
250 Internet Exchange Points And Beyond!

APIX 23

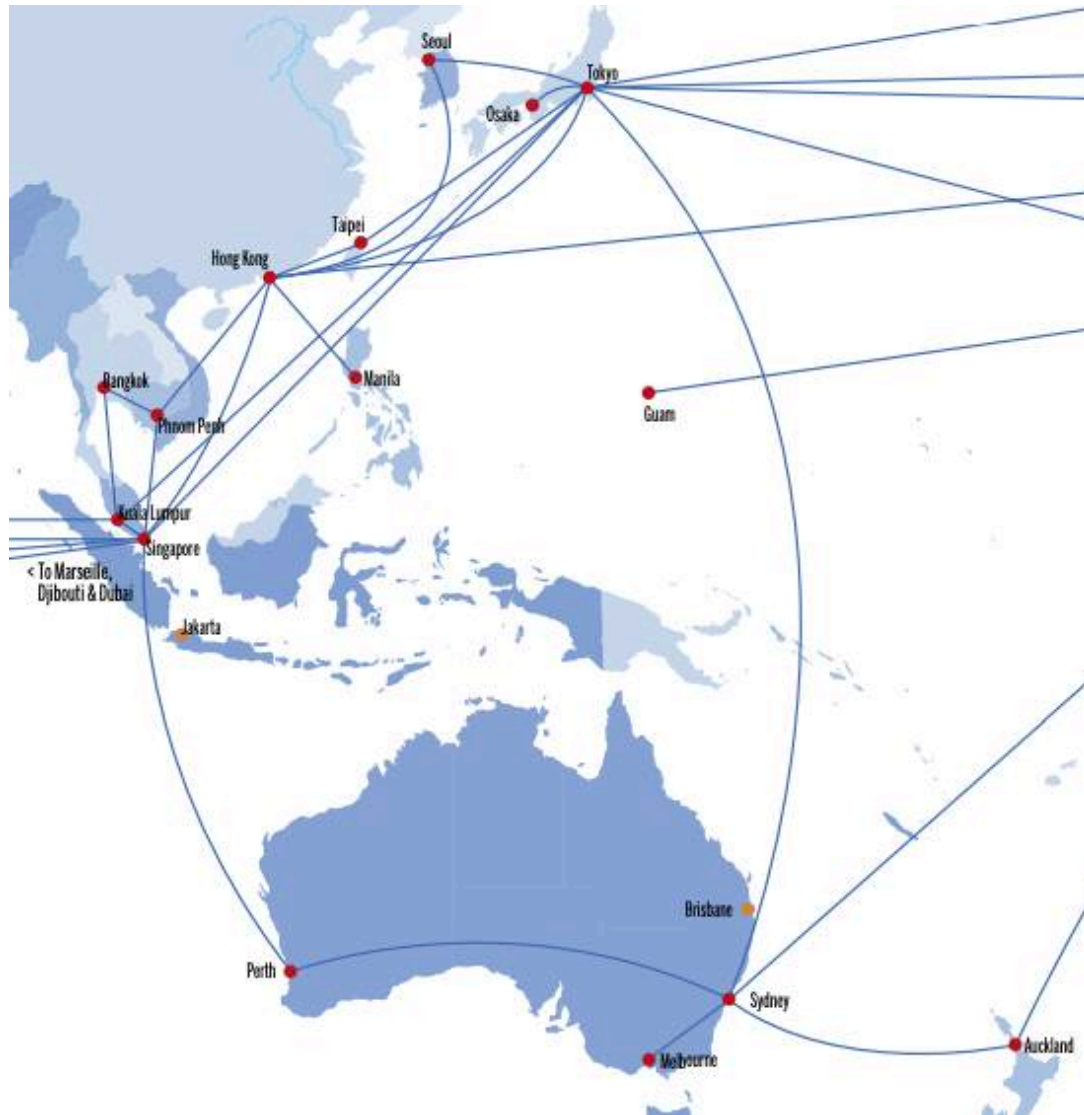
Walt Wollny, Director Interconnection Strategy
Hurricane Electric AS6939

Who is Walt Wollny?

- ❑ Hurricane Electric AS6939 – 6 years
 - ❑ Director Interconnection Strategy – supporting the network to reach to over 50 countries and over 253 Internet Exchanges. Focus on Global connectivity.
- ❑ Amazon AS16509 – 4 years
 - ❑ Developed IP Transit and Peering on five continents.
 - ❑ Primary focus on Japan, Singapore, Hong Kong, India, Taiwan, Philippines, Australia.
 - ❑ Over 62 new CDN sites.
- ❑ Microsoft AS8075 – 13 years
 - ❑ Developed IP Transit and Peering on four continents.
 - ❑ Primary focus on US, UE and South America.



Hurricane Electric Network



Hurricane Electric - Massive Peering!



Why so many Exchanges?

Shortest ASN path is the Answer!

January 2015

90 Internet exchanges
IPv4 3,644 unique adjacencies
IPv6 2,475 unique adjacencies

January 2018

179	Internet exchanges	98% increase
IPv4	6,896 unique adjacencies	89% increase
IPv6	4,183 unique adjacencies	69% increase

January 2021

253	Internet exchanges	41% increase
IPv4	8,851 unique adjacencies	28% increase
IPv6	5,605 unique adjacencies	34% increase

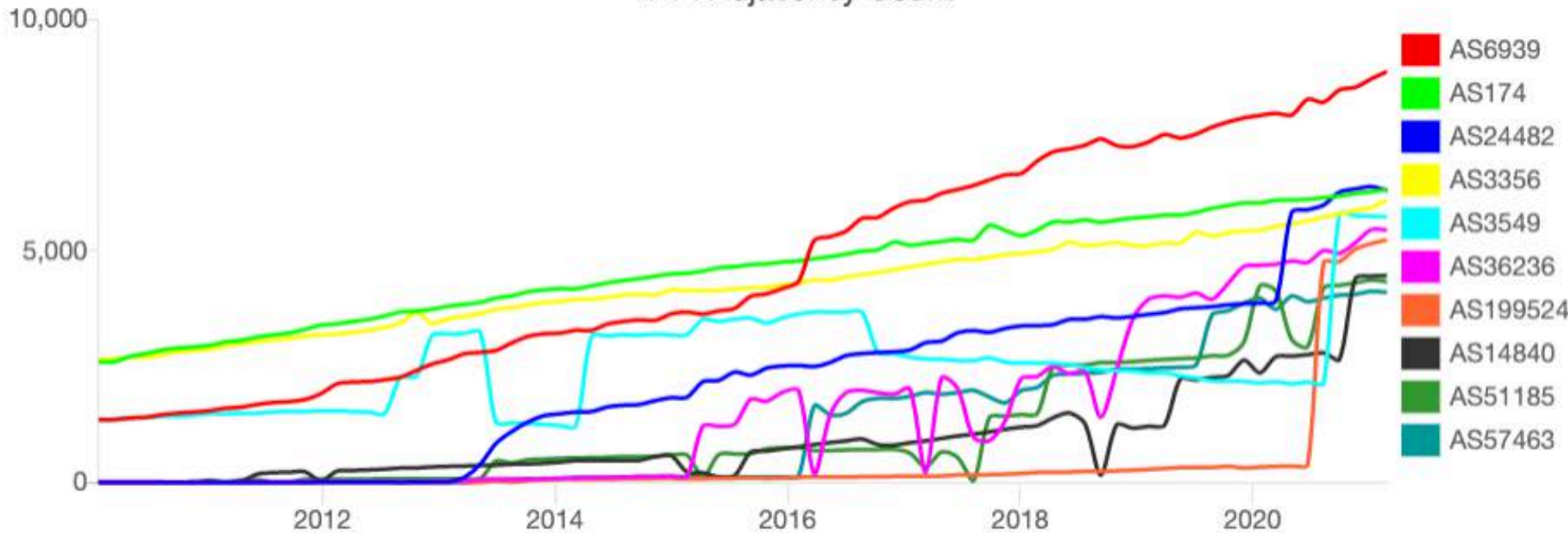
<https://bgp.he.net/report/peers>

IPv4 Adjacencies		
ASN	Name	Count
<u>AS6939</u>	<u>Hurricane Electric LLC</u>	8,851
<u>AS24482</u>	<u>SG.GS</u>	6,373
<u>AS174</u>	<u>Cogent Communications</u>	6,326
<u>AS3356</u>	<u>Level 3 Parent, LLC</u>	6,089
<u>AS3549</u>	<u>Level 3 Communications, Inc. (GBLX)</u>	5,724
<u>AS36236</u>	<u>NetActuate, Inc</u>	5,452
<u>AS199524</u>	<u>G-Core Labs S.A.</u>	5,225
<u>AS14840</u>	<u>BR.Digital Provider</u>	4,453
<u>AS51185</u>	<u>Onecom Global Communications LTD</u>	4,345
<u>AS57463</u>	<u>NetIX Communications Ltd.</u>	4,107



https://bgp.he.net/report/peers#_adjacencyhistory

IPv4 Adjacency Count



Hurricane Electric

I'm here to share with you the following:

- What Hurricane Electric looks for in a new IX
- How IX operators can attract more members



What we look for in a new IX

- Unique ASN adjacencies opportunities
- New countries
- Customer request

- Does it make financial business sense?
- Cost of long-haul circuits
- Datacenter cost
- Dark fiber/metro and cross connect cost
- Local import issues, taxes, ETC...
- Internet exchange cost

Benefits

- When Hurricane Electric connects to a new exchange, we are trying to achieve these goals:
 - Shorten the as-path
 - Reduce average per-bit delivery cost
 - Increase supply of bandwidth to keep up with growing demand
 - Improve quality: reduce loss, latency, out-of-order delivery and jitter
 - Meet and connect new potential customers



Possible new locations 2018 - 2020

- Bangkok - done
- Manila – done
- Guam - done
- Athens - done
- Istanbul - done
- Mumbai – nope
- Perth – done
- Kuala Lumpur - done

New IXs 2020

48 IX	HOUIX
ABQIX	INEX
Asteroid Mombasa	IX Australia WA
BelgiumIX	IXPlay
CHIX-CH	LocIX
CIX-ATL	MARIIX
CNX	MyIX
Connected IX Brisbane	PIT-IX
DACS-IX East	PTT Rio de Janeiro
DRT Chicago	QCIX
DRT Dallas	SAT-IX
EdgelX Melbourne	SpokanelX
Equinix Madrid	STACIX

New exchanges in 2021/22

- IIX Jakarta
 - 304 peers and 284 unique networks
- IX Australia - Brisbane
 - 87 peers and 31 unique networks
- DE-CIX – Singapore
 - KL, Cyber Jaya, Johor Bahru, Borneo-IX
 - ?? unique networks

- Total new 315 unique adjacencies

And several others

<http://www.he.net/HurricaneElectricNetworkMap.pdf>

This is updated frequently with locations of interest

How IX operators can attract more members

If we don't know about you, how can we connect!



Tell the world about your exchange!



PeeringDB

PCH



TeleGeography



WIKIPEDIA
The Free Encyclopedia



Tell the world about your exchange!

- pch.net/ixp/dir
- peeringdb.com
- en.wikipedia.org/wiki/List_of_Internet_exchange_points
- www.internetexchangemap.com
- www.ixpdb.net (www.euro-ix.net/ixpdb)

Get Your Exchange Listed Publicly

You put extensive effort into starting and running your exchange:

- ❑ Talk to network operators and recruit the members.
- ❑ Negotiate with data center operators for space to install exchange.
- ❑ Obtain, deploy and maintain hardware for the exchange.
- ❑ Prompt ongoing communication between your participants.

Taking the last step, publicizing your exchange, maximizes its value both to current participants and future members.



Your IX members page

List participants on your website including:

- ASN
- IPv4 and IPv6 addresses
- Peering and NOC contact details
- Peering policy

Why List Participants?

Current and prospective participants need this information to add peering sessions, increase peered traffic, and for the IX to grow revenue.

Network operators continuously evaluate additional IXPs for potential expansion opportunities. To make this determination they need participant AS numbers and, ideally, to see what prefixes those peers advertise to a route-server at the exchange.

Example: Seattle IX (SIX) Members Page

<https://www.seattleix.net/participants.htm>

206.81.80.10/23	Altopia Corporation	6456	noc@alt.net
206.81.80.11/23	RealNetworks, Inc.	11922	nso@real.com
206.81.80.12/23	NuclearFallout Enterprises, Inc.	32751	noc@nfoe.net
206.81.80.13/23	Beyond the Network (PCCW)	3491	peering@pccwglobal.com
206.81.80.14/23	Mouat's Technology Services, Inc.	3601	peering@mouats.com
206.81.80.16/23	Semaphore Corporation	3742	noc@semaphore.com
206.81.80.17/23	Google	15169	peering@google.com
206.81.80.18/23	Cortland Electronics Corporation	4319	peering@cortland.com
206.81.80.19/23	Zayo (was AboveNet)	6461	peering@zayo.com
206.81.80.20/23	TierPoint Spokane	30340	peering@tierpoint.com
206.81.80.21/23	Metapeer, Inc.	13331	noc@metapeer.com
206.81.80.23/23	RGnet/PSGnet	3130	peering@rg.net
206.81.80.27/23	In2net Network	26753	noc@in2net.com
206.81.80.28/23	Threshold Communications, Inc.	7752	noc@thresholdcommunications.com
206.81.80.29/23	Zillow.com	18888	noc@zillow.com
206.81.80.34/23	Connect Northwest Internet Services	10557	noc@cnw.com
206.81.80.37/23	Wowrack.com	23033	noc@wowrack.com
206.81.80.38/23	Peer 1 Network	13768	peering@peer1.net
206.81.80.40/23	Hurricane Electric	6939	peering@he.net



JSON API

Many exchanges are starting to publish a list of their members in JSON format at a URL. This API allows anyone to automate collection of a current member list and thus automate peering

<https://ripe70.ripe.net/presentations/96-inex-ripe-connectwg-amsterdam-2015-05-13.pdf>

<https://github.com/euro-ix/json-schemas>

Open-source tools, like IXP-Manager, do it for you:

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

The IX-F (Internet eXchange Federation) are behind this initiative contact secretariat@ix-f.net for more information or support.

<https://lg.megaport.com/megaport.json>

```
{
  "ixp_list" : [
    {
      "shortname" : "IX-SYD",
      "name" : "Sydney IX",
      "ixp_id" : 1,
      "vlan" : [
        {
          "ipv6" : {
            "mask_length" : 64,
            "prefix" : "2001:DEA:0:10:0:0:0:0"
          },
          "ipv4" : {
            "mask_length" : 23,
            "prefix" : "103.26.68.0"
          },
          "name" : "IX-SYD",
          "id" : 0
        }
      ],
      "support_email" : "support@megaport.com",
      "url" : "http://www.megaport.com",
      "support_phone" : "+61 7 3088 5996",
      "support_contact_hours" : "24/7"
    },
    {
      "shortname" : "IX-BNE",
      "name" : "Brisbane IX",
      "ixp_id" : 2,
      "vlan" : [
        {
          "ipv6" : {
            "mask_length" : 64,
            "prefix" : "2001:DEA:0:20:0:0:0:0"
          },
          "ipv4" : {
            "mask_length" : 24,
            "prefix" : "103.26.70.0"
          },
          "name" : "IX-BNE",
          "id" : 0
        }
      ],
      "support_email" : "support@megaport.com",
      "url" : "http://www.megaport.com".
    }
  ]
}
```









Why Use JSON

- Peeringdb.com data may not be accurate as it relies on each network to update their records
- You're in control of your JSON data!
- IXPDB will publish the full JSON schema
- Automation!

Data Feed Health

<https://bgp.he.net/report/exchanges>

Internet Exchange		Members	Data	CC	City	Website
<u>JPNAP Tokyo</u>		189		JP	Tokyo	www.jpnap.net
<u>TPIX-TW</u>		74		TW	Taipei	www.tpix.net.tw
<u>Equinix Hong Kong</u>		192		HK	Hong Kong	ix.equinix.com

TPIX-TW

https://www.tpix.net.tw/mem_list.html

TPIX Member List

Member	AS Number	Links to TPIX	Peering Policy	IPv6 Enabled
<u>AboveNet</u>	17408	10GE*2	Open	Yes
<u>Academia Sinica Network(ASNet)</u>	9264	10GE	Open	Yes
<u>Akamai</u>	20940	10GE	Open	Yes
<u>Amazon</u>	16509	100GE*2	Selective	Yes
<u>Anson Network</u>	131610	GE	Open	No



Data Feed Health

<https://bgp.he.net/report/exchanges>

Please check your IX health

If it is not green email walt@he.net
so we can get it fixed!

Conclusions

It is Hurricane Electric's vision to continue our expansion globally to as many locations as possible and help overcome illiteracy globally.

I need your help! So please make your IX information public, as membership information is key when making decisions about where to invest next.

Next milestone 300 Internet Exchanges



Questions?

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