IXP Manager

Barry O'Donovan

September 14th 2014 APIX10 – Brisbane (remote)

barry.odonovan@inex.ie

About Me

Operations
@ INEX

Open Solutions

Lead Dev for
IXP Manager

@barryo79

www.barryodonovan.com

About INEX

Incorporated in 1996 – neutral, member owned

70 full members plus 19 associate and 3 *pro-bono*

~98% of access networks in Ireland connected

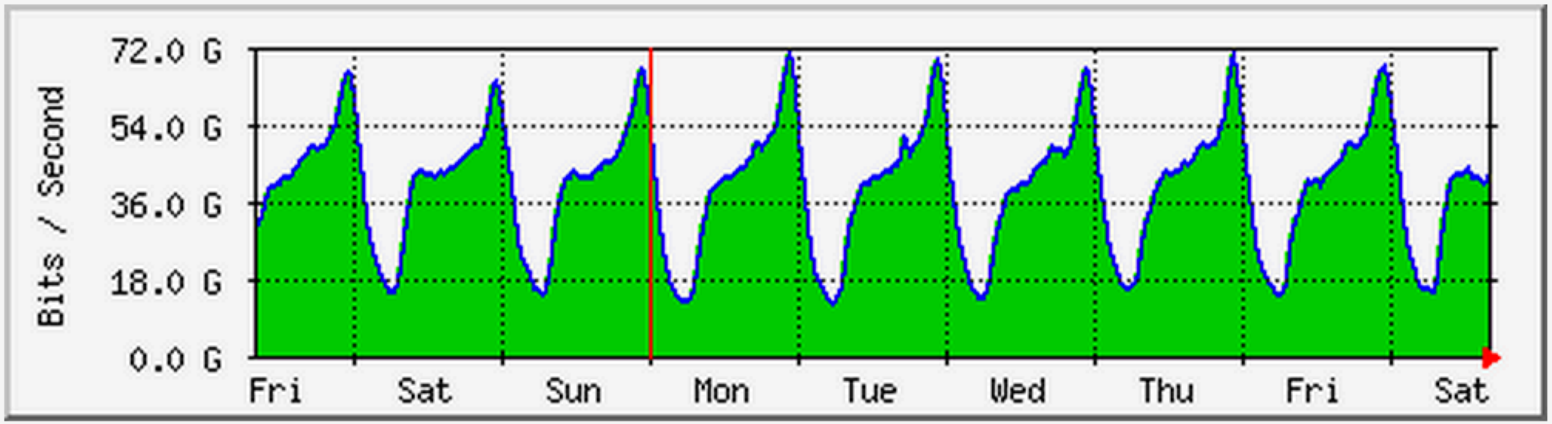
No full time staff: CEO, admin, sales are part time.
Technical services are outsourced to Nick Hilliard and I

Developed and FOSS'd IXP Manager

About INEX

inex internet neutral exchange

Week Graph



	Max	Average	Current
In	72.165 Gbits	39.344 Gbits	41.626 Gbits
Out	72.128 Gbits	39.346 Gbits	41.627 Gbits

About IXP Manager

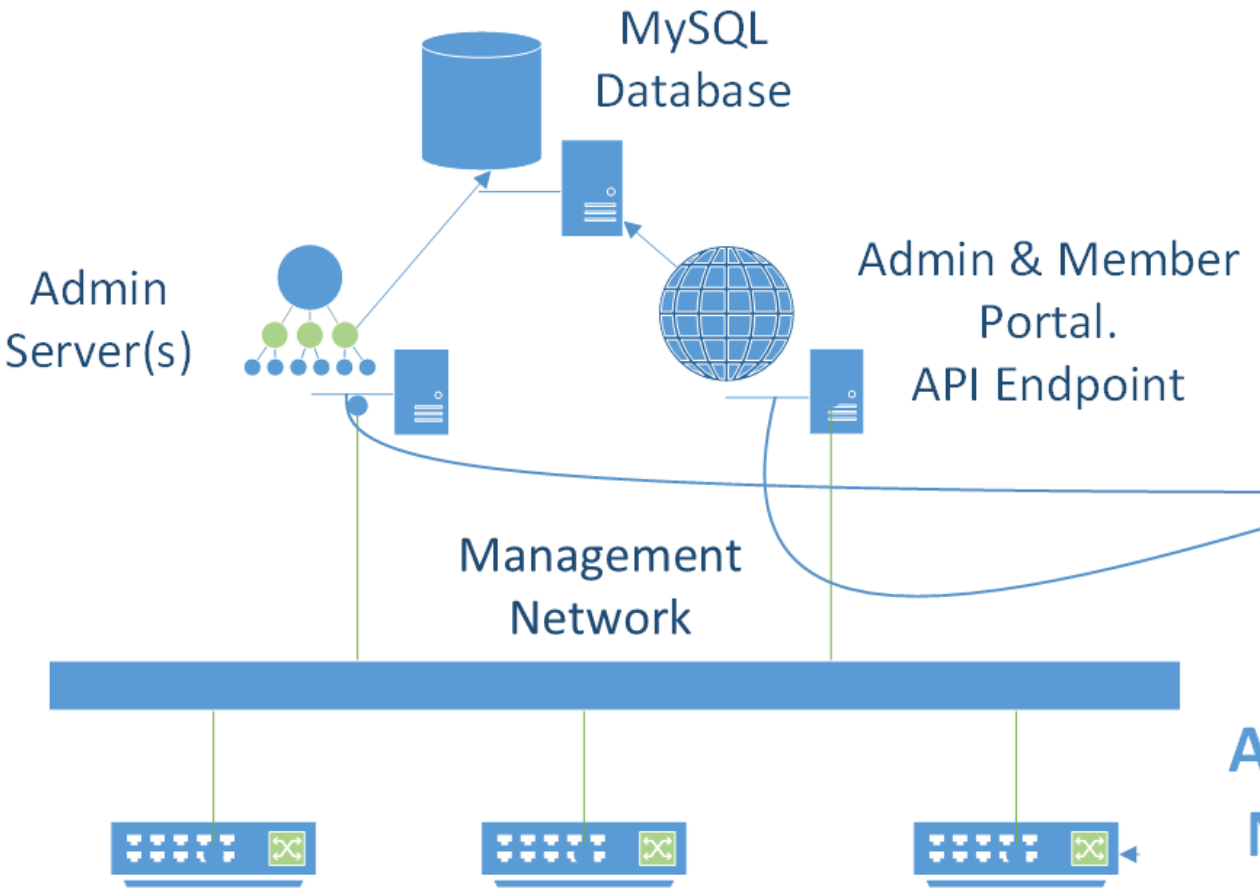
FOSS'd in 2010 under GPLv2.

No longer "just a tool" for IXPs, it's a full stack management system for IXPs:

- Administrative & Member Portal
- End to end provisioning system
- Teaches, implements and ensures best practice
- Fully loaded with IXP specific tools and features

Configures everything but the port. For now…

Components of IXP Manager



Components of IXP Manager

Route Collector(s)
Route Server(s)
AS112, MRTG, sflow
Nagios, Smokeping
TACACS+, RADIUS
DNS, RIR DB

Sample Admin Interface

inex internet neutral exchange

INEX IXP Manager | Member Information | Peering | Documentation | Statistics | Support | Staff Links | View a Customer... | My Account

IXP CUSTOMER ACTIONS
- Customers
- Interfaces
- Users
- Contacts
- Colocated Equipment
- Meetings

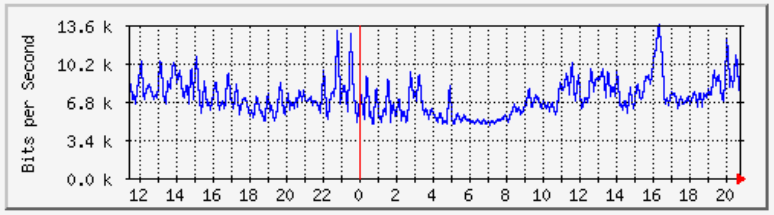
IXP ADMIN ACTIONS
- Locations
- Cabinets
- Switches
- IP Addressing
- MAC Addresses
- Vendors
- Console Server Connections
- VLANs
- IRRDB Configuration
- Route Server Prefixes

IXP STATISTICS
- Member Statistics - Graphs
- Member Statistics - List
- League Table

AS112 Reverse DNS PROBONO MEMBER

Overview | Ports | Users | Contacts | Notes | RS Prefixes » | P2P »

Aggregate Traffic Statistics



Corporate Site	http://www.as112.net/	**Peering Email**	peering@inex.ie
Status	Normal	**Joined**	2006-09-07
Type	Pro-bono	**Left**	
Peering Policy	open	**ASN**	112
PeeringDB		**AS-SET**	

Admin Interface Actions

inex
internet neutral exchange

IXP CUSTOMER ACTIONS

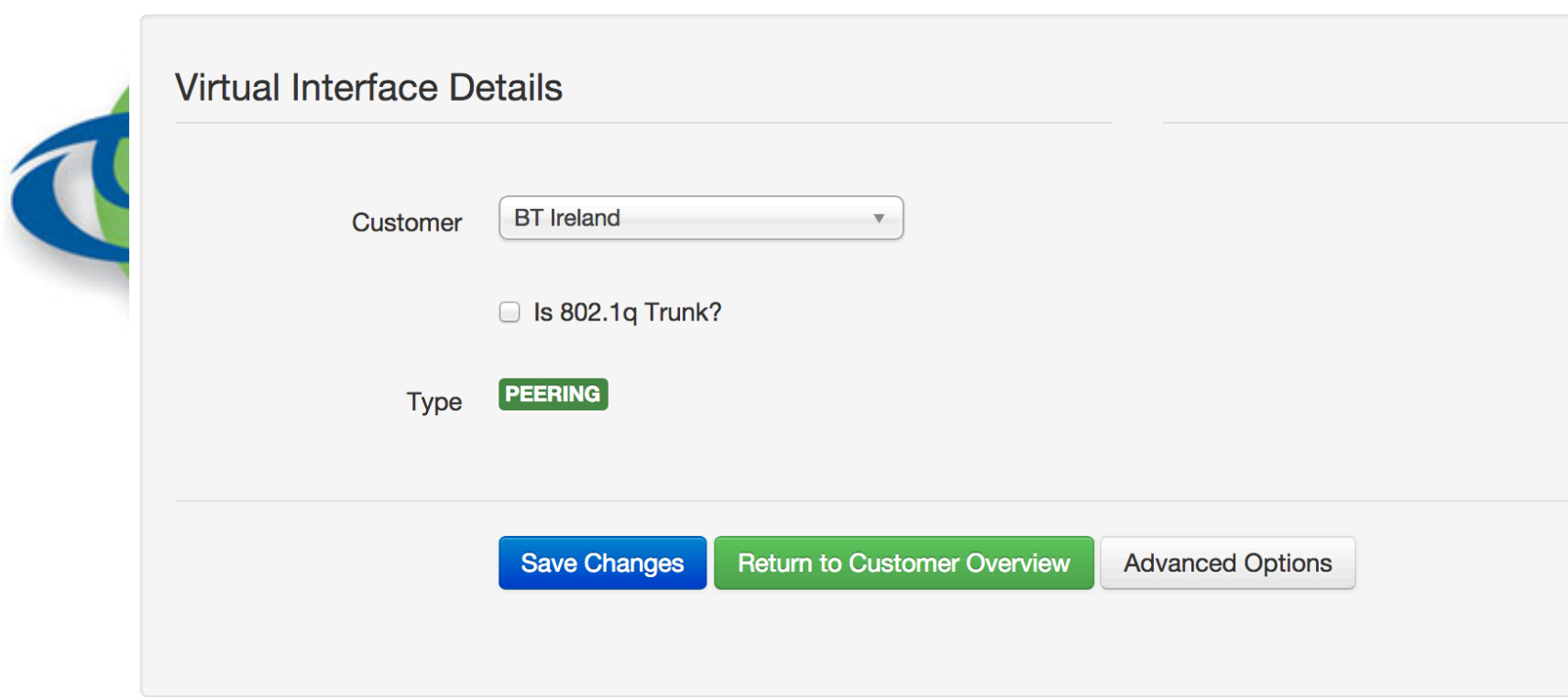
- Customers
- Interfaces
- Users
- Contacts
- Colocated Equipment
- Meetings

IXP ADMIN ACTIONS

- Infrastructures
- Locations
- Cabinets
- Switches
- IP Addressing
- MAC Addresses
- Vendors
- Console Server Connections
- VLANs
- IRRDB Configuration
- Route Server Prefixes

IXP STATISTICS

- Member Statistics - Graphs
- Member Statistics - List
- League Table



Physical Interfaces +

Location	Peering Port	Fanout Port	Speed/Duplex	
Telecity Citywest	swi1-tcy1-2::ethernet10		10000/full	
Telecity Citywest	swi1-tcy1-2::ethernet12		10000/full	

VLAN Interfaces +

VLAN Name	VLAN ID	IPv4 Address	IPv6 Address	
Peering VLAN #1	10	193.242.111.17	2001:7f8:18::2:0:1	

Sample Member Interface

inex internet neutral exchange

INEX IXP Manager | Home | Member Information | Peering | Documentation | Statistics | Support | Profile | Switch Back

Overview | My Details | Ports | Prefixes » | Peering Manager » | Statistics » | Peer to Peer Traffic »

Connection 1

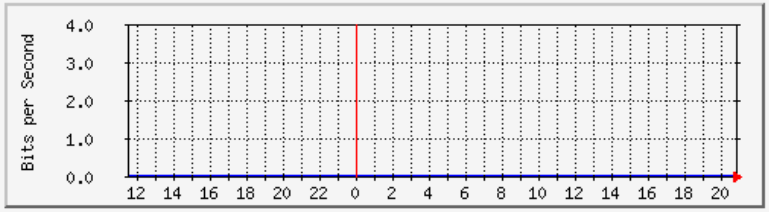
Infrastructure #1

Switch:	swi1-deg1-3.inex.ie	**Switch Port:**	GigabitEthernet44
Speed:	1000 Mbps	**Duplex:**	full
Location:	Telecity Kilcarbery	**Colo Cabinet ID:**	INEX-DEGK-1

Peering VLAN #1:

IPv6 Address:	IPv6 not enabled.	**IPv4 Address:**	193.242.111.6/25
Multicast Enabled:	No		
Route Server Client:	Yes	**AS112 Client:**	No

Day Graph for swi1-deg1-3 / GigabitEthernet44



Member Features

- Traffic graphs and P2P graphs
- Mailing list management
- NOC / peering / contact details update
- Peering Manager
- Peering matrices
- Other member details
- Documentation
- User management
- Route Server Prefix Analysis Tool **(new)**

Peering Manager

inex internet neutral exchange

IXP Manager | Dashboard | Member Information | Peering | Documentation | Statistics | Support | Profile | About | Switch Back

Potential Peers | Potential Bilateral Peers | Peers | Rejected / Ignored Peers

You currently do not exchange any routes in any way with the following members of the exchange **over the highlighted - in red - protocol(s) and LAN(s)** because:

- either you, they or both of you are not route server clients; and
- you do not have a bilateral (direct) peering session that we have detected with them.

Member	ASN	Policy	LAN 1	LAN 2	
3 Ireland	21327	open	IPv4		Request Peering ☆ Notes
BT Ireland	2110	open	IPv4	IPv4	Request Peering ☆ Notes
Cable & Wireless Worldwide	1273	selective	IPv4		Request Peering ☆ Notes
Colt Technology Services	8220	selective	IPv4		Request Peering ☆ Notes
Interfusion Networks	34912	open	IPv4	IPv4	Request Peering ☆ Notes
Limelight Networks	22822	selective	IPv4		Request Peering ★ Notes

MRTG Configuration

- We use MRTG to create all traffic graphs:
  - Individual member port graphs (bits, pkts, errs, discs)
  - Aggregate member LAG graphs
  - Aggregate member graphs
  - Aggregate switch graphs
  - Inter-switch trunk graphs (*)
  - Aggregate infrastructure graphs
  - Overall peering graphs

MRTG Configuration

- Automated configuration of MRTG configuration file compatible with IXP Manager now integrated.
- It's documented and easy!
  - https://github.com/inex/IXP-Manager/wiki/MRTG---Traffic-Graphs

- apt-get install … mrtg
- mkdir –p /home/mrtg/members
- Set a couple options in application.ini and IXP Manager

- Set a cronjob to run: ixptool.php statistics-cli.gen-mrtg-conf

Auto Provisioning

- When a interface is added to IXP Manager, you get:
  - Route Collector BGP session auto-provisioned
  - Route Server BGP session auto-provisioned
  - MRTG auto-provisioned
  - Peer to peer graphs auto-provisioned
  - Nagios monitoring of member's interface
  - Smokeping target for member's interface
  - AS112 BGP session
  - ARPA DNS for IXP assigned address
  - RIR AS-SET / ASN objects

Route Servers & IXP Manager

- Route servers are **critical IXP infrastructure**
- They must be: **secure, robust, free from operator error**
- Auto-provisioning is a requirement to meet these criteria
  - At INEX, we have always auto-provisioned
- Additionally, **your members must trust you** to properly and securely configure your route servers
- IXP Manager contains INEX's broad experience here and will ensure your route servers are configured and managed to best current practice

Route Servers & IXP Manager

- IXP Manager route server templates include:
  - Max prefix restrictions
  - IPv4 and v6 *martians*

```
martians = [
        ::/0,                   # Default (can be advertised as a rc
        ::/96,                  # IPv4-compatible IPv6 address <E2><
        ::/128,                 # Unspecified address
        ::1/128,                # Local host loopback address
        ::ffff:0.0.0.0/96+,     # IPv4-mapped addresses
        ::224.0.0.0/100+,       # Compatible address (IPv4 format)
        ::127.0.0.0/104+,       # Compatible address (IPv4 format)
        ::0.0.0.0/104+,         # Compatible address (IPv4 format)
```

Route Servers & IXP Manager

- IXP Manager route server templates include:
  - Max prefix restrictions
  - IPv4 and v6 *martians*

```
martians = [
        10.0.0.0/8+,
        169.254.0.0/16+,
        172.16.0.0/12+,
        192.0.0.0/24+,
        192.0.2.0/24+,
        192.168.0.0/16+,
        198.18.0.0/15+,
        198.51.100.0/24+,
```

Route Servers & IXP Manager

- IXP Manager route server templates include:
  - Max prefix restrictions
  - IPv4 and v6 *martians*
  - Strict inbound prefix filters
    - Via BGPQ3 from IRRDB databases
    - All database sources on RADB supported
    - Multiple source databases can be queried per member
    - Parallel (and transactional) process

Route Servers & IXP Manager

- IXP Manager route server templates include:
  - Max prefix restrictions
  - IPv4 and v6 *martians*
  - Strict inbound prefix filters
  - Origin ASN filters
    - Via BGPQ3 from IRRDB databases
    - All database sources on RADB supported
    - Multiple source databases can be queried per member
    - Parallel (and transactional) process

Route Servers & IXP Manager

- IXP Manager route server templates include:
  - Max prefix restrictions
  - IPv4 and v6 *martians*
  - Strict inbound prefix filters
  - Origin ASN filters
  - Next hop hijacking prevention
  - Standard community filters supported
    - 0:peer-as — Prevent announcement to a peer
    - 43760:peer-as — Announce to a certain peer
    - 0:43760 — Prevent announcement to all peers
    - 43760:43760 — Announce to all peers

Route Servers & IXP Manager

- IXP Manager route server templates include:
  - Max prefix restrictions
  - IPv4 and v6 *martians*
  - Strict inbound prefix filters
  - Origin ASN filters
  - Next hop hijacking prevention
  - Standard community filters supported
  - MD5 session security supported
- Quagga and Bird currently implemented.

Trusting IXP Manager…

Can you trust IXP Manager for route servers?

- Correct and expected configuration generation is covered by unit tests on every push to the Git repository.
- Smart scripts control the deployment of new configurations.
- Deployment is offset by hours between the route servers.

Route Server Prefix Analysis Tool

Route Server Prefix Analysis

Limit to Protocol...

Advertised but Not Accepted (0) | Advertised & Accepted (25) | Not Advertised but Acceptable (12)

Help

Show 10 entries

Search: 2128

Prefix	Protocol	First Seen	Origin AS
193.242.111.0/24	IPv4	2012-05-28 01:11:25	2128
194.88.240.0/23	IPv4	2012-05-28 01:11:25	2128
2001:7f8:18::/48	IPv6	2012-05-28 01:12:12	2128

Showing 1 to 3 of 3 entries (filtered from 25 total entries)

← Previous 1 Next →

Planning for v4

- Decoupling of front / back end
  - “Everything is an API”
- Switch from Zend / Smarty to Laravel / Twig
- Proof of concept: decoupled member interface with new features; 100% API and Ember.js
- Introduction of composer, bower, Grunt, etc.
- Job queues and event based processing:
  - On demand provisioning
  - Custom functionality per IXP

Thanks for Listening!

inex
internet neutral exchange

operations@inex.ie
barry.odonovan@inex.ie

https://github.com/inex/IXP-Manager

Mailing list:
https://www.inex.ie/mailman/listinfo/ixpmanager