GRAND DUCHY OF LUXEMBOURG
Ministry of Foreign Affairs

Directorate for Development Cooperation

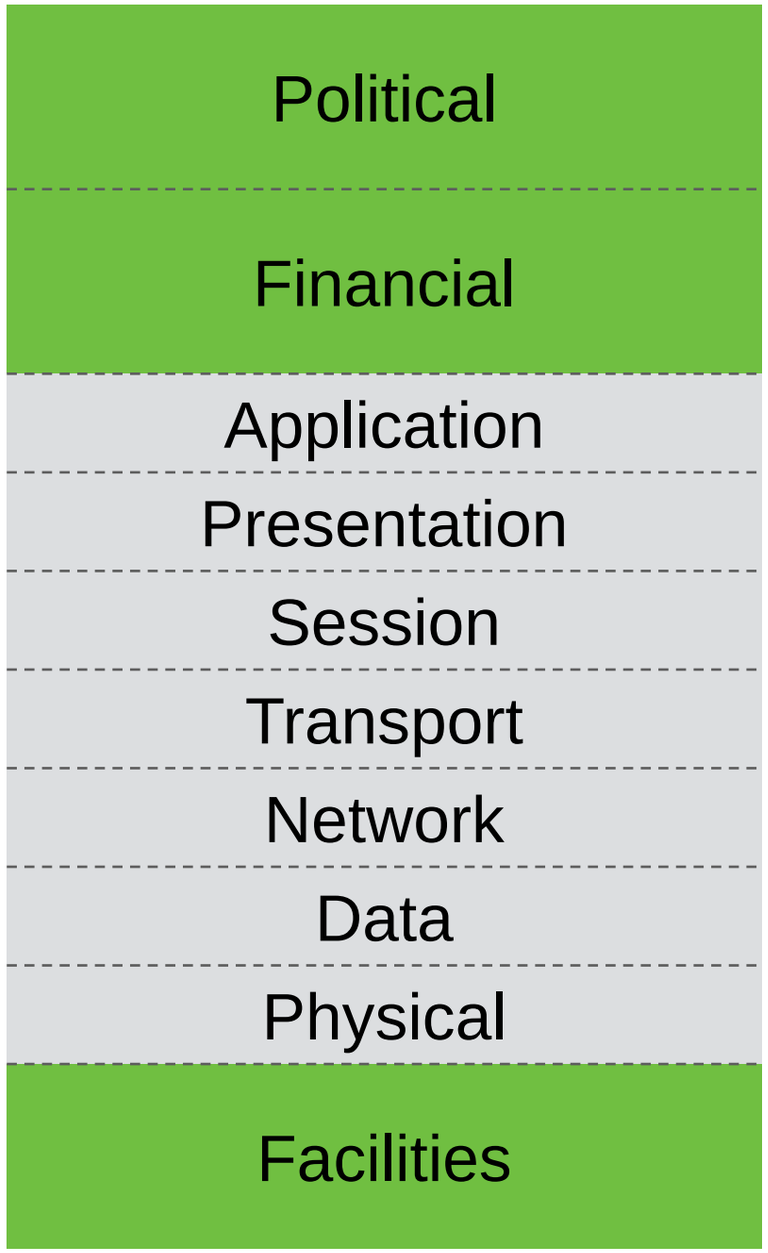
European Union Africa
Infrastructure Trust Fund

RIC Operational and Technical Best Practices

Goal: to identify and outline operational and technical Best Practices that a Regional Internet Carrier espouses.

The OSI model revisited

Sustainable and successful businesses understand the dependencies from Layer 0 all the way through to Layer 9



Fundamental ISP best practices issues apply

- Proper HVAC systems and controls should be in place. Stable power and cooling is essential.

- How do I build/manage a Tier III data-centre in an environment where I don’t have stable electricity ?

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That’s just another challenge; that’s precisely the kind of environment that *needs* this …

Reputation based networking

- Consider this as reputation based building; poor service delivery will result in poor faith in your networks ability to provide services, ultimately making you the poorer choice in an open marketplace.

Not just to your customers, but also to your peers.

OECD report #207

- 142,000 peering agreements surveyed.
- 99.5% peering concluded without written contracts.

How do you prove stability ?

- Do you wait until your clients call you to report that something is down? Do you operate a 24x7x365 NOC

- Internal visibility is **not** the same as external visibility.

- Is the uptime of your network and services being measured and published ?

What does downtime cost?

Uptime	Hours Down	Cost
99 .671	28.8h	$31,104,000
99 .741	22.7h	$24,516,000
99 .982	1.6h	$1,728,000
99 .995	26.3m	$478,800

Based on est. amazon.com earnings of $9.6bn; @$300/s

Working with a 2N mindset

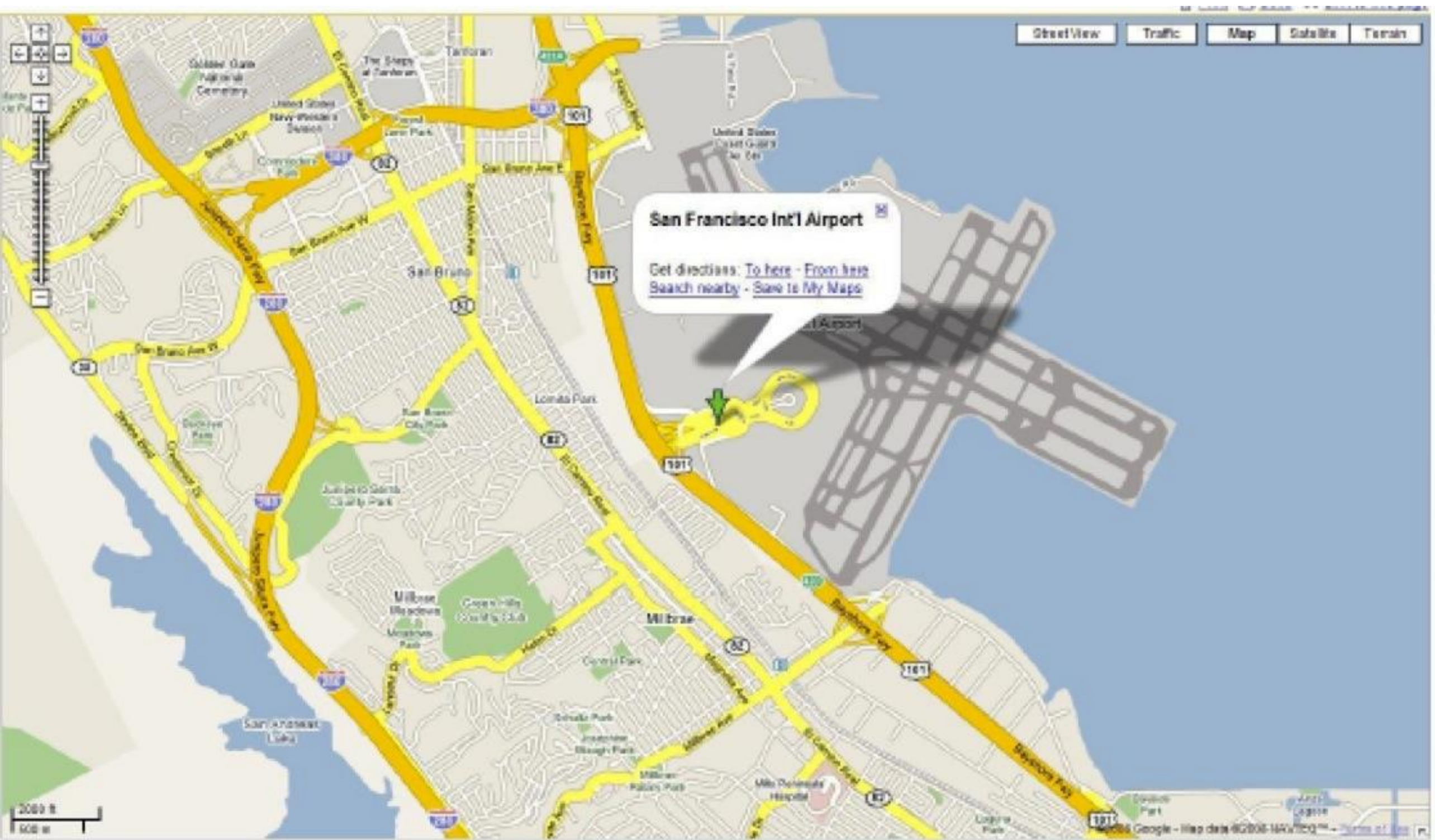
- Resiliency and redundancy should be built into the operational network design and layout from day one.

This should apply to all connectivity as well; thus cross-border connectivity should also be resilient.

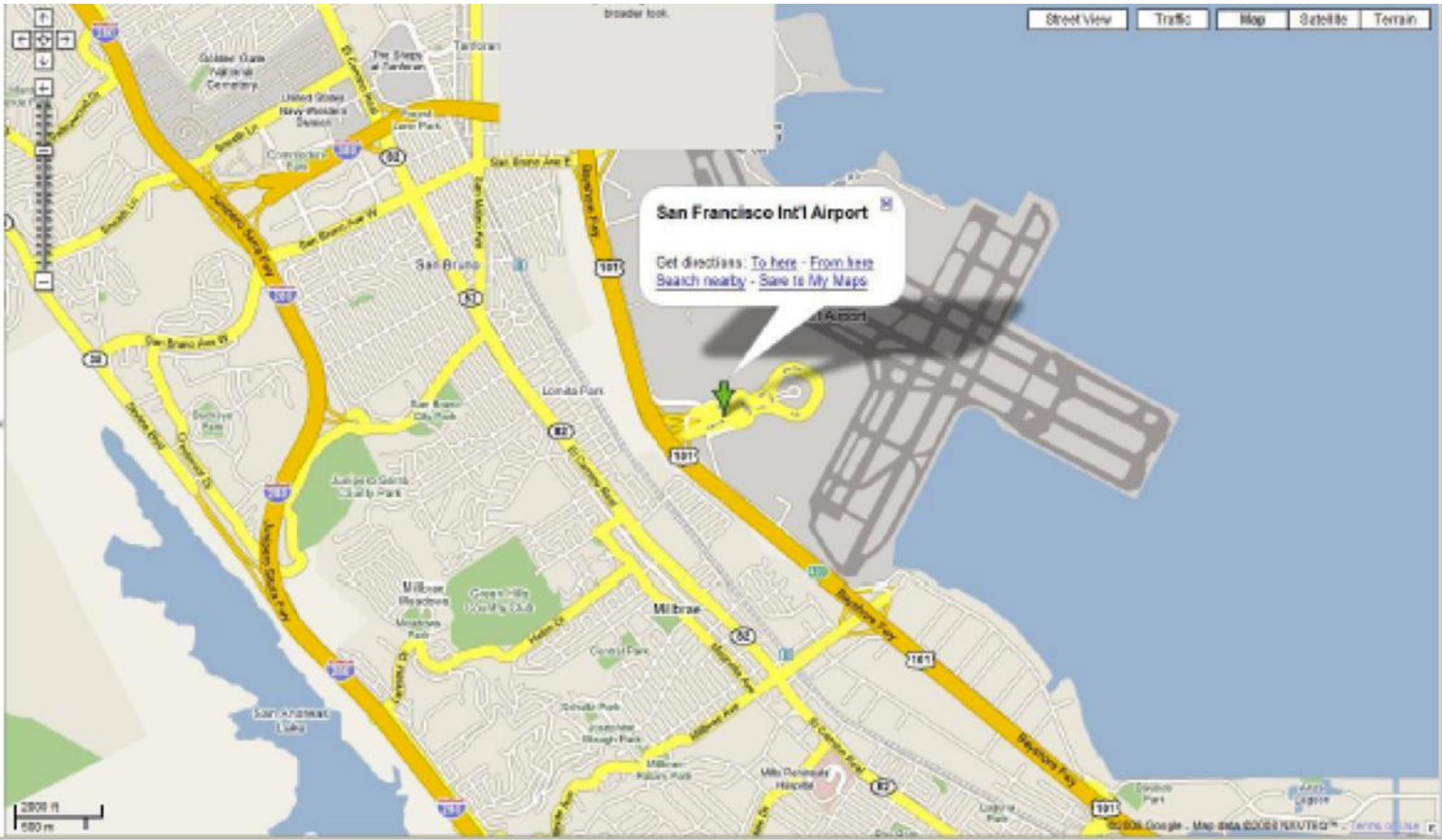
Obtain and manage their own resources

- Well run ISPs obtain and manage their own number resources (ie. IP addresses and Autonomous System Numbers) to recreate the end-to-end model of the Internet, and thus lowering their end-support costs.

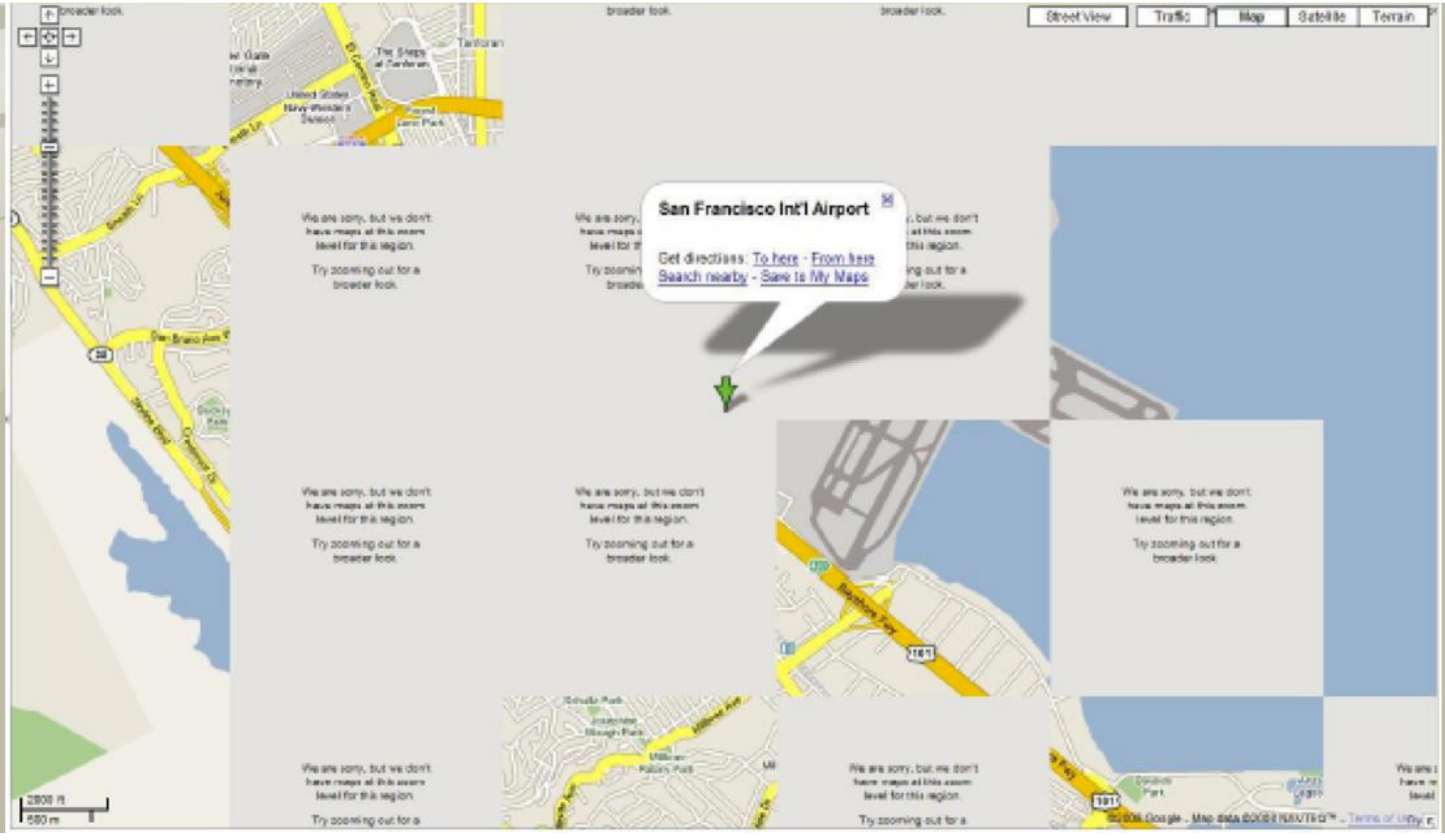
Google Maps @30 connections



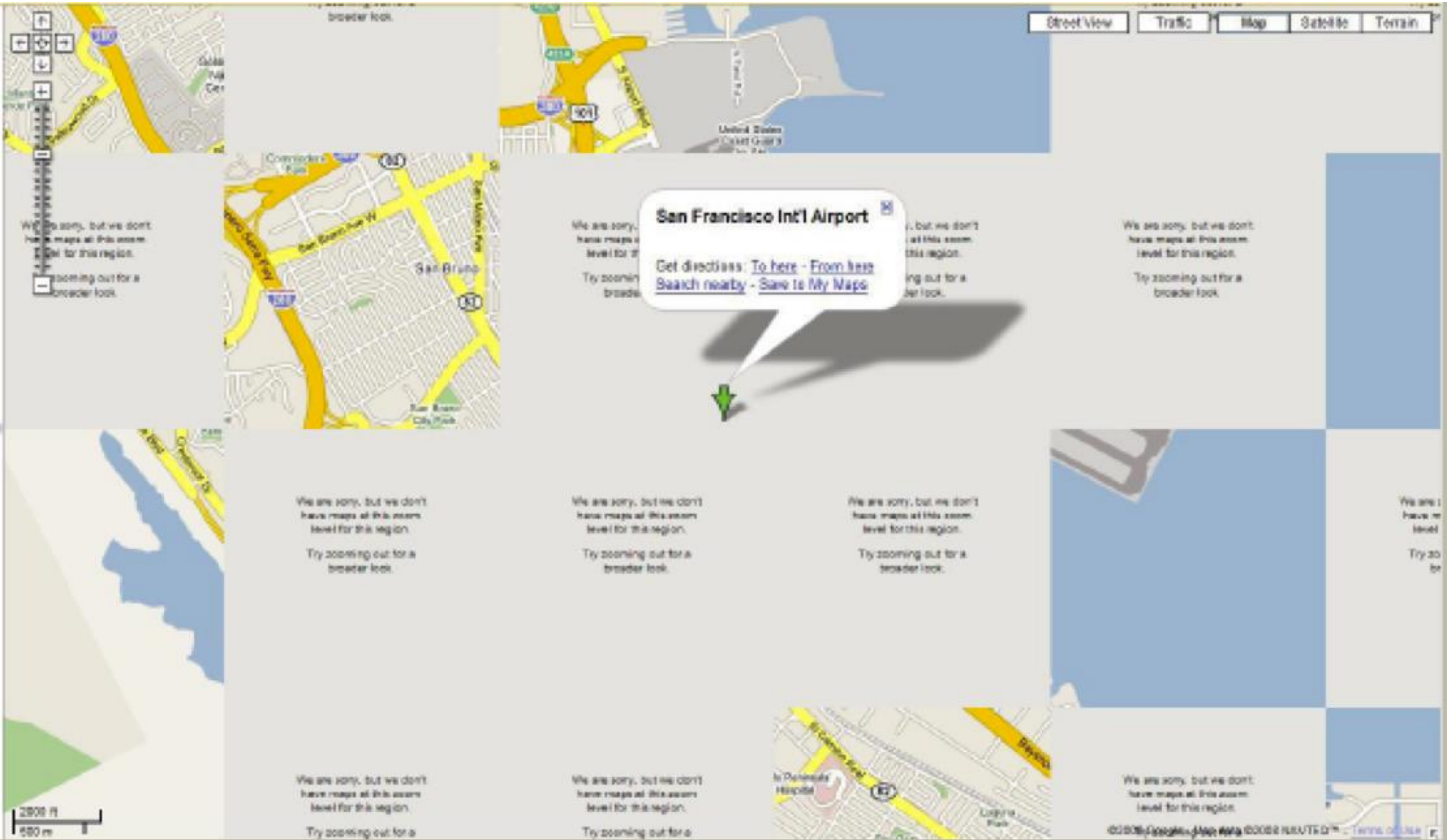
Google Maps @20 connections



Google Maps @15 connections



Google Maps @10 connections



What is the economic cost of our old technology?

- Are we still artificially increasing the cost to run, and operate our networks?
- Are we positioning our networks and services to innovate?
- How do we re-educate our operators to not accept hand-me-down hardware, and become the dumping ground for old technology?

Connecting to the IXP

- Participants should make *all* of their different networks and clients available on an equal case basis at the IXP.

- Participants at the IXP *should* provision at least as much “peering” capacity to the IXP as the “transit” that they are paying for.

How not to request peering

“Subj: Require Google Peering

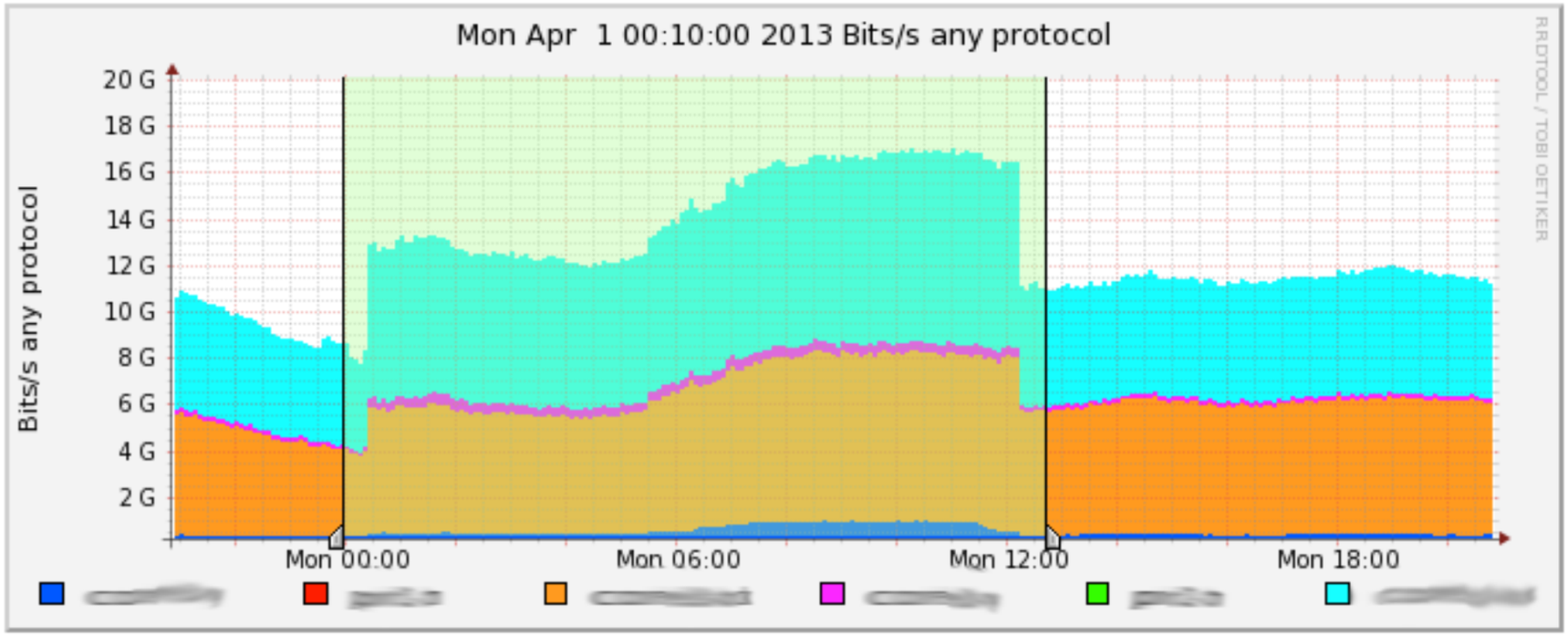
Dear sir,
We would like to have google peering for our network
Kindly mail us the process to process forward”

Human Capacity

- Multiple skilled staff sourced from in-region. Vital to train and retain “local” skills. Administer from a distance not likely to succeed!

- Skilled staff are dependent on active communities; they therefore become keystones in building local capacity through operator forum groups eg. Southern Network Operators Group (SAFNOG)

How secure are African Networks ?



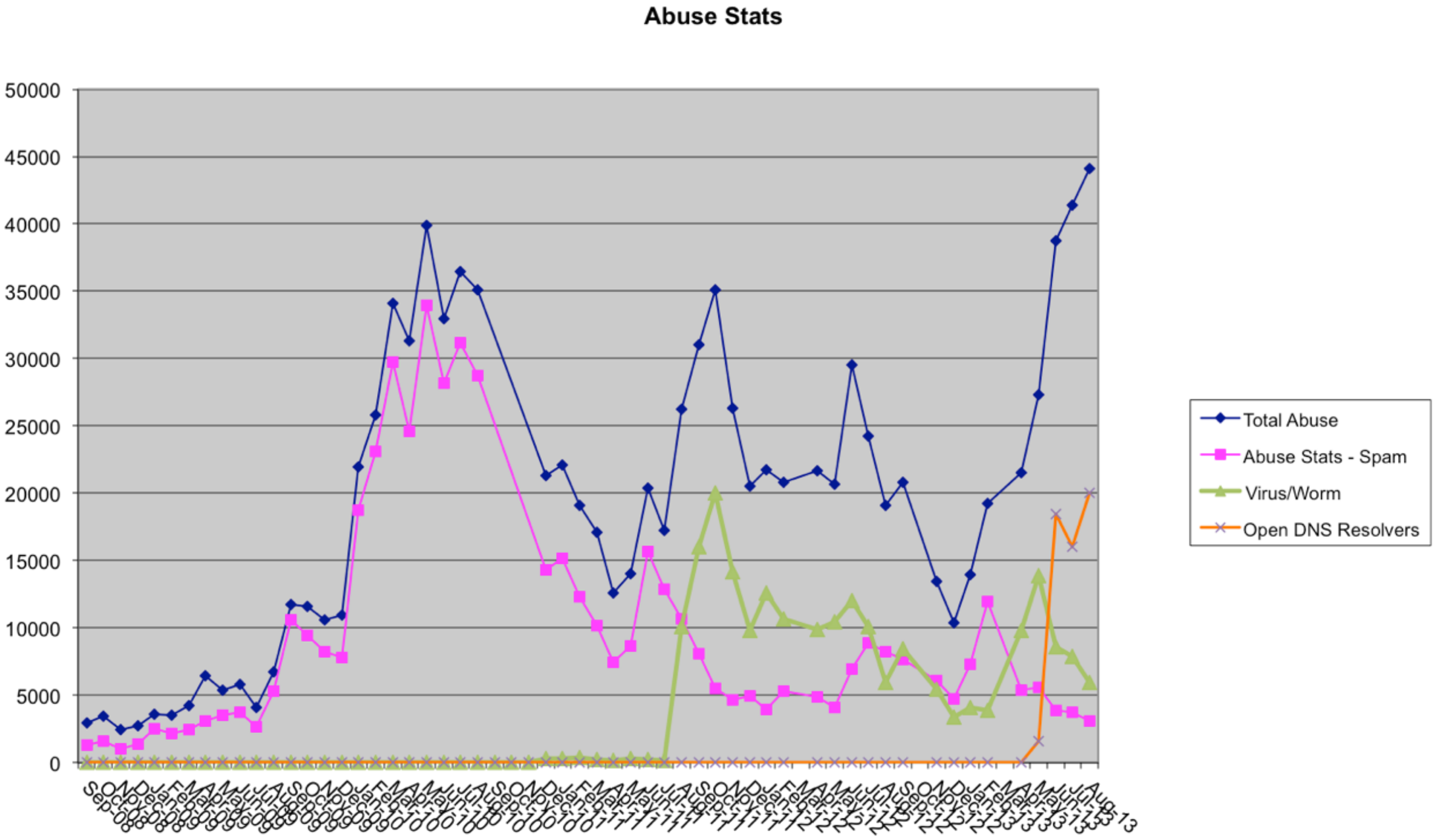
Measurements from one local network were recorded at 8.2Gb/s

Security considerations

- Security and access protocols are ever-increasing becoming more important.

c/f hijack of the @N twitter handle.

Netsec is not an option!



Secure networks come at a real cost!

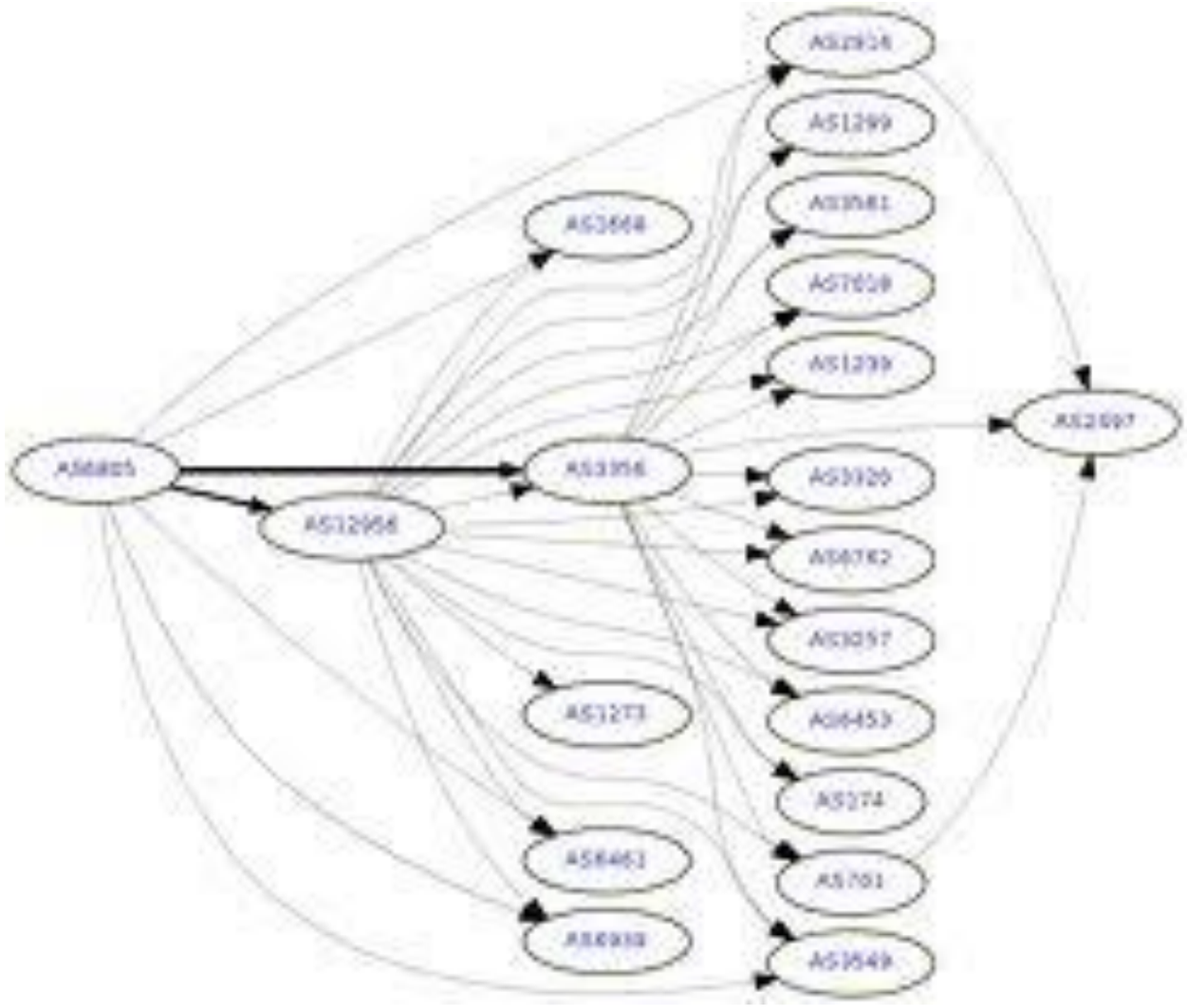
- 1 –> 8FTE
- Requirements for 24x7x365 operations
- Significant investment in training and outreach

Peering Strategies

Six steps to grow peering to the next level

Peering Essentials

- Peer where you can – Transit where you must
  - ✦ Aim to peer more and transit less
- Peer locally, regionally and internationally
- Strategic peering is informed by traffic data



Step 1: Appoint a Peering Coordinator

- Many networks in Africa lack a defined role or position for a peering coordinator
- The peering coordinator role is critical to developing a peering strategy for any operator
- Peering coordinators are also responsible for most of the peering decisions and establishing new peering relationships
- The peering coordinator will also need to implement the tools that provide the data for the peering decisions

Step 2: Implement Traffic Flow Analysis

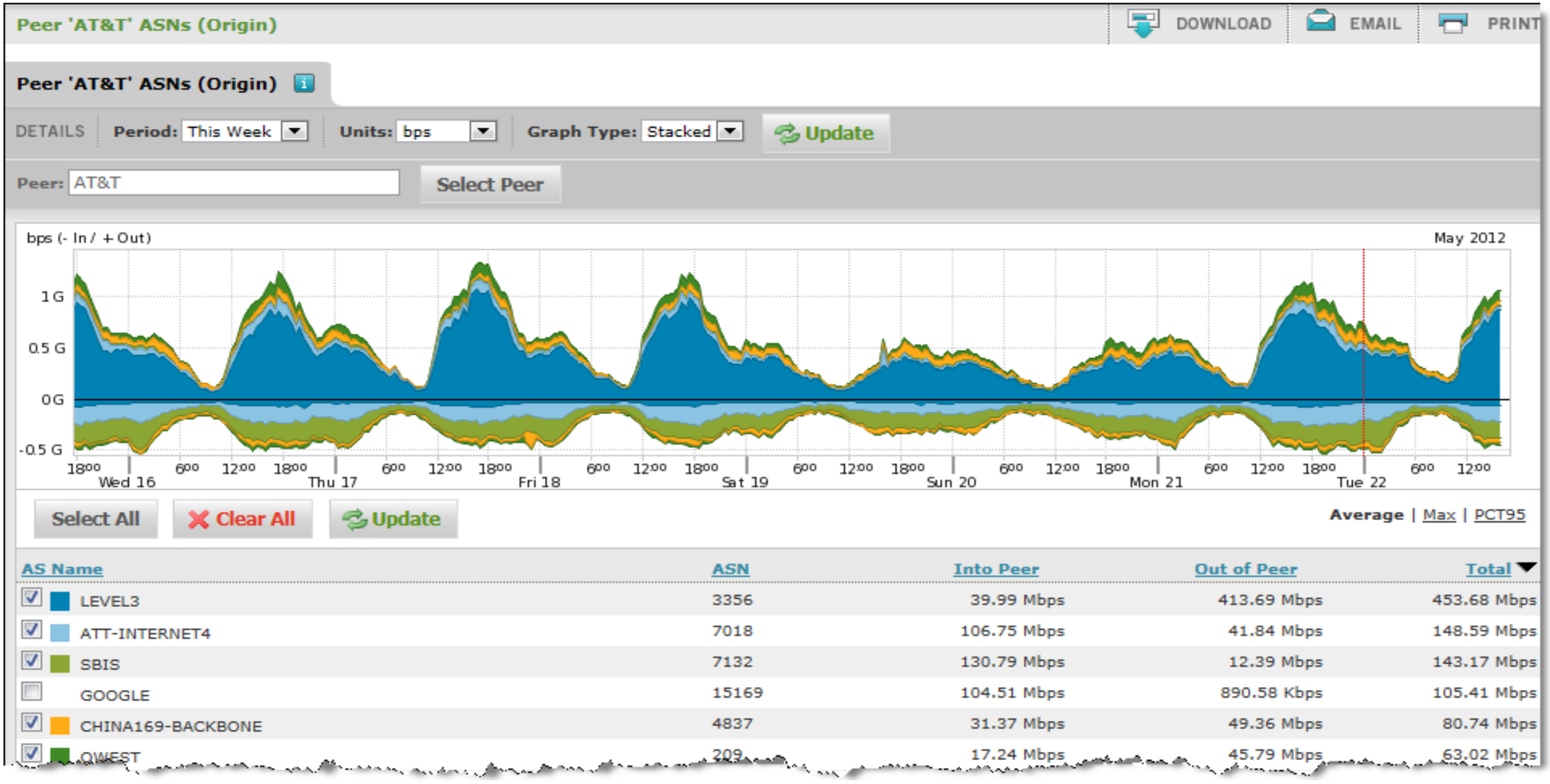


Image Source: Arbor Networks Presentation – www.arbornetworks.com

- Traffic flow analysis is important to understand where most of your traffic goes or comes from
- The flow information is useful to develop a peering strategy of where to peer and the regions

Step 3: Enhance Network Visibility

- Most networks will agree to peer with a network that publishes basic information such as;
  - The networks **Peering policy**
  - Network information on the **Peering Database** (PeeringDB)
  - Updates **Routing Registry Information**

- 99% of peering agreements are informal. Therefore, peering coordinators should attend various peering and Internet meetings in their region and globally.

Step 4: Build into other Regions

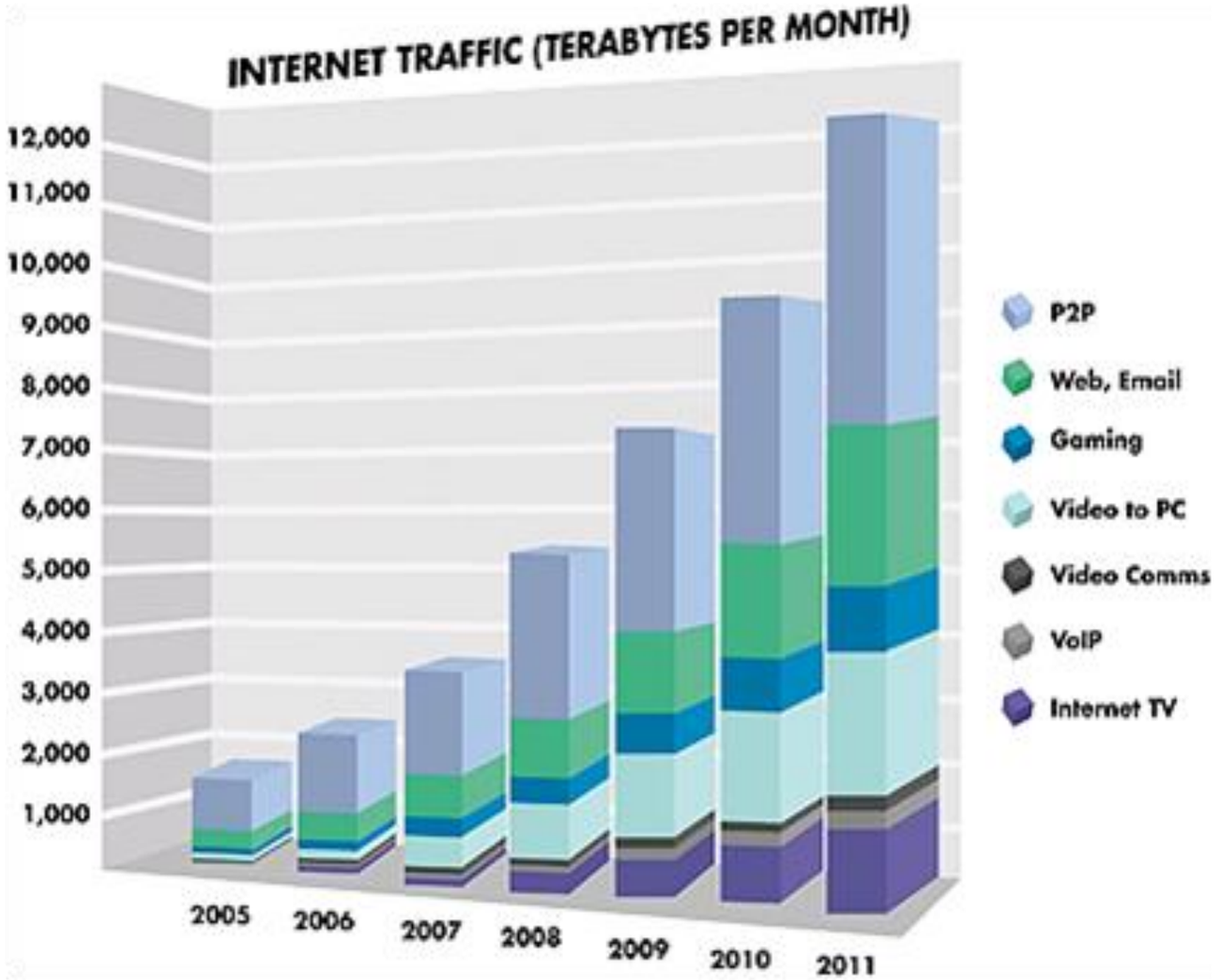
- The decision to build into other regions is informed by the traffic flow analysis
- Networks should consider building into other regions where they can get peering and lower transit costs
- Building (acquiring IPLC or IRU capacity) into regions with large IXPs such as Europe has medium to long-term benefits
  - At large IXPs in Europe 40% – 60% of the network traffic can be peered away.
- Building (acquiring IPLC or IRU capacity) into neighboring IXPs in the region has medium to long-term benefits.
  - Network can offer cross-border transit or paid peering services
- This also improves the network visibility and attractiveness for peering

Step 5: Hosting CDN Content

- A significant amount of the Internet traffic consumed by networks is carried by Content Delivery Networks (CDNs)
  - ✦ Peering with CDNs is key to better customer experience

- Hosting CDN content through various options such as CDN Edge Caches and proxies makes a network attractive to peer with

- Hosting other content such as Open source file downloads like Sourceforge, Unix/Linux Operating system downloads, also increase network traffic and attractiveness



Step 6: Evangelize Peering

- Not all understand the benefits of peering.

- Therefore creating awareness increases the potential number of peers in a region

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