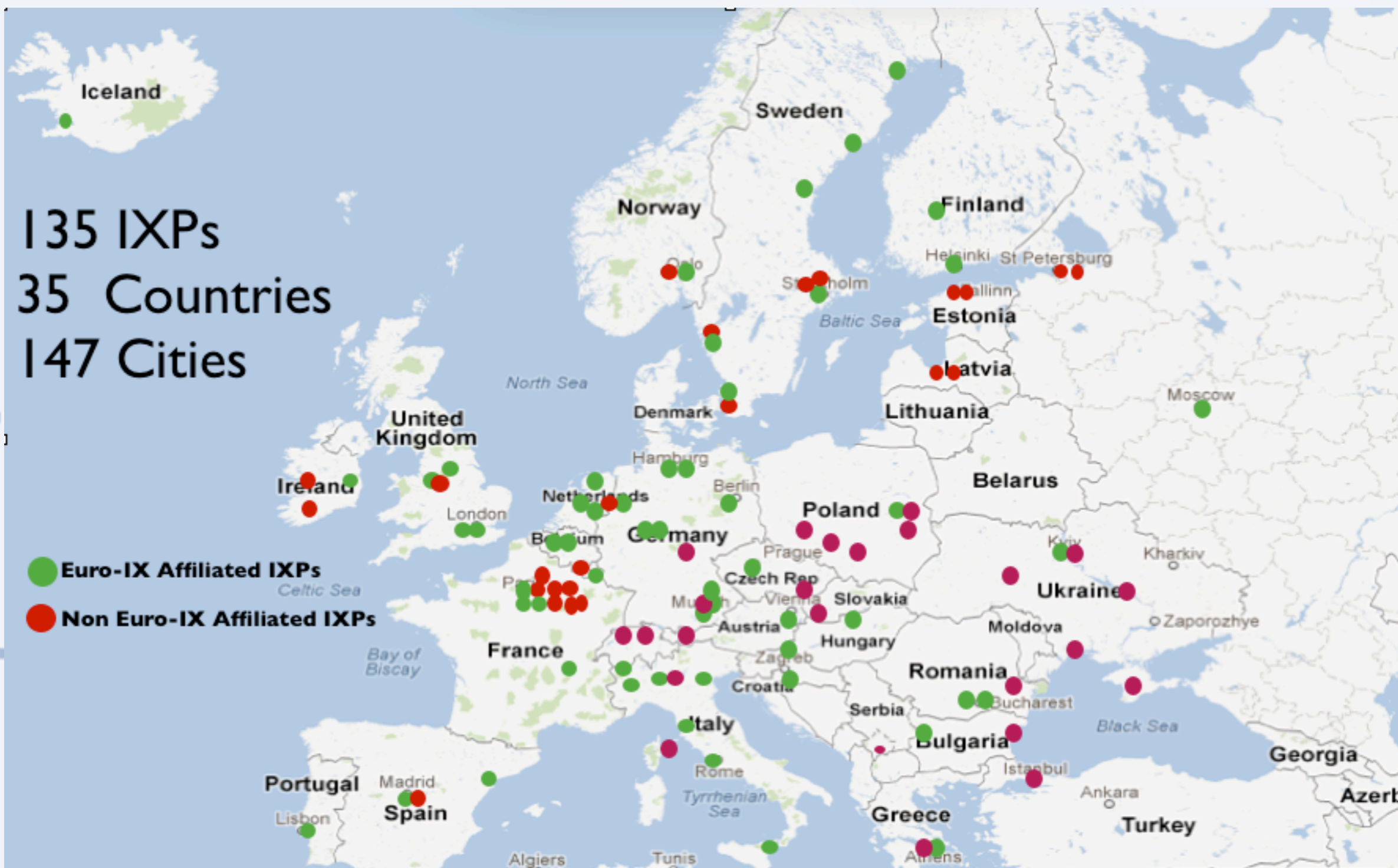
# Why the imbalance ?

- (More or less) Only eyeballs peering outside Stockholm
- Content backhauled to Stockholm

# Is history repeating itself?

- Maybe
- CDNs / Content is already doing more and more local / extended peering
- They might just be ahead of the curve
- Europe already have some of the most extensive peering mesh, but it's still pretty concentrated

135 IXPs  
35 Countries  
147 Cities



# Local peering

- Keeping regional/national traffic regional and local is always good
  - Cheaper, Better performance - will help to develop local content
- Redundancy
  - You are no longer dependent on a single provider as upstream and their current operational status
- Control - allows you greater control of traffic flows



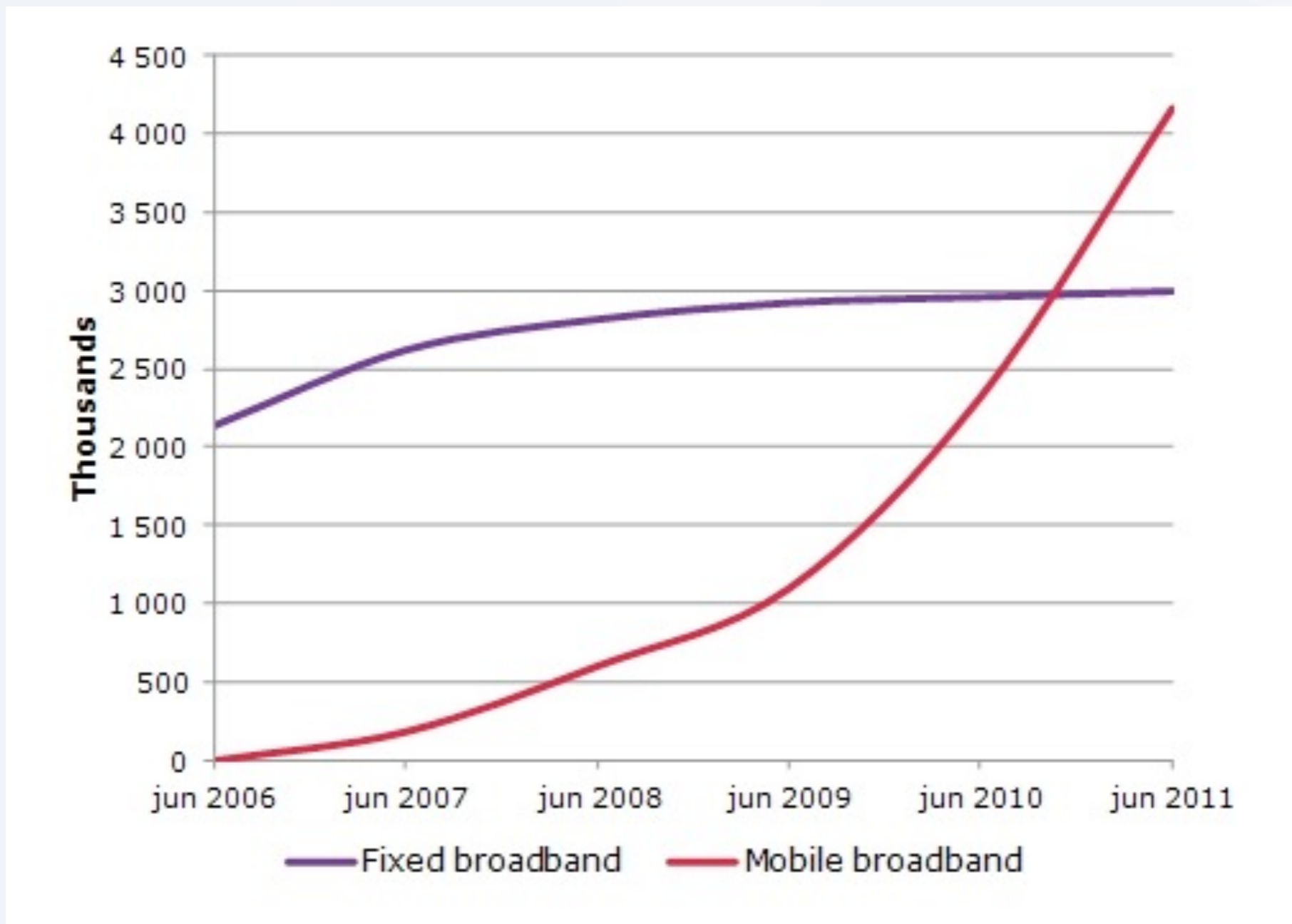
# There might be one saver..

www.netnod.se

www.netnod.se



# There might be one saver..





And a lot of thanks to Per Bilse  
for a lot of the ideas and history!