IXP database and tool

LACNIC 2017

Foz do Iguazu, Brazil
Euro-IX - What do we do?

- Two fora per year
- Maintain and develop the website, database and tools
- Annual European IXP Report
- Mentor-IX programme
- Fellowship programme
- Benchmarking Club (BMC)
Talk to us and each other

- Mailing lists
- Newsletter – Subscribe here:
  - [euro-ix.net/news-and-events/newsletter/](http://euro-ix.net/news-and-events/newsletter/)
- Working Groups
- Social Media
  - Twitter   @euroix
  - Facebook fb.me/maineuroix
  - YouTube  [youtube.com/channel/UCFyucVRAAMzxyJlslxnGwsjw](https://youtube.com/channel/UCFyucVRAAMzxyJlslxnGwsjw)
82 affiliated IXPs:
• 56 IXPs in the Euro-IX Region 49 Countries, operating over 100 Peering LANs
• 26 IXPs from the rest of the world
• Newest Members:
  CAS-IX
  Beirut-IX
Patrons

- Arista
- Brocade
- Ciena
- Coriant
- ECI Telecom
- Equinix I Telecity
- Extreme Networks
- Huawei
- Interxion
- Juniper Networks
- MRV
- Nokia
- Telehouse
Internet Exchange Federation

NA-IX

LAC-IX

EURO-IX

APIX

AF-IX
Internet Exchange Federation

• MOU signed by APIX, Euro-IX and LAC-IX to form the IX-F in November 2012 – www.ix-f.net
• Af-IX signed the MoU to join the IX-F
• Idea to have a Global IXP DB
• Global IXP BCPs
• Automate Data Collection from IXPs
• Plans to collaborate with other external Databases
Internet Exchange Federation

- **Af-IX**
  Nishal Goburdhan – JINX (South Africa)
  Kyle Spencer – UIXP (Uganda)

- **APIX**
  Katsuyasu Toyama - JPNAP (Japan)
  Gavin Tweedie - Megaport (Australia)

- **Euro-IX**
  Ondrej Filip – NIX.cz (Czech Republic)
  John Souter - LINX (United Kingdom)

- **LAC-IX**
  Ariel Graizer - NAP CABase (Argentina)
  Milton Kashiwakura - PTT.br (Brazil)
Euro-IX Website

Welcome to Euro-IX
We are an association of Internet Exchange Points (IXPs), promoting an open interchange of ideas and experiences, gained to mutual advantage of the membership, by offering fora, workshops, tutorials, mailing lists and online resources.

Register for an account
Learn more about what we do

The 29th Euro-IX forum goes to Krakow! 6 - 8 November 2016.

Latest News

OCTOBER NEWSLETTER  OCT. 10, 2016
With only a few weeks left until the 29th forum, we encourage all those who want to attend to register ASAP. There will be a tour of the districts on Sunday 6th at 12.30, and a RIPE ATLAS workshop in the evening. Find out more about the forum and register here.

We welcome new patron ARISTA to the Euro-IX community! Read their introduction and find out about the improved IX-F DB in the latest newsletter.

TESPOK LAUNCHES AFRICA’S FIRST GLOBAL ROAMING EXCHANGE  SEPT. 12, 2016

What is an IXP?

The Internet eXchange Federation has defined an IXP as:
A network facility that enables the interconnection of more than two independent Autonomous Systems, primarily for the purpose of facilitating the exchange of Internet traffic.
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...
Website – Top Improvements!

1. ASN Automation
2. Switch Database
3. Route Server Database
4. Edit your own profile
5. Edit your organisation and team members
6. Peering matrix, service matrix and ASN database all working
7. Database quality improvements
IXP Database
Organization Profile

Internet Neutral Exchange Association

Location: Ireland
Established: 1996-09-01
Affiliation: Member
Board Contact:
Email: barry.rhodes@inex.ie
Website: https://www.inex.ie/
## IXP Database

### Organization Profile

<table>
<thead>
<tr>
<th>NAME</th>
<th>COUNTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMS-IX Bay Area</td>
<td>United States of America</td>
</tr>
<tr>
<td>AMS-IX Caribbean</td>
<td>Netherlands Antilles</td>
</tr>
<tr>
<td>AMS-IX Chicago</td>
<td>United States of America</td>
</tr>
<tr>
<td>AMS-IX Hong Kong</td>
<td>China</td>
</tr>
<tr>
<td>AMS-IX India</td>
<td>India</td>
</tr>
<tr>
<td>AMS-IX New York</td>
<td>United States of America</td>
</tr>
<tr>
<td>Amsterdam Internet Exchange</td>
<td>Netherlands</td>
</tr>
</tbody>
</table>
**IXP Database**

### IXP Profile

**Internet Neutral Exchange Association**

<table>
<thead>
<tr>
<th>AS #</th>
<th>COMPANY</th>
<th>IPv6</th>
</tr>
</thead>
<tbody>
<tr>
<td>34216</td>
<td>Irelcom</td>
<td>✓</td>
</tr>
<tr>
<td>29644</td>
<td>Airspeed Telecom</td>
<td>✓</td>
</tr>
<tr>
<td>40327</td>
<td>Arwire</td>
<td>✓</td>
</tr>
<tr>
<td>20940</td>
<td>Atlam Technologies</td>
<td>✓</td>
</tr>
<tr>
<td>10009</td>
<td>Amazon</td>
<td>✓</td>
</tr>
<tr>
<td>61194</td>
<td>Another 9</td>
<td>✓</td>
</tr>
<tr>
<td>49567</td>
<td>Aptus Broadband</td>
<td>✓</td>
</tr>
<tr>
<td>5590</td>
<td>Astra IP Networks</td>
<td>✓</td>
</tr>
<tr>
<td>47680</td>
<td>Bitnet</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Automations**

- **ASN Link**: ✓
- **Traffic Link**: ❌
# IXP Database

## ASN Database

<table>
<thead>
<tr>
<th>IXP PARTICIPANTS</th>
<th>IPv6</th>
<th>UNIQUE ASNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EURO-IX</td>
<td>8715</td>
<td>5488</td>
</tr>
<tr>
<td>APIX</td>
<td>1513</td>
<td>447</td>
</tr>
<tr>
<td>AF-IX</td>
<td>335</td>
<td>64</td>
</tr>
<tr>
<td>LAC-IX</td>
<td>1883</td>
<td>1258</td>
</tr>
<tr>
<td>NORTH AMERICA</td>
<td>2185</td>
<td>538</td>
</tr>
<tr>
<td>GLOBAL</td>
<td>14641</td>
<td>7795</td>
</tr>
</tbody>
</table>
## IXP Database

### ASN Database

<table>
<thead>
<tr>
<th>AS#</th>
<th>COMPANY</th>
<th>PRESENT AT</th>
<th>IPV6</th>
</tr>
</thead>
<tbody>
<tr>
<td>6939</td>
<td>HE</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>20940</td>
<td>Akamai</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15169</td>
<td>Google</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3850</td>
<td>Packet Clearing House</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>WoodyNet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8075</td>
<td>Microsoft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22652</td>
<td>Limelight Networks, Inc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10910</td>
<td>Yahoo Inc. (B)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13335</td>
<td>CloudFlare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18609</td>
<td>Amazon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28415</td>
<td>VeriSign Netherlands BV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15133</td>
<td>Edgecast</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

** IXPs **

- AMS-IX
- AMS-IX Bay Area
- AMS-IX Chicago
- AMS-IX Hong Kong
- AMS-IX New York
- BBIX - Tokyo
- BCIX
- BIX.BG
- BIX
- Big APE
- CATNIX
- CoreSite - Any2 Denver / RIX Denver
- CoreSite - Any2 Los Angeles
- DE-CIX Frankfurt
- DE-CIX Hamburg
- DE-CIX Marseille
- DE-CIX Munich
- DE-CIX New York
- DIX - Lyngby
- ECIX Berlin
### Peering Matrix

<table>
<thead>
<tr>
<th>IXP</th>
<th>ASNs</th>
<th>ASNs that don't peer at other IXP</th>
<th>% of ASNs that don't peer at other IXP</th>
<th>% of ASNs that peer at other IXP</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMS-IX</td>
<td>79.77</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>AMS-IX Caribbean</td>
<td>30.77</td>
<td>2</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>ARIIX</td>
<td>0.00</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Angonix</td>
<td>50.00</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>BIX - Tokyo</td>
<td>62.50</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>BCIX</td>
<td>70.89</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>BIX.BG</td>
<td>58.33</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>BNX</td>
<td>53.33</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>BIX</td>
<td>42.86</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>CATNIX</td>
<td>37.50</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>CIK</td>
<td>37.50</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>CIKP</td>
<td>75.00</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>DE-IX - Frankfurt</td>
<td>72.48</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>DK - Lyngby</td>
<td>59.09</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>ECIX Berlin</td>
<td>83.62</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Equinix Paris</td>
<td>83.36</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Equinix Zurich</td>
<td>98.95</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>FICIX - Helsinki</td>
<td>56.67</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>FVGI-IX</td>
<td>75.00</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>France-IX Paris</td>
<td>89.80</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>IXP</td>
<td>Location</td>
<td>ASN</td>
<td>RS ASN</td>
<td># of customers</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------</td>
<td>-------</td>
<td>--------</td>
<td>---------------</td>
</tr>
<tr>
<td>AMS-IX Bay Area</td>
<td>San Francisco</td>
<td>23</td>
<td>17</td>
<td>73.91</td>
</tr>
<tr>
<td>AMS-IX Caribbean</td>
<td>Willemstad, Curacao</td>
<td>28017</td>
<td>14</td>
<td>32.85</td>
</tr>
<tr>
<td>AMS-IX Chicago</td>
<td>Chicago</td>
<td>21</td>
<td>17</td>
<td>80.95</td>
</tr>
<tr>
<td>AMS-IX Hong Kong</td>
<td>Hong Kong</td>
<td>58516</td>
<td>32</td>
<td>78.12</td>
</tr>
<tr>
<td>AMS-IX India</td>
<td>Mumbai</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AMS-IX New York</td>
<td>New York</td>
<td>62981</td>
<td>18</td>
<td>94.44</td>
</tr>
<tr>
<td>ATMiX</td>
<td>Yerevan</td>
<td>51225</td>
<td>10</td>
<td>80.00</td>
</tr>
<tr>
<td>Angonix</td>
<td>Luanda</td>
<td>327788</td>
<td>2</td>
<td>100.00</td>
</tr>
<tr>
<td>Arcalif (BE)</td>
<td>Arcalif</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BBX - Hong Kong</td>
<td>Hong Kong</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BBX - Tokyo</td>
<td>Tokyo</td>
<td>23840</td>
<td>8</td>
<td>12.50</td>
</tr>
<tr>
<td>BCJX</td>
<td>Berlin</td>
<td>16374</td>
<td>83</td>
<td>86.75</td>
</tr>
<tr>
<td>BX</td>
<td>Bergen</td>
<td>0</td>
<td>4</td>
<td>50.00</td>
</tr>
<tr>
<td>BX BX</td>
<td>Sofia</td>
<td>15669</td>
<td>77</td>
<td>45.75</td>
</tr>
<tr>
<td>BNIX</td>
<td>Brussels</td>
<td>5406</td>
<td>45</td>
<td>31.11</td>
</tr>
<tr>
<td>Belo Horizonte (MG)</td>
<td>Belo Horizonte</td>
<td>29</td>
<td>13</td>
<td>44.83</td>
</tr>
<tr>
<td>Belm (BEL)</td>
<td>Belém</td>
<td>15</td>
<td>6</td>
<td>40.00</td>
</tr>
<tr>
<td>BIX</td>
<td>Budapest</td>
<td>5507</td>
<td>49</td>
<td>75.51</td>
</tr>
<tr>
<td>Brasilia (DF)</td>
<td>Brasilia</td>
<td>32</td>
<td>21</td>
<td>65.62</td>
</tr>
<tr>
<td>CATNIX</td>
<td>Barcelona</td>
<td>49638</td>
<td>35</td>
<td>62.86</td>
</tr>
<tr>
<td>CHN-IX</td>
<td>Beijing</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CIX</td>
<td>Zagreb</td>
<td>51702</td>
<td>32</td>
<td>34.38</td>
</tr>
<tr>
<td>CXP</td>
<td>Geneva</td>
<td>57859</td>
<td>36</td>
<td>19.44</td>
</tr>
</tbody>
</table>
IXP Database

### ASN Database

<table>
<thead>
<tr>
<th>Status</th>
<th>Search</th>
<th>Recent</th>
<th>Common</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Search**

ASN, IXP or Organization

**Advanced Filters**

- **First Level:**
  - **Option:** Nothing selected
- **Second Level:**
  - **Option:** Nothing selected

Filter: Toggle Advanced Filters
IXP Database – where are we?

• Database schema is in place for IXPs to record their information about themselves and the operators they serve

• IXP API is live - https://db.ix-f.net/api/ixp
IXP Database – What’s next?

- Extend and internationalise the admin interface for all IXPAs (APIX, LAC-IX and AF-IX)
- Create bespoke maintained APIs
- Future revisions to the database schema to capture more data
IXP Member List JSON Schema
IXP Database – IXP JSON Schema

- Contains both IXP data & IXP participant data
  - ASN (member list), locations, switch, RS, etc etc
- Open, consistent & an atomic design
- Currently 24 IXP independent implementations
  (API includes data from euro-ix portal entered manually or via .csv)
- Open source implementation in IXP Manager
- Further information about the Member Lists can be found here: [http://ml.ix-f.net](http://ml.ix-f.net)
- Source available on GitHub; [https://github.com/euro-ix/json-schemas](https://github.com/euro-ix/json-schemas)
Why not just use the IXPs own data?

• This gives you a single API for many IXPs
• Get the same format for all IXPs, its standard – wohoo!
• Data is fed from the IXP – IXPs have accurate data, they own it.
• Portable, supportable and scaleable!
IXP Database – use case e.g. 1

Thanks to Andy Davidson for the example

“who am I not peering with at LONAP?”

• You have a script which load direct adjacencies into an array
• You need a complete and canonical list of peers to compare differences
IXP Database – use case e.g.1

Using the IXP API

https://db.ix-f.net/api/ixp
IXP Database – use case e.g.1

```json
{
  "ixp_info": {
    "status": "active",
    "updated": "2014-02-17T08:51Z",
    "name": "London Network Access Point",
    "created": "2011-08-16T13:36:36Z",
    "shortname": "LONAP",
    "ixp_id": "IX-F#18"
  },
  "timestamp": "2015-09-16T08:17:31.116Z",
  "version": "2014110401",
  "member_list": [
    {
      "asnum": 26915,
      "name": "180 Percent"
    },
    {
      "url": "http://www.2connectbahrain.com/",
      "asnum": 51406,
      "name": "2Connect"
    },
    {
      "url": "http://www.34sp.com",
      "asnum": 41337,
      "name": "34SP.com Ltd"
    },
    {
      "url": "http://4d-dc.com/",
      "asnum": 31463,
      "name": "4D Data Centres"
    },
    {
      "url": "http://www.afilias.info",
      "asnum": 12041,
      "name": "Afilias"
    },
    {
      "url": "http://www.akamai.com",
      "asnum": 20940,
      "name": "Akamai Technologies"
    },
    {
      "url": "http://www.alentus.com",
      "asnum": 21321,
      "name": "Alentus UK Ltd"
  ]
}``
IXP Database – use case e.g.1

```python
import urllib, json

url = "http://db.ix-f.net/api/ixp/18/member-list"
response = urllib.urlopen(url)

ixpdata = json.loads(response.read())

my_peers = [8916, 20940, 20915, 51406, 41357, 31463, 12041, 21321, 12536, 16509, 20712, 33920, 4

for member in ixpdata["member_list"]:
    if member["asnum"] not in my_peers:
        print "Get some peering with " + str(member["asnum"]) + " (" + member["name"] + ")"
```
IXP Database – use case e.g.1

enigma:Desktop andy$ python ixp.py
Get some peering with 6871 (PlusNet)
Get some peering with 8689 (PowerGroup (Power Internet Ltd))
Get some peering with 8676 (PRT Systems)
Get some peering with 28792 (Public Internet Limited)
Get some peering with 31402 (Rank Interactive (Blue Square Limited))
Get some peering with 35662 (Redstation)
Get some peering with 5552 (Redstone Communications Ltd)
Get some peering with 5503 (RM Education Plc)
Get some peering with 51409 (Sectorsix)
Get some peering with 50056 (Advantage Interactive Ltd)
Get some peering with 29550 (Simply Transit Ltd.)
Get some peering with 48961 (Warwicknet Ltd)
Get some peering with 20738 (Webfusion)
Get some peering with 44444 (Websense Hosted R&D Ltd. (UK))
Get some peering with 49158 (Wifinity)
Get some peering with 13037 (Zen Internet)
enigma:Desktop andy$
Create clients.yml file from Euro-IX member list JSON file using ArouteServer

- The Euro-IX ML JSON Schema defines a portable output format to export the list of members connected to an IXP
- These can fetch the list of clients and their attributes (AS-SETs, max-prefix limits)
- automatically build the clients.yml file used by ARouteServer to generate route server’s configuration
- The client command you use is:

  arouteserver clients-from-euroix --url <URL> <ixp_id> -o <output_file>
The JSON file contains information about more than one IXP for every IX e.g., AMS-IX has ‘AMS-IX’, ‘AMS-IX Caribbean’, ‘AMS-IX Hong Kong’ and more.

To filter only those clients which are connected to the IXP of interest an identifier (ixp_id) is needed.

When executed without the ixp_id argument, the command prints the list of IXPs and VLANs reported in the JSON file; the ID can be found on this list:
$ arouteserver clients-from-euroix --url https://my.ams-ix.net/api/v1/members.json

IXP ID 1, short name 'AMS-IX'
- VLAN ID 502, name 'GRX', IPv4 prefix 193.105.101.0/25, IPv6 prefix 2001:7f8:86:1::/64
- VLAN ID 504, name 'MDX', IPv4 prefix 195.60.82.128/26
- VLAN ID 600, name 'PI'
- VLAN ID 501, name 'ISP', IPv4 prefix 103.247.139.0/25, IPv6 prefix 2001:13c7:6004::/64

IXP ID 3, short name 'AMS-IX Caribbean'
- VLAN ID 600, name 'PI'
- VLAN ID 501, name 'ISP', IPv4 prefix 103.247.139.0/25, IPv6 prefix 2001:13c7:6004::/64

IXP ID 2, short name 'AMS-IX Hong Kong'
- VLAN ID 501, name 'ISP', IPv4 prefix 103.247.139.0/25, IPv6 prefix 2001:13c7:6004::/64

...
IXP Database – use case e.g.2

- An example from LONAP:

```bash
$ arouteserver clients-from-euroix --url https://portal.lonap.net/apiv1/member-list/list 1
clients:
- asn: 42
  cfg:
    filtering:
      irrdb:
        as_sets:
        - AS-PCH
      max_prefix:
        limit_ipv4: 100
        description: Packet Clearing House AS42
        ip: 5.57.0.0/23
- asn: 42
  cfg:
    filtering:
      irrdb:
        as_sets:
        - AS-PCH
      max_prefix:
        limit_ipv6: 100
        description: Packet Clearing House AS42
        ip: 2001:7f8:17::2a:1
- asn: 714
  cfg:
    filtering:
      irrdb:
        as_sets:
        - AS-APPLE
      max_prefix:
        limit_ipv4: 1000
        description: Apple Europe Ltd
        ip: 5.57.81.57
...
• Thanks to Pier Carlo Chiodi for his work on this subject.
• More of his work is on GitHub:
In search of accurate information

• Peering networks can go to two sources of data to guarantee accuracy
• Tools and portal available on the Euro-IX website, future development for APIX, LAC-IX and AF-IX
• IXPAs have regional reach to local IXPs
• The data is complementary to database services that the RIR/NIRs & PeeringDB provide
IXP Database Funding

• Funding so far has been from Euro-IX
• We need funds to continue development
• Next stage includes:
  • Interface to database for all IXPAs
  • Fetch data center data from external databases
  • Enhance the data set e.g. add IP Addressing from IXPs
  • Outreach and training for IXPs

Please contact bijal@euro-ix.net if you are interested in supporting this work!
Thank You!

Bijal Sanghani
Bijal at euro-ix dot net
Twitter: @euroix