Internet eXchange points

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Why an exchange point (IX)?

- speed
- predictability
- independance
- money

"Keep local traffic local"

By the way, what is an IX?

- (architecture) a point where Internet operators exchange traffic
- (hardware) a set of switches where members plug themselves in

Peering

As an operator, you are no longer connecting to a provider only.

You also connect to peers.

IX for speed

No need to go through slown and overused international lines.

IX for predictability

Less hardware, less lines.
ping times are more predictable.

IX for independance

Traffic between two countrymen should not go through a different country (what if they have a political crisis?)

IX for money saving

Peering through an IX is typically gratis.

(Peering is specially interesting if you do not pay a flat rate for your Internet links.)

IX, layer 1/2

An IX is typically an Ethernet switch

(Or a group of switches connected at the layer 2.)

100 Mb/s is more than enough for most IX.

Location

If located in a data center, members may connect from their nearby router.

(Ethernet-only IX.)

Otherwise, members may install a router in the IX.

Annd install a leased line to their network.

IX, layer 3

Most IX does not provide any layer 3 service, besides IP addresses allocation for the routers.

Some provide a route server.

Members establish peering relations by running BGP between their routers. The IX is not involved.

IP addresses for the IX

(ep.net can provide them.)

```
inetnum:      80.67.175.0 - 80.67.175.63
netname:      POUIX
descr:        POUIX internet exchange
country:      FR
admin-c:      SB4267-RIPE
admin-c:      PB401
admin-c:      FC2409-RIPE
tech-c:       GI1036-RIPE
status:       ASSIGNED PA
```

Small reminder about IP routing

BGP allow providers to exchange routes.

Exchange of traffic can then occur.

The BGP speaker and the actual forwarding router may be different.

Units of routing for BGP are Autonomous Systems (AS), not networks.

IX, layer 7

Statistics, monitoring, looking glass, Usenet, NTP, multicast exploders, etc.

Connecting to an IX

- Cabling (from an Ethernet cable to a leased line)
- Configuring your router (IP address)
- Finding peers (if no route servers)
- Configuring BGP
- Updating Afrinic info :-)

BGP, route server

```
neighbor 80.67.175.6 remote-as 65432
neighbor 80.67.175.6 update-source eth0
neighbor 80.67.175.6  next-hop-self
neighbor 80.67.175.6 description Pouix route server
neighbor 80.67.175.6 prefix-list announce-out out
neighbor 80.67.175.6 filter-list 1 out
neighbor 80.67.175.6 prefix-list peer-in in
neighbor 80.67.175.6 route-map pouix-in in
ṙòùte-map pouix-in permit 10
   set local-preference 2000
```

BGP, peer

```
neighbor  80.67.175.3  remote-as  8975
neighbor  80.67.175.3  description  Claranet
neighbor  80.67.175.3 soft-reconfiguration inbound
neighbor  80.67.175.3 prefix-list peer-in in
neighbor  80.67.175.3 prefix-list announce-out out
neighbor  80.67.175.3 filter-list 1 out
neighbor  80.67.175.3 route-map pouix-in in
```

Registry

Internet Routing Registry: Afrinic, RIPE, etc

Some people derive filters from IRRs.

Keep registry data up to date

```
as-name:      GITOYEN-MAIN-AS
descr:        The main Autonomous System of Gitoyen (Paris, France).
tech-c:       GI1036-RIPE
remarks:      Open peering policy: just ask peering@gitoyen.net
remarks:      Looking Glass: http://lookinglass.gitoyen.net/
import:       from AS6461
              action pref=100;
              accept ANY
export:       to AS6461
              announce AS-GITOYEN
import:       from AS13049
        action pref=100;
        accept AS-FRONTIER
export:       to AS13049
        announce AS-GITOYEN
import:       from AS8975
        action pref=100;
        accept AS-CLARANETFR
export:       to AS8975
        announce AS-GITOYEN
```

Building an IX

- Technically, very simple.
- Financially, unexpensive.
- Politically, may be difficult.
- "Commercially", may require a lot of effort (neutrality required).

Building, technical

Decide if your IX will be at layer 2 (Ethernet switch) or 3 (IP router). Most are layer 2.

Buy (or borrow) one Ethernet switch.

(A spare PC for housekeeping tasks is recommended).

Housing

Put it somewhere.
Finding a good place can be the most difficult if there are no existing data centers.

99.999 % reliability is not necessary: an IX is never the only way to reach the Internet.

Building, financial

Decide on a business model (in Europe, unlike the USA, most IX are not intended to earn money).

Building, legal

Write a contract. A typical IX:

- bans transit
- mandates IP
- mandates BGP (and mandates to follow its routes)

An example: Pouix

Pouix is small but so are many IX.

Pouix is managed by Gitoyen, an operator.

Who runs the IX?

Some IX depend on an operator (in Paris: Sfinx, FreeIX, Pouix), perceived as neutral.

Some IX are commercial companies.

Some IX are non-profit organizations.

Why Pouix?

Gitoyen, as a small operator, wanted more peerings and even exchange of transit (forbidden at many IX).

And because it is fun :-)

Hardware of Pouix

Nortel Ethernet switches, 100 Mb/s (may be soon 1 Gb/s).

PC/Unix route server (not a forwarding router) using Zebra.

MRLG looking glass.

Route server of Pouix

Great but not a commercial success :-)

```
pouix-rs> show ip bgp summary
BGP router identifier 80.67.175.6, local AS number 65432
2 BGP AS-PATH entries
0 BGP community entries
Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down
State/PfxRcd
80.67.175.1     4 20766   18912   18968        0    0    0 01w6d03h     1
80.67.175.4     4 13049   18916   18918        0    0    0 01w6d03h     3
Total number of neighbors 2
þóùix-rs>  show ip bgp
BGP table version is 0, local router ID is 80.67.175.6
Status codes: s suppressed, d damped, h history, * valid, > best, i -
internal
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network          Next Hop            Metric LocPrf Weight Path
*> 80.67.160.0/19   80.67.175.1                              0 20766 i
*> 195.5.197.0      80.67.175.4                              0 13049 i
*> 195.5.204.0      80.67.175.4                              0 13049 i
*> 213.161.192.0/19 80.67.175.4                              0 13049 i
Total number of prefixes 4
```

Software of Pouix

Monitoring and statistics on free software (MRTG, mon)

A few scripts (list of members in a XML file, all configurations automatically produced from it).

Contract of Pouix

Almost everything is authorized, even exchanging transit (full routes).

Almost nothing is mandatory (no need to peer with Gitoyen, for instance).

Pouix and money

Gratis at the present time

Convincing

By far the most complicated.

- Pouix is not serious
- Gitoyen is not serious
- We already peer with you elsewhere
- We are not (yet) located in the same data center
- We don’t have free Ethernet ports on our expensive router
- F... you

Various IX

KIXP in Kenya

PAIX in Palo Alto
Linx in London
Sfinx in Paris
etc...

Useful information

```
http://www.ep.net/
http://www.kixp.net/
http://www.sfinx.tm.fr/
http://www.pouix.net/
```