e-Commerce and Emerging Digital Trade Agenda

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International Institute for Trade & Development

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- Why Internet Development and Broadband?
- What is Digital Trade?
- Difference btw Internet Development and Digital Economy
- The Internet and the Technology
- E-Commerce platform technology
- Understanding Global Interconnection and the Digital Supply Chain
- Drivers and measures for e-Commerce and Digital Trade
- ASEAN landscape
- Lessons from Brazilian Government, Australia and Neatherland

Digital Trade

- Enable Physical Goods and Services
- Digital Services (Innovation) – consumed online

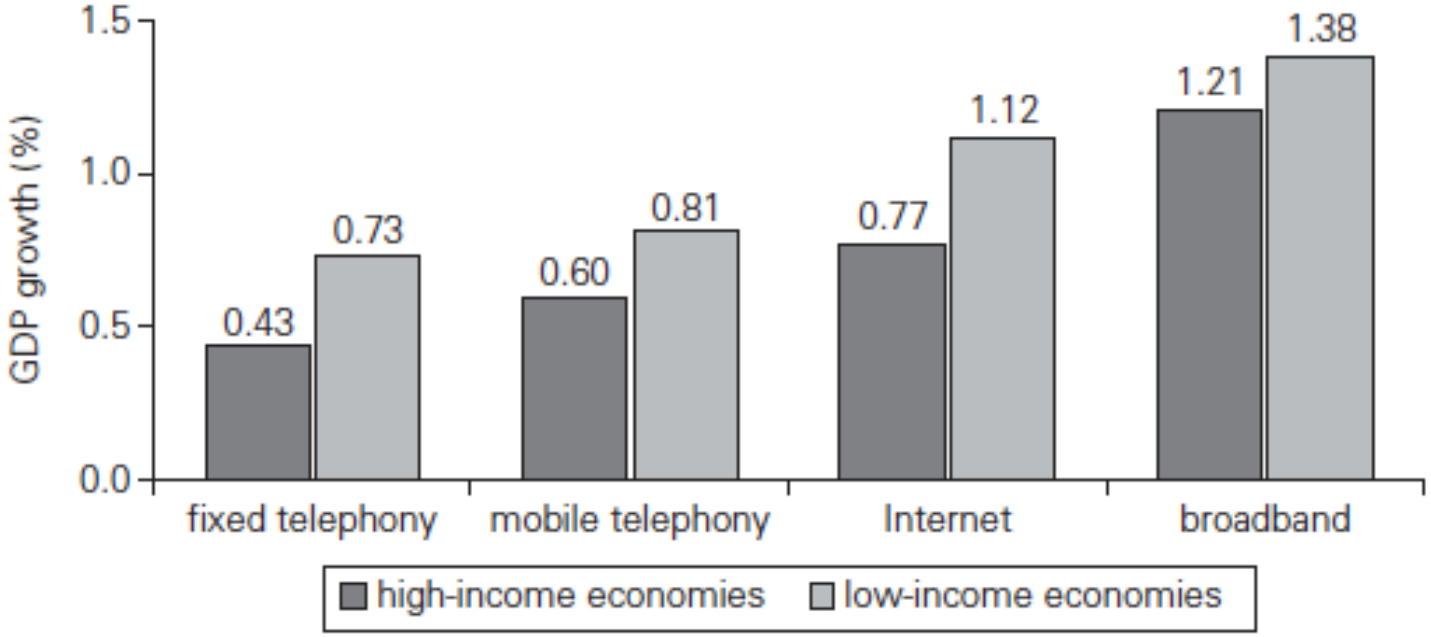
Why Internet Development & Broadband?

Percentage increase in economic growth per 10 percent increase in penetration, in:	Fixed	Mobile	Internet	Broadband
High-income countries	0.4	0.6	0.8	1.2
Low-income countries	0.7	0.8	1.1	1.4

Table 6: Estimates of the effect on growth of increased telecommunication services penetration[45]

ICT Contribution to %GDP Growth

Figure 1.1 Effect of Various Information and Communication Technologies on GDP Growth in High- and Low-Income Economies, 2000–06



Source: Adapted from Qiang and Rossotto 2009, 45.

Note: Measures the percentage point increase in gross domestic product that is associated with a 10 percent increase in different information and communication technologies.

The Internet

The Applications

What is the Internet?

- Internet is a network of Networks connecting Client and Server network (hierarchy).
- Internet is a network of peer-to-peer connections.
- Internet uses a common language called protocols i.e. TCP/IP.
- Internet is the infrastructure which allows other types of application for communication i.e. email, text messaging, web based application, Internet-of-Things (IoT), Machine-to-machine(M2M), blockchain (open ledger system), etc.
- Internet is not Facebook or the World Wide Web.
- Internet is a new generation of communication technology (stateless, self-healing, non-proprietary protocol based on multistakeholder framework)

Internet Brief History

- 1960s Born in DARPA
- 1970 IPv4 addressing developed (32 bits or 4 bytes); 4.3 billion IP
- 1998 IPv6 developed (1258 bit or 8 bytes); 7.9 X 10^28
- 1989 Launch of the Internet
- 1992 Privatisation of the Internet
- 2005/6 DNSSEC launched
- 1990/1 World Wide Web Launched
- June, 2012 IPv6 Global Launch
- 2007/8 IDNs introduced
- 2008 Seoul Declaration
- 2011 OECD Internet Governance for Open Internet Framework
- 2012 451 Error report code for https to report illegal obstacles (vs. 404 URL not found)

The Internet Standards Ecosystem

- Connectivity: ISPs, Telecom operator, Blue Tooth, OTT providers
- Hardware: ITU, IEEE, IEC, GSA(ICT)
- Software (API): W3c, Google, Huawei, etc.
- Protocol: IETF (6,000 RFCs), IEEE, Open Connectivity Alliance, GSMA, ISO
- Web Services: W3C
- Platform: Google, Facebook, YouTube
- Industry ecosystems: Telecom, Blockchain, IoT Consortiums, Quantum Computing, OTT, AI, etc.
- Internet Policy: WSIS, Internet Governance Forum (IGF), UN SDG 2030 Platform
- Domain Name, IP address : ICANN, IANA,
- Allocation of Domain names and IP address: Regional Internet Registry, Private companies
- Root Servers: Regional Internet Registry, IETF
- Languages: ISO
- Open Data: Open Data Initiative Alliance

Internet Stakeholders

- Infrastructure (Backbone): IAB
- Protocol (SMTP, Email, etc.) : IETF
- Cryptography: IETF
- Access provider: Tier 1, Tier 2, Tier 3 (Internet Service Providers)
- Naming : ICANN (GAC, GNSO)
- Numbering: IANA
- Allocation of IP Addresses, ASNs : RIR
- Internet languages (ASCI, Unicode) : ISO
- Devices interoperability: IEEE, ISO, ITU,
- Wireless Connection: Spectrum standard (GSMA, IMT, Bluetooth, etc.)
- Applications : Facebook, Skype, Snapchat, WeChat, AliPay, Line YouTube, ToR
- Telecom Equipment and Standard: ITU, IEEE, ETSI
- Web Standard: W3C Foundation (HTML 5, https, etc.)
- IoT SW Standards: Open Connectivity Foundation, The Thread Group (Alphabet), etc.

Regional Internet Registry

Internet Application Layer

- Email
- Instant Messaging
- World Wide Web (W3C)
- Peer-To-Peer
- e-Commerce
- Over the Top (OTT)
- Internet of Things (IoT) – separate ecosystem

Internet Resources Management and Coordination: ICANN

- Domain Name System (DNS) i.e. .happy, .internet
- Internet Protocol (IP) Address Allocation i.e. IPv4, IPv6
- ASN
- Protocol-Parameter Registry
- Root Server Systems i.e. 13 servers)
- Generic Top-Level Domain Names (gTLD) system management i.e. .org, .com, .biz
- Country-code Top-Level Domain Name (ccTLD) DNS i.e. .cn, .my, .de
- nternalized Domain Name (IDN) i.e.
- Time Zone Database Management

Internet Technical Function

- Internet protocol development : Internet Engineering Task Force (IETF)
- Internet domain name system (gTLD, TLD, ccTLD) and WHOIs management: ICANN
- Internet Root Servers (13): ICANN
- Allocation of IP addressing : IANA and Regional Internet Registry (RIR), APNIC
- Allocation of ASN: Regional Internet Registry
- Internet Architecture: Internet Architecture Board(IAB)
- Research and Future Internet Function: Internet Research Task Force (IRTF)
- Internet backbone (Tier 1, Tier 2, Tier 3) : Private Sector
- Internet Governance Policy : Internet Society
- Physical link layer and devices: IEEE, GSMA, ITU

Internet Interconnection

- Peering and Transit (Routing)
- Latency and Speed
- Packet Switching vs. Circuit Switching
- Bandwidth (Broadband, Narrowband)
- Domain Name Servers (DNS)
- Internet Exchange Point
- API
- Net Neutrality
- Internet Chokepoint

The Context

Data is Eating the World!

- World's largest taxi company owns no taxis ➔ UBER
- Most popular media creates no content ➔ Facebook
- Largest accommodation provider owns no real estate ➔ AirBnB
- Largest phone companies does not own any telephone infrastructure ➔ Skype, WeChat
- World's most valuable retailer has no inventory ➔ Alibaba
- Fastest growing banks have no actual money ➔ Society One
- World's largest movie house owns no cinemas ➔ NetFlix
- Largest software vendor, does not write their apps ➔ Google
- Most popular emerging research firm, has no researchers ➔ HfS Research

Source: HfS Research

Why is Digital Standard Important?

- Relevant to future communication technology (Future Proofing)
- Convergences in services not technology (licensing, broadband applications)
- For infrastructure sharing*
- Content(Data) is King!
- Achieving Digital inclusion

*IP based services and applications, promote “any to any principles of connections.

What Happens in an **Internet Minute?**

And **Future Growth** is **Staggering**

Today, the number of networked devices = the global population

By **2015**, the number of networked devices = **2x** the global population

In **2015**, it would take you **5 years** to view all video crossing IP networks each **second**

intel

Table 1.2 Upstream and Downstream Speeds Needed for Various Services and Applications

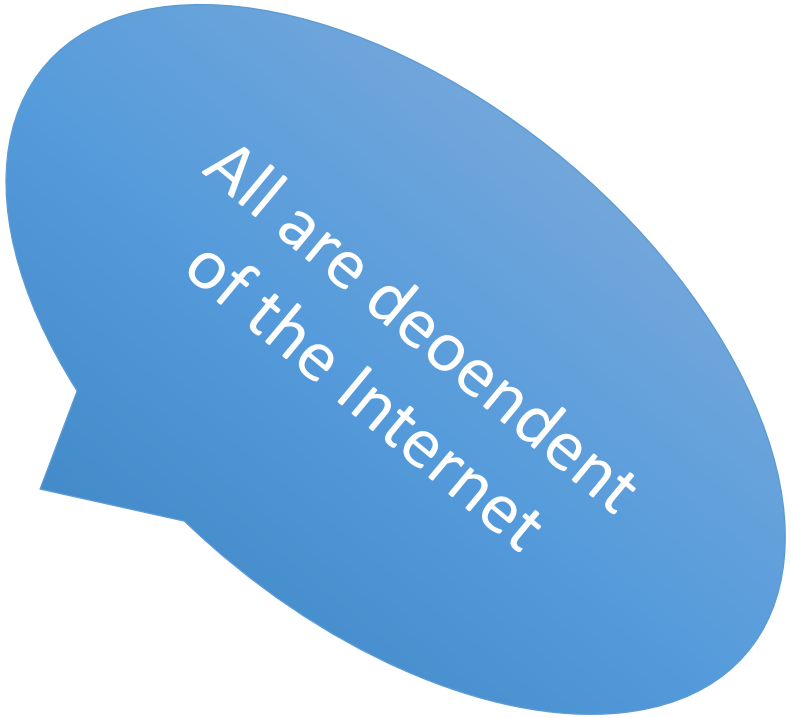
500 kbit/s to 1 Mbit/s	5 to 10 Mbit/s	100 Mbit/s to 1 Gbit/s
• VoIP • SMS • Basic e-mail • Web browsing (simple sites) • Streaming music (caching) • Low-quality video (highly compressed)	• Telecommuting (converged services) • File sharing (large) • IPTV, SD (multiple channels) • Switched digital video • Video on demand, SD • Broadcast video, SD • Video streaming (2–3 channels) • Video downloading, HD • Low-definition telepresence • Gaming • Medical file sharing (basic) • Remote diagnosis (basic) • Remote education • Building control and management	• Telemedicine, HD • Multiple educational services • Broadcast video, full HD • Full IPTV channel support • Video on demand, HD • Gaming (immersion) • Remote server services for telecommuting

1 to 5 Mbit/s	10 to 100 Mbit/s	1 to 10 Gbit/s
• Web browsing (complex sites) • E-mail (larger attachments) • Remote surveillance • IPTV, SD (1–3 channels) • File sharing (small, medium) • Telecommuting (ordinary) • Digital broadcast video (1 channel) • Streaming music	• Telemedicine • Educational services • Broadcast video, SD and some HD • IPTV, HD • Gaming (complex) • Telecommuting (high-quality video) • High-quality telepresence • Surveillance, HD • Smart, intelligent building control	• Research applications • Telepresence using uncompressed video streams, HD • Live event digital cinema streaming • Telemedicine remote control of scientific or medical instruments • Interactive remote visualization and virtual reality • Movement of terabyte data sets

Global Internet Connection

Technology behind e-Commerce

- Instant Messaging
- Social Media
- The Web
- Payment and Settlement system

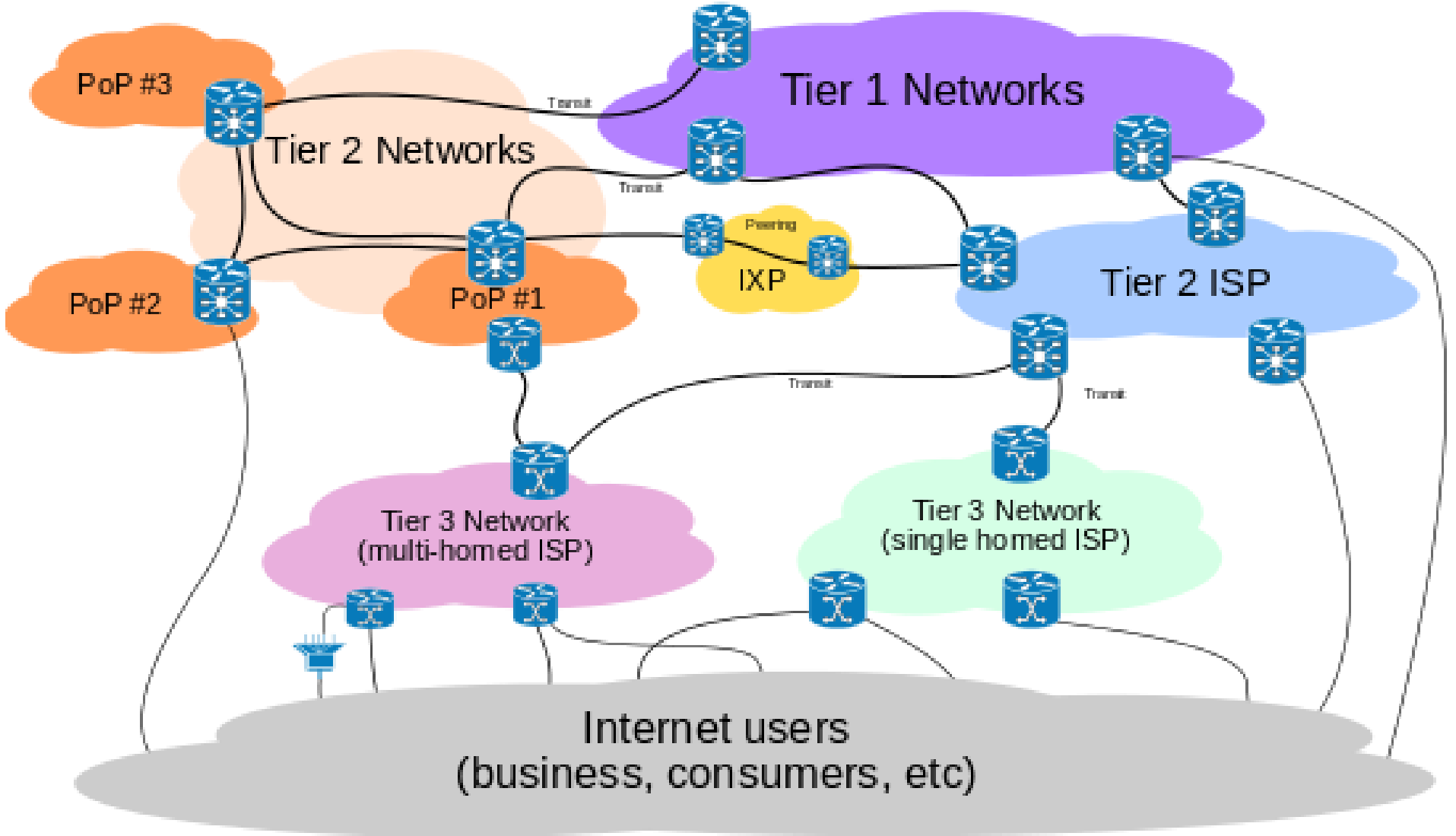


De Minimis Threshold?

Digital Trade Related Issues

- Digital Goods and Services definition (WCIT, GATT, UNCITRAL, OECD, G20, APEC)
- ICT goods and services (classification)
- ITA (member countries, trade barriers)
- E-Commerce Framework (OECD, APEC, ASEAN, GATT)
- De minimis threshold international rule
- Current and emerging Intellectual Property Rights (IPR) ➔ domain name system, ccTLD
- Internet Governance Issues (open data, privacy, digital identity, data localization, sovereign rights, etc.)
- Cybersecurity and cyberspace (legal and regulatory framework)
- Economic Model (2-sided market, long tail, monetization, network science, technology policy)

Global Internet Back Bone



Internet Interconnection

- Peering and Transit (Routing)
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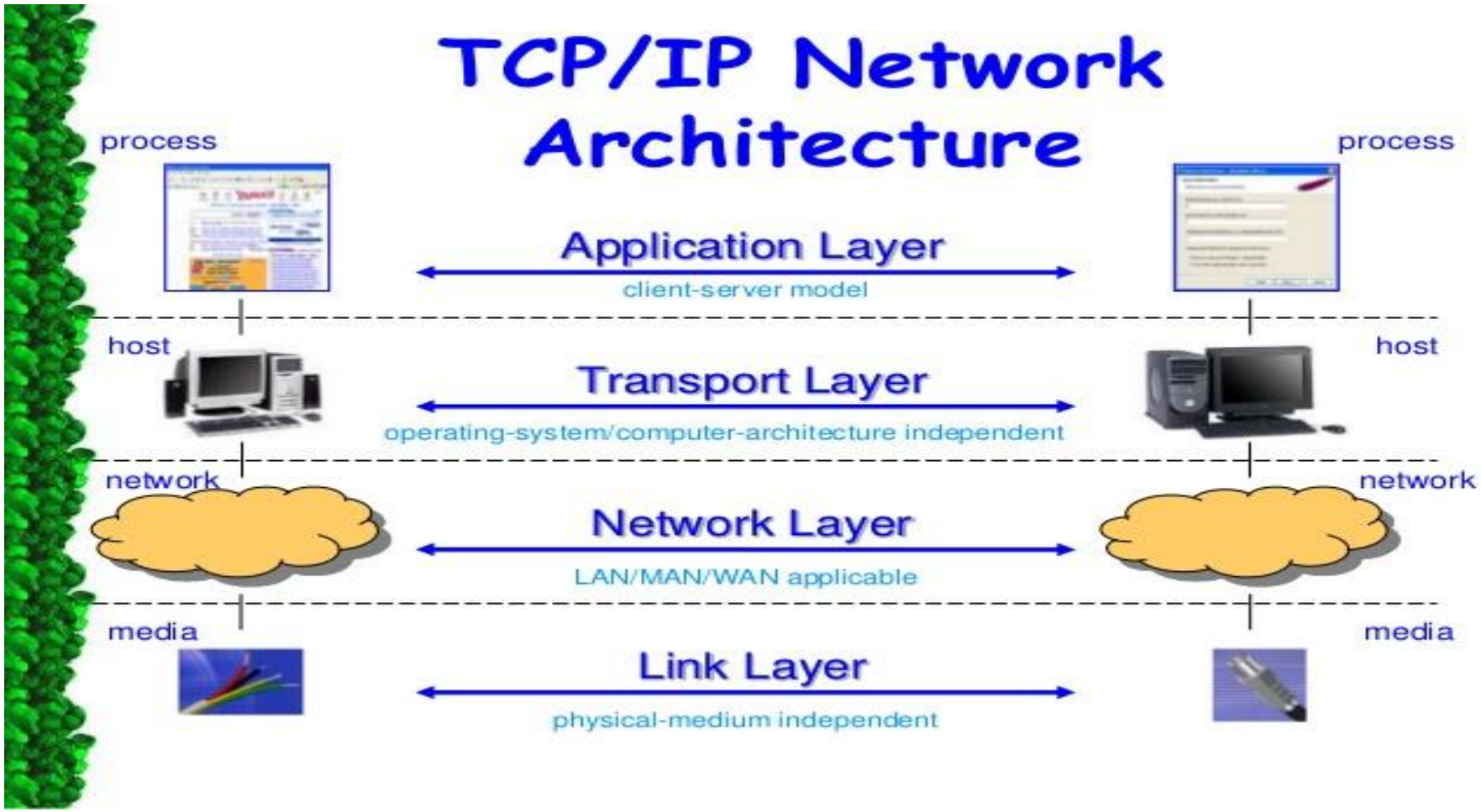
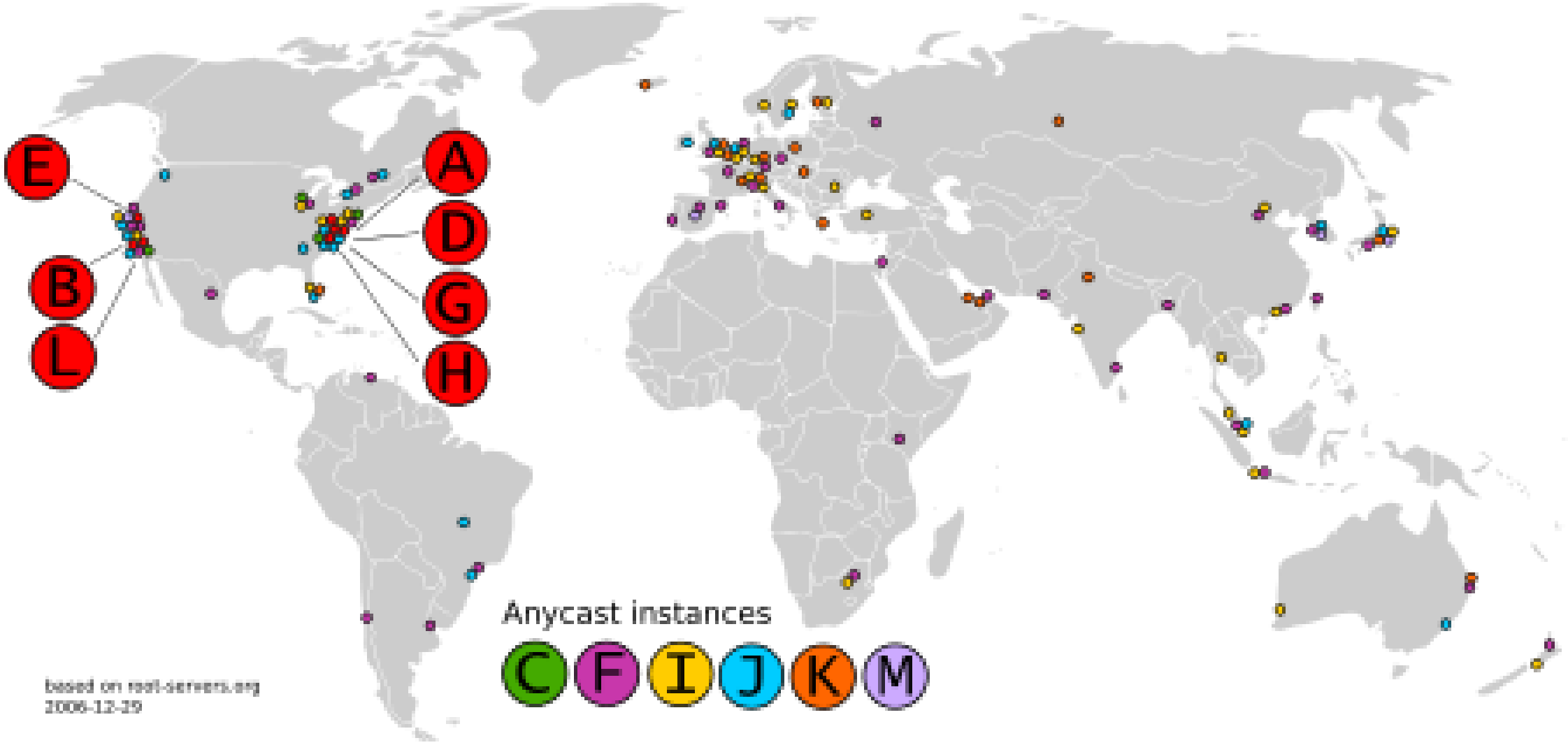
- Internet Exchange Point
- API
- Net Neutrality
- Internet Chokepoint

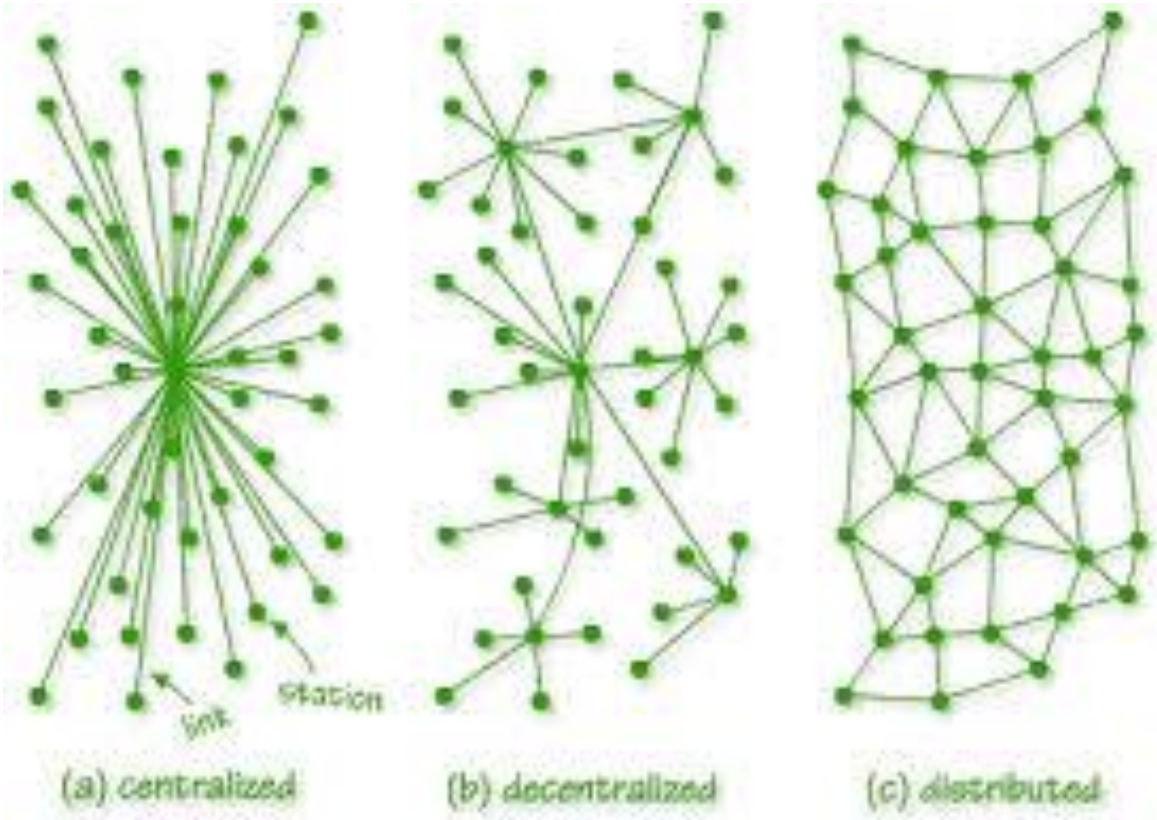
The Technology Behind the Internet



13 servers enabling the Public Internet



Mesh Network – Avoids Single Failure Point

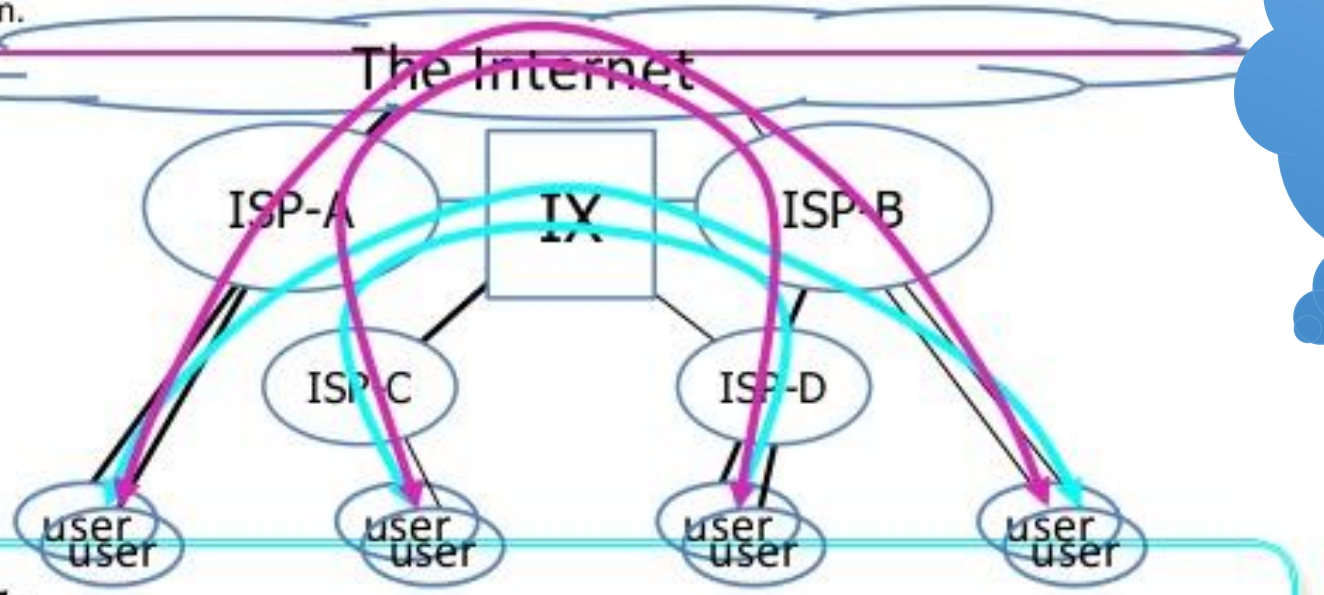


This is how the Internet interconnects and scales via distributed network!

Transit and Peering

-Transit-

"Transit" has an upstream and a downstream, then the traffic from/to the latter and its customers are carried by the former to/from the rest of the Internet with payment from the downstream.



-Peering-

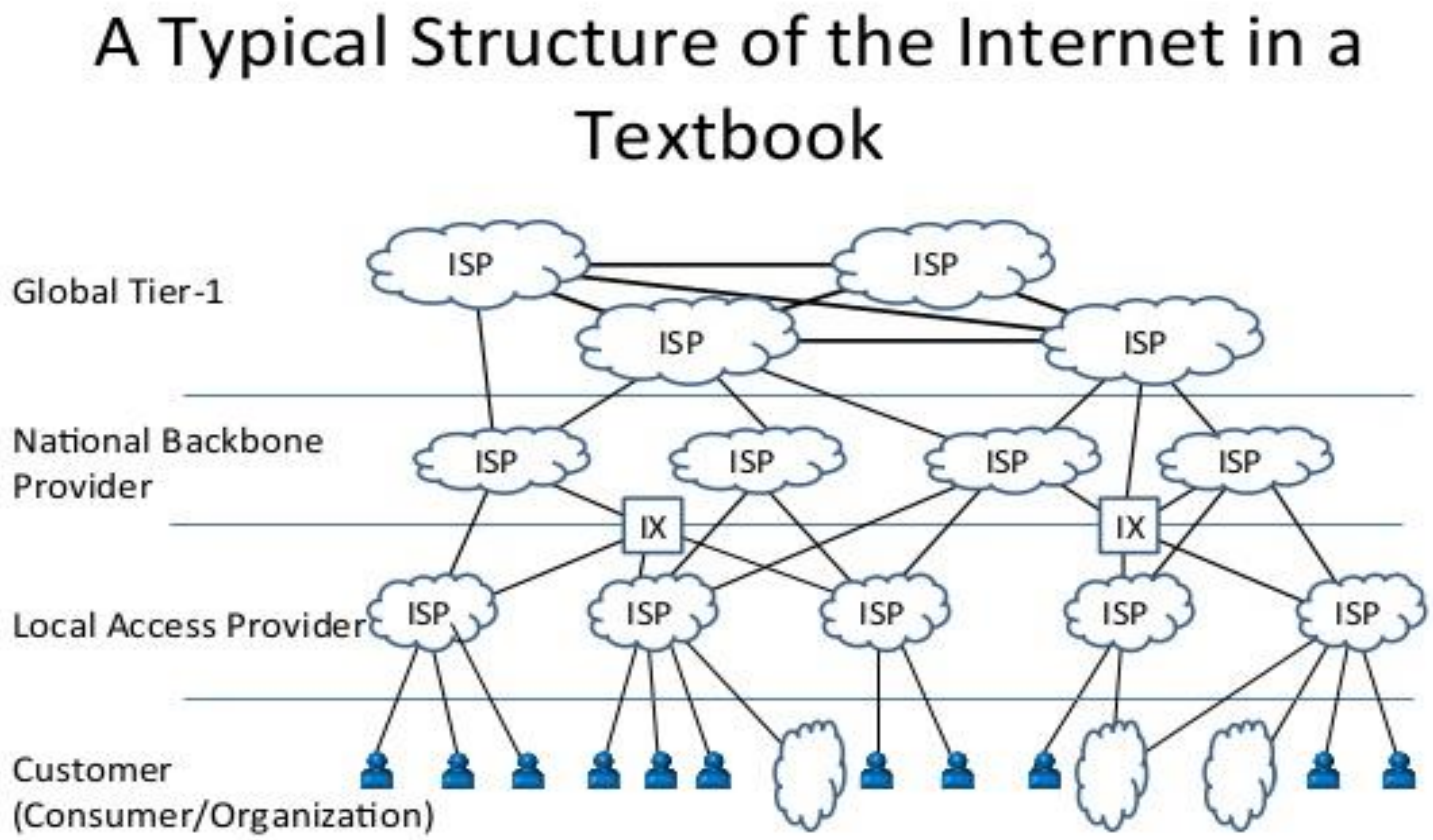
Traffic between two parties and their customers are exchanged by using "peering." Useless traffic to the upstream decreases by exchanging traffic with peering, and their transit cost can be reduced.

5

This is how the Internet traverses!

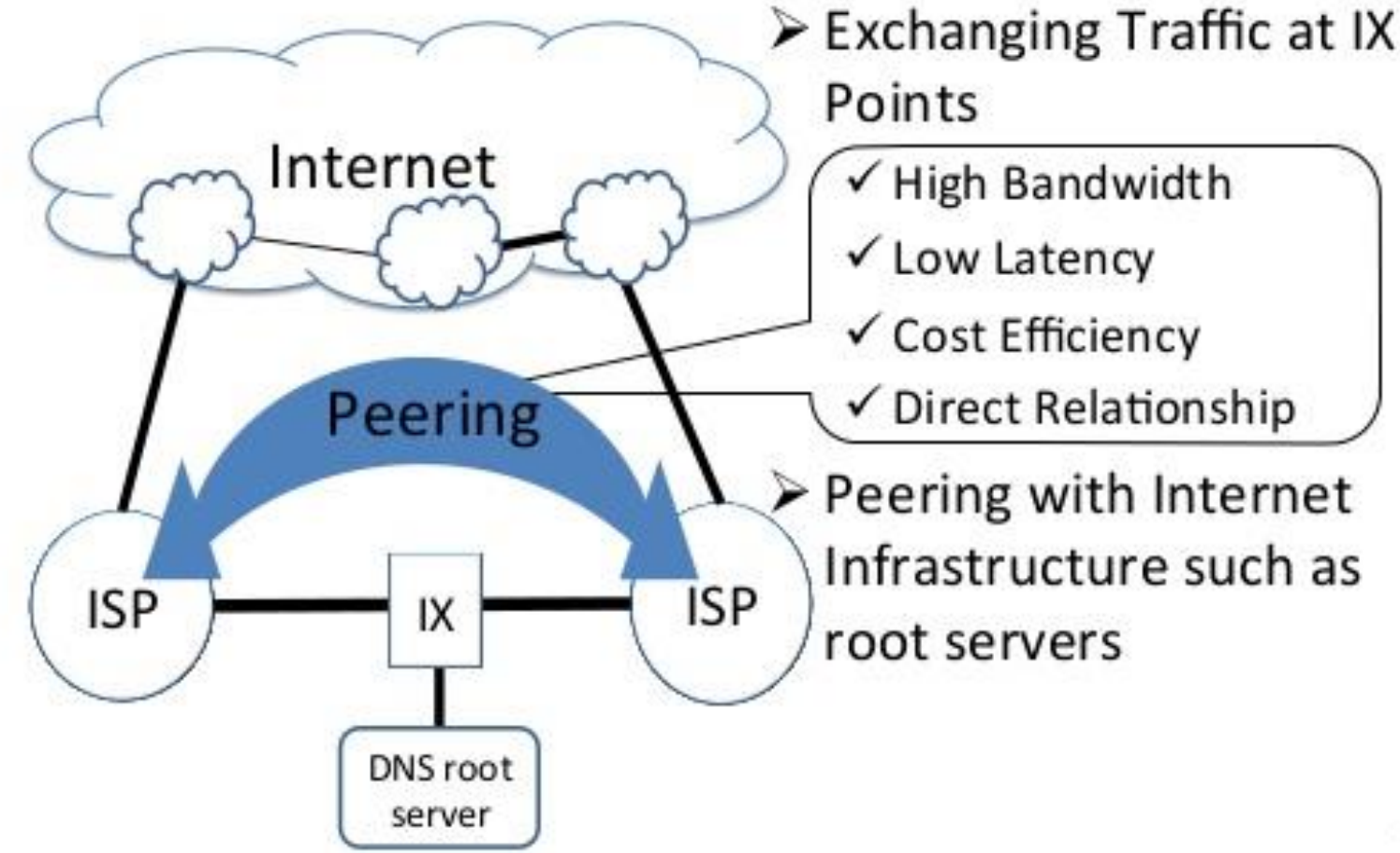
Source: Yoshiki Ishida, Japan Internet exchange

Internet Exchange Point (IXP) – Promotes Local Traffic, Saves Cost and Keeps Traffic Local (avoids tromboning network effects)



Source: Yoshiki Ishida, Japan Internet exhange

Merits of using IX



- Exchanging Traffic at IX Points
  - ✓ High Bandwidth
  - ✓ Low Latency
  - ✓ Cost Efficiency
  - ✓ Direct Relationship
- Peering with Internet Infrastructure such as root servers

- Recommendation as critical Internet Development infrastructure by WCIT/ITU 2013, OECD policy and Internet Society (IETF)
- APIX (APAC region)

Successful Internet exchanges have become an integral part of the global Internet

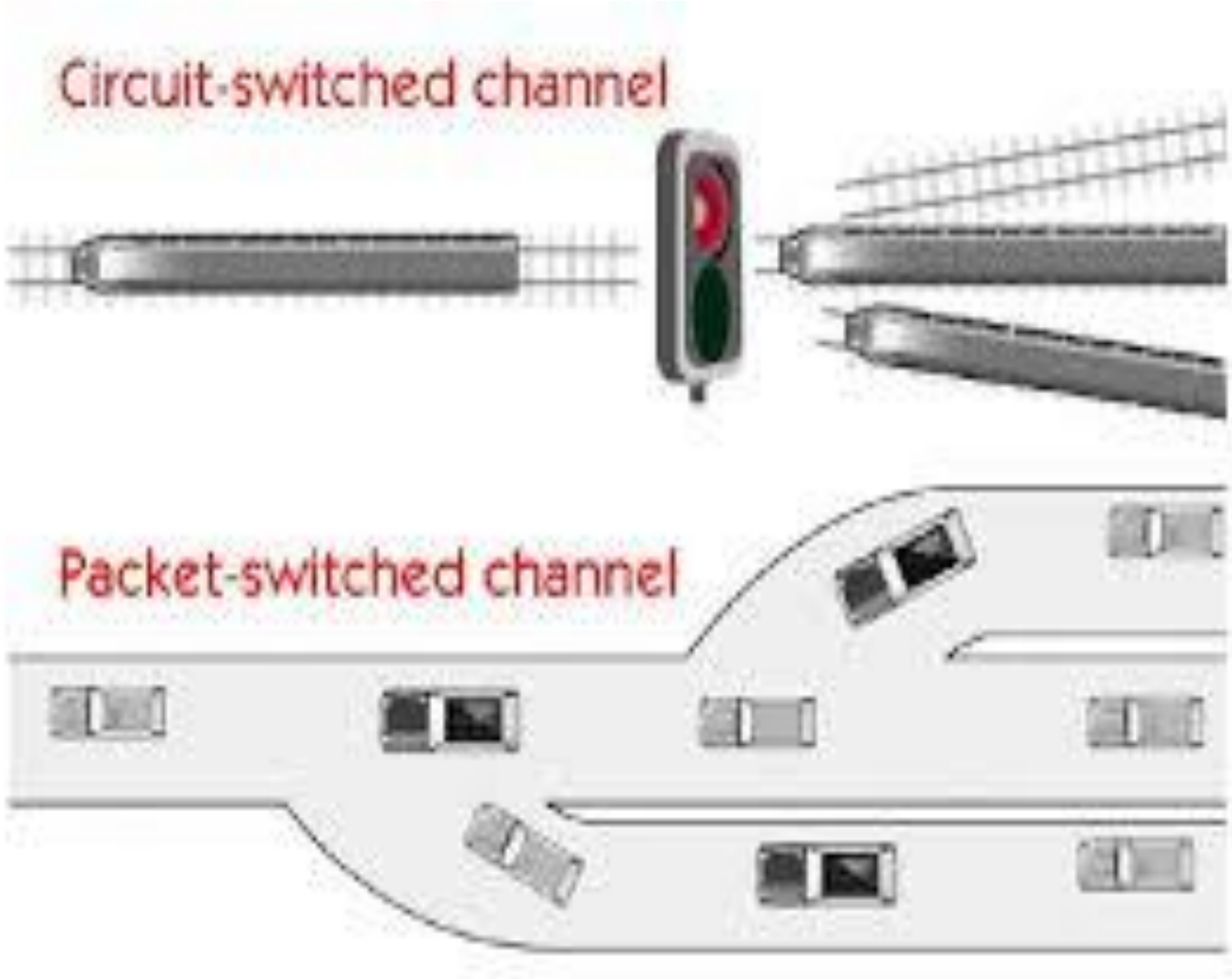
DE-CIX in Germany is the biggest IXP in terms of traffic volume – including significant amounts from Eastern Europe.

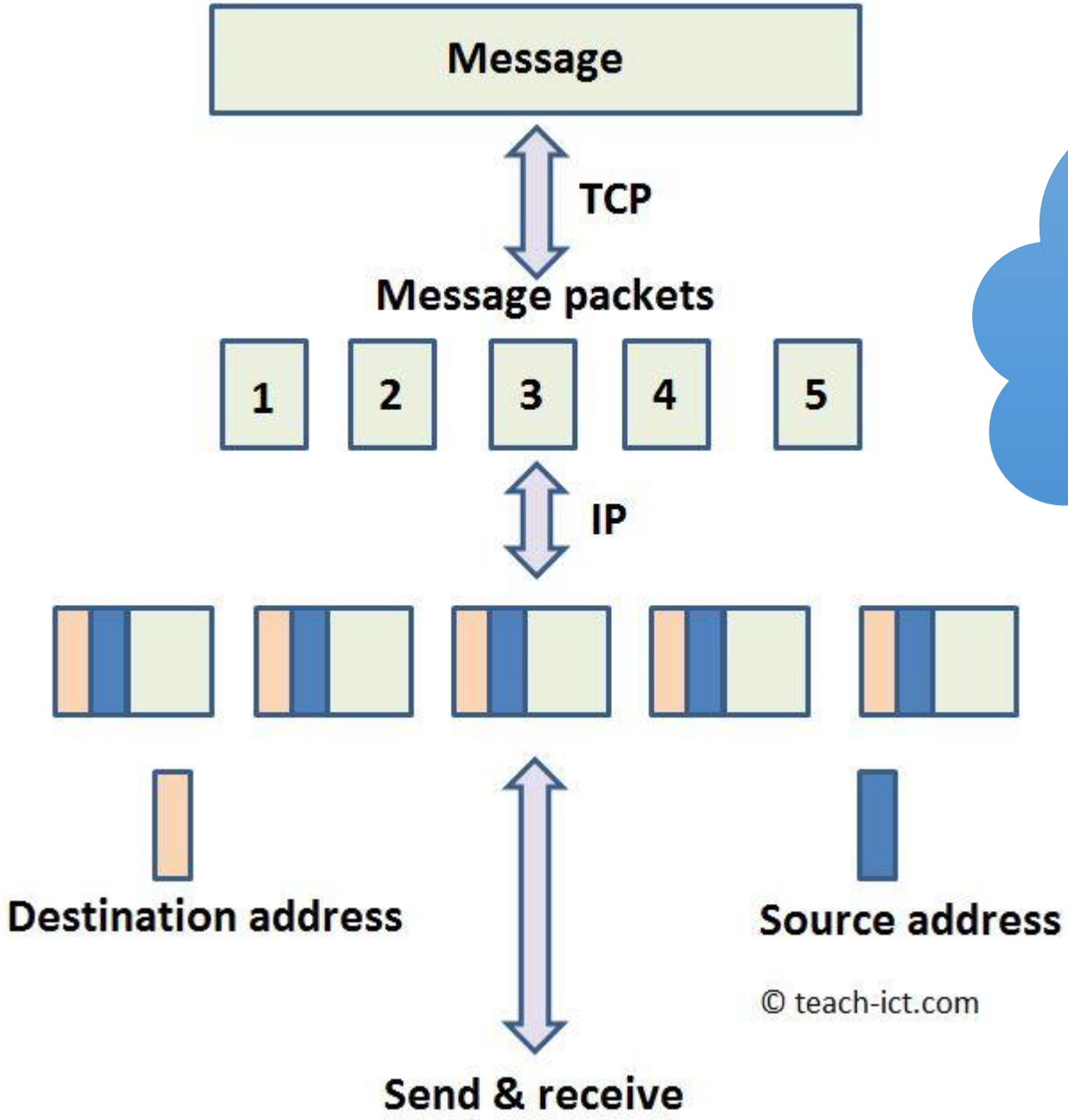
NetNod in Sweden has significantly improved the efficiency and performance of Internet services in Sweden, where it acts as a major point of domestic traffic exchange.

LINX in London and **AMS-IX** in Amsterdam were founded in the early days of the Internet, and established themselves as major international hubs for traffic exchange.

In Singapore and Malaysia, governments have sought to encourage the establishment of IXPs, in recognition of the benefits they can bring.

analysys mason

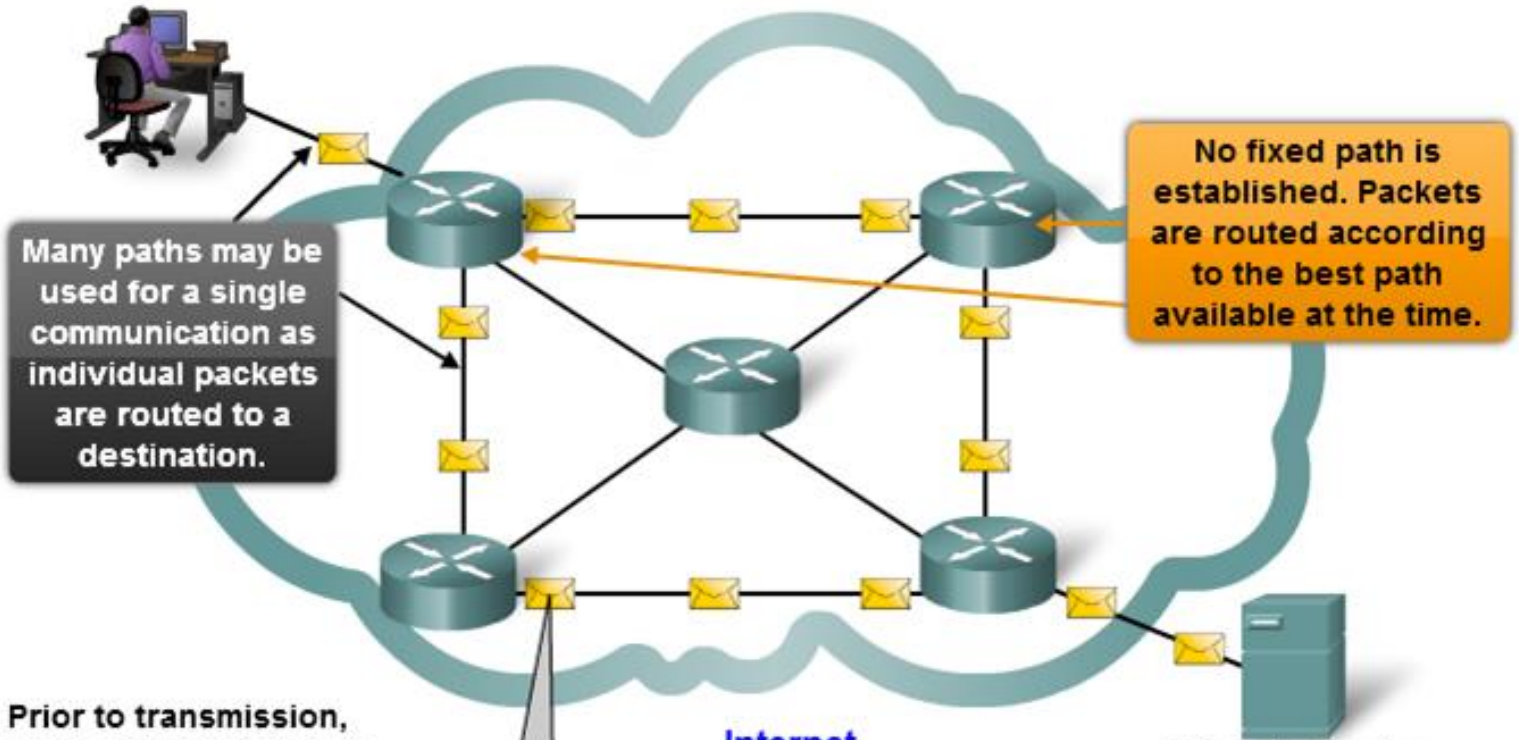

Circuit-switched channel
Packet-switched channel



The heart of the Internet functionalty and technology!

Source: USC Packet Switching Course

Packet Switching in a Data Network

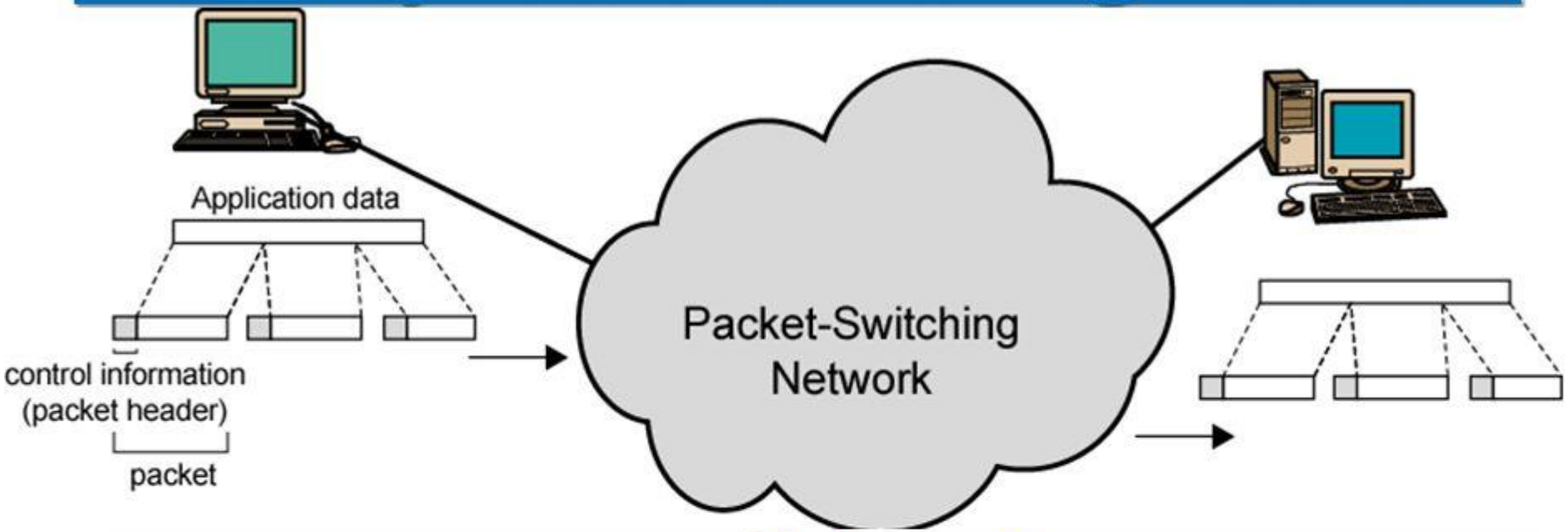


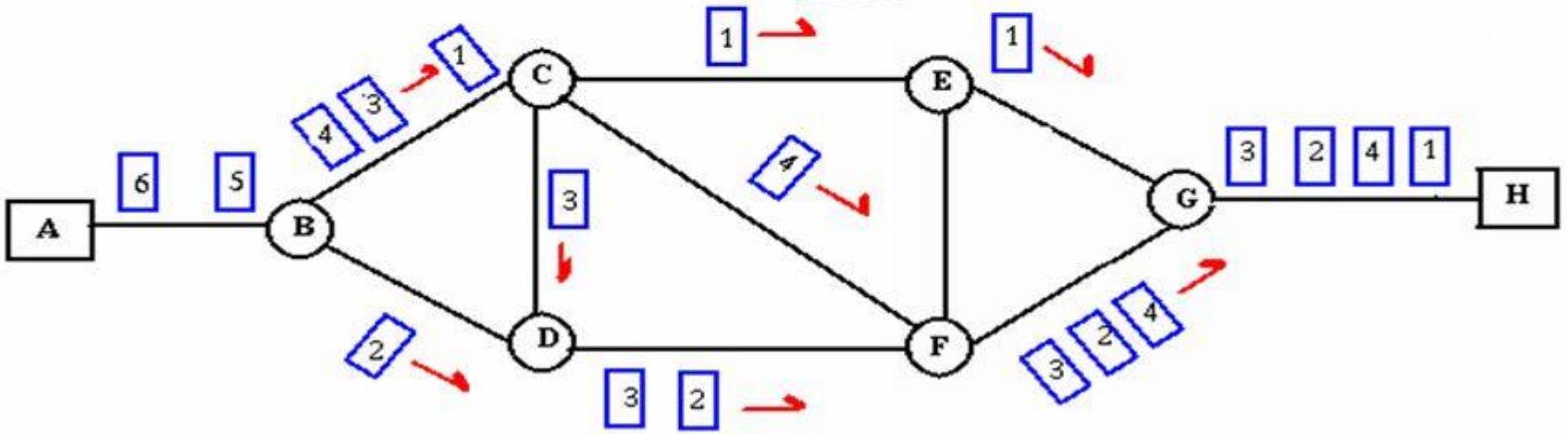
Prior to transmission, each communication is broken into packets which are addressed and numbered.

At the destination, packets may be reassembled into order according to their sequence number.

During peak periods, communication may be delayed, but not denied.

Model of Packet Switching Network





Source: USC Packet Switching Course

IX Status
Asia-Pacific Region

- APIX"Asia-Pacific Internet Exchange"
  - ✓ An association of Internet Exchange Providers in Asia-–Pacific region.
  - ✓ just like Euro-IX in Europe
- Objectives
  - ✓ To share information about technical, operational, and business issues and solutions regarding Internet Exchange.
- APIX was established in 2010 under the support of ***APNIC***
- ***APNIC***'s support for APIX
  - ✓ Engineering assistance for organizations needed.
  - ✓ APNIC is in a good position to encourage on facilitate to share knowledge and experience among IX points in the region.
- Members: 16 IXPs from 12 economies
  - ✓ BDIX(BD)
  - ✓ HKIX(HK)
  - ✓ BBIX, DIX-IE, JPIX, JPNAP(JP)
  - ✓ KINX(KR)
  - ✓ IIX(ID)
  - ✓ NIXI(IN)
  - ✓ MyIX(MY)
  - ✓ NP-IX(NP)
  - ✓ NZIX(NZ)
  - ✓ SGIX,SOX(SG)
  - ✓ VNIX(VN)
  - ✓ Equinix(US, HK, JP, AU)
- Contact:
  - ✓ sc(at)apix.asia

Global Data Traffic (Internet)

Source: Dyn expert

Global Interconnection is dependent on the following key measures:

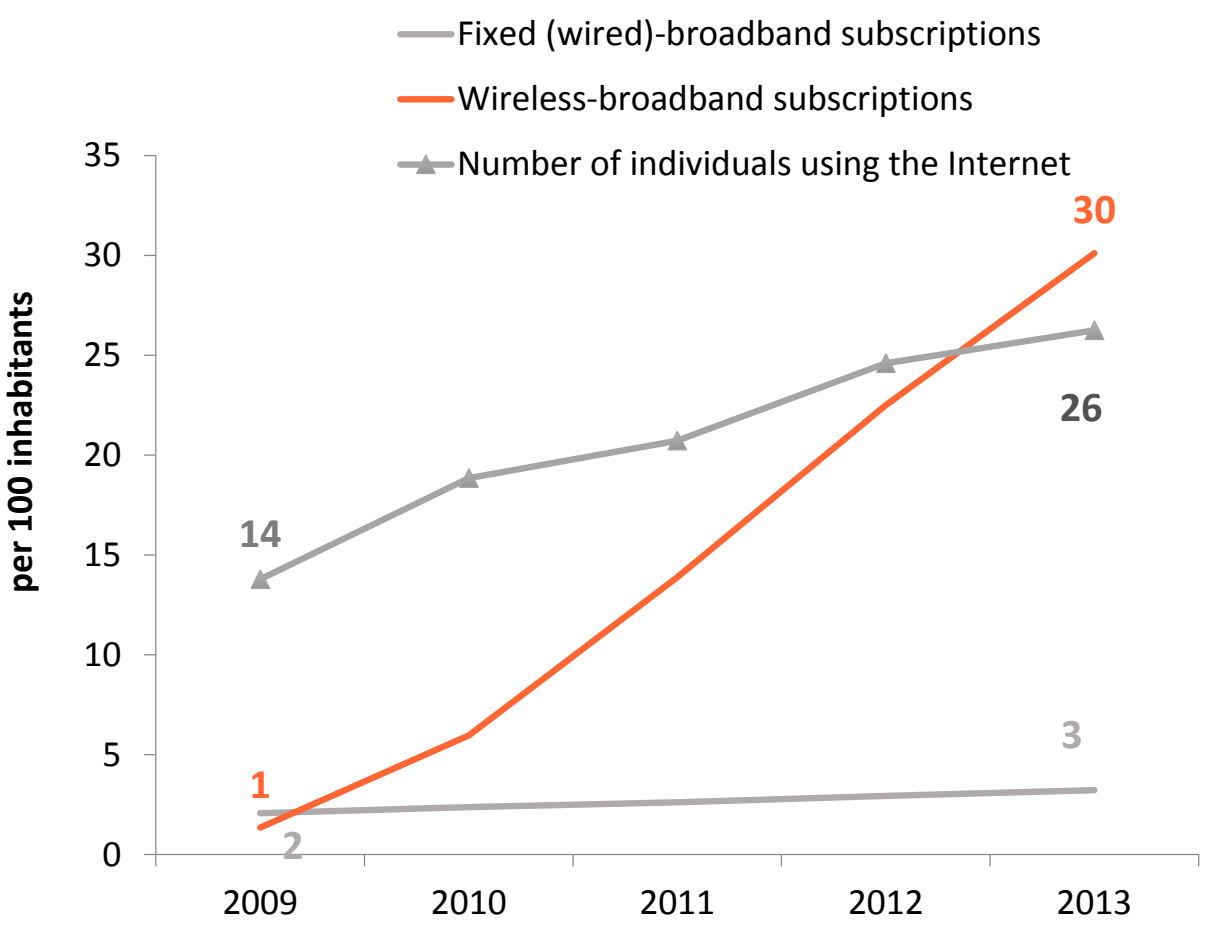
1) Latency (mbps)

2) Bandwidth (mbps)

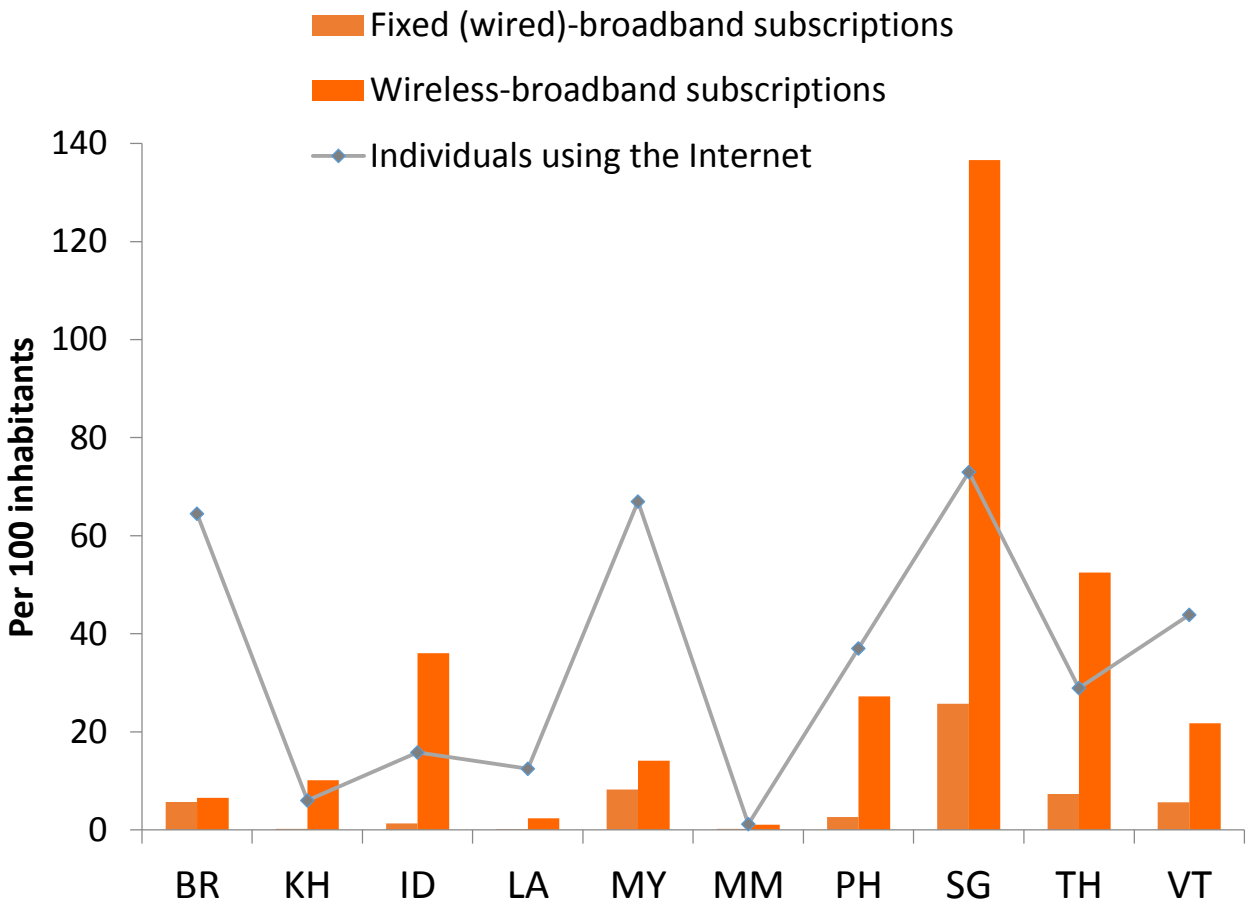
3) Hops

4) Geographic distance

ASEAN experienced healthy growth in penetration, especially in wireless, but regional averages mask huge diversity among countries

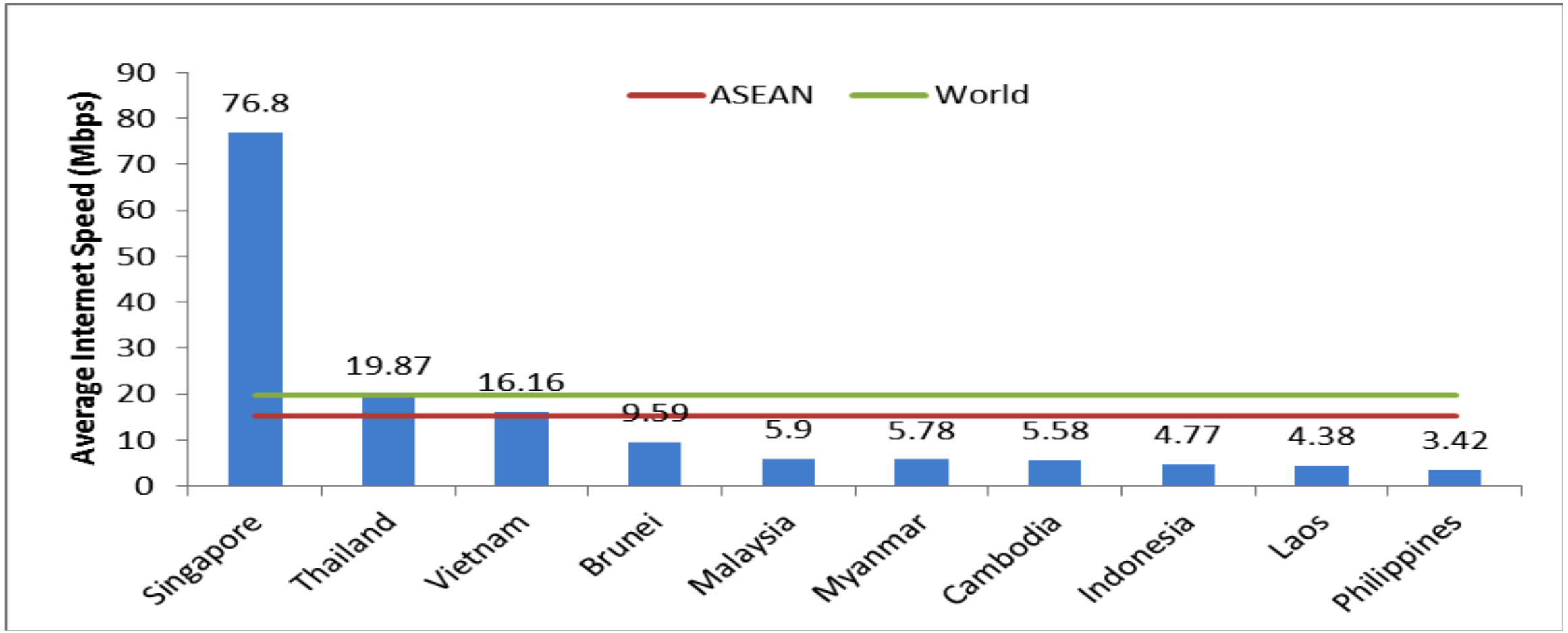


Source: ISOC Study Lifting the Barriers to Internet Development in ASEAN



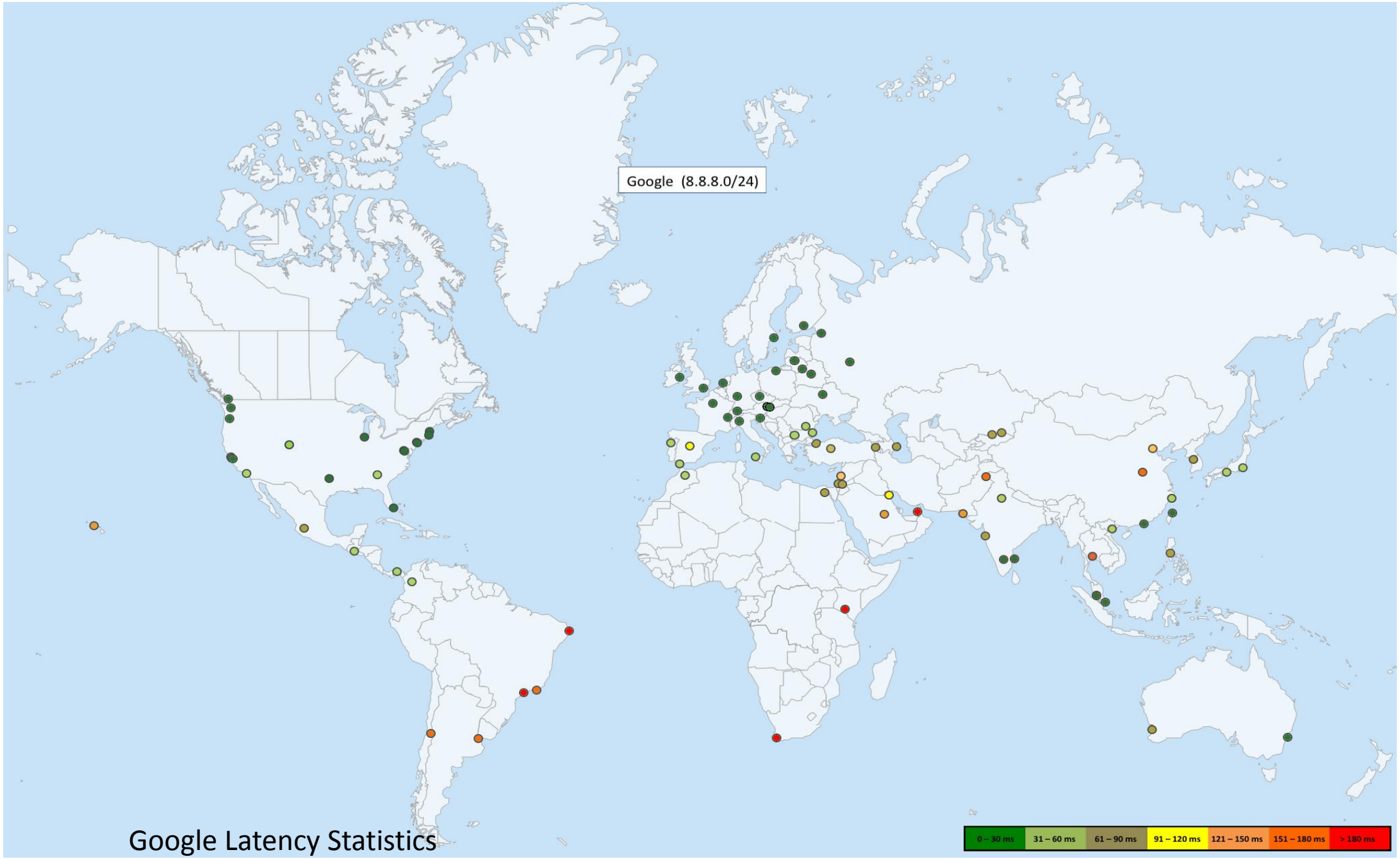
Source: ITU (2014), ITU World Telecommunication/ICT Indicators database, Population, Fixed (Wired)-Broadband Subscriptions, Wireless-Broadband Subscriptions, Percentage of Individuals Using the Internet.

ASEAN Internet Speed



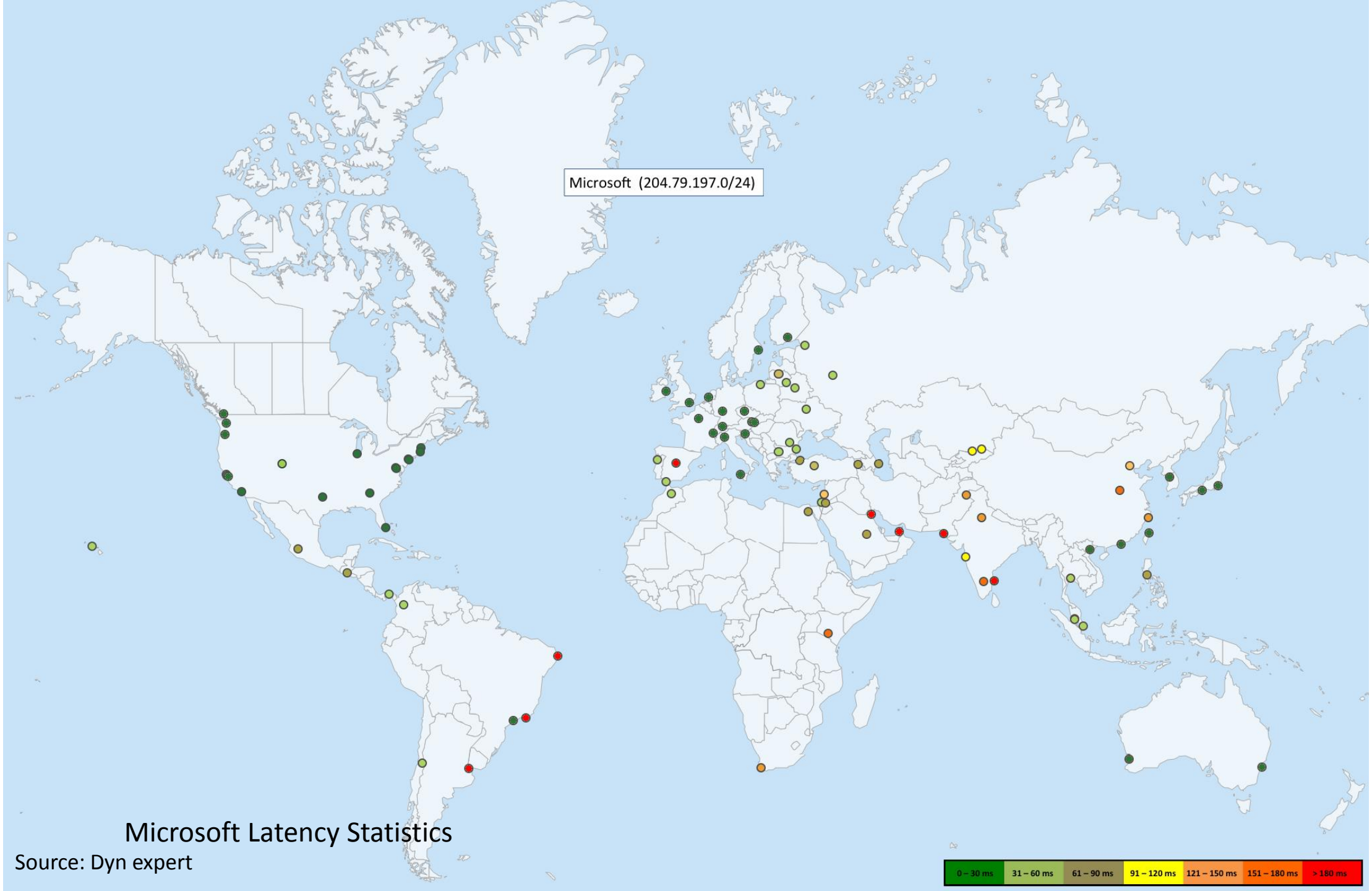
** The Philippines fares well in affordability but not in speed!

Source: ISOC Study Lifting the Barriers to Internet Development in ASEAN



Google Latency Statistics

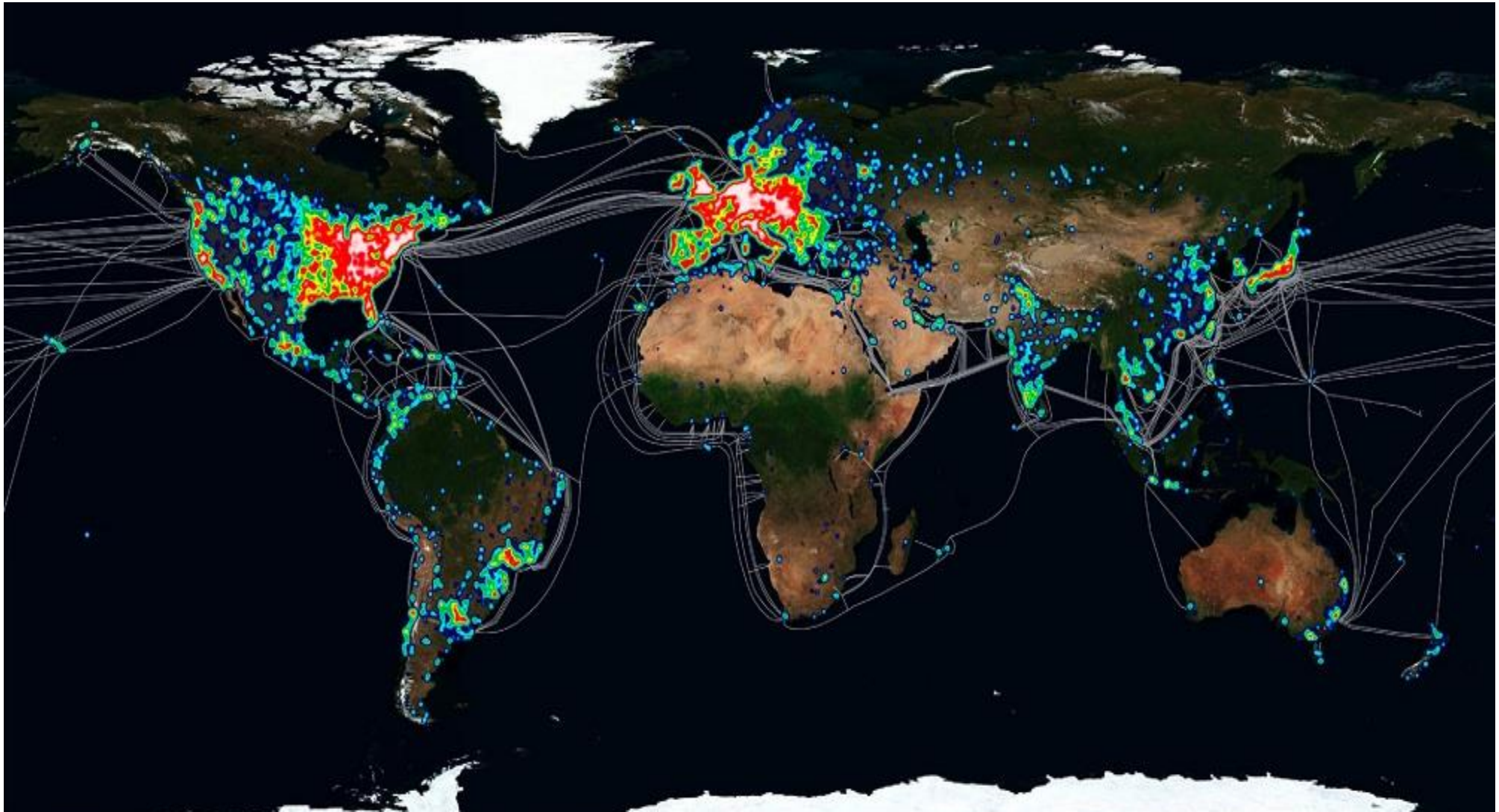
Source: Dyn expert



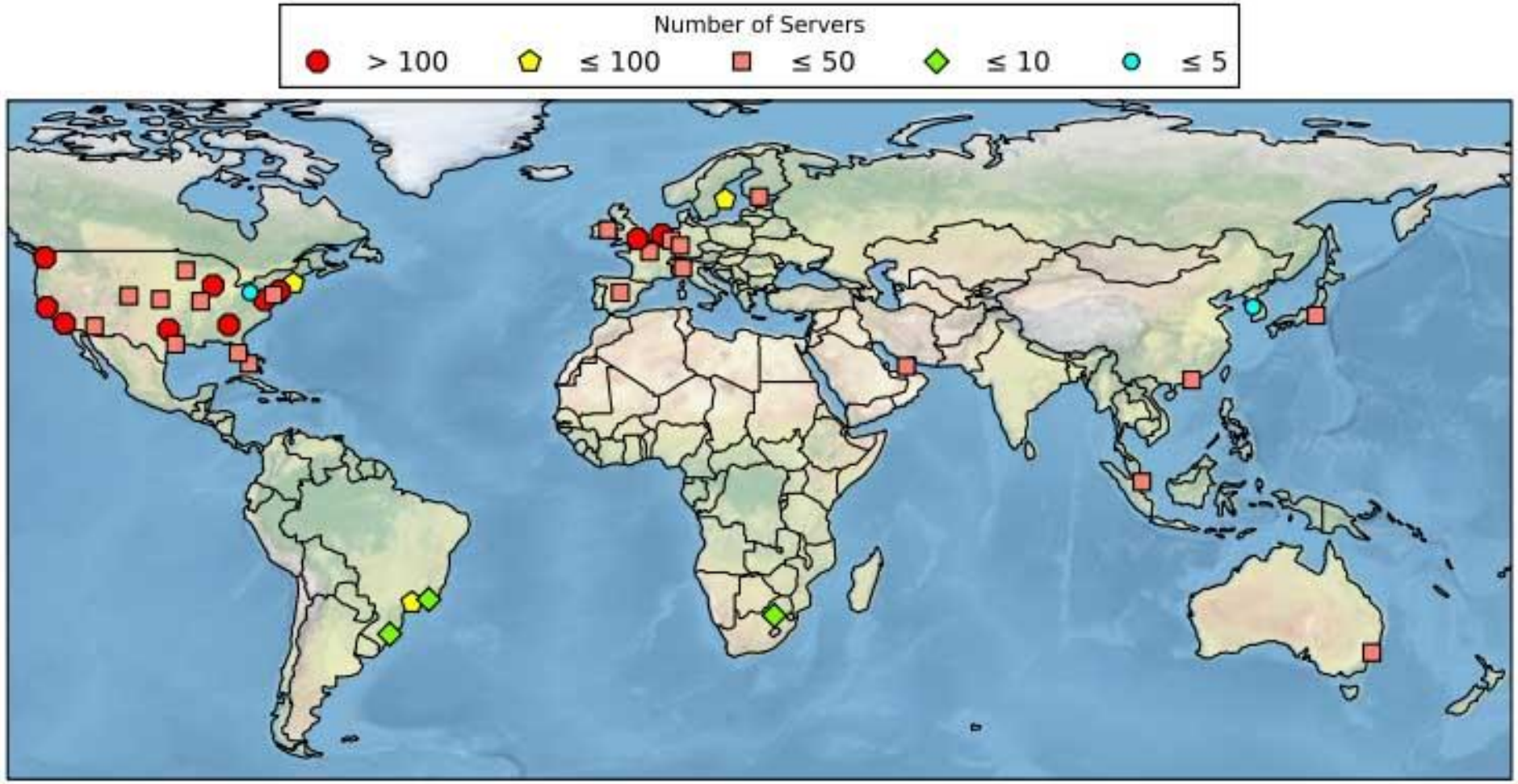
Microsoft Latency Statistics

Source: Dyn expert

Global Data Traffic



Netflix Global Network



(a) CDN servers operated by Netflix at IXPs.

Source: Dyn expert

IBM Global Data Centers Network

Map of Information Technology Agreement (ITA) members

Generally, ITA members with FTA tariff rates avg. 0.6% vs. Non-ITA members of 3.3%

Figure 11: Signatories of the ITA as of 2014

Map of Global Trade Tariff and Taxation on ICT

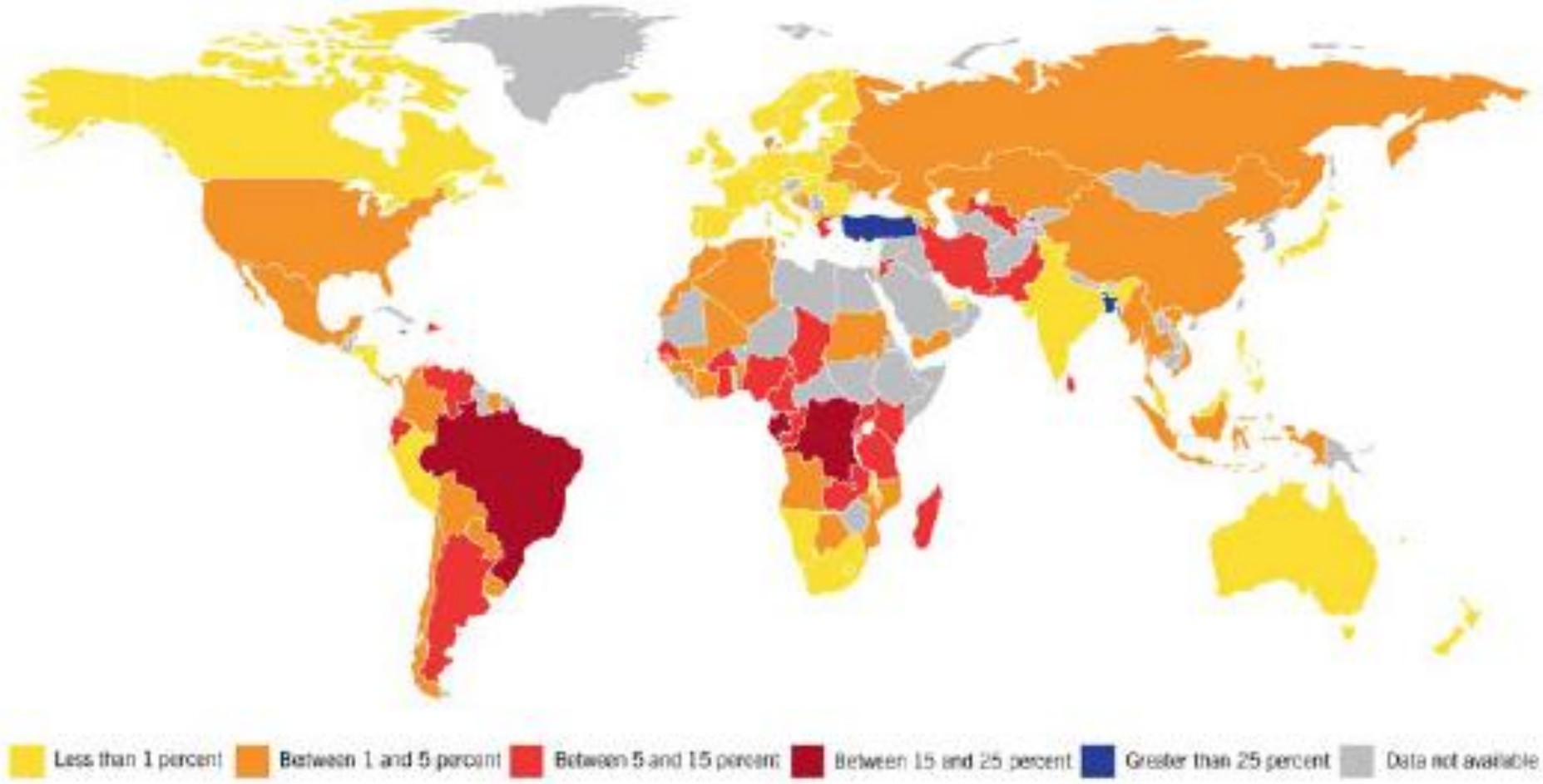
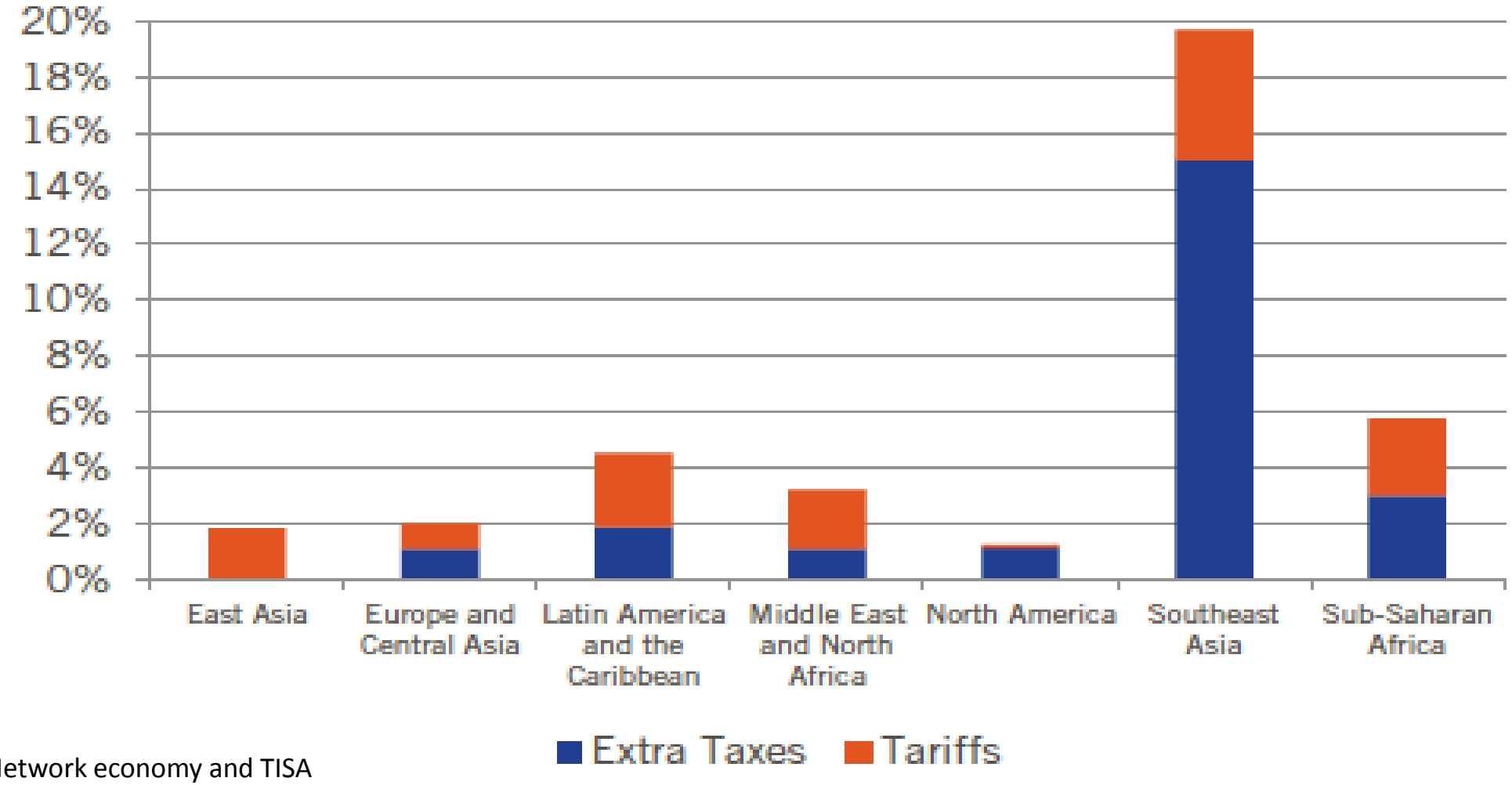


Figure 1: Map of countries by total taxes and tariffs for consumer ICT products and services[1]

ICT Tax and Tariff by Regions



Source: Network economy and TISA

New Network Economics Effect

- More eyeballs (network) ➔ Competitive market (market access)
- More content (network) ➔ High local net worth
- Higher traffic ➔ Lower cost, better connectivity performance, promote inward investments
- Open data exchange ➔ GVC linked, leverage external growth effect, competitive market enabling new technology and services (i.e. blockchain, IoT, e-signature, paperless trade, regional single window, etc.)
- Secure network ➔ trustworthiness, resiliency
- Technology neutral policy ➔ neutral service policies grows innovative digital services and start uops(open standard, open API, etc.)
- Cost efficiencie ➔ lower operating cost, attract FDI and local entrepreneurs (HW, infrastructure, SW, network management policies, leverage global network effects, local content, infrastructure sharing, Climate Change, Energy Security)

Invest in neutral IXP, lower barrier to ICT devices and related technology, build local content and new businesses

(Mis)Understanding the Internet Workings

- SPAM ➔ Bulk of Junk Mail or Unwanted/Unsolicited Messages

(Technical concept: Badly constructed and timed messages)

- Interconnection ➔ Connection based communication using Call Termination concept (like the telephone)

(Technical concept: Connection less communication, no termination)

- Peering ➔ Equal exchange

(Technical concept: exchanging traffic under open or close contracts)

- Privacy ➔ User protection

(Technical concept: Anonymity and Cryptography)

- Net neutrality: No discrimination (speed)

(Technical concept: application and package agnostic interconnection)

- Quality of Service: Guaranteed Service

(Technical concept Best effort, not guaranteed service)

- Data Protection: Data localization

(Technical concept: encrypted communication, Metadata)

- Free or Open Internet ➔ No one pays/No fees

(Technical concept: Permissionless, Voluntary, Open Protocol/Standard or Open source code, Non-proprietary)

- Open Data ➔ Data Accessibility

(Technical concept: Free flowing Bits and Bytes)

- Open Operating System (OS): No membership fee

(Technical concept: Permissionless, Collaborative Development via sharing source code)

- Interoperability: harmonization or common standards/practices

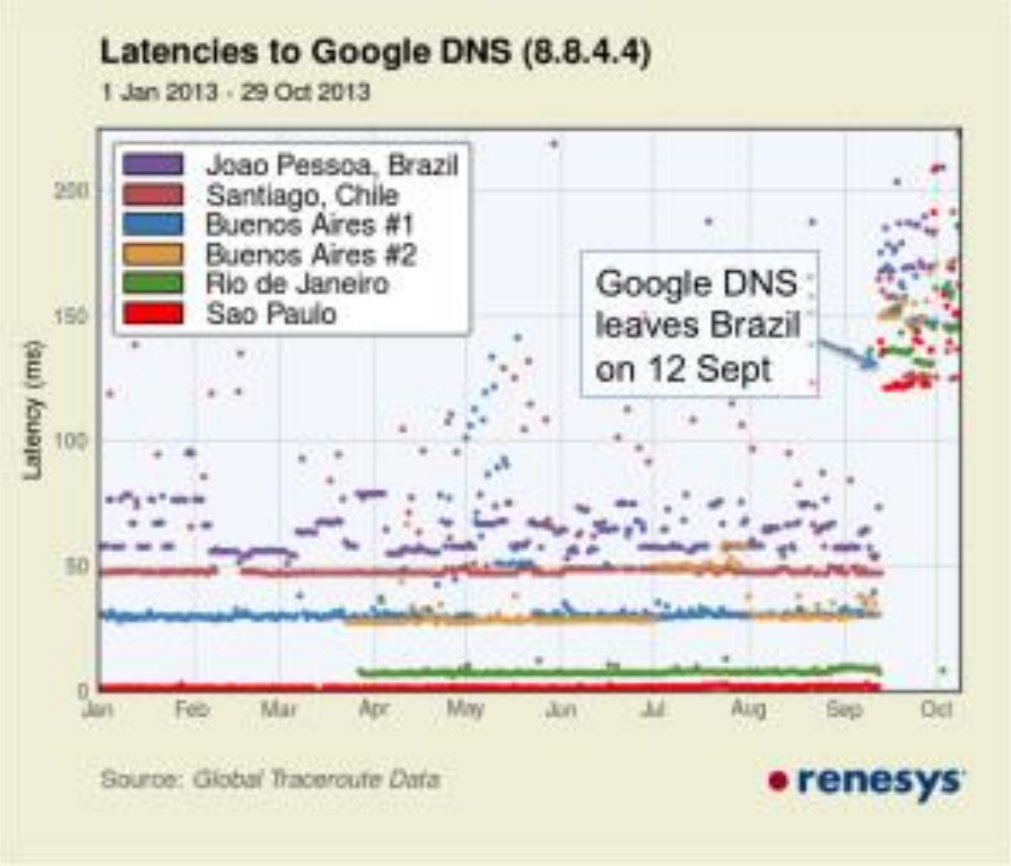
(Technical concept: Minimal impact or changes to current protocol at the core level)

- Technology neutral policy: No prejudice (equality basis)

(Technical Concept: Accommodate future technology and its applications (beyond equality basis)

Lessons from Brazilian Government

Latency Impact After Google DNS Discontinued Operation in Sao Paulo



This not only affceted Brazil but also the regional Internet latency and disrupted the country's economic activities as well as the Latin American region!

Source: Dyn Blog

Why consider Legislation

- Define spam
- Specify what (legitimate) businesses must do to avoid their marketing messages being identified as spam

Australian Spam Legislation…

- Spam is defined as any email, SMS or instant message that:
  - Promotes a product or service to the recipient
  - Deceptively and dishonestly attempts to obtain a financial advantage

It is not necessary for messages to be sent in bulk or to contain offensive or illegal content, to be spam

- Rules are specified for sending commercial email, SMS or instant messages:
  - Recipient must have *consented* to the sending of the message
  - Message must accurately *identify the sender*, and indicate how the sender can be contacted
  - Message must indicate how the recipient can *unsubscribe* from receiving further messages

The Spam Law in the Netherlands specified

There is no definition of “spam” in the law.

It addresses unsolicited electronic communications

Whether by fax, computer, device or phone

So, it is much broader than “spam”

The Netherlands, Telecommunications Act 2004 Art. 11.7,1

The use of automatic calling systems without human intervention, faxes and electronic messages for transmitting unrequested communication to subscribers for commercial, idealistic or charitable purposes will only be permitted if the sender can demonstrate that the subscriber concerned has given prior consent for this, notwithstanding that laid down in paragraph 2.

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2. Any party who has received electronic contact information for electronic messages as part of the sales of his product or service may use this information for transmitting communication for commercial, idealistic or charitable purposes in relation to his own similar products or services, provided that with the obtaining of the contact data the customer is explicitly given the opportunity to submit an objection in a straightforward manner and free of charge against the use of his electronic contact information and, if the customer has not taken up this opportunity, he is offered the opportunity with each communication transmitted to submit an objection against the further use of his electronic contact information under the same conditions. Article 41, paragraph 2, of the Personal Data Protection Act is applicable mutatis mutandis.

For inquiries, please write to duangthip@itd.or.th