INEX

IXP Manager Update & Route Server Configuration

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Internet Neutral Exchange Association

Company Limited by Guarantee

(Brief) IXP Manager Update

- Last IXP Manager Update @ 23rd Euro-IX Forum (Oct. 2013)
- That was v3.6.0. Since then:
  - 2048 files changed, 360865 insertions(+), 119213 deletions(-)
- Now on v4.7.3 with v4.8 shortly.
- V4 is also a framework migration
  - Not without consequences when changing huge swaths of code

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Laravel

Zend Framework (v1)

- Modern, hugely popular PHP framework

- #1 web framework on GitHub[1] **(across all languages - 41.9k stars)**

  - Artisan - console commands

  - Events and queuing

  - Request routing, middleware, validation, CSRF

  - Ease of APIs

- Latest 5.6 but requires PHP 7.1. IXP Manager on 5.5.

- End of life Sep 2016 **but dates from 2008**

- Has been newer versions but complete rewrites and methodology changes

- Looked at v2 but, nggggg.....

- Had a scaffolding engine for simple CRUD (*Doctrine2Frontend*) which we have re-implemented in Laravel.

- Migration to Laravel >80% done.

1. https://github.com/topics/framework

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DOCUMENTATION http://docs.ixpmanager.org/

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http://docs.ixpmanager.org/

Type	
Height (U)	
U's Count From	Select an option ▼
Notes	

Add   Cancel   Help

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http://docs.ixpmanager.org/

Type

Free text - may allow you to manage different makes / models / half/full / owned/shared etc.

Height (U)

The height of the rack in standard rack U(nits).

U's Count From

Select an option

Some racks have their U's labelled - please indicate if you count these from top to bottom or from bottom to top.

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EURO-IX 32

Route Server History at INEX

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[inex-tech] Route server system now in beta

Nick Hilliard   Fri Nov 23 12:20:17 GMT 2007

```
Following the announcement at the last INEX members meeting that we were
looking into running a route server system, we are now pleased to announce
that we now have a route server system which is in stable beta.

As a brief summary, the route server system offers the following advantages:

 - dramatically reduces the number of BGP sessions required to peer with
other INEX members
 - strict route filtering on inbound announcements means that only prefixes
registered at RIPE by exchange members will be visible
 - dual-hosted system offers high reliability
 - community based filtering allows route server users to control which
INEX members their prefixes are sent to
```

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ROUTE SERVER HISTORY @ INEX

- Designed from the start to be automated, templated and secure

- Nick Hilliard is an author of the route server RFCs:

  - RFC7947: Internet Exchange BGP Route Server

  - RFC7948: Internet Exchange BGP Route Server Operations

- This knowledge and experience has been distilled into IXP Manager

- Route Server configuration generation overhauled during v4 and now includes looking glass integration, monitoring, new API calls.

- More generally: IXP Manager generates configuration for *routers*: route collectors, route servers and AS112 services.

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FEATURES SUPPORTED

- Secure by design / out of the box

- Strict prefix filtering based on IRRDB entries

    - New option in v4.8.0 to allow *more specifics*

- Origin ASN filtering based on IRRDB entries

- IANA special purpose ranges / *bogons* filtered

- Next hop hijacking detection and filtering

- Max prefix limits

- Standard community filters supported (inc. large communities - RFC8092)

- Looking glass integration, MD5 shared secrets

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IXP Manager and Route Server Configuration Generation

Configuring a Route Server via IXP Manager

1. Gather the required information for a route server:

- AS number (should be a dedicated ASN for route server)

- Peering IP and BGP router ID (usually the peering IPv4 address)

- BGP software (IXP Manager supports Bird but others possible)

- API type and looking glass software

- Support MD5? Support large BGP communities?

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2. Add this data into IXP Manager via UI

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Field	Value
Handle	rs1-lan1-ipv4
Vlan	Peering VLAN #1
Protocol	IPv4
Type	Route Server
Name	Route Server #1 - LAN1 - IPv4
ShortName	RS1 - LAN1 - IPv4
Router ID	192.0.2.8
Peering IP	192.0.2.8
ASN	65501

Management Host	2001:db8::3:8
API Type	Birdseye ▾
API Endpoint	https://rs1-lan1-ipv4.mgmt.example.com/api
LG Access Privileges	CUSTUSER ▾
Quarantine	☐ Router will be used for quarantine procedures only
BGP LC	☑ Enable Large BGP Communities / RFC8092
Skip MD5	☐ Do not include any MD5 configuration
Template	api/v4/router/server/bird/standard

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3. Enable route server clients for your members

Configuring a Member as a Route Server Client

Vlan Peering VLAN #1

☐ Multicast Enabled

☑ Busy host

☑ IPv6 Enabled

☑ IPv4 Enabled

Max BGP Prefixes 50

☑ Route Server Client

☑ Apply IRRDB Filtering

☐ IRRDB - Allow More Specifics?

☑ AS112 Client

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5. Pull the route server configuration via API

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Configuring a Route Server via IXP Manager

```
curl -X GET

    -H "X-IXP-Manager-API-Key: my-api-key"

    https://ixp.example.com/api/v4/router/gen-config/rs1-lan1-ipv4

    > /etc/bird/rs1-lan1-ipv4.conf


bird -s /var/run/rs1-lan1-ipv4.ctl —c /etc/bird/rs1-lan1-ipv4.conf
```

https://github.com/inex/IXP-Manager/tree/master/tools/runtime/route-servers

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IRRDB Filtering

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IRRDB Filtering in IXP Manager

- Sample IRRDB entries

```
$ whois 192.0.2.1

...

route:     192.0.2.0/24
descr:     Packet Loss Ltd
origin:    AS65501
mnt-by:    JOE-MNT
source:    RIPE
```

```
$ whois 2001:db8::1

...

route:     2001:db8::/32
descr:     Packet Loss Ltd
origin:    AS65501
mnt-by:    JOE-MNT
source:    RIPE
```

IRRDB Filtering in IXP Manager

- Local database storage of members' IRRDB entries (via bgpq3)

- Flexible configuration of IRRDB source database(s) on a per member basis

- Support for both AS sets and *just* ASNs

- Updating IRRDB database is an asynchronous operation to generating route server configuration

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IRRDB Filtering in IXP Manager

- Very efficient when using the appropriate data structures (php-ds)

```
./artisan irrdb:update-prefix-db hurricane -vv
Hurricane Electric:
    [IPv4: 1029706 total; 0 stale; 0 new; DB updated]
    [IPv6: 182593 total; 0 stale; 0 new; DB updated]
Time for net/database/processing: 55.92/22.00/2.65 (secs)
```

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IRRDB Filtering in IXP Manager

- Very efficient when using the appropriate data structures (php-ds)

- A full run for INEX takes ~3mins

```
./artisan irrdb:update-prefix-db -v

Total time for net/database/processing:
138.745264/29.177696/2.913495 (secs)
```

IRRDB Filtering in IXP Manager

- Route server prefix analysis tool:

Advertised but Not Accepted (2)	Advertised & Accepted (78)	Not Advertised but Accepted (32)	Help

Prefix	Protocol	First Seen	Origin AS
192.231.21.0/24	IPv4	2017-07-16 10:18:18	AS47615
87.232.5.0/24	IPv4	2017-06-02 10:18:19	AS25441

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Bird's Eye - A Simple Secure Micro Service for Querying Bird

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Bird's Eye

- Winning project from the RIPE IXP Tools Hackathon @ RIPE73 (Madrid, 2016)

- The Alice-LG started as a client querying Bird's Eye

- Provides API access to query Bird

- Designed with security as a primary goal

- Integrated with IXP Manager for a built-in looking glass

  - Coded to a contract / interface as a Laravel service provider

- Also has its own built in looking glass

- RFC8092 / BGP Large Communities support

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Bird's Eye Features

- Bird (and Bird's Eye) daemon status and version details

- Tabular view of 'show bgp summary' with:

  - click to view the routing table

  - click to view routes received

  - click to view routes advertised

- Session information as available in Bird (router ID, neighbour capabilities, input and output filters, max prefixes, stats, etc.)

- Route lookup by routing table / protocol

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IXP Manager Looking Glass

- Production example: https://www.inex.ie/ixp/lg

  - Provides visibility of 6 x AS112 / 6 x route collectors / 12 x route servers

- Does not expose Bird's Eye to the public - IXP Manager queries Bird's Eye internally and formats and presents that information to the user

- Bird status and 'show bgp summary' also available as JSON

- IXP Manager also generates Nagios snippets to:

  - Monitor Bird daemons

  - Monitor member BGP sessions (great for maintenance)

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Future Work

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Support Additional BGP Daemons

- Requires feature parity with Bird implementation

  - IRRDB filtering

  - Ideally suitable for route servers, route collectors and AS112 services

  - API access and service provider for looking glass functionality

  - Standard community filtering (plus ideally large communities)

- Want to look at GoBGP and have committed to implementing OpenBGPd

- Arouteserver can consume IX-F Member Export to generate route server config

  - But: not compatible with IXP Manager features including prefix analysis tool, looking glasses, monitoring, etc.

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New Features

- ~~Per-member *or longer* prefix filtering~~

- RPKI integration

- IXP-side community tagging to indicate the reason a prefix was blocked

  - These exist only within the route server daemon

  - Will then replace the existing route server prefix analysis tool

- UI controls to block advertising / receipt of your prefixes to / from other members and to allow you to prepend you advertisements to other networks

- Filter known transit networks

- BGP Graceful shutdown support?

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THANK YOU

Any Questions?

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https://www.inex.ie/

https://www.ixpmanager.org/