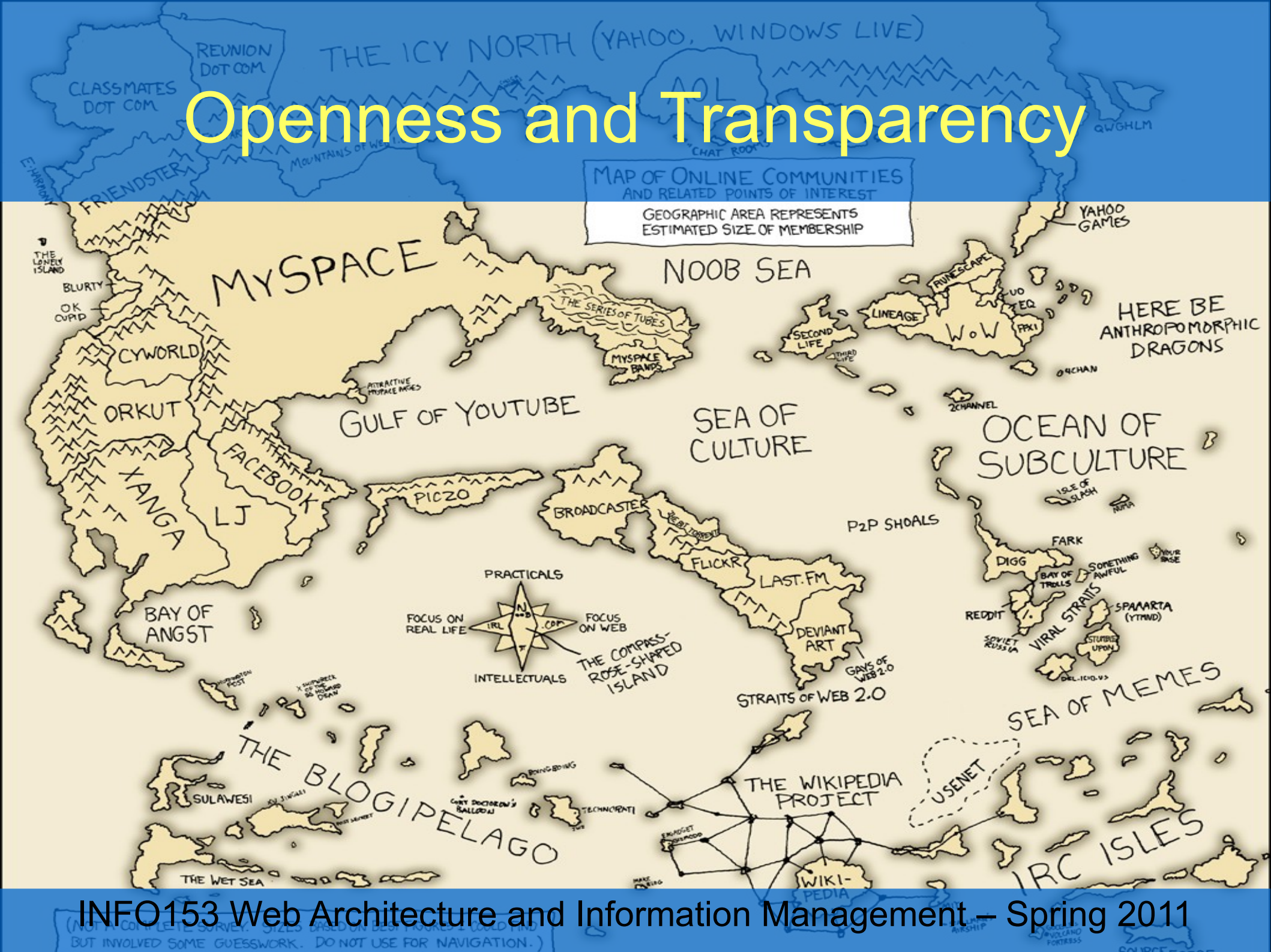
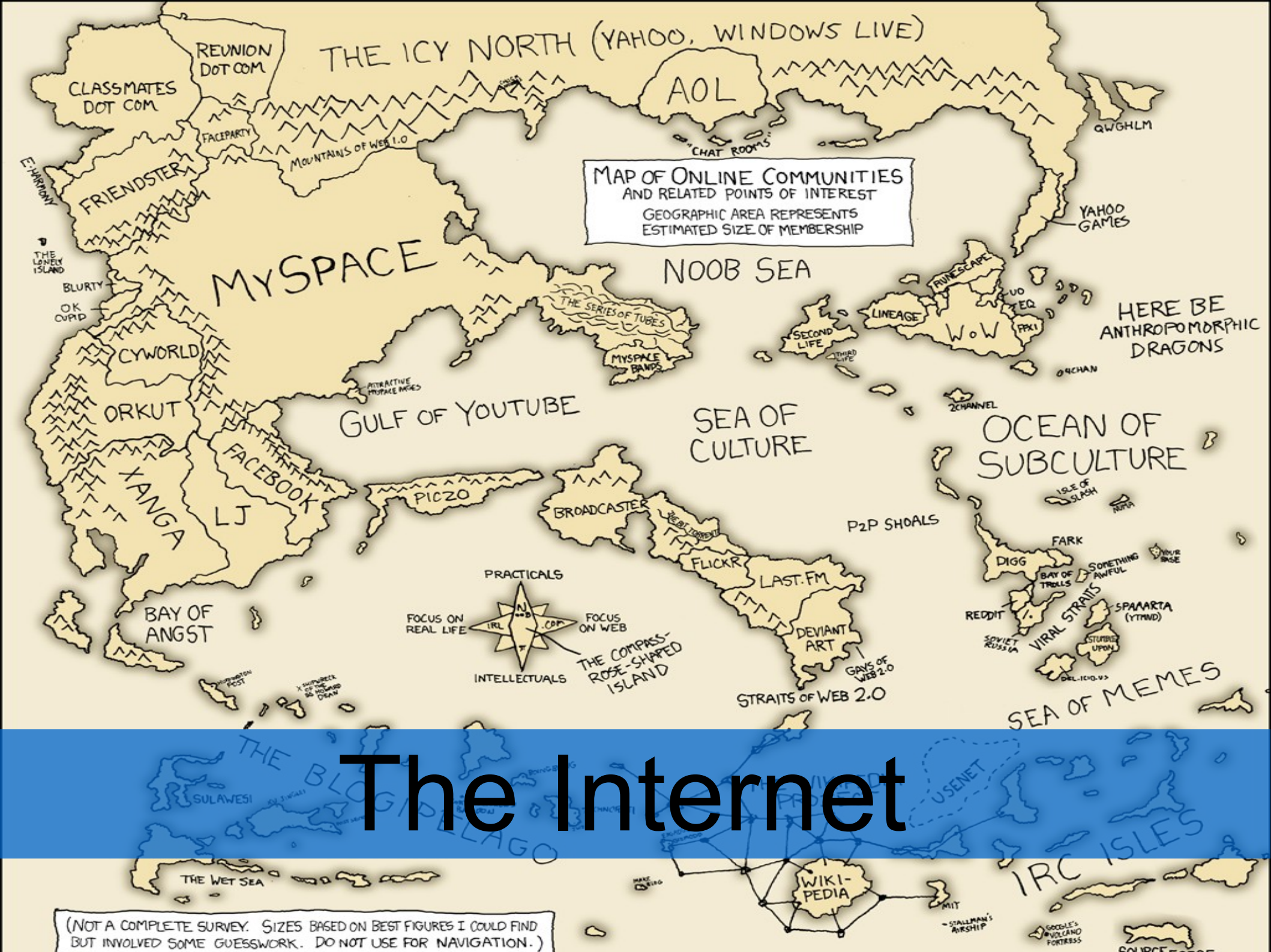
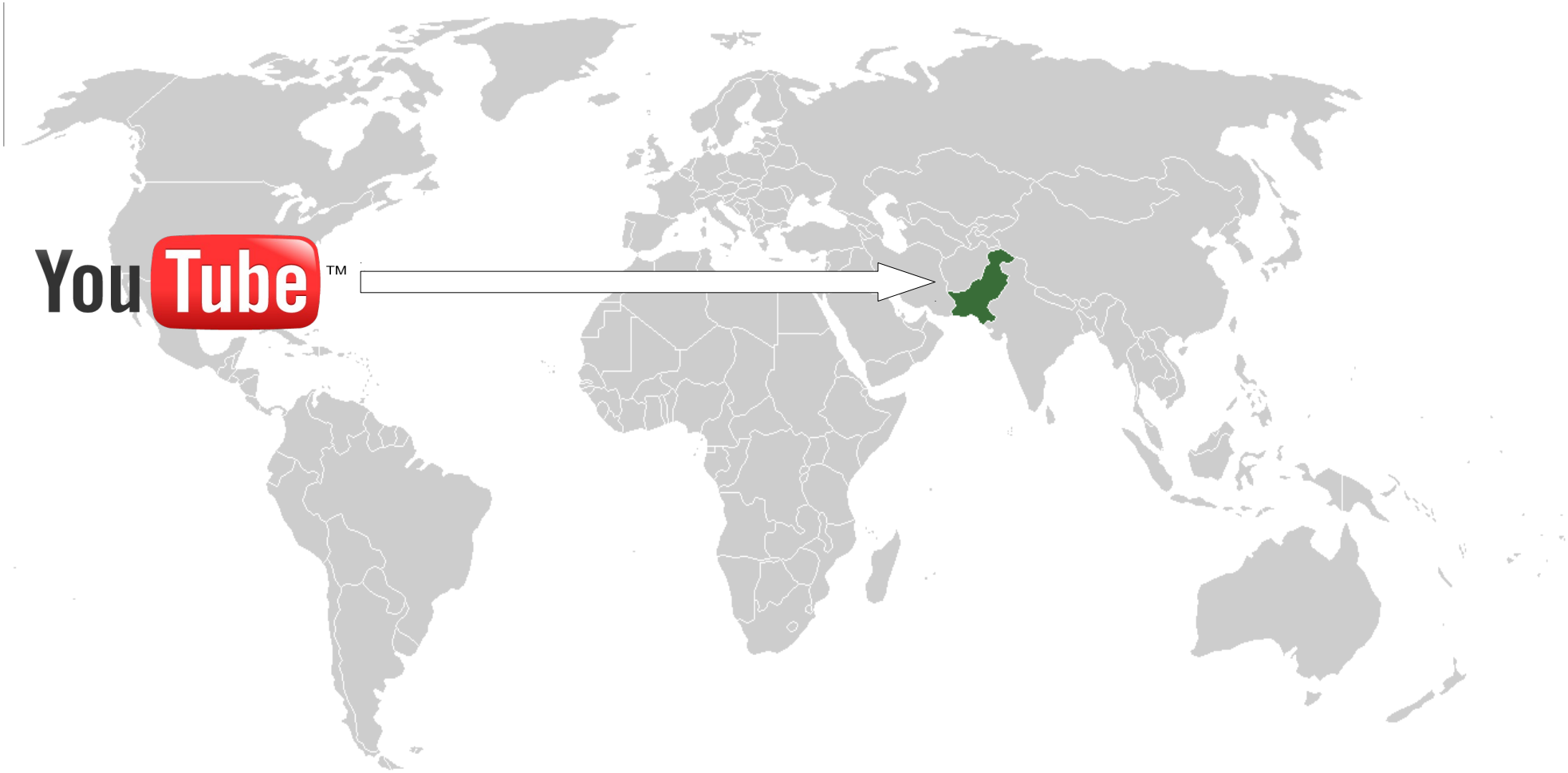
Openness and Transparency





The Internet

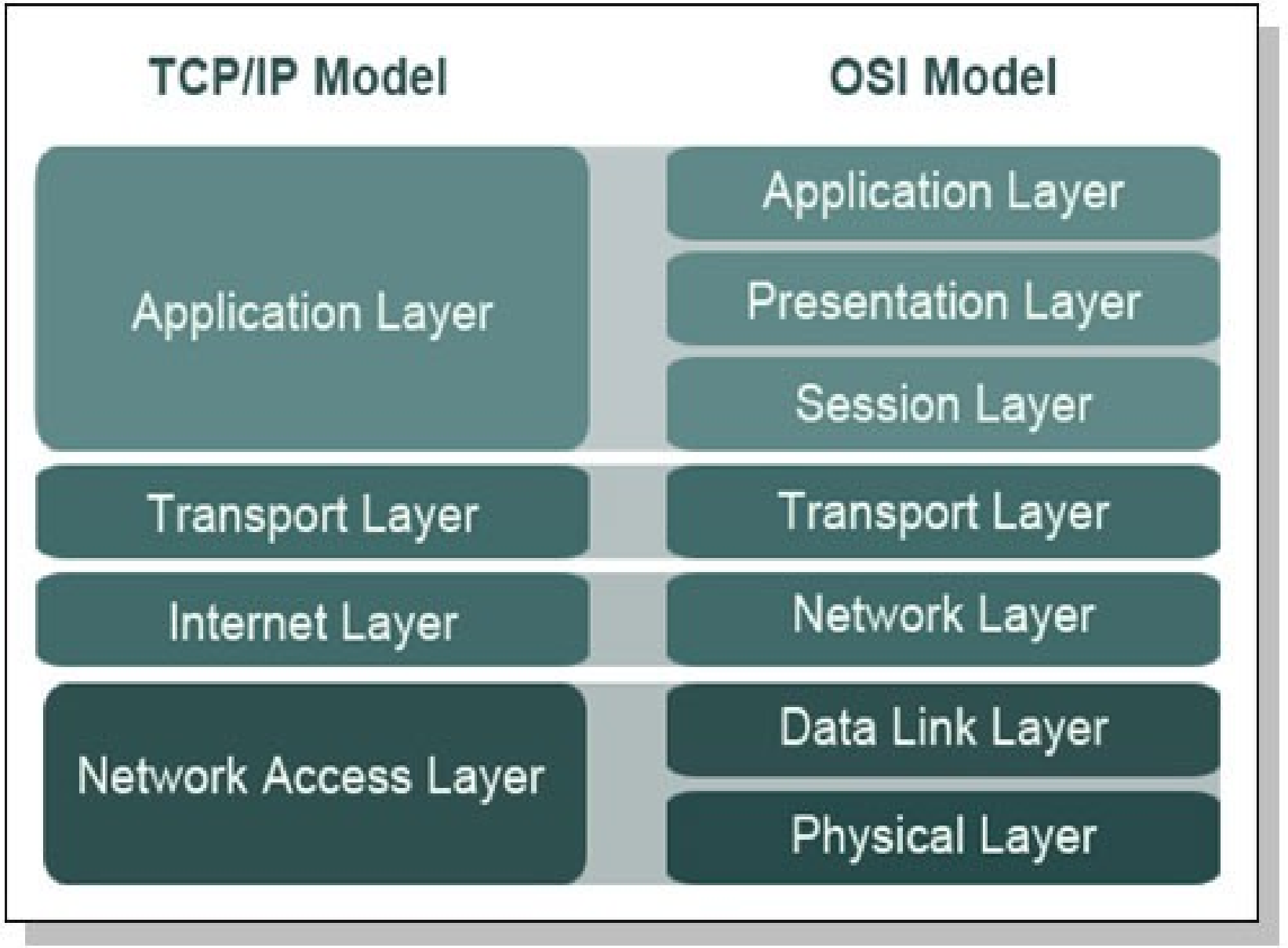
YouTube Goes to Pakistan



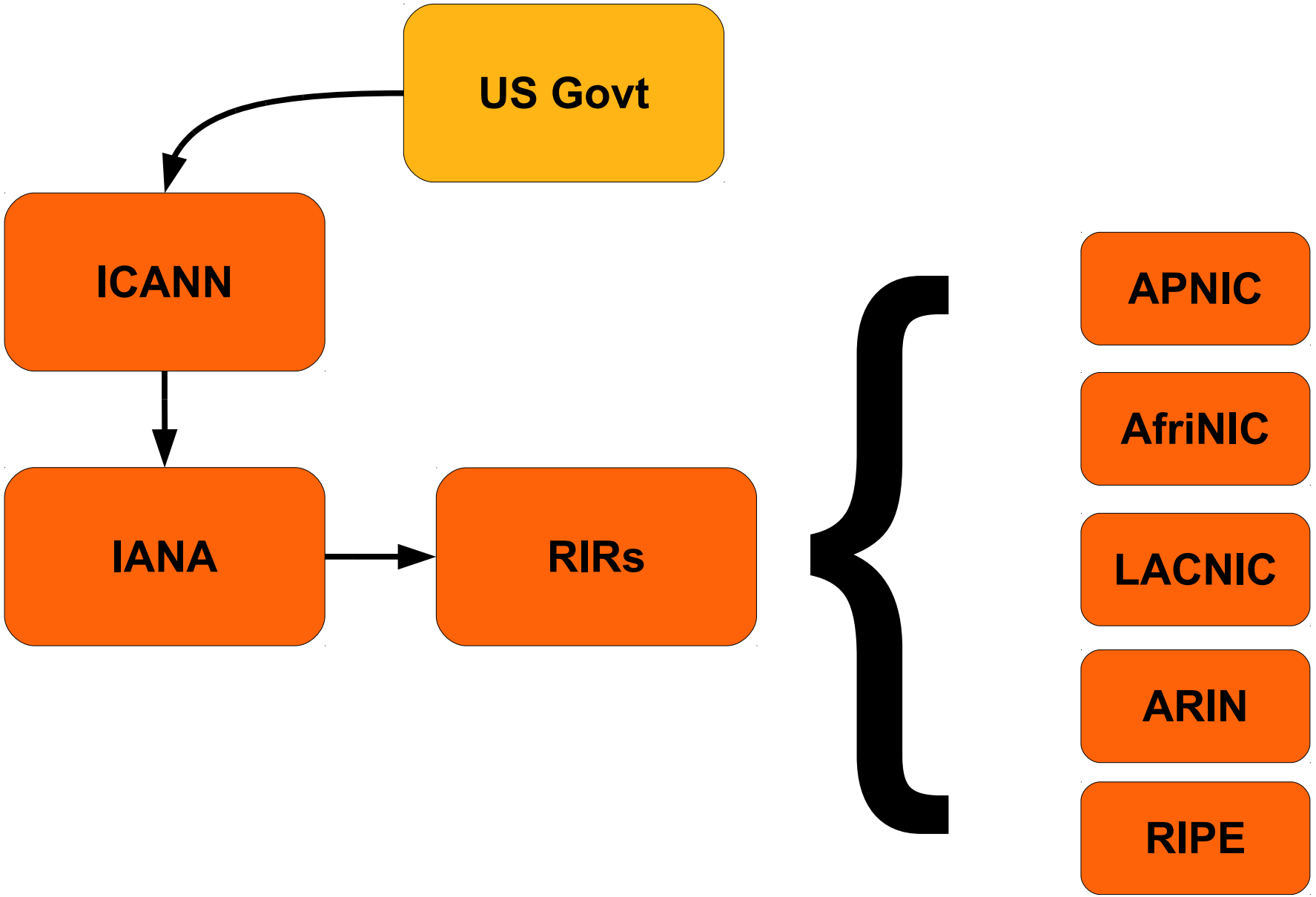
~ 2 hours on 24th February 2008

The Internet

Network Layers



Where do IP addresses come from?



Open Protocols, Transparent Networks?

- **Standards development**
  - IETF, W3C
- **Institutional structures**
  - ICANN regime
- **Topological arrangements**
  - Interior Gateway Protocols: IS-IS, RIP, OSPF, etc
  - Exterior Gateway Protocols: BGP

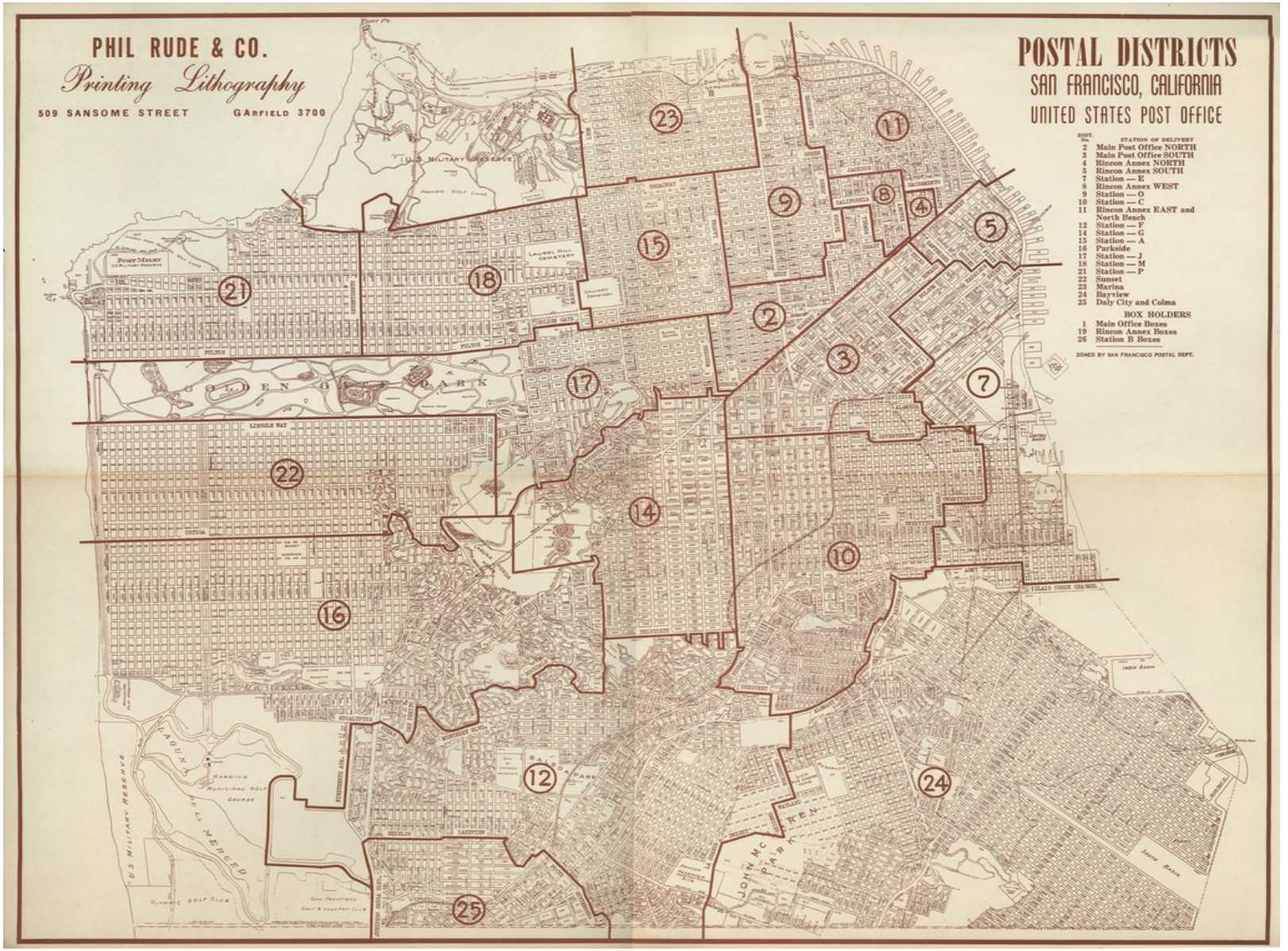
The Internet as a Postal Map

YouTube
AS15169

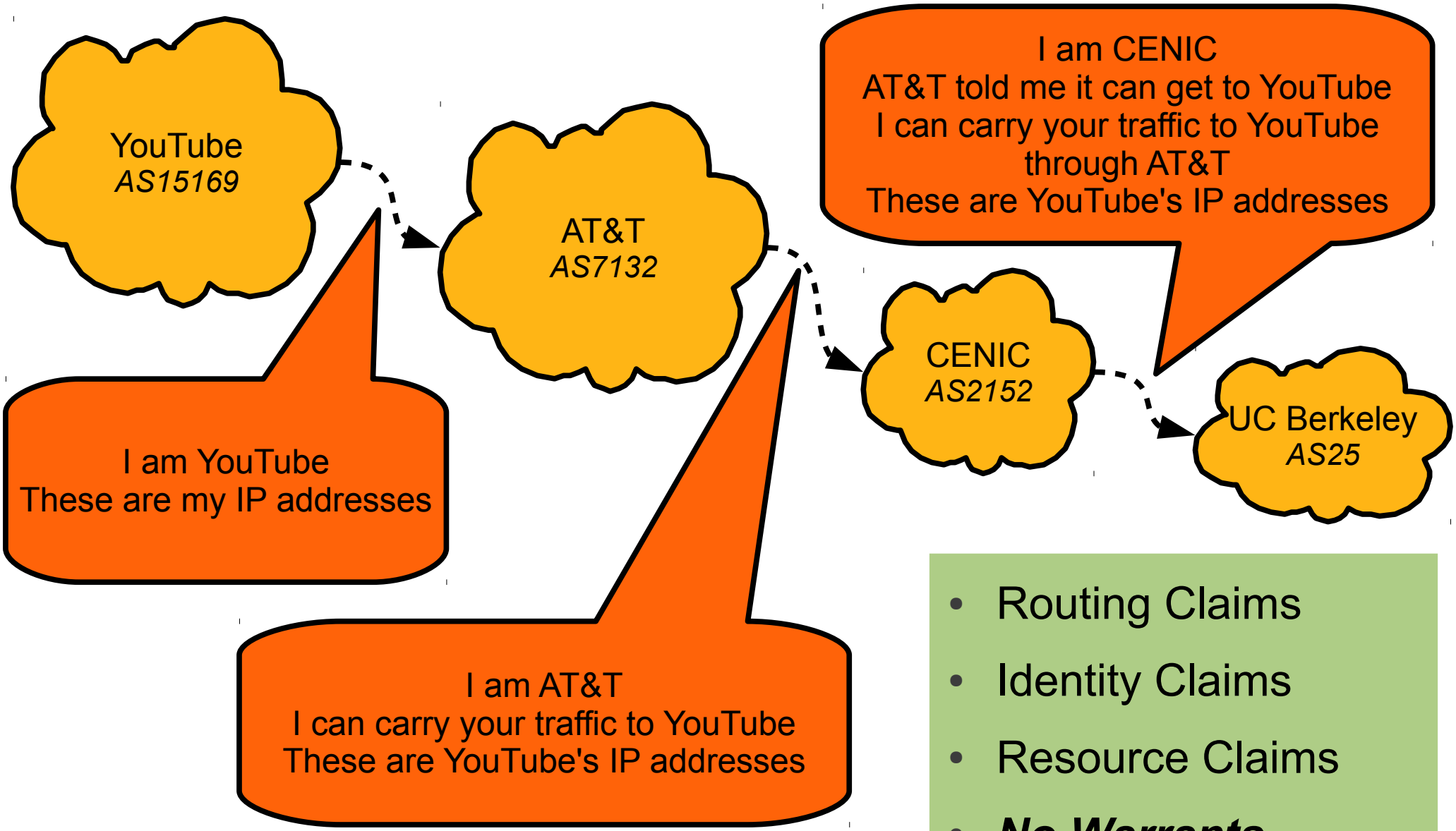
AT&T
AS7132

CENIC
AS2152

UC Berkeley
AS25



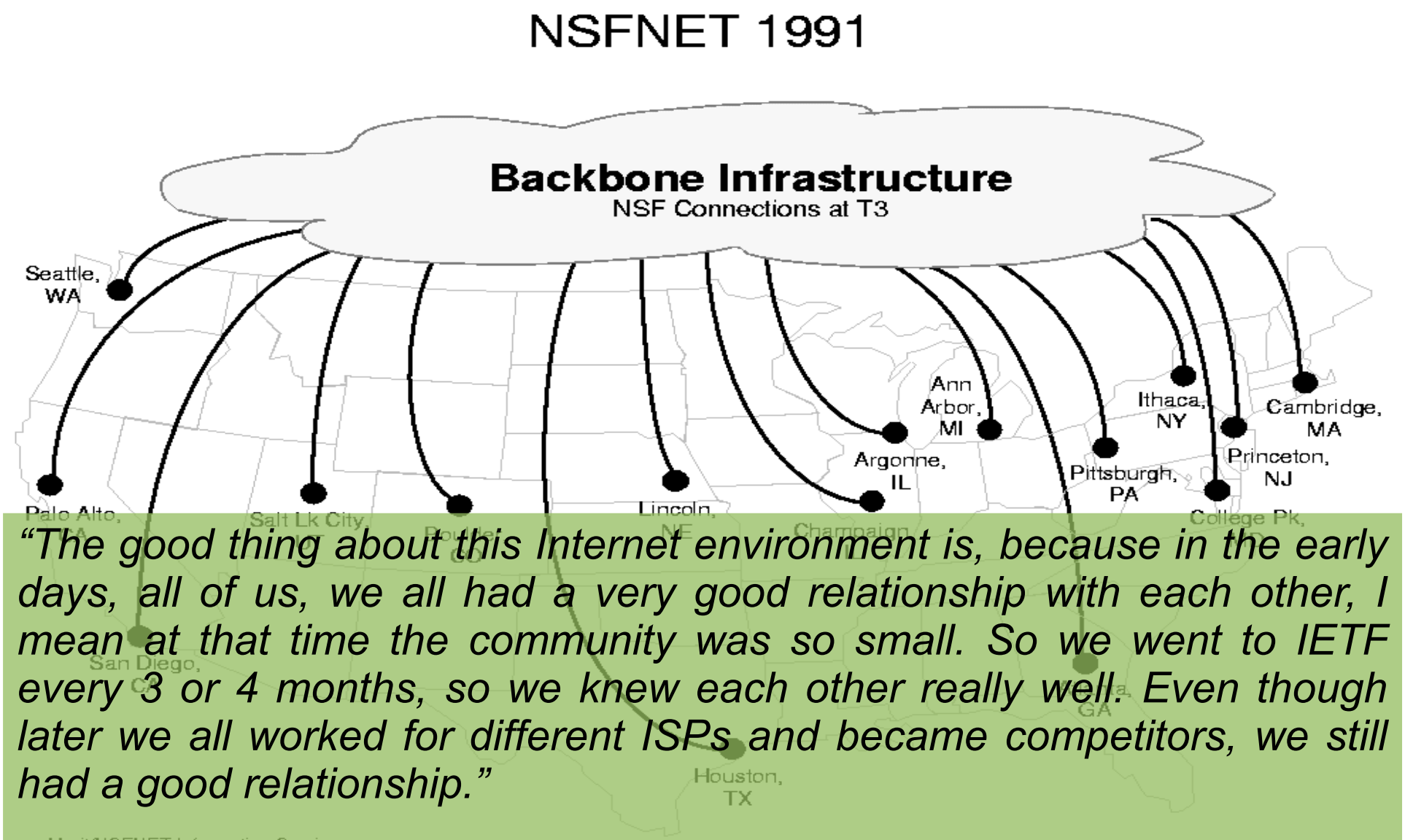
BGP: Inter-Domain Routing



- Routing Claims
- Identity Claims
- Resource Claims
- ***No Warrants***

The Internet

NSFNET



"The good thing about this Internet environment is, because in the early days, all of us, we all had a very good relationship with each other, I mean at that time the community was so small. So we went to IETF every 3 or 4 months, so we knew each other really well. Even though later we all worked for different ISPs and became competitors, we still had a good relationship."

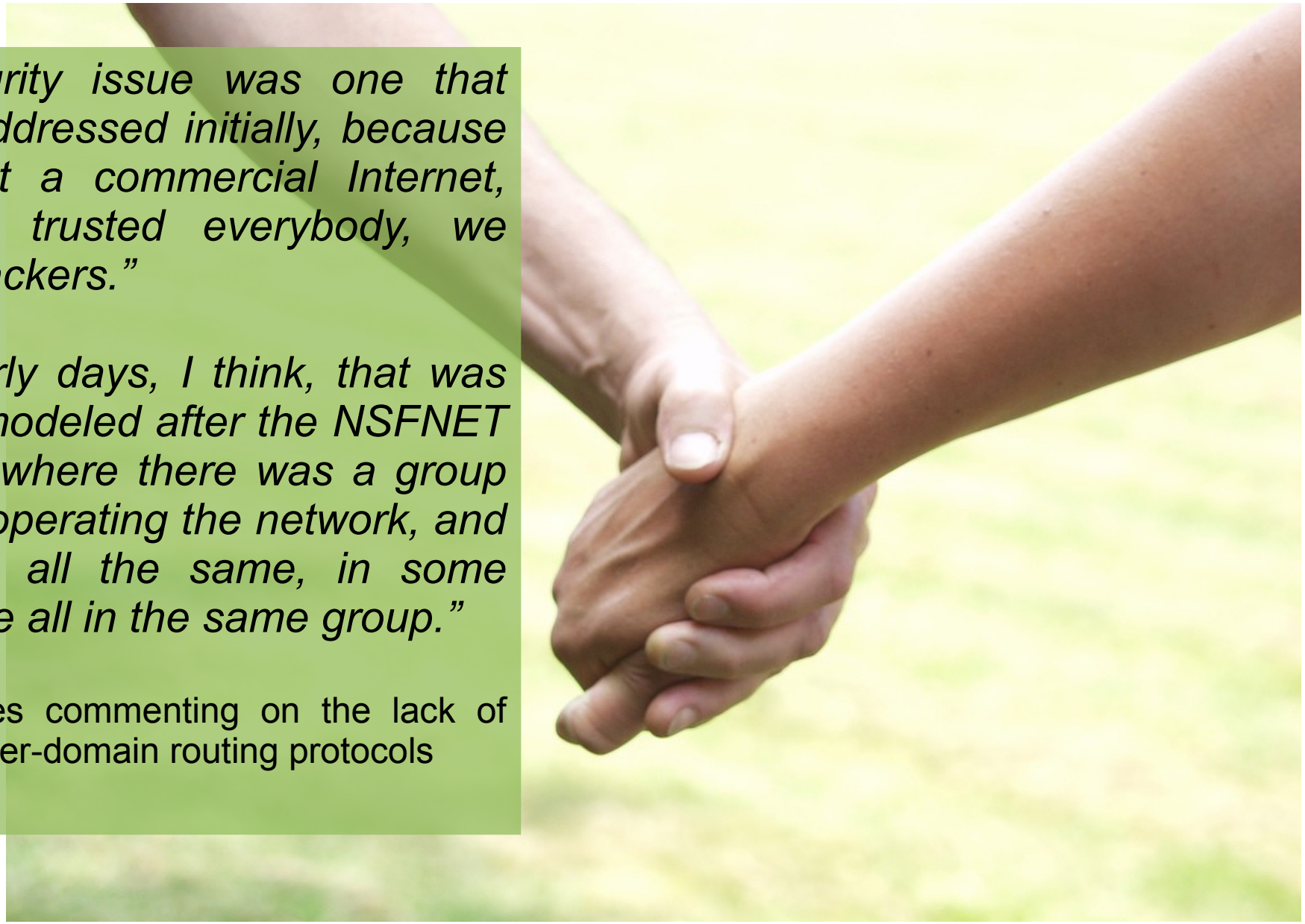
- An NSFNET Network Administrator

“Everybody trusted everybody”

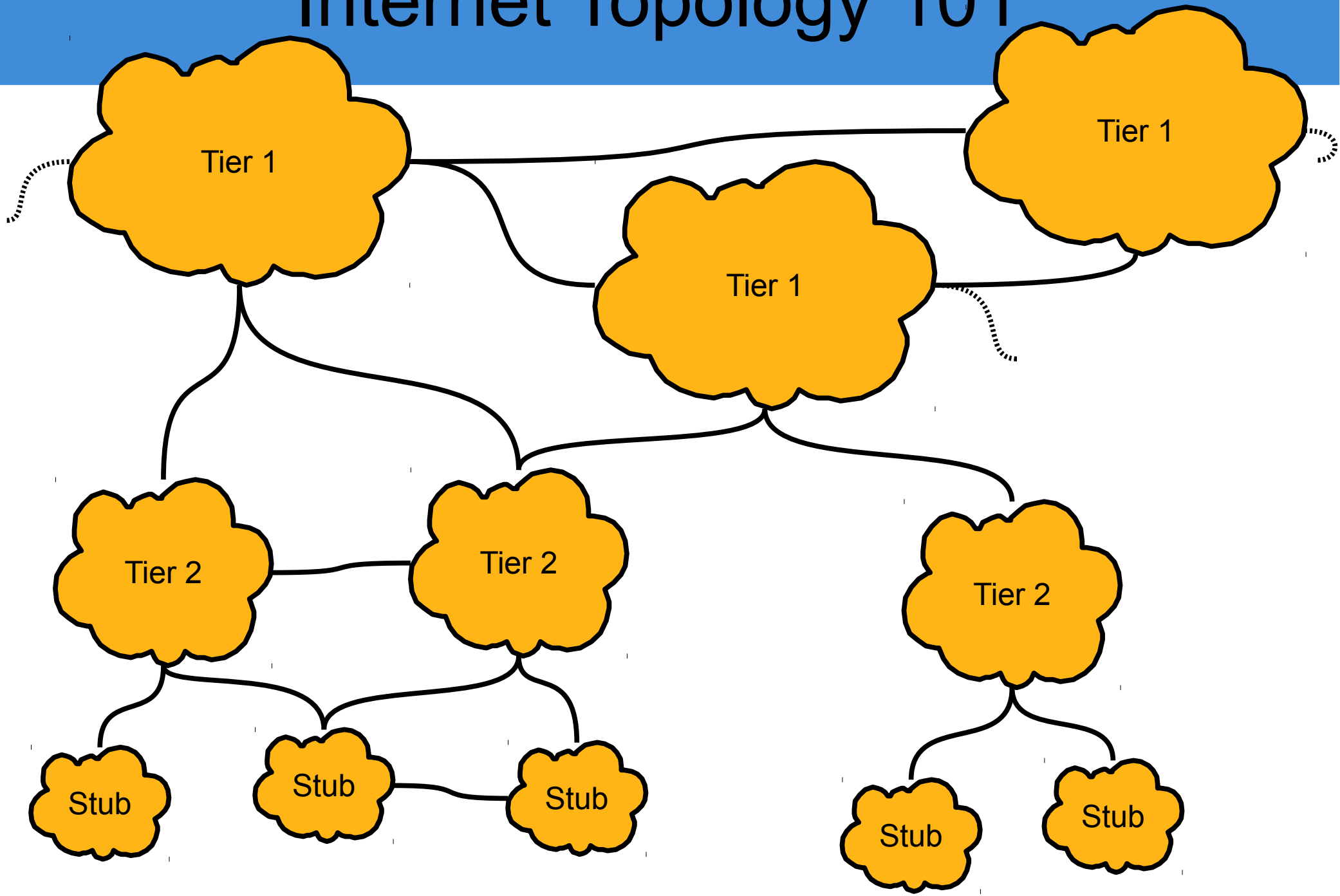
“The security issue was one that was not addressed initially, because it was not a commercial Internet, everybody trusted everybody, we were all hackers.”

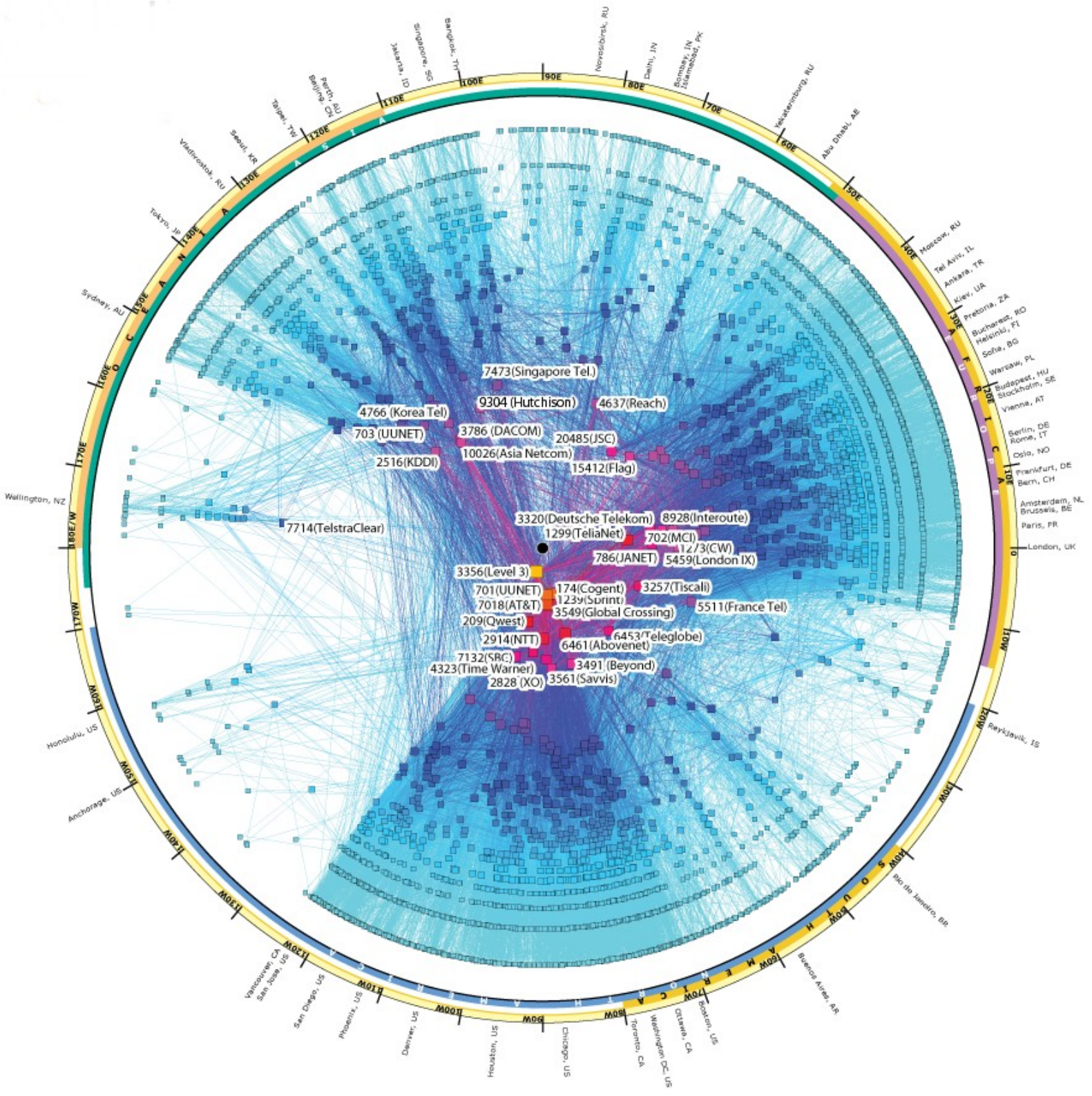
“In the early days, I think, that was probably modeled after the NSFNET backbone where there was a group of people operating the network, and they were all the same, in some sense were all in the same group.”

- Interviewees commenting on the lack of security in inter-domain routing protocols



Internet Topology 101

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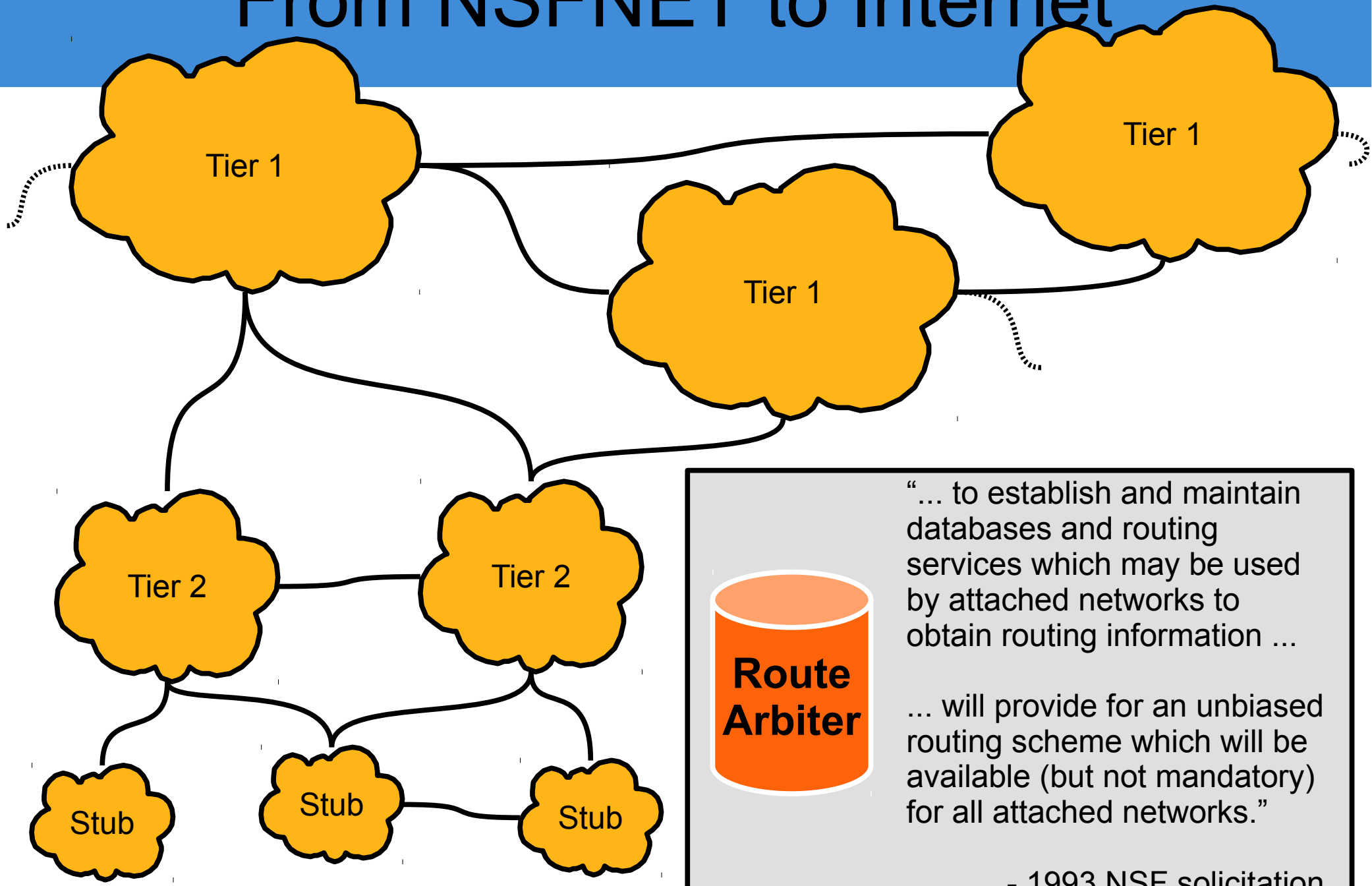
9304 (Hutchison)
4637(Reach)
4766 (Korea Tel)
703 (UUNET)
3786 (DACOM)
20485(JSC)
10026(Asia Netcom)
2516(KDDI)
15412(Flag)
7714(TelstraClear)
3320(Deutsche Telekom)
8928(Interoute)
1299(TeliaNet)
702(MCI)
786(JANET)
5459(London IX)
3356(Level 3)
701(UUNET)
174(Cogent)
3257(Tiscali)
7018(AT&T)
3549(Global Crossing)
5511(France Tel)
209(Qwest)
2914(NTT)
6461(Abovenet)
7132(SBC)
4323(Time Warner)
3491 (Beyond)
2828 (XO)
3561(Savvis)
Singapore, SG
Bangkok, TH
Jakarta, ID
Perth, AU
Beijing, CN
Taipei, TW
Seoul, KR
Vladivostok, RU
Tokyo, JP
Sydney, AU
Wellington, NZ
Honolulu, US
Anchorage, US
Vancouver, CA
San Jose, US
San Diego, US
Phoenix, US
Denver, US
Houston, US
Chicago, US
Toronto, CA
Washington DC, US
Ottawa, CA
Boston, US
Buenos Aires, AR
Rio de Janeiro, BR
Reykjavik, IS
London, UK
Amsterdam, NL
Brussels, BE
Paris, FR
Frankfurt, DE
Bern, CH
Oslo, NO
Berlin, DE
Rome, IT
Budapest, HU
Stockholm, SE
Vienna, AT
Warsaw, PL
Bucharest, RO
Helsinki, FI
Sofia, BG
Pretoria, ZA
Kiev, UA
Tel Aviv, IL
Ankara, TR
Moscow, RU
Yekaterinburg, RU
Abu Dhabi, AE
Delhi, IN
Bombay, IN
Islamabad, PK
Novosibirsk, RU

From NSFNET to Internet



"... to establish and maintain databases and routing services which may be used by attached networks to obtain routing information ...

... will provide for an unbiased routing scheme which will be available (but not mandatory) for all attached networks."

- 1993 NSF solicitation

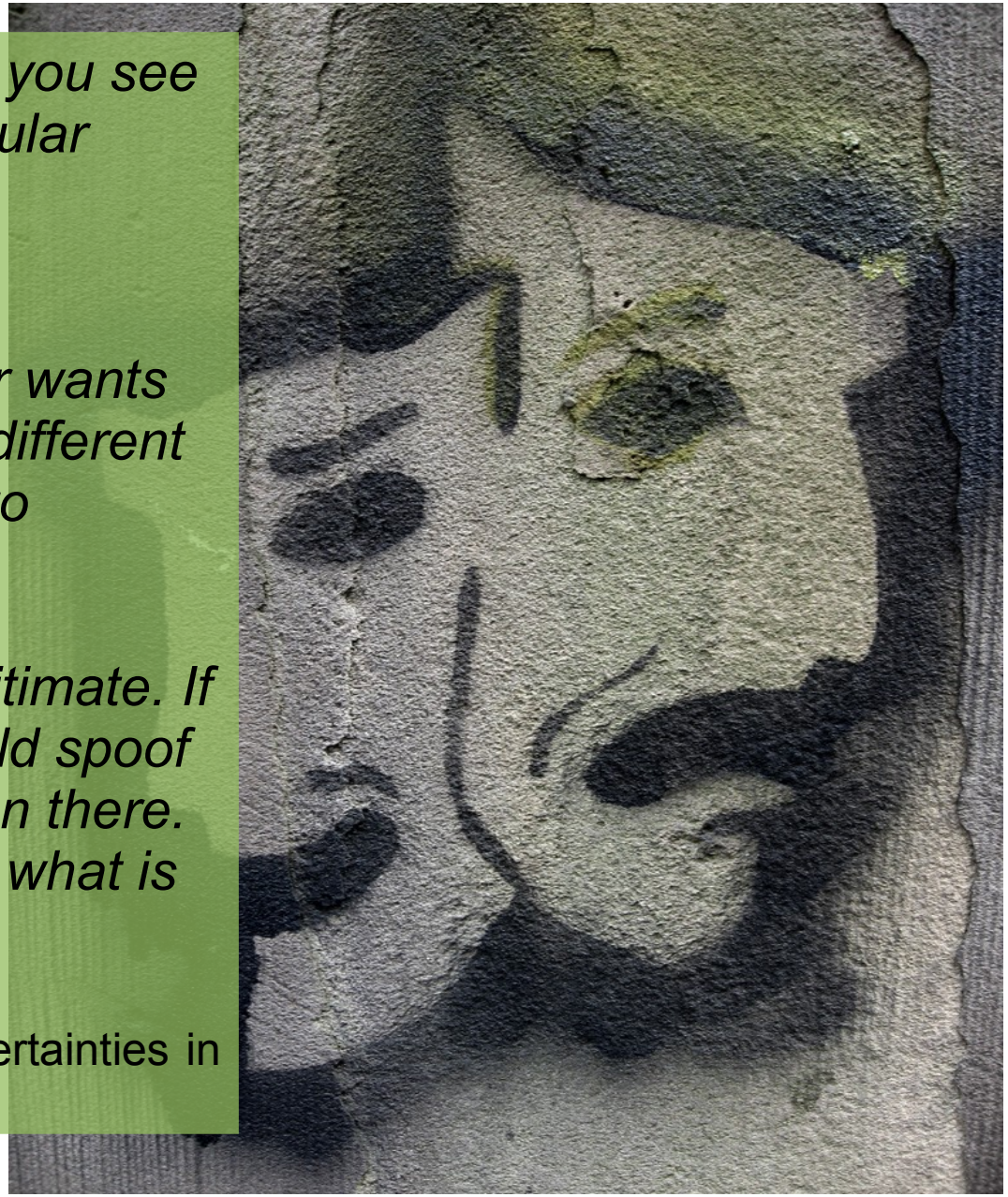
“It gets really hard to know what is legitimate”

“If you're looking around the network, you see a prefix being originated from a particular ASN. How do you know that's really legitimate?

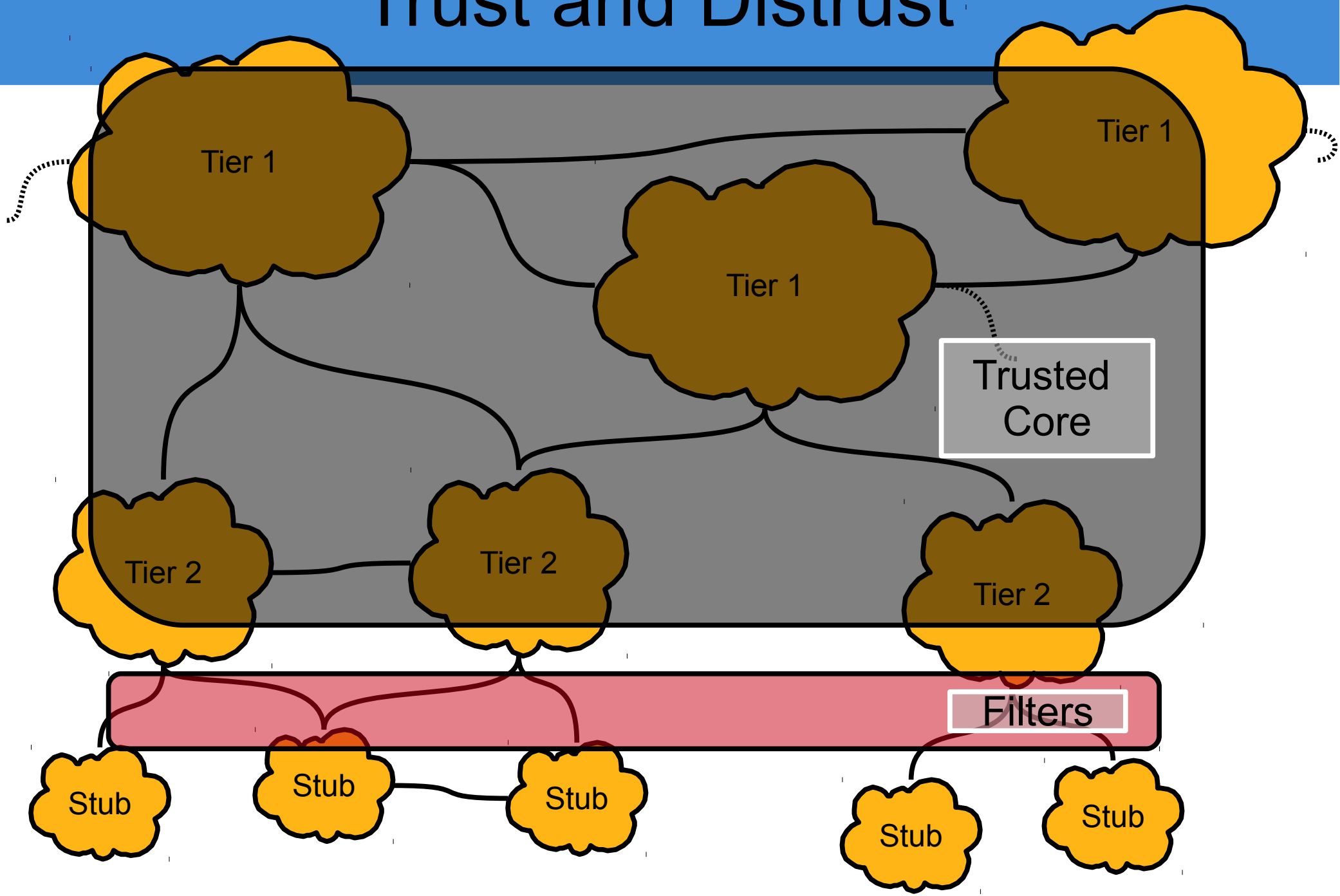
Maybe the person who's at the border wants to multi-home, maybe they have two different transit providers, and each one likes to advertise differently.

It gets really hard to know what is legitimate. If you tie it into the AS path, people could spoof an AS, they could put a different AS on there. It's really hard to say what is real and what is not.”

- An interviewee commenting on current uncertainties in inter-domain routing



Trust and Distrust



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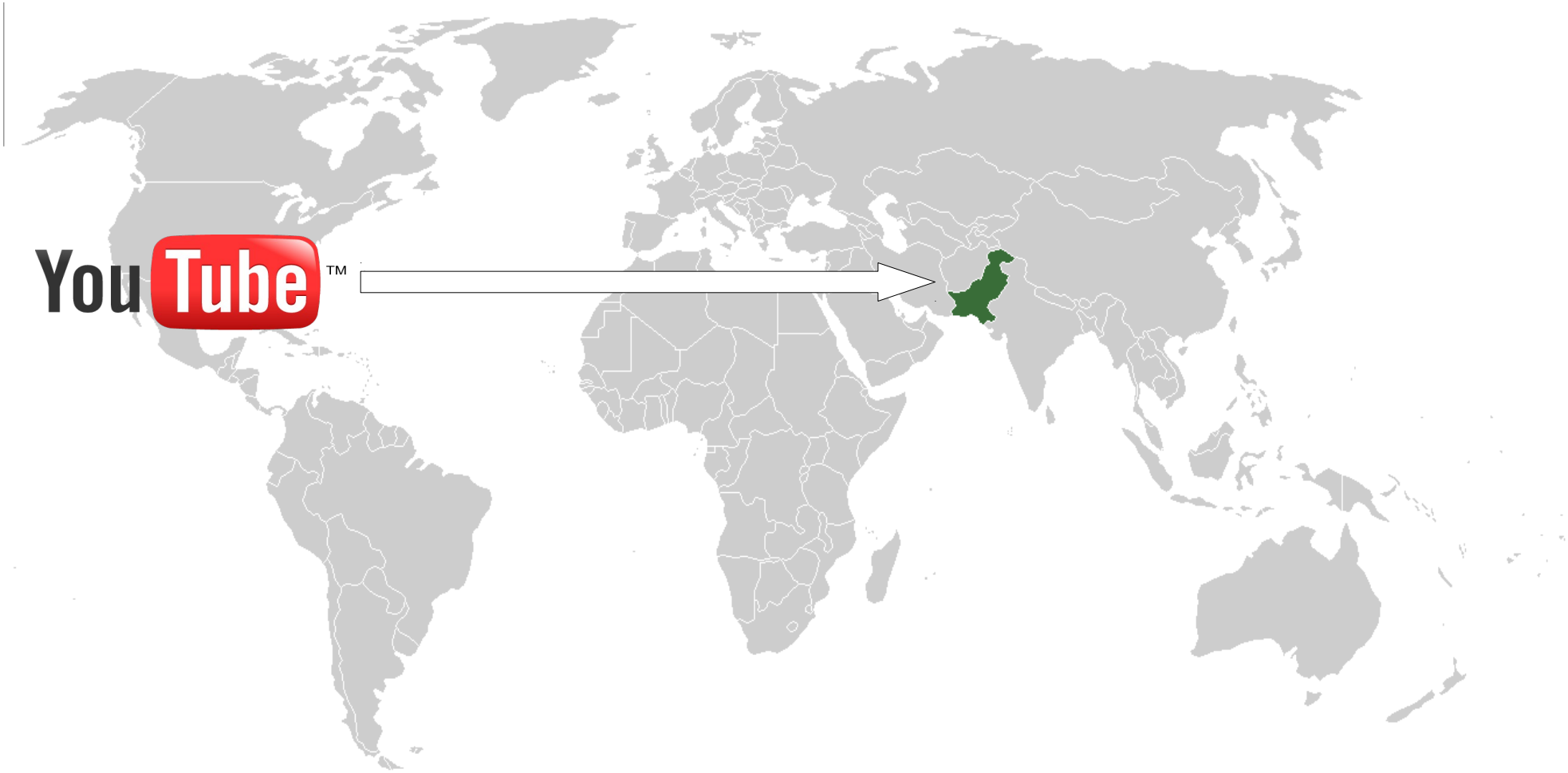


~ 2 hours on 24th February 2008

“It was all trust”

“You know, in the early days it was all based on trust ... Personal trust, right. I'm not going to leak your routes, or advertise something stupid to your network that breaks you. It was all trust.”

- An interviewee recalling the early days of the Internet, in the late 1990s

“*There's lots of communication through backchannels, lots of unofficial communication. There's lots of things that nobody can officially talk about, but if we can all share information about it, we can make the Internet a better place.*”

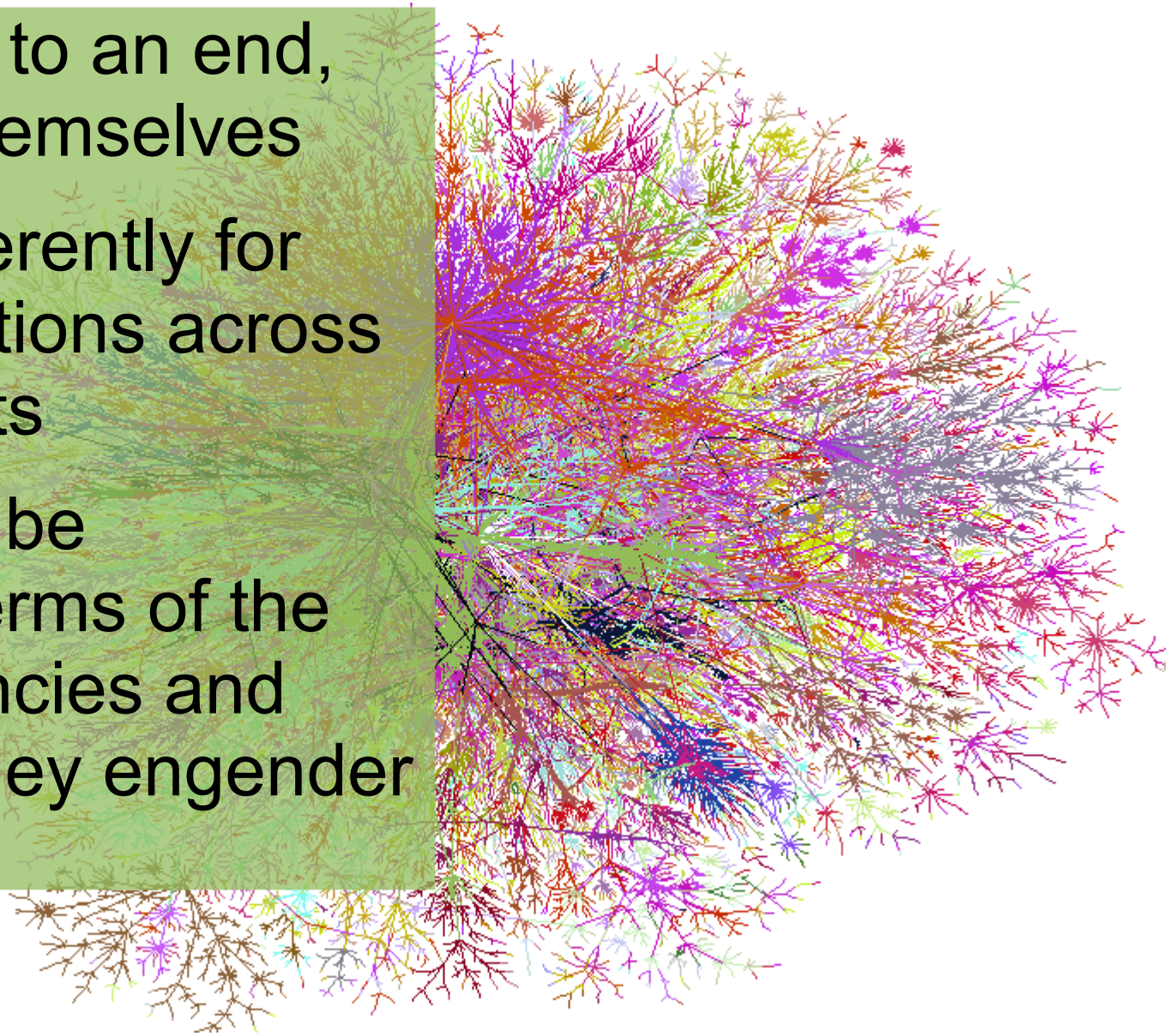
- An interviewee commenting on current practices of coordination

Openness and Transparency

Open will win.
It will win on the Internet and will then cascade across many walks of life:
The future of government is transparency.
The future of commerce is information symmetry.
The future of culture is freedom.
The future of science and medicine is collaboration.
The future of entertainment is participation.
Each of these futures depends on an open Internet.
- Official Google Blog

… openness is defined according to whether individuals are able to use a communication system to organize themselves in any way they find adequate. My understanding of openness also implies the facilitation of both production and distribution of information, as in true dialogues where all participating parties are given equal possibilities.
...
The communication patterns are limited by the two initial questions: **“Who controls production?”**, and **“Who controls distribution?”**
These questions do not address the different actors' underlying motivation, in other words: **which and whose interests benefit from different patterns?**
- Hoem 2006

To know whether a particular transparency rule works, then, **we need to trace just how the information will enter these "complex chains of comprehension."** We need to see what comparisons the data will enable, and whether those comparisons reveal something real.
- Lessig 2009

Openness and Transparency...

- … are a means to an end, not an end in themselves
- … manifest differently for different populations across different contexts
- … must always be considered in terms of the structures, agencies and practices that they engender