

STUIX

Forming a Community Internet  
Exchange from Nothing

by Li-Heng Yu(seadog007)  
@ APIX 30

STUIX

The logo consists of the word "STUIX" in a bold, white, sans-serif font. The letter "I" is replaced by a white graduation cap (mortarboard) with a tassel hanging to the right. The logo is set against a dark gray background.

# About me

- Li-Heng Yu (seadog007)
- Open Source Contributor since 2014 (14 yr)
- Occupation
  - Currently a Cybersecurity Engineer in Onedegree / Cymetrics
  - Founder / Co-Founder of 3 Companies
    - Taiwan Digital Streaming Co. (Networking, Encouraging Networking Stuff)
    - Starverse Network Ltd. (Cheap VPS for Learning)
    - Nebulax (Course, Summer Camp, Co-op with NCHC, NTHU)
  - Also a Student :D

# Homelab

- When I first get into college
  - I got few servers located in different place, connected with Mikrotik hap / CCR
  - I played around with DN42
  - Created a similar project like DN42, and invited friends to join (STUIN)
- Apply for Public IPs
  - Taiwan Digital Streaming Co.
  - AS18041, my homelab
- No one peering with me :(
  - connectivity all over Vultr, Sky Digital Transit
- What's the way to peering with lots of people and also benefit to the society?
  - Establish a new Internet Exchange!!!
  - Homelab Extension!

# STUIX

- Since Jan, 2021
- A community Internet Exchange in Taiwan
  - The first one and the only one
  - We also hold the record to be the only Internet Exchange that fully supported BGP communities in Taiwan. (2024/09/02)
- Operated by Volunteers (3~5 ppl)
- Currently have 2 POPs in Chief IDC, TW
- AS 38855
- <https://www.peeringdb.com/ix/3352>

# Software

- Bird2
  - <https://gitlab.nic.cz/labs/bird/tree/master>
  - For RS (Route Server)
    - Controlling BGP Message
- MRTG
  - <https://github.com/oetiker/mrtg>
  - Traffic Accounting / Visualizing
- IXP Manager
  - <https://github.com/inex/IXP-Manager>
  - Manage IX Members
  - RS / MRTG Automation

# Few targets

- By providing High Bandwidth & Low Latency IX Peering
  - Reducing the Cost of the Internet
  - Add More Resilience to the Internet
  - Lowering Internet Latency in Taiwan
- Allowing Personal AS to join
  - More Young Network Operator
- Increasing network operation communication in Taiwan

# Expensive Peering in Taiwan

- 2.3 USD per Mbps for Hinet

項目	調整前	調整後	調整幅度
雙方互連 (Private Peering) 批發價牌價	83元/Mbps	74元/Mbps	每Mbps調降9元 降幅10.84%

# Others IXPs in Taiwan

## 1. TWIX - IXP, kind of?

- Most traffic is for peering with Hinet (620Gbps in Private VLAN)
- Private Peering Access Switch (30 Gbps in Public VLAN)
- No BGP community control

## 2. TPIX - Real IXP

- High price due to lack of competitor
- No BGP community control

## 3. EBIX

- Access Switch for their transit service

## 4. FOX - Real IXP

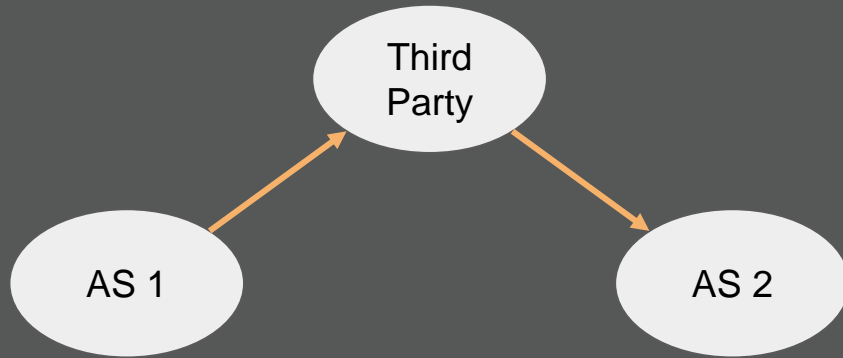
- Newer than us
- Have BGP community support issue
- Hard to access
- High Bandwidth North-South Backbone, High Access
- Government Funded



Transit

v.s.

Peering



# Reducing the Cost of the Internet

- Increasing Peering Ratio
  - No need to pay for third party for transit traffic
  - Cheaper Peering Price
  - Lowering ISP Operation Cost
    - Taiwanese ISP
      - nope :P
- Cloudflare - Bandwidth Costs Around the World
  - mention that Korea Telecom and Hinet have 15x cost of EU/NA

# Add More Resilience to the Internet

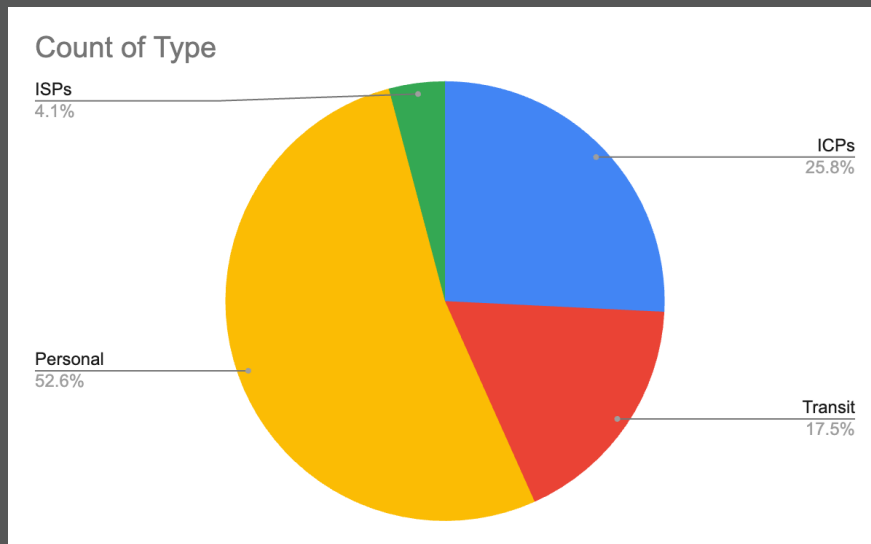
- Provide High Bandwidth Access to Cloud Provider
  - High transit / peering price in Taiwan
  - Some transit services are 95th percentile billing
    - Cause some ISPs to limit their bandwidth
- Provide Backup Link for Companies
  - If one link down, they can use our IX as backup peering
- Increasing Connectivity of the Internet

# Allowing Personal AS to join

- Promoting Network Operation Stuff
  - Creating an environment that allow personal to connect to the Internet via Free IPv6 Transit provided by our member
  - Reducing latency of personal AS
- Lowering the Cost for Personal to Enter the field
  - 1U Colocation
  - IPMI / Access IP
  - Limited Free Transit (Co-Provided with Chief & Sky Digital)
  - Starting from
    - Colo: 100 USD / month
    - Shared Device 16 USD / month

# Members

- <https://stuix.io/members>
- <https://www.peeringdb.com/ix/3352>
- Most 100G IXP in Taiwan



# Funding Source & Spending

- The project cost a lot
  - ~120k TWD (3800USD) / month
- Funding
  - Sponsors
  - My Wallet, since I consider this is my homelab extension and expect no return
  - Need more, but no one can handle complicated paperworks
- Let more people knowing the concept of peering
  - Learning Cost, Peering Cost
  - 30 USD / month \* 50 = 1500 USD

# Strategy for now

- Attracting local ISPs
  - Got no hope for major 3 ISPs in Taiwan
  - Creating Content with IXP members
- Invite more ISPs/ICPs to join
  - Free ports for major ISPs/ICPs
- High Iteration Cycle
  - 10G -> 100G
  - 1U second-hand equipment
    - Low Cost

# Attracting local ISPs

- Creating Content with IXP members
  - Attracting ICPs
  - International ICPs are supporting this kind of project
    - Google
    - Meta
    - Cloudflare
    - Amazon
    - Microsoft



# Creating Content with Members (Or become an ICP)

- TWDS Mirror
  - mirror.twds.com.tw
  - Currently one of few Fedora/EPEL in Asia can keep up with update
  - We are also Tier-1 Mirror of Fedora
    - Only 2 in Asia, the other one is IJ, Japan
  - Fixed issue for upstream also
    - <https://pagure.io/fedora-infrastructure/issue/11929>
- TWDS Valve Content Server
  - Applying for now
- Other Local ICPs

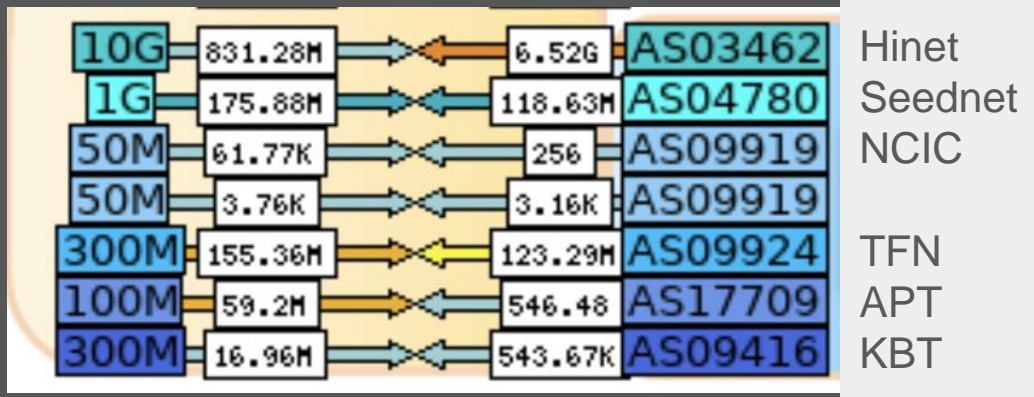
## Fedora Sync Status





# Open Source Mirror

- No Gain, No Return
  - Not much company will host this
  - Foundation, Education institution
  - NCHC
- Education institution in Taiwan
  - TANet
    - No Upgrade on Peering Bandwidth



# High Iteration Cycle

- Bandwidth Growth is relative fast compare to others
- Cisco Neus N5K-C5596UP \*2 (Retired, 10G \* n, 300USD)
- Cisco Nexus N77-C7706 (Prepare to retire, 10G,40G,100G CPAK, 4325USD)
  - CPAK is hard to buy, and can't support special request from customers
- Cisco Nexus N9K-C9236C (100G QSFP28, 1100USD)
- Arista DCS-7060SX2-48YC6 (25G, 100G, 1340USD)
  
- Except 7706, 1~2U model
  - I regret to buy 7706, BTW

# High Iteration Cycle

- 1~2 U Model
  - 200G Upgrade if needed, just add a new one
- Low Power Requirement

# 1~2 U Model

aveline

来学习一下 BCIX

Reply

copy

```
core-l105-01: DCS-7280CR2A-60
core-n15-01: DCS-7280CR2A-60
edge-w46-21: DCS-7280SR-48C6
edge-l5-21: DCS-7280SR-48C6
edge-n15-21: DCS-7280SR-48C6
edge-n15-22: DCS-7280SR3-48YC8
edge-l105-21: DCS-7280SR-48C6
edge-a36-21: DCS-7280SR-48C6
edge-l105-22: DCS-7280SR-48C6
edge-a36s-21: DCS-7280SR-48C6
edge-k15-31: DCS-7280CR3-32P4
edge-g60-31: DCS-7280CR3-32P4
edge-g60-21: DCS-7280SR-48C6
edge-l105-31: DCS-7280CR3-32P4
edge-n15-31: DCS-7280CR3-32P4
edge-l105-32: DCS-7280CR3-32P4
edge-f133-21: DCS-7280SR-48C6
edge-a36-31: DCS-7280CR3-32P4
edge-l105d-21: DCS-7280SR3-48YC8
edge-l45-21: DCS-7280SR-48C6
```

← 1 edited 3:44 PM

aveline

copy

```
sw2.jb1.napafrika.net: ex4200-24t
sw3.jb1.napafrika.net: ex4200-48t
ar-l2.jb1.napafrika.net: DCS-7280SR-48C6
ar-l1.jb1.napafrika.net: DCS-7280SR-48C6
ar-l3.jb1.napafrika.net: DCS-7280SR-48C6
ar-l4.jb1.napafrika.net: DCS-7280SR-48C6-M
ar-l5.jb1.napafrika.net: DCS-7280SR-48C6
ar-l7.jb1.napafrika.net: DCS-7280QR-C36
ar-l8.jb1.napafrika.net: DCS-7280QR-C36
ar-l6.jb1.napafrika.net: DCS-7280SR-48C6
ar-l10.jb1.napafrika.net: DCS-7280SR-48C6
ar-l14.jb1.napafrika.net: DCS-7050CX3-32S
ar-l12.jb1.napafrika.net: DCS-7280QR-C36
ar-l9.jb1.napafrika.net: DCS-7280QR-C36
j-m1.napafrika.net: ex4200-24t
ar-m1.jb1.napafrika.net: DCS-7010T-48-DC
ar-l11.jb1.napafrika.net: DCS-7280SR-48C6
ar-l13.jb1.napafrika.net: DCS-7280SR-48C6
ar-l15.jb1.napafrika.net: DCS-7050CX3-32S
j-m3.jb1.napafrika.net: ex3200-48t
ar-l17.jb1.napafrika.net: DCS-7280SR-48C6
ar-l16.jb1.napafrika.net: DCS-7050CX3-32S
ar-l18.jb1.napafrika.net: DCS-7280SR-48C6
ar-l19.jb1.napafrika.net: DCS-7280QR-C36
ar-l20.jb1.napafrika.net: DCS-7280SR-48C6
ar-l21.jb1.napafrika.net: DCS-7050CX3-32S
ar-l22.jb1.napafrika.net: DCS-7280SR-48C6
ar-l23.jb1.napafrika.net: DCS-7280QR-C36
ar-l24.jb1.napafrika.net: DCS-7280SR-48C6
ar-l25.jb1.napafrika.net: DCS-7280QR-C36
ipi-l26.jb1.napafrika.net: EC_AS7726-32X
ipi-l27.jb1.napafrika.net: EC_AS7726-32X
ar-l28.jb1.napafrika.net: DCS-7280SR-48C6
ar-l29.jb1.napafrika.net: DCS-7280CR-48
```

Reply

INEX LAN2 这个有够可怕的 ...

copy

```
swi2-pwt2-1: X670G2-48x-4q
swi2-pwt1-1: X670G2-48x-4q
swi2-nwb1-1: X670G2-48x-4q
swi2-pwt1-3: Mellanox MSN2100
swi2-cwt1-2: X670G2-48x-4q
swi2-nwb1-3: Mellanox MSN2100
swi2-cwt2-3: Mellanox MSN2100
swi2-cwt2-1: X670G2-48x-4q
swi2-kcp1-4: Mellanox MSN2100
swi2-kcp1-1: X670G2-48x-4q
swi2-cwt1-4: Mellanox MSN2100
```



3:53 PM

INEX LAN1 比较正常

copy

```
swi1-cwt1-7: DCS-7280CR3-32D4
swi1-cwt1-5: DCS-7280SR-48C6
swi1-nwb1-1: DCS-7280SR-48C6
swi1-pwt1-1: DCS-7280SR-48C6
swi1-pwt2-1: DCS-7280SR-48C6
swi1-cwt2-1: DCS-7280SR-48C6
swi1-pwt1-3: DCS-7060CX2-32S
swi1-cwt2-3: DCS-7060CX2-32S
swi1-pwt1-4: DCS-7060CX2-32S
swi1-nwb1-3: DCS-7060CX2-32S
swi1-kcp1-5: DCS-7280SR-48C6
swi1-kcp1-6: DCS-7280SR-48C6
swi1-kcp1-7: DCS-7060CX2-32S
swi1-kcp1-8: DCS-7060CX2-32S
swi1-pwt2-3: DCS-7060CX2-32S
```

# 1~2 U Model

aveline  
SGIX 草。

copy

```
EQXSG1-L3B-R0113-SW01: qfx10008  
1N-L5-505A-SW02: qfx5100-48s-6q  
GS-L5-MMR3-SW04: qfx10008  
STDCW-7-Z7-A05-SW01: qfx5120-48y-8c  
TELIN3-DS2-3: qfx5100-48s-6q  
GS-L5-MMR3-SW06: qfx5100-48s-6q  
EQXSG1-L3B-R0114-SW05: qfx5120-48y-8c  
GS-L5-MMR3-SW03: qfx5100-48s-6q  
GS-L5-MMR3-SW02: qfx5100-48s-6q  
GS-L5-MMR3-SW05: qfx5120-48y-8c  
EQXSG1-L3B-R0114-SW03: qfx5100-48s-6q
```

← 1 3:58 PM

shell

```
curl -s https://my.fl-ix.net/api/v4/member-  
export/ixf/1.0 | jq '.ixp_list[0].switch | .[] |  
.name + "": " " + .manufacturer + " " + .model' -r  
  
edge01.fl1001: Arista DCS-7280SE-64  
core01.mia002: Arista DCS-7504N  
edge01.bct001: Arista DCS-7280SE-64  
edge01.mia005: Arista DCS-7280QR-C36  
edge01.mia006: Arista DCS-7280SR-48C6  
edge01.mia004: Arista DCS-7280SR-48C6-M  
edge01.mia001: Arista DCS-7280CR3-32D4  
core02.mia002: Arista DCS-7280CR3-32D4  
agg01.mia002: Arista DCS-7280QR-C36  
edge01.mia003: Arista DCS-7280SR-48C6  
edge01.mia002: Arista 7289  
edge02.mia002: Arista 7289
```

shell

```
+ ~ curl -s  
https://ixpmanager.ixp.net.ng/api/v4/member-  
export/ixf/1.0 | jq '.ixp_list[0].switch | .[] |  
.name + "": " " + .manufacturer + " " + .model' -r  
los-med-sw1: Arista DCS-7050SX-128  
los-rc-sw1: Arista DCS-7060SX2-48YC6  
los-mdx-sw1: Arista DCS-7050SX3-48C8  
los-mdx-sw2: Brocade BigIron RX  
los-icn-sw1: Cisco Systems n3500  
los-med-sw3: Arista DCS-7050SX3-48C8  
los-rc-sw2: Brocade MLXe  
los-mdxi-sw3: Arista DCS-7050SX3-48C8  
los-adc-sw1: Arista DCS-7050SX3-48C8  
los-mdxi-sw4: Allied Telesyn Unknown
```

可怕的 DataIX

copy

```
+ ~ curl -s http://109.239.130.10/api/v4/member-  
export/ixf/1.0 | jq '.ixp_list[0].switch | .[] |  
.name + "": " " + .manufacturer + " " + .model' -r |  
grep -v vswitch  
ar7508-1.m9.mow.gblnet.net: Arista DCS-7508  
ar7280-1.okt4.ufa.gblnet.net: Arista DCS-7280SR-48C6  
ar7508-1.am5.ams.gblnet.net: Arista DCS-7508N  
ar7508-2.m9.mow.gblnet.net: Arista DCS-7508N  
ar7508-1.bm18.led.gblnet.net: Arista DCS-7508  
ar7508-1.k12.led.gblnet.net: Arista DCS-7508  
ar7508-1.fr5.fra.gblnet.net: Arista DCS-7508N  
ar7280-1.bor7.mow.gblnet.net: Arista DCS-7280SR-48C6  
ar7280-2.bor7.mow.gblnet.net: Arista DCS-7280CR2-60  
ar7280-1.ixc.mow.gblnet.net: Arista DCS-7280SR-48C6  
ce6870-1.mya54.rnd.gblnet.net: Huawei CE6870-48S6CQ-  
EI  
ar7280-1.bor57.led.gblnet.net: Arista DCS-7280SR-48C6  
ar7060-1.digita.hel.gblnet.net: Arista DCS-7060CX-32S  
ar7508-1.gay50.iev.gblnet.net: Arista DCS-7508  
ar7508-1.atracom.kiv.gblnet.net: Arista DCS-7508  
ar7050sx-1.tir27.ods.gblnet.net: Arista DCS-7050SX-64  
ar7050sx-1.sk11a.lwo.gblnet.net: Arista DCS-7050SX-64  
qfx5100-1.leo9.iev.gblnet.net: Juniper Networks  
qfx5100-96s-8q  
ar7280-1.n3khef.ams.gblnet.net: Arista  
DCS-7280SR-48C6  
ar7508-1.sk2.sto.gblnet.net: Arista DCS-7508N  
ar7280-1.am4.ams.gblnet.net: Arista DCS-7280SR-48C6  
ce6870-1.sto1.sto.gblnet.net: Huawei CE6870-48S6CQ-EI  
ar7280-1.kir19.cek.gblnet.net: Arista
```



# 1~2 U Model

- With IXP Manager

```
curl -q https://www.inex.ie/ixp/api/v4/member-export/ixf/1.0 | jq '.ixp_list[0].switch  
| .[] | .name + ": " + .model' -r
```

## Other Local ICPs

- They are facing the same issues
  - No major ISPs peering
- Become first batch of sponsors



Sky Digital Co., Ltd.  
天空數位有限公司



PITTQIAO NETWORK  
彼得巧網路資訊股份有限公司



Fast Line  
台灣速連

# Deadlock for new IXP

- No ISPs, No Content
  - ISP: We need Content
  - ICP: We need Enduser
- Who is going to be the first member?
  - International ICPs are supporting this kind of project
    - Google
    - Meta
    - Cloudflare
    - Amazon
    - Microsoft
  - Pay to connect to ISPs
    - Not Health, but can be the first step

# Except More Community Based IX / Project !

- JCIX
  - Japan
  - New project
- HomeNOC
  - Japan

Thanks for listening & Join us / Sponsor us

<https://stuix.io>

Email: [liheng@stuix.io](mailto:liheng@stuix.io)

Telegram: [@seadog007](https://t.me/seadog007)

Facebook: [fb.me/seadog007](https://fb.me/seadog007)

LinkedIn: [linkedin.com/in/seadog007](https://linkedin.com/in/seadog007)

