Internet Society (ISOC): Internet Exchange Point (IXP) – Global Development Work

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Many other ISOCers and Partners around the world (off-site)

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What is an IXP

- An Internet Exchange Point (IXP) is a physical location where different IP networks meet to exchange traffic (switch, routers, cabling, ports) with each other to keep local traffic local. **BUT they are much more than just "boxes and wires":**

- IXPs are **vital part of the Internet ecosystem**, essential for facilitating a robust domestic ICT sector

- Benefits of an Internet Exchange Point (IXP):

  - **Keeps local Internet traffic within a local infrastructure, and reduces costs** associated with traffic exchange between networks.

  - **Builds local Internet community and develops** human technical **capacity** – better net management skills and routing

  - **Improves the quality of Internet services and drive demand** in by reducing delay and improving end-user experience

  - **Convenient hub for attracting hosting key Internet infrastructures** within countries – **content is key and confidence** builds in local infra when delivery is consistent and reliable

  - **Catalyst** for overall Internet development

Measuring the Benefits and Impacts of IXPs: Kenya and Nigeria Case Study

Benefit	KIXP	IXPN	Summary
Latency	Reduced from 200-600 ms to 2-10 ms	Reduced from 200-400 ms to 2-10 ms	Noticeable increase in performance for end users
Local traffic exchange	1 Gbit/s peak	300 Mbit/s peak	Savings on international transit of over $1 million per year in each country
Content	Google network present locally, along with rehoming of domestic content	Same as in Kenya	Increase in usage and corresponding revenues for mobile data traffic
E-government	Kenya Revenue Authority gathers taxes online	Usage by education and research networks	Social benefits from e-government access to IXPs
Other benefits	An increasing amount of regional traffic exchanged at KIXP	Financial platforms hosted locally	Further economic benefits resulting from IXPs

- **Reduced latency increasing performance** and driving demand

- Direct **savings on international transit** ($1.5M p.a. Kenya, $1M Nigeria)

- Benefits **facilitating e-government and education** services

- **Catalyzing local hosting and content** industry

- **Increased mobile data market** by an estimated $6 million in Kenya

- KIXP **attracting regional traffic**

- http://www.internetsociety.org/ixpimpact

LAC IXP Study| November 2013

- **LAC Findings:**

  - Argentina: In one city → $100.00 Mgbs pre IXP/440.00 Mgbs post IXP

  - Brazil: 22 IXPs attracting investment/content | 179Gbps at Peak

  - Ecuador: International transit $100 Mgbs | local traffic costs $1.00 Mgbs + now running RPKI & After CDN cache installed in Quito in 2009 -> traffic up 700%

  - **Additional Studies:**

  - **Measurement Study** in Bolivia | Raspberry Pi's

  - **Network efficiency** Study in Argentina | Cabase and University of Buenos Aires

  LAC IXP Study can be found here: http://bit.ly/1k6NaO0

IXPs Around the World
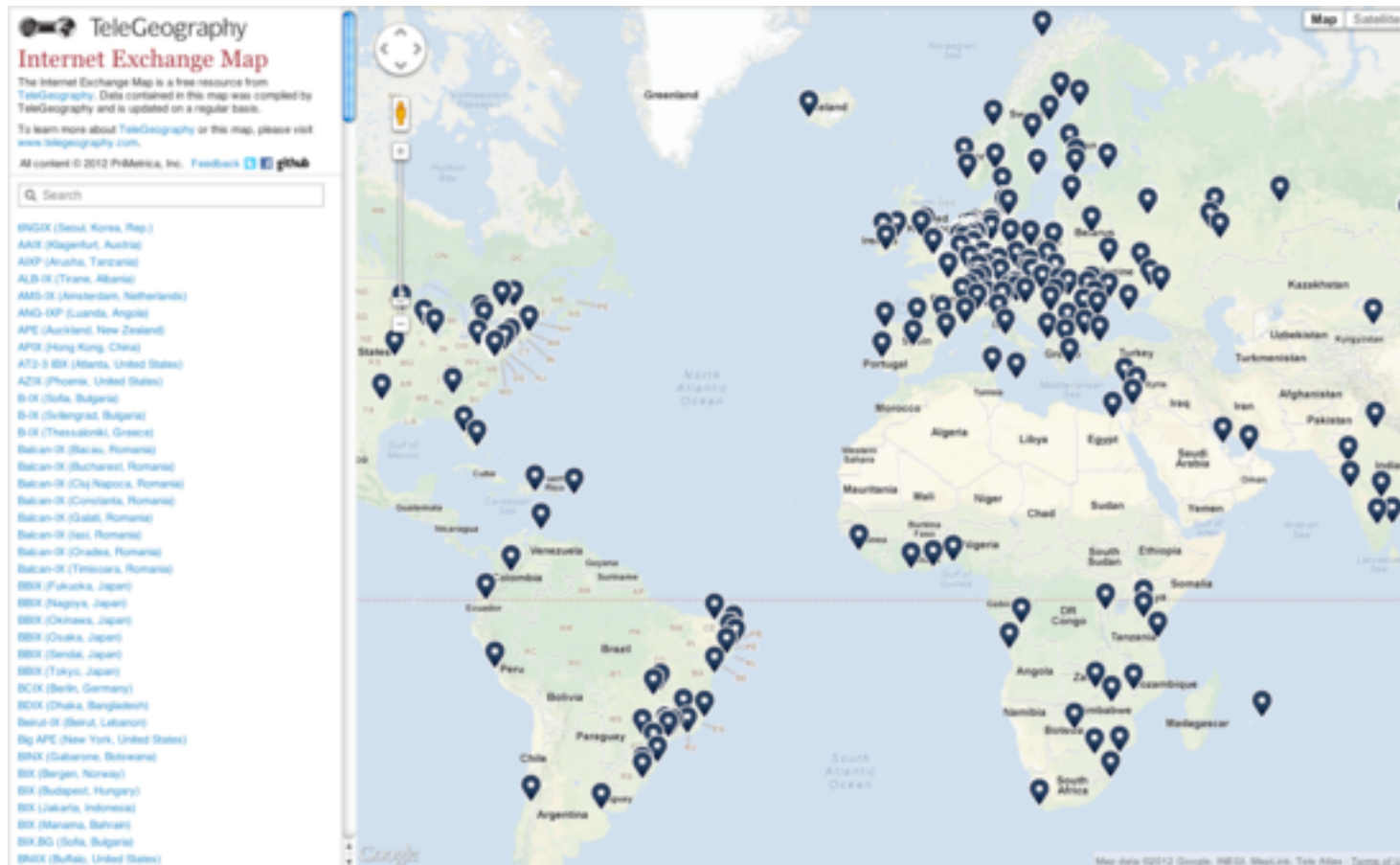
Source: TeleGeography World IX Map, http://www.internetexchangemap.com/

Other sources: www.euro-ix.net | www.ixptoolkit.org | www.pch.net

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Africa: Need for Capacity Building

- **Best practices for IXPs**

  - How can we make the IXP grow and become valuable for the local and regional ecosystem?

  - What are the right business models?

- **Technical skills**

  - Routing, network management, and network efficiencies

  - Running an IXP and working with local Internet community and authorities

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AXIS I & II and AfPIF

- African Union Projects | Implemented by the Internet Society

- AXIS I

  ▪ 30 Best Practice Workshops and community mobilization & 30 Technical Aspects workshops (hands-on)

  ▪ 4 IXPs launched with partners (AfriNIC, Jaguar Networks, Lyon-IX, INEX)

- AXIS II

  • 5 Regional meetings to focus on development of Regional IXPs and Regional Internet Carriers

- AfPIF – African Peering & Interconnection Forum

  • Peering, interconnection, IXP meet-ups

LAC – the Need for Capacity Building

- Countries that deployed IXPs 16 years ago (Argentina, Brazil, Colombia, Ecuador, Chile) developed stronger Internet technical infrastructures and markets. Related to market conditions and regulatory/policy environment.

- Countries that do not have IXPs - symptom of market conditions and regulatory/policy environment and less developed Internet community infrastructure (Paraguay, Bolivia, Honduras, El Salvador, Guatemala).

  - Strong **incumbents**, **lack of strong** Internet technical community and infrastructure

  - **ISPs reselling traffic**

  - **Pre Best Practices training with Governments (Reg+Min):**
    - Help **invite companies** to initial training sessions
    - **Joint training objective** – train the Govt and Internet community
    - Faster progress → countries where the Govt does not try to regulate the entire process
    - Two **different examples using the same approach**:

      - Costa Rica: Did not mandate everything be regulated.

      - Bolivia: Imbedded in law and regulation. Top down. Longer process.

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LAC – Capacity Building & Partnerships (cont…)

- **Intro+ to BGP** and **traffic engineering** using BGP (how to reflect their businesses in the network – preference for routes from IXP) (total 3 days)

- **Joint training** usually with LACNIC, LACNOG, PCH, Governments, company experts – basics of architecture and how to obtain resources (addresses and ASNs)

- **Equipment**: Work with local experts to identify their needs and help provide equipment (Cisco, Google Foundation):

  - **Start-up**: Difficult at the beginning (think of IXP as additional set of costs). Provide **equipment and training** and the value of the IXP becomes more apparent

  - Later: **Easier to "level-up"** to charge (maintenance, upgrades, electricity)
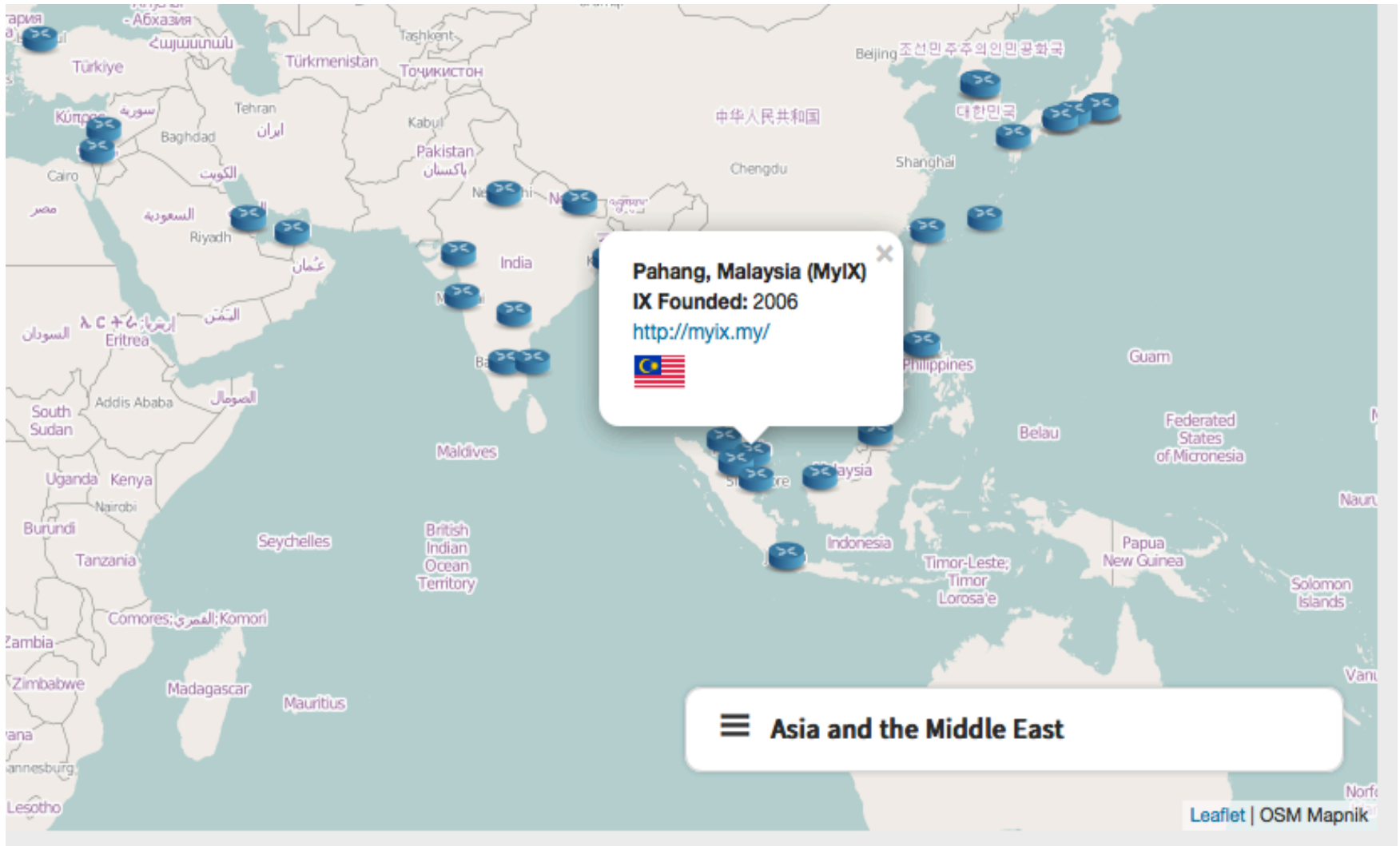
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LAC Partnerships have developed and....

- **Development of LAC-IX**

  - ISOC and LACNIC helped develop LAC-IX

  - ISOC working with LACNIC and partners to train in the region

- **Community Building**

  - Regional Interconnection **Forum** (within LACNIC Meeting)

  - **LAC Peering Forum** (WG within LACNOG)

- **Partners**

  - LACNIC, LAC-IX, NIC.BR, PCH, LACTLD

  - Governments: CITEL, regulators, ministries

  - Cisco, Google Foundation

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IXP Toolkit & Best Practices Project

- **The Internet Society was awarded a grant to extend its Internet exchange point (IXP) activities in emerging markets.**

- **The IXP Toolkit Grant builds on the Internet Society's previous efforts and is:**

    - Creating and improving an IXP **Toolkit** | A study and Methodology to Identify Best Practices | http://www.internetsociety.org/ixptoolkitguide

    - Creating and improving an IXP "**Portal**" | www.ixptoolkit.org

    - Partnering to Conduct **Training and Hold Workshops** | Building Capacity around the World
        - Working with: Academics, Euro-IX, IXPs (INEX, Lyon-IX), LACNIC, RIPE-NCC, NSRC (in works)
        - Also working in: Asia-Pacific, Eastern Europe, Commonwealth of Independent States

IXP Toolkit & Portal | Maps

Pahang, Malaysia (MyIX)
IX Founded: 2006
http://myix.my/

Asia and the Middle East

Leaflet | OSM Mapnik

Keeping "Local Traffic Local"

- **Develop local Internet infrastructure & Ecosystem**

  - Human | people

  - Technical | equipment & training

  - Governance | evolving models

- **Snowden implications**

  - Questions from local governments about local traffic

  - IXP is **not set-up to be** a monitoring facility

  - Local content creation, local hosting, local DNS

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Thank you | Gracias | Merci

Questions?

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