



## 一、出國目的

APNIC(Asia Pacific Network Information Centre)為掌管亞太地區 IP 位址與 AS 號碼發放的機構，為能廣納會員對於 IP 位址及 AS 號碼相關政策之意見，並進行網路管理相關技術交流，APNIC 每半年召開會議，以供各界對於其 IP 位址及 AS 號碼資源之政策作一個公開的討論，藉由對 IP 位址及 AS 號碼資源管理政策提案之公開討論的方式，依照與會的會員所達成共識的結果制訂成相關政策。

本次參加的為 APRICOT 2018 暨 APNIC 45 會議，會議於 2018 年 2 月 19 日至 28 日在尼泊爾加德滿都舉辦。本次會議共有 752 人參與，其中包括 577 人參加 conference 以及 175 人參加 Workshop。本次會議涵蓋網際網路維運、技術及發展等的討論，也邀請 NIR 代表、網路技術專家、政府代表、網路業者代表、Internet 工程師等共同參加，針對管理維運技術介紹與經驗分享。台灣共有 12 位代表報名參加，包括國家通訊傳播委員會、台灣網路資訊中心、台灣經濟研究院、中華電信、是方電訊、Oath 及亞洲大學等單位專家學者。

此次參加會議之目的為參與相關議題及進行報告台灣最新發展現況，瞭解亞太地區各國之網際網路發展狀況與網路運作之政策。另外，TWNIC 於此會議中負責 IPv6 readiness measurement BoF 場次之議程規劃，並邀請具有 IPv6 量測實作經驗的國家及業者，如印度、日本及澳洲等國家之講者，來進行 IPv6 量測方法的討論與經驗分享，以促進 IPv6 發展。

## 二、參與議程與議題

2 月 24 日至 2 月 28 日的 APNIC 45 會議，相關議程及會議資訊如下：

### ● Saturday, 24 February 2018

時間	議程					
09:00	ICANN GAC 09:00 to 17:30	APIX Meeting 09:00 to 17:30	APNIC Hackathon 09:00 to 21:00	FIRST Plenary 09:00 to 17:30	TC	APStar Retreat Meeting 09:00 to 15:00
15:15	DotAsia AGM Regency Room, L1 15:15 to 17:00					
17:30	APRICOT AGM Regency Room, L1 17:30 to 18:30					

● **Sunday, 25 February 2018**

時間	議程			
09:00	APNIC Hackathon 09:00 to 12:00			
09:30	ICANN GAC 09:30 to 13:00	IXP Manager Tutorial - Part 1 09:30 to 11:00		
11:30	IXP Manager Tutorial - Part 2 11:30 to 13:00		Network State Awareness and Troubleshooting 11:30 to 13:00	
14:30	Opening Ceremony & Plenary 14:30 to 16:00			
16:30	Network automation (NetDevOps) with Ansible 16:30 to 18:00	Cooperation SIG 16:30 to 18:00	APOPS 1 16:30 to 18:00	Importance of SSHFP And Configuring SSHFP for Network Devices 16:30 to 18:00
18:00	APNIC BoF - ISIF Asia: Investing in Innovative Operational Technologies - Ten Years of Success 18:00 to 19:00		Routing Security BoF 18:00 to 19:00	
19:00	Opening Reception 19:00 to 21:00			

● **Monday, 26 February 2018**

時間	議程			
08:00	Newcomers Social 08:00 to 09:00			
09:30	SRv6 Network Programming: deployment use-cases 09:30 to 11:00	APNIC NIR SIG 09:30 to 11:00 APOPS 2 09:30 to 11:00	Introduction to SDN - Part 1 09:30 to 11:00	
11:30	DNS/DNSSEC 11:30 to 13:00	APNIC Services 11:30 to 13:00	Peering and Interconnection I: Regional 11:30 to 13:00	Introduction to SDN - Part 2 11:30 to 13:00
13:00	Tech Girls Social 13:00 to 14:30			
14:30	Measuring & Monitoring 14:30 to 16:00	Cross-region Resource Management 14:30 to 16:00	Peering and Interconnection II: Global 14:30 to 16:00	DNS/DNSSEC - Part 1 14:30 to 16:00

時間	議程			
16:30	Network Devices 16:30 to 18:00	APNIC IPv6 Readiness Measurement 16:30 to 18:00	Peering Forum: IXP session 16:30 to 18:00	DNS/DNSSEC - Part 2 16:30 to 18:00
18:00	APNIC BoF - Data Gathering Analysis 18:00 to 19:00	NOG BoF 18:00 to 19:00	RIPE Atlas BoF 18:00 to 19:00	
19:00	Peering Social 19:00 to 21:00			

● **Tuesday, 27 February 2018**

時間	議程			
09:30	Network Function Virtualisation - Part 1 09:30 to 11:00	ASO Review Consultation 09:30 to 11:00	Security 1 09:30 to 11:00	Routing to SDN Era 09:30 to 11:00
11:30	Network Function Virtualisation - Part 2 11:30 to 13:00	APNIC Policy SIG 1 11:30 to 13:00	Network Operations 1 11:30 to 13:00	IPv6 transition and deployment tutorial - Part 1 11:30 to 13:00
14:30	Network Operations 2 14:30 to 16:00	APNIC Policy SIG 2 14:30 to 16:00	Secure SDN 14:30 to 16:00	IPv6 transition and deployment tutorial - Part 2 14:30 to 16:00
16:30	Network Operations 3 16:30 to 18:00	Global Reports 16:30 to 18:00	Cross-Border Internet Relationships in Asia 16:30 to 18:00	IPv6 - A Real World Deployment for Mobiles 16:30 to 18:00
18:00	Abuse Desk Operations and M3AAWG 18:00 to 19:00	APNIC BoF - Community Trainers 18:00 to 19:00	BoF: NOG Reports 18:00 to 19:00	ISOC@APRICOT 18:00 to 19:00
19:00	Meet the APNIC EC Social 19:00 to 20:00			

● **Wednesday, 28 February 2018**

時間	議程		
09:30	Brace Yourselves: DDoS is Coming - A DDoS Tutorial - Part 1 09:30 to 11:00	APNIC AGM 1 09:30 to 11:00	Security 2 09:30 to 11:00
11:30	Brace Yourselves: DDoS is Coming - A DDoS Tutorial - Part 2 11:30 to 13:00	APNIC AGM 2 11:30 to 13:00	Network Operations 4 11:30 to 13:00
14:30	RPKI Overview, Case Studies, Deployment, and Operations 14:30 to 16:00	APNIC AGM 3 14:30 to 16:00	Lightning Talks 14:30 to 16:00
16:30	Closing Plenary 16:30 to 18:00		
19:30	APRICOT Closing Social 19:30 to 21:30		

本次會議參與的 APNIC 45 的 Session 如下：

議程名稱	說明
IPv6 Readiness Measurement BoF	邀請亞太地區有作 IPv6 量測之國家，來進行 IPv6 量測方式的討論與經驗分享。
NIR SIG	各國 NIR 半年來的活動與狀況經驗分享報告。
Policy SIG	對於現行網路資源管理政策提出修正意見之提案。
NIR Hostmaster Workshop	與會對象為各 NIR 之 Hostmaster，目的是提供 APNIC 與 NIRs 的 Hostmaster 交流溝通管道，以檢討 IP 審理發放作業及增進彼此的 IP 管理技術。
APNIC Annual General Meeting (AGM)	與會對象為全體 APNIC 會員，目的是向會員報告 APNIC 近半年的狀況，同時總結各 SIG 所討論之提案，並尋求參與會員之共識。

### 三、參加心得

#### 1. IPv6 Readiness Measurement BoF

IPv6 Readiness Measurement BoF 由本人主持，本次會議與 AP-IPv6 TF 會議聯合舉辦，時間為 2 月 26 日的 16:30-18:00，共有 4 個講者進行報告如下：

- Jeff Schmidt – IPv6 Progress and Challenges in Australia
- Hiroki Kawabata – IPv6 Progress and Challenges in Japan
- Ajai Kumar – India IPv6 Measurement

- Tim Wang – IPv6 Progress and Challenges in Taiwan

在各報告中，首先由本人進行 BoF 最新狀況報告，澳洲、日本、印度及台灣針對該國的 IPv6 量測提出相關經驗分享。本次會議約有 50 多人參加，現場討論熱烈。



圖一：本人主持 IPv6 Readiness Measurement BoF



圖二：IPv6 Readiness Measurement BoF 中 Australia 講者報告



圖三：IPv6 Readiness Measurement BoF 中日本講者報告



圖四：IPv6 Readiness Measurement BoF 中 India 講者報告





圖五：IPv6 Readiness Measurement BoF 中 TWNIC 王彥傑工程師報告

## 2. Policy SIG

本次會議 Policy SIG 中改選兩位 co-chairs，原任兩位來自新喀里多尼亞 Micro Logic Systems 的 Bertrand Cherrier 和台灣 TWNIC 的顧靜恆組長都順利連任當選。



圖六：Policy SIG co-chair 改選，TWNIC 的顧靜恆組長順利連任當選



此次 Policy SIG 共有四個 Proposals，包括 prop-118: No need policy in APNIC region、prop-119: Temporary transfers、prop-120: Final /8 pool exhaustion plan 及 prop-123: Modify 103/8 IPv4 transfer policy，由於都沒有 Proposal 達成共識，提案都需要回到 mailing list 讓社群回饋意見後再做修改。

### 3. NIR SIG

本次 NIR SIG 共有 CNNIC、VNNIC、TWNIC、IDNIC、IRINN、JPNIC 等 6 個 NIR 上台報告，各 NIR 主要報告其各項業務推動狀況，而 TWNIC 在此會議中報告會員狀況、IP 核發狀況、舉辦的相關活動如 2017 Taiwan Internet Forum、第 29 次 TWNIC IP OPM 會議及 4G IPv6 試用專案等與各 NIR 和與會者進行交流。



圖七：TWNIC 王彥傑工程師在 NIR SIG 報告目前 TWNIC IP 業務狀況

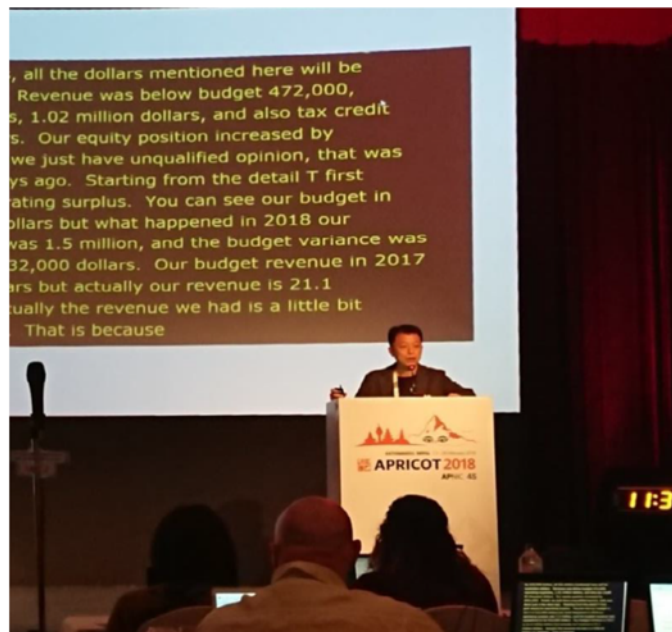
### 4. AGM會議

2月28日召開APNIC AGM會員大會，會議由APNIC Executive Council (EC)主席Gaurab Raj Upadhaya擔任主持人，7位APNIC EC共同於台上參與。



圖八：七位APNIC Executive Council進行AGM

APNIC主要針對目前的各業務進行相關報告與進行APNIC EC選舉，APNIC EC成員中負責Treasure為TWNIC 黃勝雄執行長，黃執行長於會員大會中進行APNIC EC Treasurer Report，報告APNIC 2017年決算以及APNIC 2018年經費預算。



圖九: TWNIC 黃勝雄執行長進行 APNIC EC Treasurer Report

本次會議改選三位EC成員，當選者為香港Kam Sze Yeung、印度Rajesh Chharia以及印尼Benyamin Naibaho，前兩位為續任，第三位為新任。此外，本人也受邀在會員大會中對IPv6 Readiness measurement BoF進行報告，簡報如附件一。



圖十：本人於 AGM 中進行 IPv6 Readiness Measurement BoF Report

#### 四、建議事項

1. 目前國際上各國家都積極在推動IPv6，愈來愈多國家的ISP業者都預設啟用IPv6，建議國內ISP參考此方式推動使用IPv6，也建議持續對國際IPv6發展持續關注，並以量化的方式進行實際量測及推動國內IPv6發展。
2. Policy是推動網路發展的重要依據，在Policy形成之前，需先進行Proposal的提案及討論，由於proposal的討論需尊重整個社群的意見，建議國內ISP及相關單位能了解並參與相關的討論，以便能與國際接軌及健全國內網路的持續發展。
3. 今年台灣三大ISP預計推出4G IPv6上網服務，期望能提升台灣IPv6使用率，進而將相關經驗持續推廣到其他ISP。

#### 五、其他相關事項或資料

APRICOT 2018及APNIC 45會議各場次簡報投影片及YouTube錄影均提供於活動網站上，活動網址如下：<https://2018.apricot.net/>

附件一



# IPv6 Readiness Measurement BoF Report

28 February, 2018@APNIC 45



**IPv6 Readiness Measurement BoF**

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## Outline

- Status reports of the IPv6 Readiness Measurement
- Data Analysis of IPv6 readiness
- Conclusions



## APNIC 45

### IPv6 Readiness Measurement BoF

- Date : Monday, 26 February 2018, 16:30-18:00
- Location: Kathmandu, Nepal
- Agenda
  - Welcome, [Shian-Shyong Tseng](#) (Asia University, Chair of BoF)
  - IPv6 Progress and Challenges in *Australia*, [Jeff Schmidt](#) (Telstra)
  - IPv6 Progress and Challenges in *Japan*, [Hiroki Kawabata](#) (JPNIC)
  - *India* IPv6 Measurement, [Ajai Kumar](#) (Mumbai Internet Exchange)
  - IPv6 Progress and Challenges in *Taiwan*, [Tim Wang](#) (TWNIC)
- There are more than 50 attendance in this BoF.

## Current Status reports

### ***Jeff Schmidt (Telstra)***

- Introduced their network architectures and the experience.
- Showed the Migration Strategy to get to IPv6 single stack.
- Use DNS64 as a migration step from dual stack to single stack.

### ***Hiroki Kawabata (JPNIC)***

- Introduced IPv6 Deployment Status by each segments.
- Major ISP provides IPv6 Connectivity by PPPoE or IPoE.
- **Three major MSO started IPv6 operation in 2017.**
- Contents providers seem to be indifferent.



## Current Status reports

### ***Ajai Kumar (Mumbai IX)***

- Introduced India Government Initiatives.
- Showed the National IPv6 Deployment Roadmap II and the Revised IPv6 Transition Timelines.
- Introduced IPv6 deployment status in Internet Exchange Points in India.

### ***Tim Wang (TWNIC)***

- Introduced IPv6 Deployment Status by each segments.
- Showed the major IPv6 Milestones.
- Updated the status of 3 common measurement criteria.



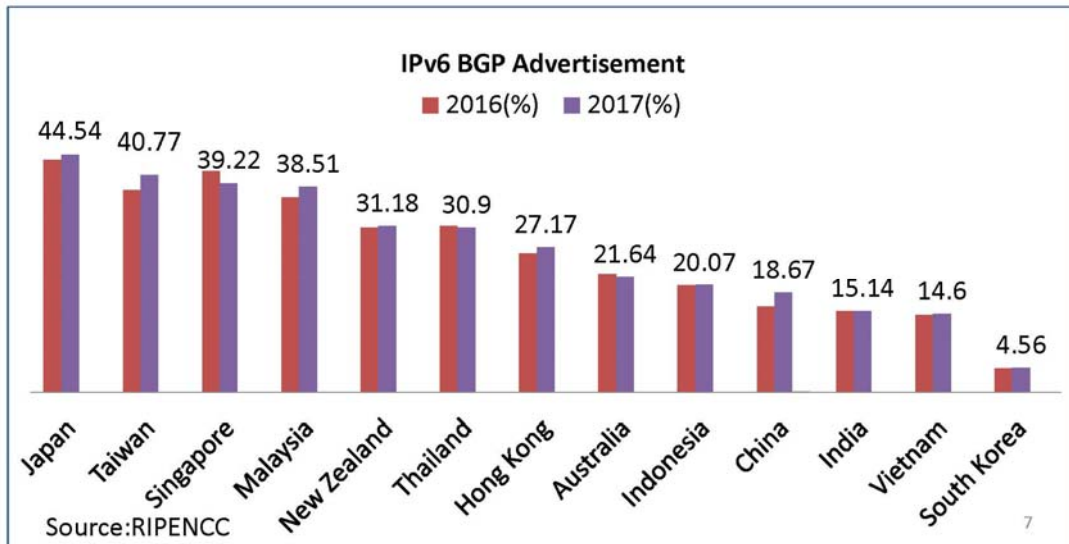
## Data Analysis of IPv6 readiness





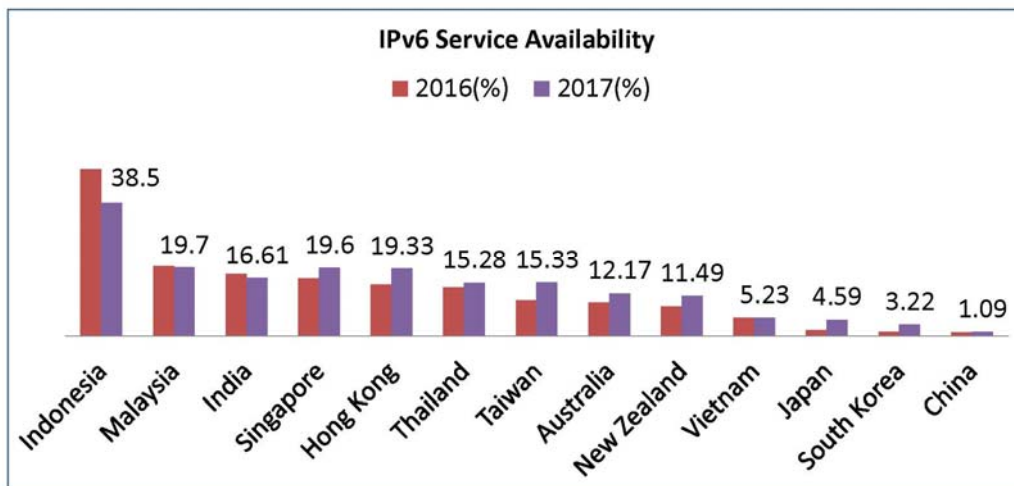
## Observation of IPv6 Allocation and BGP Advertisement

- The average of IPv6 BGP advertisement in 2017 has arrived at 26.7%, the annual growth rate is about 0.6%.



## Observation of Service Availability

- The average of IPv6 service availability in January, 2018 has arrived at 14.01%, the annual growth rate is 1.07%. Japan and South Korea have the larger growth rates.



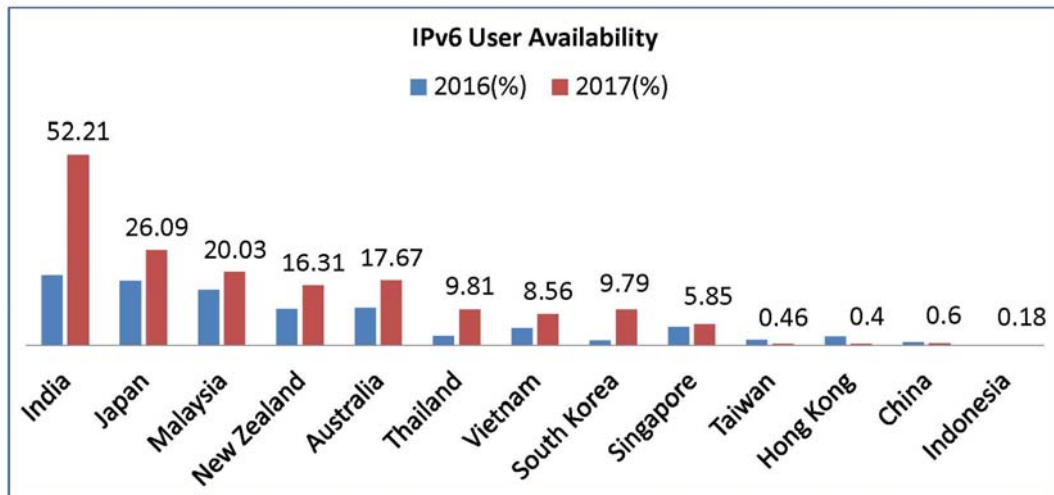
Source:Alexa (Data from Alexa top 500 web services for each ccTLD.)

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## Observation of User Availability

- The average of IPv6 user availability in 2017 has arrived at 12.92%, the annual growth rate is 5.94%. India jumped to 52.21%.



Source:APNIC

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## Conclusion

- The growth rate of the user availability shows that most Asia Pacific countries made big progress in last year.
- As to IPv6 BGP advertisement, the annual growth rate is about 0.6%.
- As to IPv6 service availability, the annual growth rate is 1.07%.
- Different methodologies and criteria of readiness measurement are very welcome.

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Thank you  
Please join us:

Mailing list: [ap-v6readiness@ap-v6readiness.org](mailto:ap-v6readiness@ap-v6readiness.org)

Website: <http://www.ap-v6readiness.org>