



# 台灣大哥大

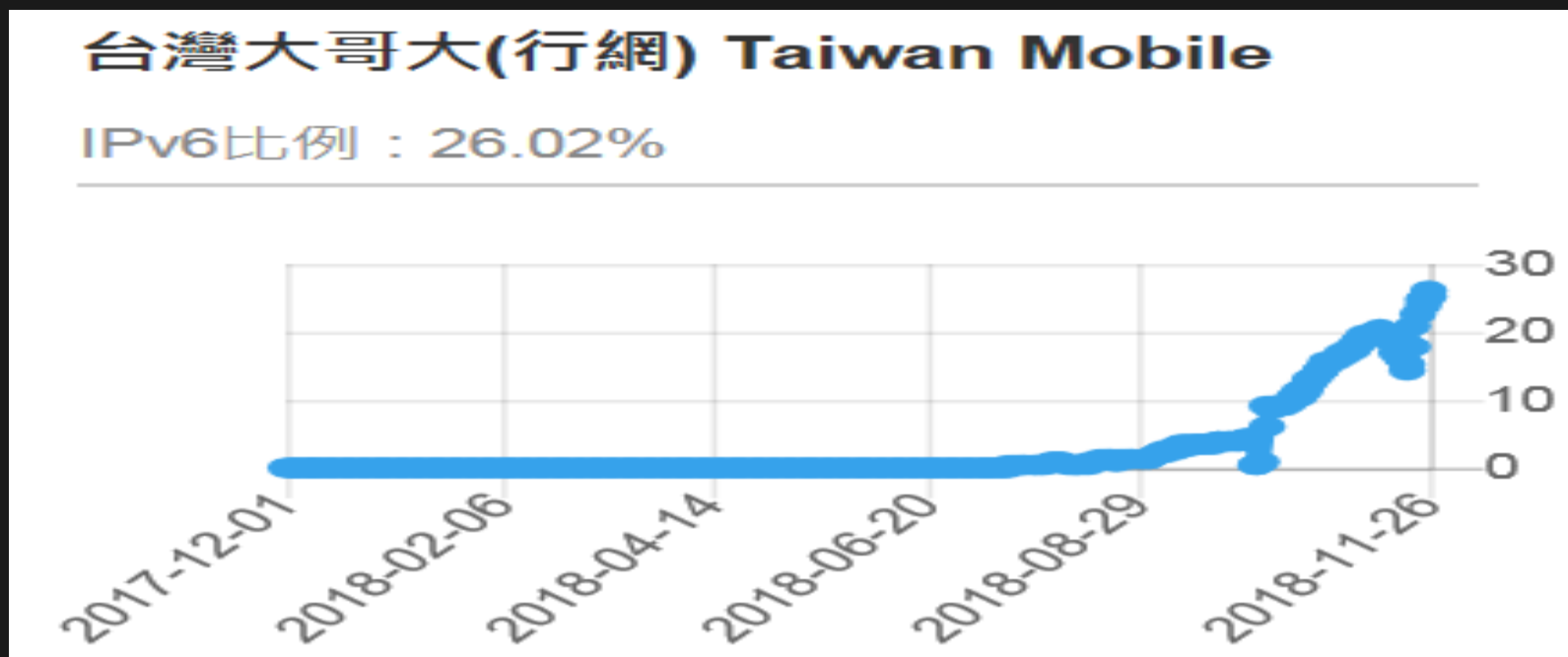
## 台灣大哥大 IPv6經驗分享

簡維志

2018/11/27

# 台灣大哥大IPv6進度

- 預計2018/12完成全網台灣大哥大用戶導入IPv6服務(11/E約50%)



ASN	AS Name	IPv6 Capable	IPv6 Preferred	Samples
AS24158	TAIWANMOBILE-AS Taiwan Mobile Co., Ltd.	25.04%	21.58%	10,044

- <https://ipv6now.twnic.net.tw/ipv6/info.html>
- <https://stats.labs.apnic.net/ipv6/TW?c=TW&x=1&v=1&p=1&r=1&w=1>

# IPv6 Capable/Preferred

- 剛導入時，APNIC的全球IPv6 Capability Metrics網站列表中，TWM的“IPv6 Capable” & “IPv6 Preferred”的差距較大

ASN	AS Name	IPv6 Capable	IPv6 Preferred	Samples
AS24158	TAIWANMOBILE-AS Taiwan Mobile Co., Ltd.	18.28%	9.81%	6,941

- Capable** means “can fetch IPv6”
  - The endpoint was observed to fetch a web object when the only address binding to the DNS label was an IPv6 address (IPv6 only)
- Preferred** means “given dual-stack options, select IPv6”
  - The endpoint was given a DNS name that had bindings to both IPv4 and IPv6 addresses
  - The observed web fetch was over IPv6. “Happy Eyeballs” or some other local protocol selection logic at the endpoint preferred to use IPv6 over IPv4

# APNIC IPv6 Measurement Topology

- 經確認台灣大哥大到APNIC Test Site IPv6的路由RTT較高因此導致APNIC的測試結果IPv4優先選擇，後來調整APNIC Test Site的IPv6路由後差異就大幅變少
- APNIC上的IPv6 preferred的數值僅表示DS用戶到**測試URL**的連線選擇，不代表用戶到**Internet**的所有連線選擇。

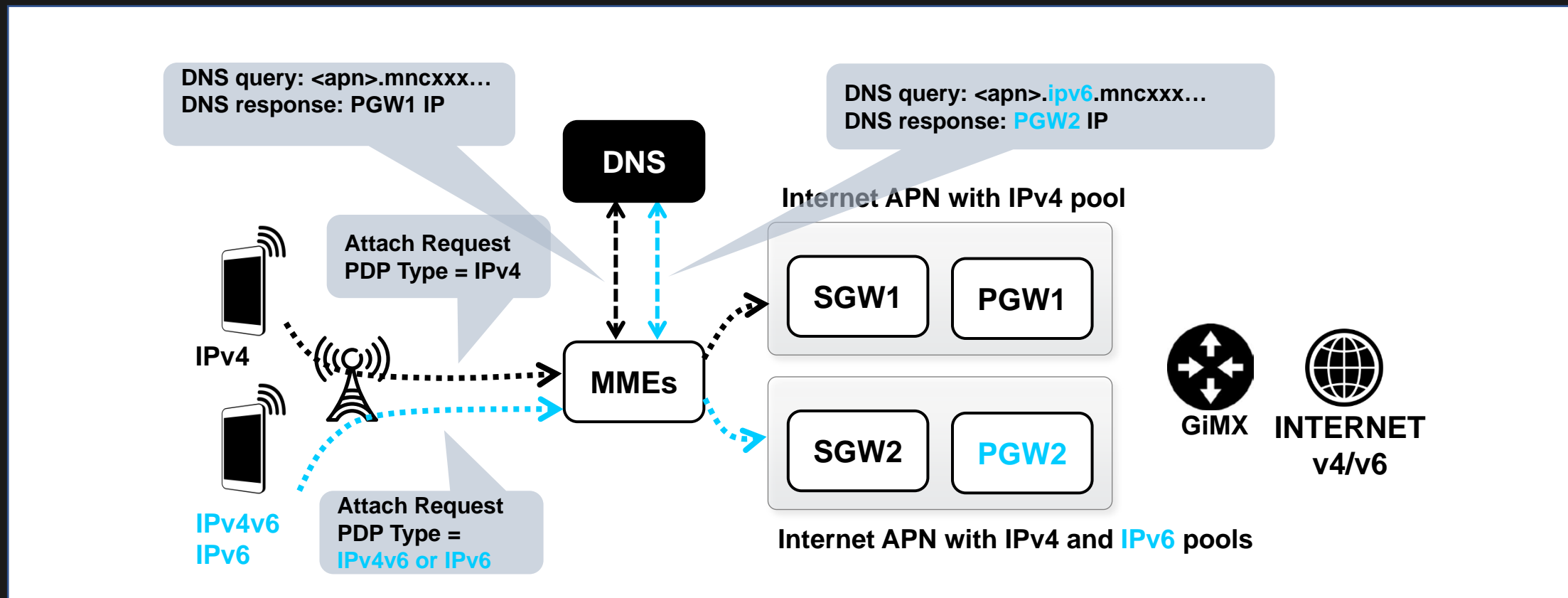


\* Refer APNIC "How We Measure IPv6" document

\* APNIC test URL [aaa-bbb-ccc-ddd-eee.ap.dotnxdomain.net](http://aaa-bbb-ccc-ddd-eee.ap.dotnxdomain.net)

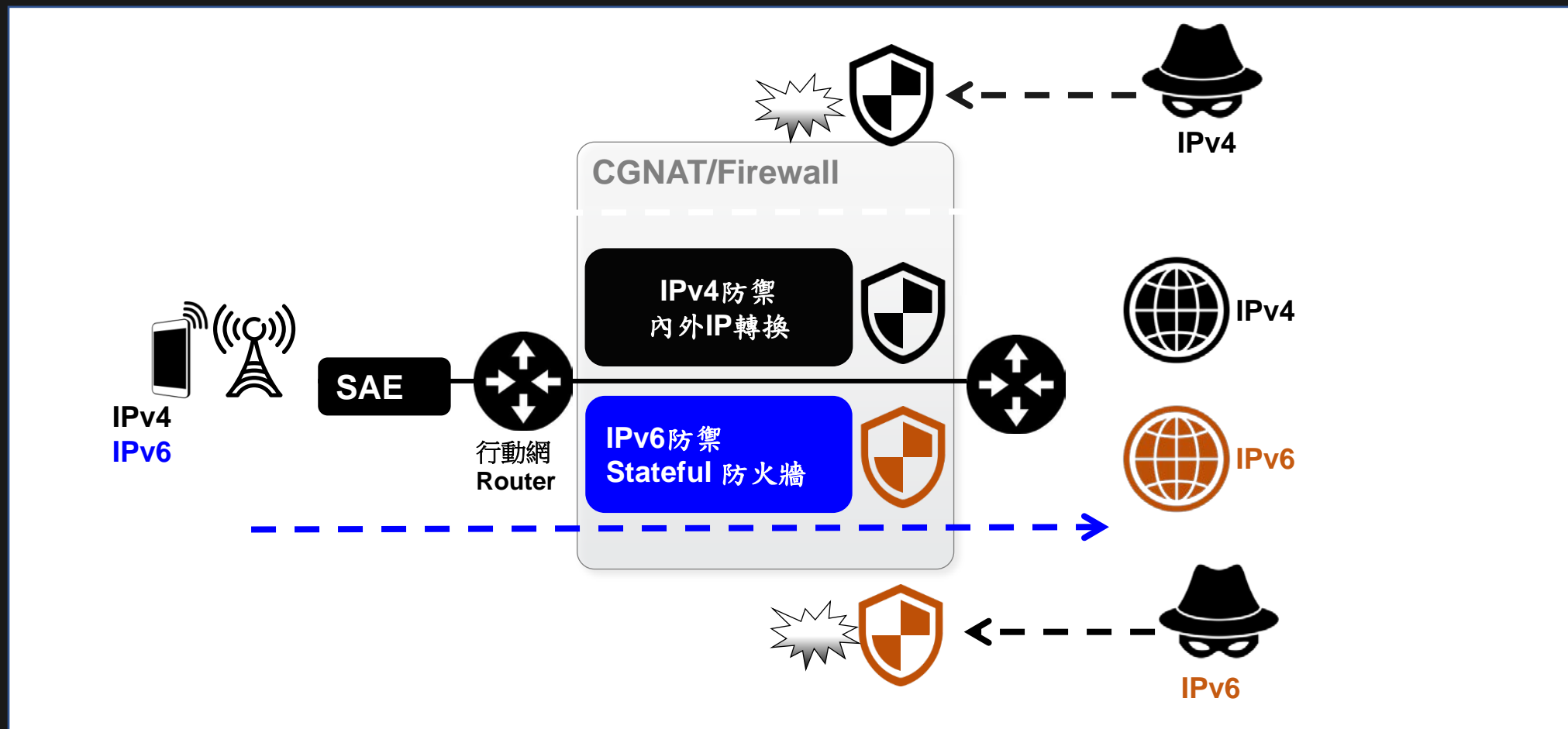
# MME PGW Selection based on PDN type

- 一種彈性在行動網實現服務的方法，未來可以彈性調度資源
- 此次採用透過MME分辨PDN Type導入特定P-GW的方式



# IPv4/v6 防禦示意

- IPv4: 透過CGNAT可阻擋外部主動連線
- IPv6: 透過stateful 防火牆可阻擋外部主動連線





台湾大哥大

Backup

# Happy Eyeballs

## Dual Stack用戶使用IPv4 or IPv6連線機制

- **Happy Eyeballs**
  - (Also called Fast Fallback) is an algorithm published by the IETF which can make **dual-stack applications** (those that understand both IPv4 and IPv6) more responsive to users by attempting to connect using both IPv4 and IPv6 at the same time (preferring IPv6), thus avoiding the usual problems faced by users with imperfect IPv6 connections or setups.
- **RFC 6555: Happy Eyeballs: Success with Dual-Stack Hosts**
  - 同時送出v4/v6連線，以TCP SYN/ACK回覆時間決定連線(IPv6 advantage 50ms)。
  - 目前手機主要支援。
- **RFC 8305: Happy Eyeballs v2: Better Connectivity Using Concurrency**
  - 收到DNS任一AAAA/A回覆立刻連線
- [https://en.wikipedia.org/wiki/Happy\\_Eyeballs](https://en.wikipedia.org/wiki/Happy_Eyeballs)