What is an IXP?

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Internet Neutral Exchange Association
Company Limited by Guarantee
Just a Switching Platform
Switch

Switch
What is an IXP?

IXPs - the IX-F Definition

• An Internet Exchange Point (IXP) is a network facility that enables the interconnection and exchange of Internet traffic between more than two independent Autonomous Systems.

• An IXP provides interconnection only for Autonomous Systems.

• An IXP does not require the Internet traffic passing between any pair of participating Autonomous Systems to pass through any third Autonomous System, nor does it alter or otherwise interfere with such traffic.
Generally speaking, three types of IP connectivity:

- Private Network Interconnections (PI or PNI)
- Internet eXchange Point (IXP)
- Regular IP Transit (IPT)
IXPs and IP connectivity

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  • latency
  • available bandwidth
  • “control” - more recently we also consider mitigation against DDoS.
IXPs and IP connectivity

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What is an IXP?
<table>
<thead>
<tr>
<th>What is an IXP?</th>
<th>IP Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IXPs</strong></td>
<td><strong>IP Transit</strong></td>
</tr>
<tr>
<td>• Less Expensive</td>
<td>• More expensive</td>
</tr>
<tr>
<td>• Limited routes</td>
<td>• Near or 100% routes</td>
</tr>
<tr>
<td>• Member &amp; community</td>
<td>• You’re just a customer</td>
</tr>
<tr>
<td>• Greater control</td>
<td>• Limited or no control</td>
</tr>
<tr>
<td>• Greater QoS</td>
<td>• Main problems:</td>
</tr>
<tr>
<td>• Traffic remains local</td>
<td>• Latency</td>
</tr>
<tr>
<td>• Lower latency</td>
<td>• Routing</td>
</tr>
<tr>
<td>• No congestion</td>
<td>• Congestion</td>
</tr>
<tr>
<td>• Greater reliability</td>
<td></td>
</tr>
<tr>
<td>• Enhanced security</td>
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</tbody>
</table>
Northern Ireland: 1.8m  
Republic of Ireland: 4.6m  
Total: 6.5m  
Land Area: 85,000 Km²
UK spy base GCHQ tapped Irish internet cables

Snowden documents reveal how British intelligence target Irish internet traffic
Why did Ireland need an exchange?

- Internet connectivity was extremely expensive
- Cost of IP Transit was $250,000 per megabit per month
- Speed of access was crippling low
- Local IXP would relieve international links
- Local traffic routed via London / Amsterdam
- Greater security / resilience for local traffic

What is an IXP?
What is an IXP?

First Attempt: DINX

- Neutrality not mandated in its Constitution
- No neutral colocation
- Two members decided to hijack the process
- IXP didn’t grow beyond two members
Second Attempt: INEX

- HEAnet – Ireland’s NREN
- EUnet Ireland (acquired by BT Ireland)
- Indigo (acquired by Eircom - NPT)
- Telecom Internet (acquired by Eircom - NPT)
What is an IXP?

INEX - Governance Structure

- Neutrality enshrined in Company Memo & Arts
- No member is more privileged than any other
- Not for profit “Company Limited by Guarantee”.
- Open to anyone agreeing to and meeting the MoU
  - MoU has policy and technical requirements
  - Publicly available on the INEX web site - www.inex.ie
- Owned by the members (currently ~91 full members, 18 associate members)
INEX - Governance Aims

- Provide high-speed, reliable and resilient IP traffic exchange facilities
- Allow national and international members to route traffic more efficiently
- Keep Irish IP traffic in Ireland
- Only an IXP - no feature creep into other areas
What is an IXP?

**INEX - Organisational Structure**

- Controlled by a committee of the members
  - Two year term, term limits for chairman
- Delegates day-to-day operations to the management team:
  - Barry Rhodes – CEO
  - Eileen Gallagher – Marketing and Membership Development
  - Nick Hilliard (CTO) – Operations (out-sourced)
  - Barry O'Donovan – Operations (out-sourced)
  - Louisa Holmes – Administration / billing
  - Roisin King, Denis Nolan joined in 2016
- All part time
Sample of INEX Members
IXP Technicalities
Not “Just” a Switching Platform
What is an IXP?

INEX - Pro Bono Connections

- Verisign ‘J’ DNS root server (.com/.net)
- PCH ‘D’, ‘E’ DNS root server, Top-Level Domains
- AS112
- RIPE ‘K’ DNS root (INEX Cork)
- RIPE Atlas anchors (Dublin and Cork)
What is an IXP?

INEX - Routing Assistance Systems

- Route collector - http://rc1-lan1-ipv4.inex.ie/lg/
- Resilient route servers
- Without route servers, full mesh peering at an exchange is \( n \times (n-1) \) sessions
  - 72 members means potentially 8,190 BGP sessions.
IXP Manager is a full stack management system for Internet eXchange Points (IXPs) which includes an administration and customer portal; provides end to end provisioning; and both teaches and implements best practice.
• Full-stack IXP Management System, including switch configuration
Any Questions?
IXP Traffic
<table>
<thead>
<tr>
<th></th>
<th>Max</th>
<th>Average</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>In</td>
<td>155.720 Gbits</td>
<td>76.845 Gbits</td>
<td>92.786 Gbits</td>
</tr>
<tr>
<td>Out</td>
<td>156.002 Gbits</td>
<td>76.828 Gbits</td>
<td>93.125 Gbits</td>
</tr>
</tbody>
</table>
Regional Wireless ISP in Ireland
What Routers do People Use?

- **Cisco**: 34%
- **Juniper**: 30%
- **PC / VMware**: 16%
- **Mikrotik**: 14%
- **Others**: 5%