Building Internet Exchange Points

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Summary

- Background Information

- Overview of IXPs World Wide

- IXP Policies and Governance Questions

- Best Practices

- A Checklist for Building IXPs

- Questions & Answers

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Background Information

- The Internet is a decentralized network of autonomous commercial interests.

- Internet Service Providers (ISPs) operate by exchanging traffic at their border, forwarding data from its source to its destination.

- This exchange can be settlement-free (also known as *peering*) or paid (also known as *transit*).

- Internet exchanges are used to peer, If no IXP facility exists then all traffic must be purchased from foreign ISPs.

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What is an Internet Exchange Point?

- **Switch Fabric Enabling Physical Interconnection of Networks.**

  - Fastest and cheapest way of exchanging traffic between a large number of participants.

  - Switching (L2) scales much better than routing (L3)

  - Direct paths are always the shortest and cheapest paths.

- **Bandwidth generation point**

  - Peering creates value and transit exports capital.
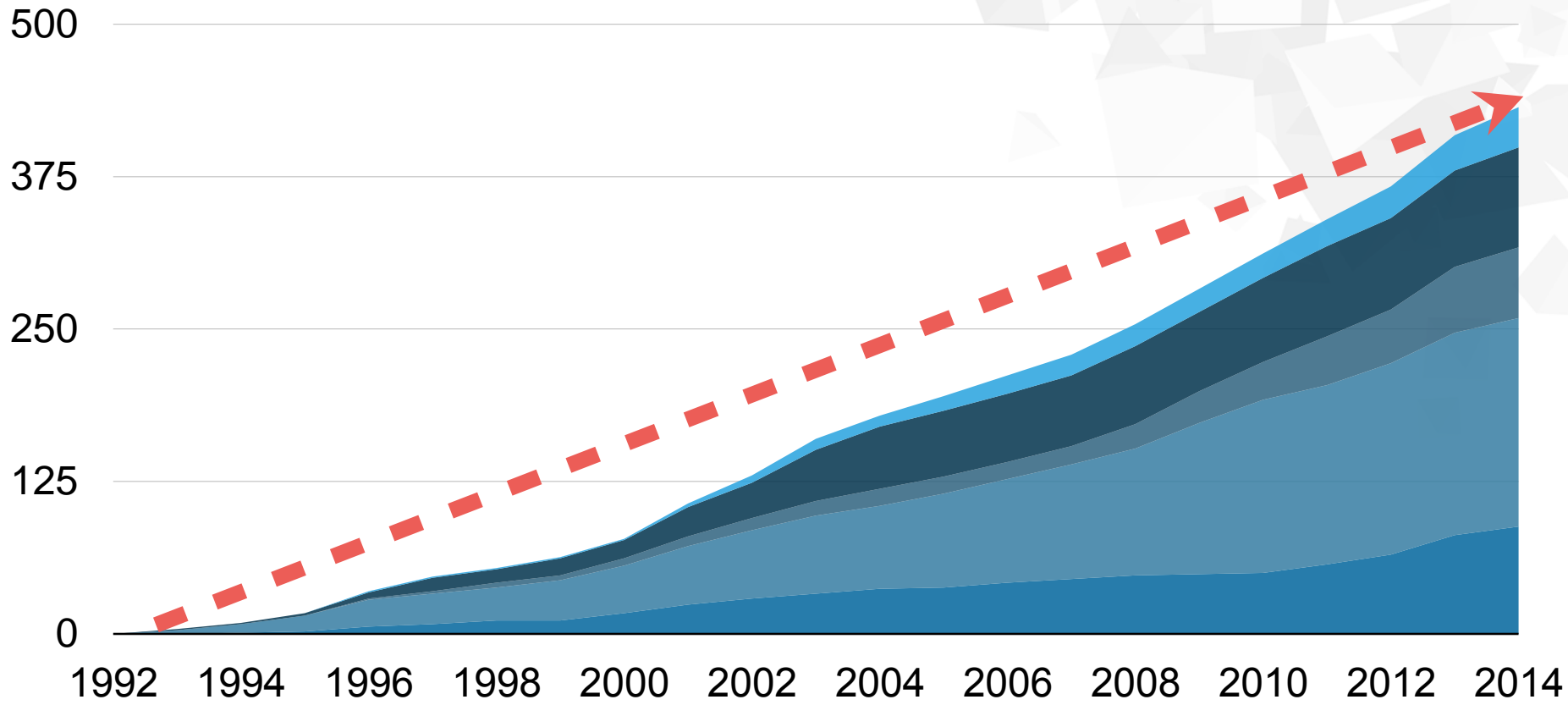
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Benefits of IXP

- Cost and Performance Benefit

- Autonomy as a Region

- Natural Ecosystem for Content Driven Systems to Develop
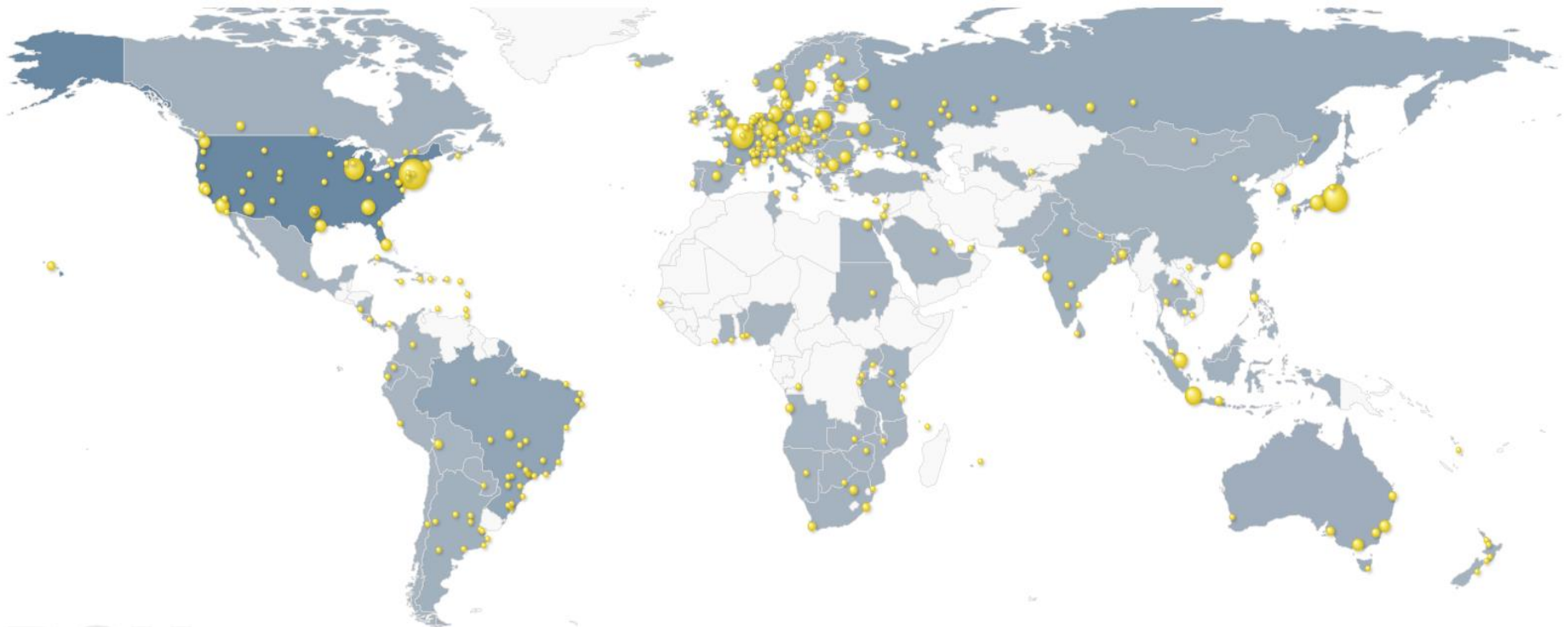
- Knowledge Worker Environment Improved

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Overview of IXPs Word Wide

- The first Internet exchange was built in1994 in the United States.

- Other countries quickly followed: Finland, Norway, United Kingdom, Russia, Hong-Kong, Germany, France, etc.

- Today there's about 430 IXPs built in 114 countries. There are still 87 countries that do not have IXPs.

- Iran has a facility performing traffic exchange in Tehran (Not a L2 Exchange).
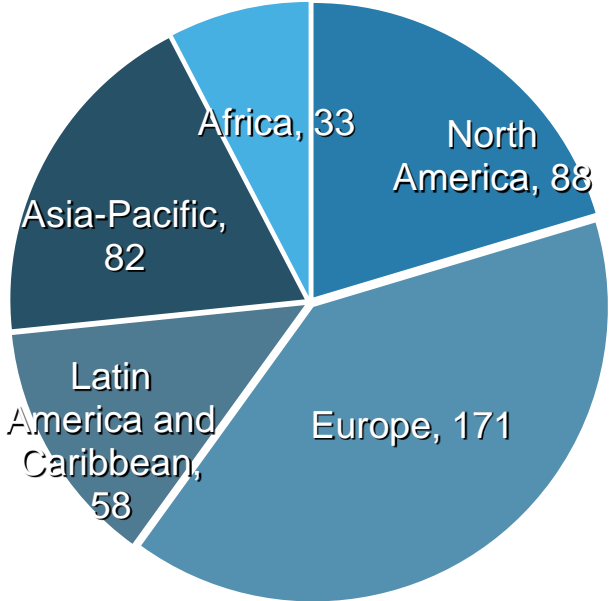
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Active IXPs by Region (1992-2014)

■ North America ■ Europe ■ Latin America and Caribbean ■ Asia-Pacific ■ Africa

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Overview of IXPs Word Wide

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Overview of IXPs Word Wide

IXP Policies and Governance Questions

- **Governance and Business Structure:**
  Who owns the exchange? How does the exchange take decisions? How we maintain neutrality? How is the exchange operated on a daily basis?

- **Policies:**
  What policies are applied? What process is followed to change the policies?

- **Services:**
  What are the services available at the exchange?

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IXP Policies and Governance Questions

- **Governance and Business Structure**

  - Incorporated or Unincorporated?

  - Staffed or Volunteer?

  - Non-profit or Commercial?

  - Cooperative or External Ownership?

  - Cost-Recovery (Predictive or Actuals), ad-hoc, or Market Pricing?

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IXP Policies and Governance Questions

- **Policies**

  - Bilateral Peering Agreements (BLPA), Multi-lateral PA (MLPA) or Mandatory MLPA (MMLPA)?

  - Mandatory looking-glass?

  - Routing and Switch Port Information be Public or Members-Only?

  - Secrecy in the Event of Security Problems, Failures, or Mistakes?

  - Extensible Switch Fabric?

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IXP Policies and Governance Questions

- **Services**

    - Switch Fabric (L2 Ethernet Switch)

    - Cross-Connects (L1)

    - Route Server

    - Remote Hands

    - Network Time Protocol

    - DNS root Servers

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Best Practices

- **Governance and Business Structure**

  - Membership-Based Association with Annual General Meeting voting for a Technical Committee that oversees the operations of the IXP.

  - Neutral and Trustworthy: All IXPs decisions should remain neutral and no participant should benefit in one way or another.

  - Non-Profit making (Cost-Recovery) and built with participant's contributions rather than fee-based.

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Best Practices

- **Policies**

  - Draft one IXP Policy document only, simple and clear. Policies should be a tradeoff between minimizing costs and service portfolio.

  - Be as inclusive as possible: All entities with an ASN and using BGP should be welcome.

  - Build inexpensive and easy to manage IXPs that can later grow, participants will see a faster return on investment.

  - Focus on growth in the early days of the exchange to create momentum: make easy to join the exchange

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Best Practices

- **Services**

  - Start simple with your Switch Fabric and allow BLPA among participants. Route Servers can add unnecessary complexity at the beginning.

  - Basic website with the IXP policy document, participants data to facilitate peering and statistics (if possible).

  - Other services should be planned and discussed among members because they would likely require time investment.

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Check List to Build IXPs

- **Determining Need:** Do we really need an Internet Exchange Point?

- **Governance and Business Structure:** What governance structure, policies and services should the IXP have?

- **Geographic Location:** Which is/are the best location/s to build exchange points?

- **Building Conditioning:** What does the location need to be conditioned?

- **Services:** What are the services that the exchange will provide to its members?

- **Capacity Building:** Identify the areas of human resource development and the target groups.

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Check List to Build IXPs

- **Determining Need**

  - Is there sufficient end-user base and locally-destined traffic to build an Exchange Point?

  - Is there an existing facility to build upon?

- **Governance and Business Structure**

  - Governance and Management Model

  - Commercial or Non-Profit?

  - BPA, MLPA or MMLPA?

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Check List to Build IXPs

- **Geographic Location**

  - Analysis of the User Population, Density Maps and Financial Sector.

  - Are there ICT facilities with Fiber or location with rights-of-way?

  - Where are the founding participants located?

- **Building Conditioning**

  - Pathways

  - Analysis of the power and cooling needs

  - Access and security of the building

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Check List to Build IXPs

- **Services**

  - Switch Fabric, Cross-Connects, Route-Server, Remote Hands, NTP, DNS

  - Website, Participants Data, Traffic Statistics

  - Looking glass for troubleshooting

- **Capacity Building**

  - Key Areas: Policy, Commercial and Technical

  - Routing and Switching Technologies: BGP, VLANS, MPLS

  - New Roles: Peering Manager, Business Development

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Thanks to

Any Questions?