IXP Manager Workshop

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Workshop Introduction & Catch-up

Barry O'Donovan - INEX

barry.odonovan@inex.ie

Prologue

This slide deck was originally presented by
Barry O'Donovan at the 28th Euro-IX Forum IXP Manager
Workshop in Luxembourg.

- This is the third IXP Manager workshop at euro-ix
- First two mostly introductory

  - https://www.inex.ie/noncms/euroix27-inex-ixp-manager-workshop-introduction.pdf
  - https://www.inex.ie/noncms/euroix27-inex-ixp-manager-v4-deep-dive.pdf
  - https://www.youtube.com/watch?v=v8PRUQlRMRM

- By request, the second workshop was mostly a repeat of the first.
- This one will be more technical.

- Part 1 - non-technical:
  - Funding / Development Wish List
  - Status of IXP Manager v4
  - Grapher

- Part 2 - getting technical
  - Upgrading to v4
  - The Anatomy of a Grapher HTTP Request

Sustainable Funding Model?

- February 2016 we wrote a funding proposal:
  - https://www.inex.ie/noncms/2016-02-IXP-Manager-Funding-1.3.pdf

- IXP Manager is (mostly) supported by INEX
  - Mostly: personal labour of love, LONAP, DE-CIX

- Standard FOSS reality: wish list is always much greater than available resources

Funding Proposal

- Full time PHP developer to be hired in Dublin
- INEX to continue to provide PM and oversight
  - via Barry O'Donovan, Nick Hilliard
- Have employer, office space and all on a not for profit basis
- euro-ix Audit Committee to provide financial oversight
- Bi-annual reports right here at euro-ix (and continued outreach, etc.)

Funding Proposal

- Full time PHP developer to be hired in Dublin

Salary (with bonus)	€50,000
Employer Taxes	€5,500
H/W, S/W, cloud services	€4,500
Travel (2 x euro-ix)	€1,200
Rent, insurance, …	€4,150

- €65k / annum for up to three years
  - €2,500 per IXP using IXP Manager?
  - Bigger sponsor(s)?
  - euro-ix funding?
  - ISOC?
  - Others?
  - "Big Ticket" Bounties?

- ~~Complete and release v4~~
- Complete Helpdesk integration
- L2 ACLs
- Advanced P2P functionality (API, Grapher)
- Patch panel / cross connect management
- Provisioning process / production line
- Easier installs and upgrades

- Not as developed as year one - a lot can happen in twelve months!
  - On-demand based provisioning
  - Automated switch provisioning
  - My Peering Manager
  - Customer Facing Area
  - More APIs!
  - I18n / L10n

- Official release of v4 will be v4.2
  - INEX (and LONAP) running v4.1
  - v4.2 will be tagged with Grapher support
- It's been a long road…

Commits on Feb 4, 2015

Schema files updated form latest Doctrine version
barryo committed on Feb 4, 2015

10d6c22 `<>`

Add opensolutions/doctrine2bridge and fix path
barryo committed on Feb 4, 2015

23abc63 `<>`

Fixes for using composer
barryo committed on Feb 4, 2015

f7d8a6b `<>`

Replace submodules with composer packages
barryo committed on Feb 4, 2015

9ad4a99 `<>`

Remove submodules
barryo committed on Feb 4, 2015

d3ae206 `<>`

So, what needs to happen to make v4 official?

1. INEX needs to switch to v4.2
2. Complete documentation
3. Official tagging
   - current *master* branched to becomes v3
   - v4 merged into master

- Essentially a technology upgrade
- Controller: Zend Framework to Laravel
- View: Smarty to Plates
- Tools: composer, bower
- Requirements: PHP7 (thus: Ubuntu LTS 16.04)
- *A framework in transition - not redoing everything*

Why change framework at all?

- Developer apathy which leads to:
- Stagnation of the code base
- New or prospective developers are turned off
- New features remain unimplemented because there are *better ways*
- Stay modern to leverage new techniques and services

The Laravel **framework** provides new techniques and integrations:

- Service provider framework
- Events
- Queues
- Task scheduling
- Testing
- Migrations
- Package management

- New code: (mostly) Laravel

- Old code: stays as Zend Framework but will be transitioned over time

- Would expect v5 (ish) to be Zend free

- Application entry is Laravel

- If a route doesn't exist, an exception is thrown
  `\Symfony\Component\HttpKernel\Exception\NotFoundHttpException`

- Caught by `App\Exceptions\Handler` which passes onto Zend Framework

  - via `App\Providers\ZendFrameworkServiceProvider`

```php
use \Symfony\Component\HttpKernel\Exception\NotFoundHttpException;

class Handler extends ExceptionHandler {
  public function render($request, Exception $e) {
    if( $e instanceof NotFoundHttpException ) {
        \App::make('ZendFramwork')->run();
        die();
    }
    else { ... }
  }
}
```
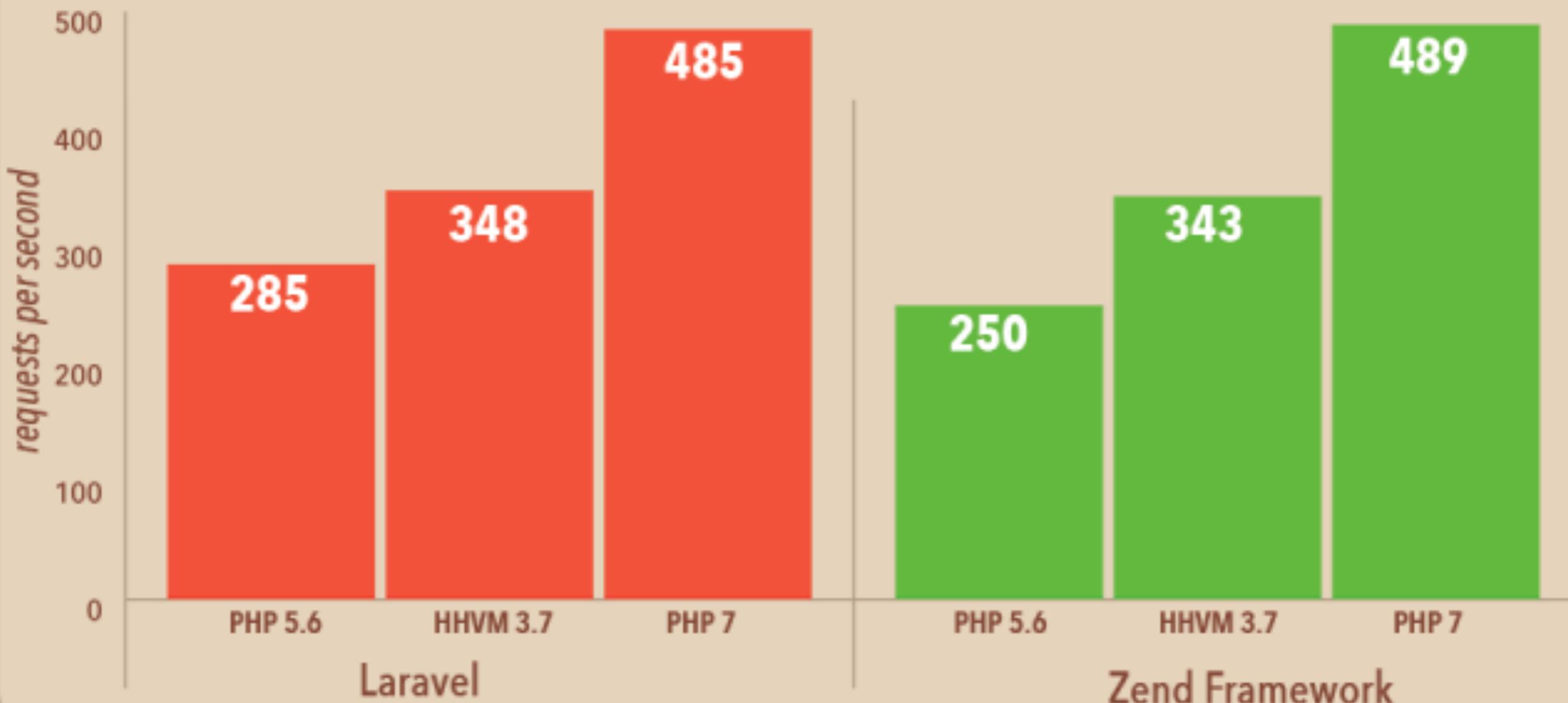
- It's wayyyyyyyy faster - >2x reqs/sec in some cases

http://www.zend.com/en/resources/php7_infographic

- It's wayyyyyyyy faster - >2x reqs/sec in some cases

- Strict typing and return type declarations

```php
declare(strict_types=1);

function fn(int $i, string $s, array $a, SomeClassObject $o): array
{
    ...
    return [];
}
```

- It's wayyyyyyyy faster - >2x reqs/sec in some cases

- Strict typing and return type declarations

- Null coalescing operator

```php
// old, verbose and error prone:
$username = isset($_GET['user']) ? $_GET['user'] : 'nobody';

// null coalescing:
$username = $_GET['user'] ?? 'nobody';

// Coalescing can be chained:
$username = $_GET['user'] ?? $_POST['user'] ?? 'nobody';
```

IXP Manager V4 – The Controller

- Why change framework at all?
  - Developer apathy which leads to:
  - Stagnation of the code base
  - New or prospective developers are turned off
  - New features remain unimplemented because there are *better ways*
  - Stay modern to leverage new techniques and services

- We've been using the GitHub wiki.

- Meh. It doesn't scale.

  - It's not versioned

  - Anyone can edit (this is a good thing btw, but it's unstructured)

  - No decent structuring

- Yeah, you can bend it to solve the above but…

  - This problem is already solved: https://readthedocs.org/

- https://ixp-manager.readthedocs.org/

- https://github.com/inex/ixp-manager-docs/

Grapher

- Pre-existing MRTG based graphing system existed before IXP Manager. ~12 years ago?
  - IXP Manager's graphing designed around this
- Like most of Nick's original designs, has served us very well.
- But time moves on:
  - MRTG Log replaced with RRD
  - For P2P, RRD's being replaced by time-series databases
  - Members now expect better traffic analysis than "here's 150 p2p graphs, enjoy!"
- Special thanks to DE-CIX for a bounty to help with this!

- Backend agnostic
  - MRTG log, RRD, OpenTSDB, Carbon, …
  - Grapher just needs the data
- Renderer agnostic
  - Grapher just needs the PNG
- Flexible support for *types of graphs*
  - p2p, member port, member lag, IXP aggregate, etc
- Mechanism to select backend(s) for graph type
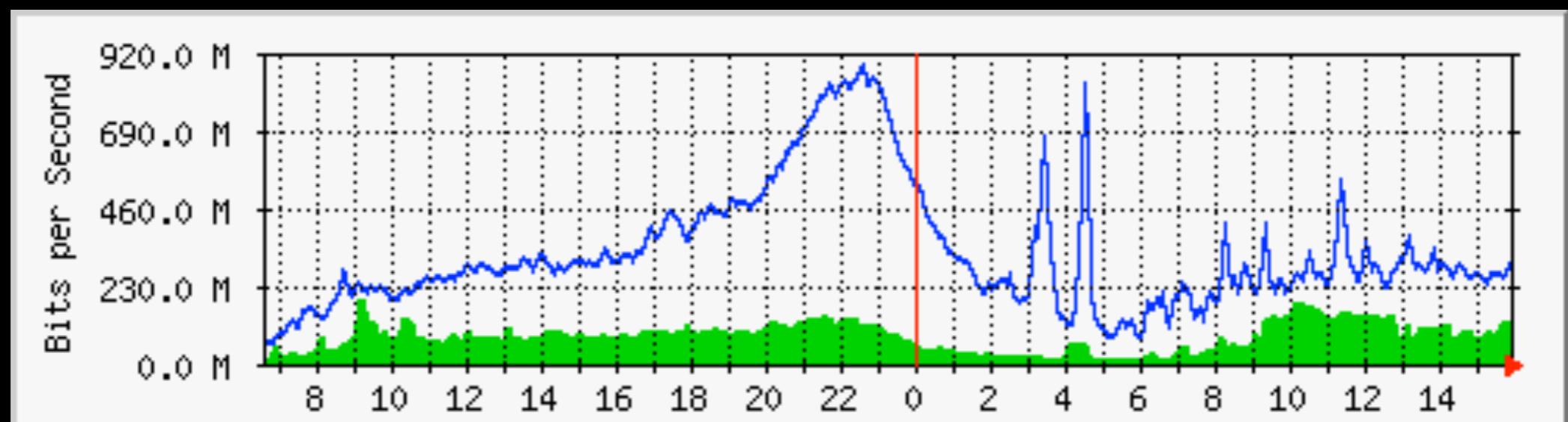- A service provider to access graphs programatically
- HTTP/API access to graphs

```php
// Load the physical interface from the database
$pi = d2r('PhysicalInterface')->find(127);

// create a PNG graph
$g = Grapher::physint($pi)
    ->setCategory( Graph::CATEGORY_BITS )
    ->setPeriod( Graph::PERIOD_WEEK );
```
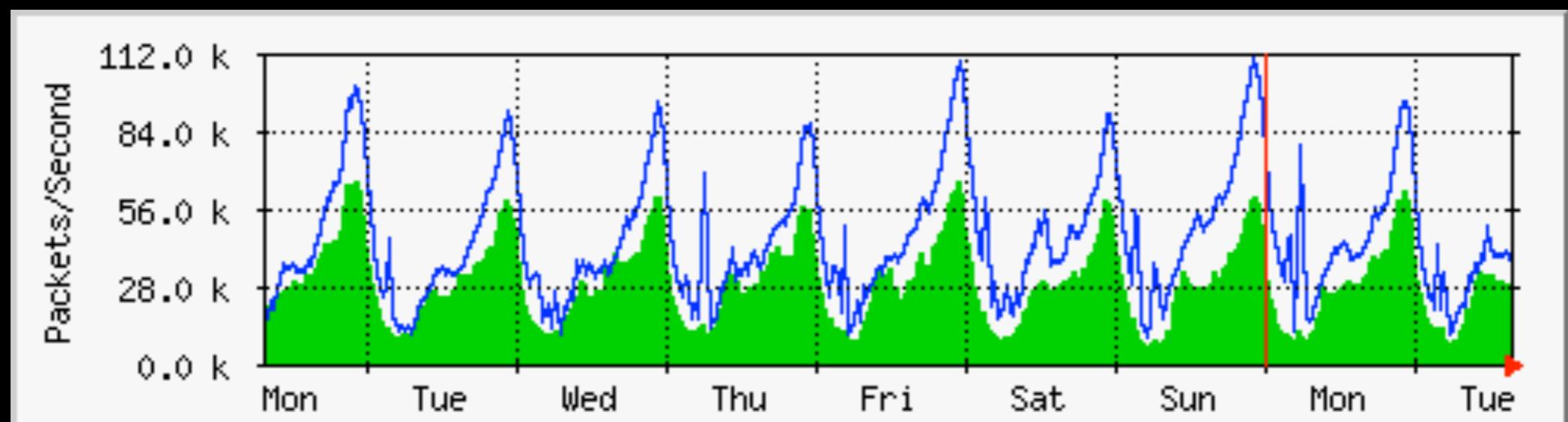
```php
// get some stats
echo sprinf( "Avg in:  %02f bps", $g->statistics()->averageIn()  );
echo sprinf( "Avg out: %02f bps", $g->statistics()->averageOut() );
```

```php
// send a PNG
return new Response( $g->png() )
        ->header('Content-Type', 'image/png' )
        ->header('Content-Disposition', 'inline; filename="graph.png"' )
        ->header( 'Expires', Carbon::now()->addMinutes(5)->toRfc1123String() );
```

http://localhost:8088/grapher/phsyicalinterface?id=127

http://localhost:8088/grapher/phsyicalinterface?id=127 &category=pkts&period=week

http://localhost:8088/grapher/phsyicalinterface?id=127 &type=json
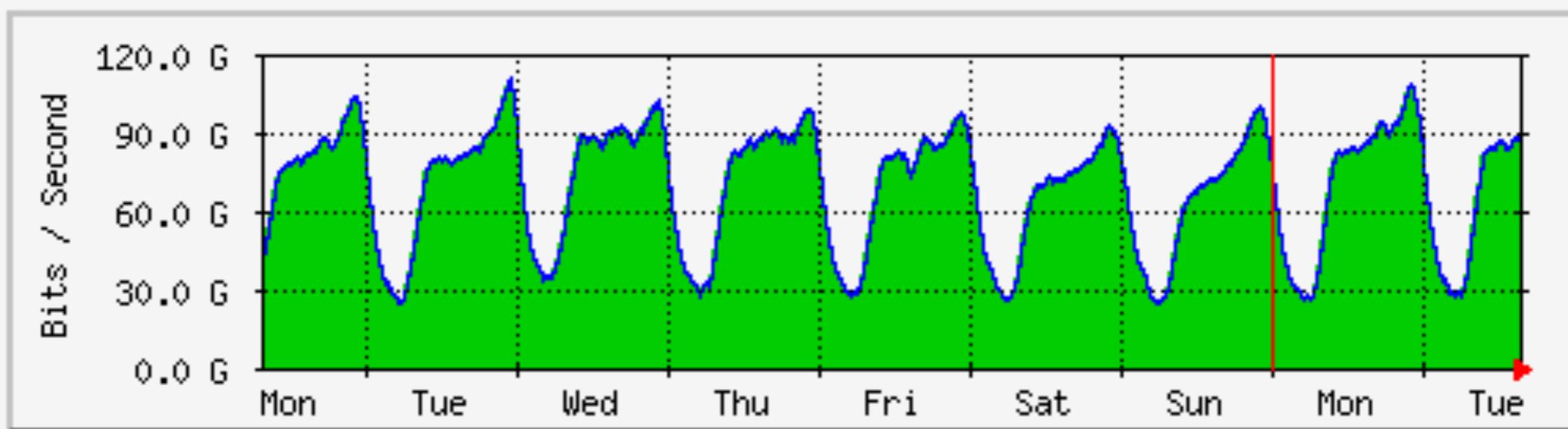
```
{
    "class": "physicalinterface",
    "urls": {
        "png": "http:\/\/localhost:8088\/grapher\/physicalinterface?period=year&type=png&category=bits&protocol=all&id=127",
        "log": "http:\/\/localhost:8088\/grapher\/physicalinterface?period=year&type=log&category=bits&protocol=all&id=127",
        "json": "http:\/\/localhost:8088\/grapher\/physicalinterface?period=year&type=json&category=bits&protocol=all&id=127"
    },
    "base_url": "http:\/\/localhost:8088\/grapher\/physicalinterface",
    "statistics": {
        "totalin": 2.6415529016871e+15,
        "totalout": 1.7612251721233e+16,
        "curin": 130538224,
        "curout": 261752304,
        "averagein": 84545116.588695,
        "averageout": 563694891.06581,
        "maxin": 1448749448,
        "maxout": 9338060544
    },
    "params": {
        "type": "json",
        "category": "bits",
        "period": "year",
        "protocol": "all",
        "id": 127
    },
    "supports": {
        "protocols": {
            "all": "all"
        },
        "categories": {
            "bits": "bits",
            "pkts": "pkts",
            "errs": "errs",
            "discs": "discs"
        },
        "periods": {
            "day": "day",
            "week": "week",
            "month": "month",
            "year": "year"
        },
        "types": {
            "png": "png",
            "log": "log",
            "json": "json"
        }
    },
    "backends": {
        "mrtg": "mrtg",
        "dummy": "dummy"
    },
    "backend": "mrtg"
}
```

{$graph->setPeriod($pvalue)->renderer()->boxLegacy()}

Week Graph

	Max	Average	Current
In	118.842 Gbits	67.100 Gbits	90.491 Gbits
Out	118.816 Gbits	67.106 Gbits	90.453 Gbits

- Will be available:

  - Users:

    https://ixp-manager.readthedocs.org/en/latest/features/grapher.html

  - Developers:

    https://ixp-manager.readthedocs.org/en/latest/dev/grapher.html

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