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# IPv6 Progress and Challenges in Chunghwa Telecom

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Chunghwa Telecom

2016.2.24



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# Outline

- ❖ **Chunghwa Telecom Profile**
- ❖ **IPv6 Measurement in Taiwan**
- ❖ **IPv6 Access Deployment - Home Gateway**
  - IPv6 Ready CE Router Logo
- ❖ **IPv6 Challenges in Mobile Network**
- ❖ **IPv6 WiFi Tethering Challenges**
- ❖ **Summary**



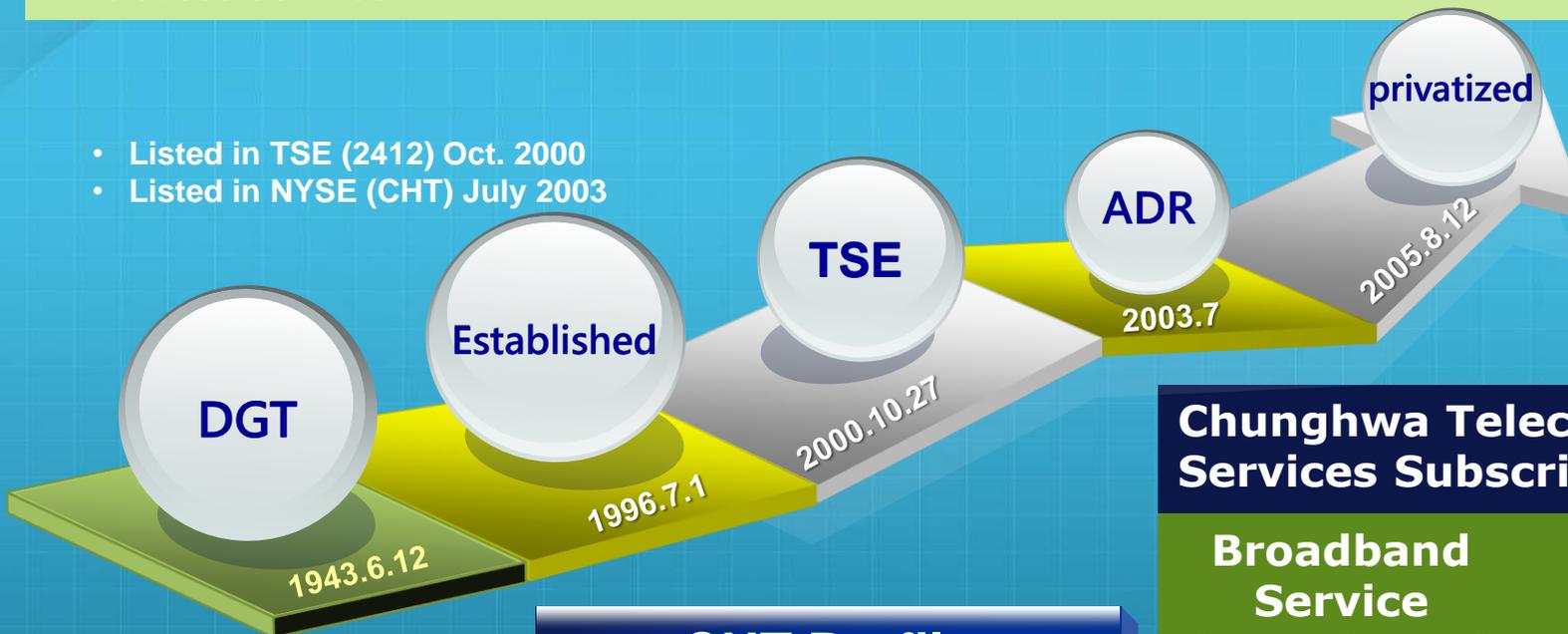
# Chunghwa Telecom Profile

## CHT : Chunghwa Telecom

<http://www.cht.com.tw/en/>

- ✓ CHT is the largest Internet service provider in Taiwan
- ✓ CHT also is Taiwan's largest provider of fixed services, mobile services and broadband access service

- Listed in TSE (2412) Oct. 2000
- Listed in NYSE (CHT) July 2003



### CHT Profile

- Capital : US\$2.6 billion
- Employees: 23,141

### Chunghwa Telecom Major Services Subscriber

Broadband Service (FTTx/xDSL)	4,496,265
Mobile Service (2G/3G/4G)	11,176,819

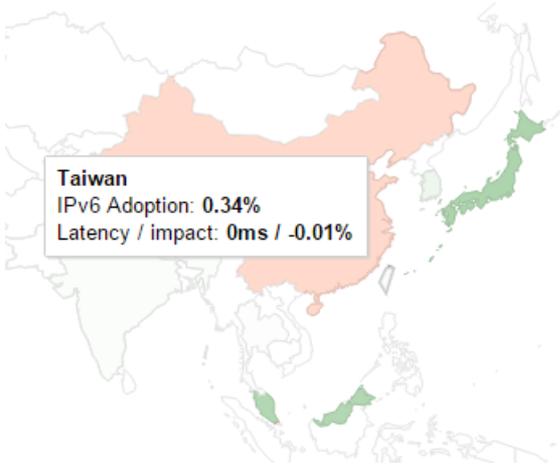
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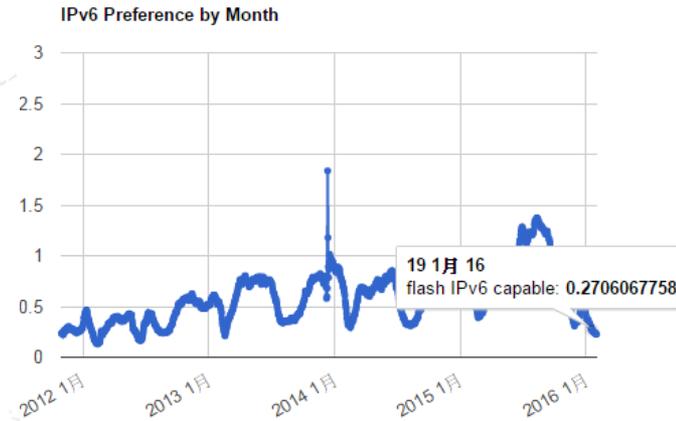


# IPv6 Measurement in Taiwan

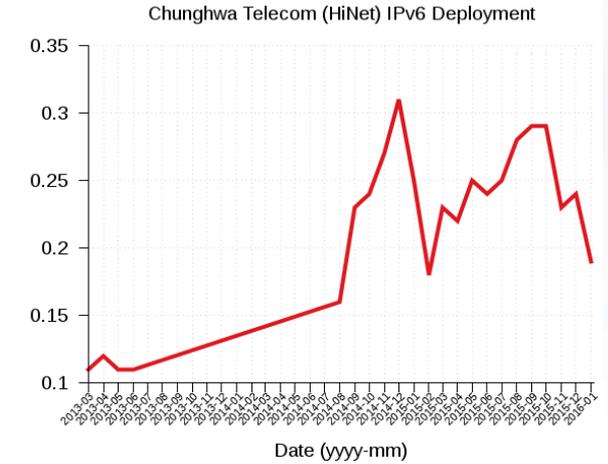
## Google



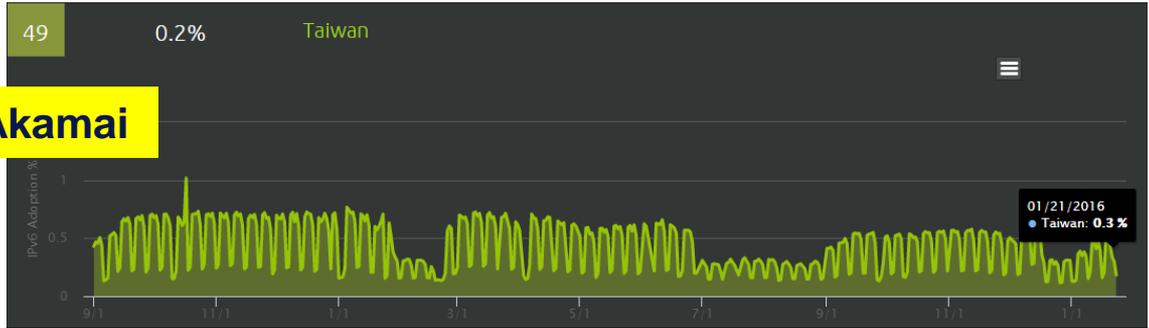
## APNIC



## Internet Society



Rank ▲	Participating Network ▼	ASN(s) ▼	IPv6 deployment ▼
47	<a href="#">Chunghwa Telecom (HiNet)</a>	3462, 9680, 17419	0.19%



## Akamai

### Taiwan IPv6 Ranking

- IPv6 Use Ratio: 0.2261%
- IPv6 Use Ratio Ranking: 59th

2016/2/3 Updated

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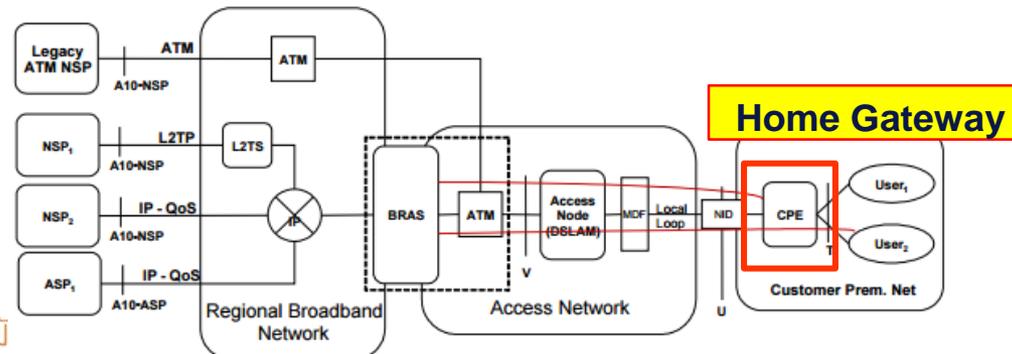
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# IPv6 Access Deployment - Home Gateway

- ❖ Home Gateway(a.k.a CE Router/DSL Router/GPON ONU/Cable Modem/WiFi AP) is a significant device for IPv6 access deployment
- ❖ CHT will provide IPv6 capable Home Gateways to customer for IPv6 Internet connection
- ❖ *Which Home Gateway is truly IPv6 Ready?*  
*Every vendor claims his product is IPv6 Ready, is it real?*
- ❖ The IPv6 Forum has recognized the need for the last mile interoperability testing of the highly diverse CE Router market



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# IPv6 Ready CE Router Logo

- ❖ The IPv6 Forum and the IPv6 Ready Logo Committee launched the **IPv6 Ready CE Router Logo Program** on 2014/03/19



- ❖ IPv6 Ready CE Router Logo can verify the product compliance with IPv6 Core、DHCPv6 and RFC 7084
- ❖ Two parts of test in IPv6 Ready CE Router Logo Program => Conformance Test and Interoperability Test
- ❖ CHT IPv6 Testing Lab is the author of IPv6 CE Router conformance test specification and technical reviewer of interoperability test specification
- ❖ CHT also provides the self-test tools and verifies vendors' products to get the IPv6 Ready CE Router Logo

ALWAYS AHEAD Self-Test tool download url: <http://interop.ipv6.org.tw/CERouter/>

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# IPv6 Ready CE Router Logo

- ❖ CHT IPv6 Testing Lab helped two products get the first and second CE Router Logo in the world

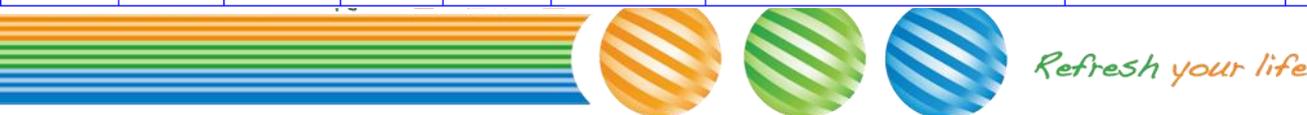


- ❖ Based on IPv6 Ready CE Router approved list, ISPs can purchase the certificated IPv6 CE Router and end users can select the capable IPv6 device

- ❖ Check the approved device in below URL:

<https://www.ipv6ready.org/db/index.php/public/search/?ap=2&etc=E&do=1&lim=25&o=5>

Logo ID ▲▼	Approved Date ▲▼	Application Phase ▲▼	Test Category ▲▼	Vendor Name ▲▼	Region/Country Name ▲▼	Product Name	Product Version	Product Classification ▲▼	Conformance Test Version	Interoperability Test Version	OEM Licensor's Logo ID ▲▼	Update
<a href="#">02-E-000111</a>	2016/01/20	Phase-2	CE Router	NETGEAR	TW	R6300v2	V1.0.4.2_10.2.2CH	Router	1.0.0	1.0.2		New
<a href="#">02-E-000112</a>	2016/01/20	Phase-2	CE Router	Netgear	TW	WNDR3800-1CHNAS	V1.0.0.71CH-LOGO	Router	1.0.0	1.0.2		New
<a href="#">02-E-000113</a>	2016/01/20	Phase-2	CE Router	Broadcom	US	BCM97435VMS	IPv6 Stack Version 1.2.1	Router	1.0.0	1.0.2		New
<a href="#">02-E-000114</a>	2016/01/20	Phase-2	CE Router	ZTE	CN	ZXHN H267N	V1.0	Router	1.0.0	1.0.2		New
<a href="#">02-E-000115</a>	2016/02/15	Phase-2	CE Router	Sagemcom	BR	F@st3284u HP NET, F@st3284 HP NET	IPv6 Stack Version 1.2.3	Router	1.0.0	1.0.2		New
<a href="#">02-E-000116</a>	2016/02/15	Phase-2	CE Router	Humax	KR	HNB200	IPv6 Stack 1.2.3	Router	1.0.0	1.0.2		New
<a href="#">02-E-000117</a>	2016/02/16	Phase-2	CE Router	Humax	KR	HG100R-L4	IPv6 Stack Version 1.2.3	Router	1.0.0	1.0.2		New



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# IPv6 Challenges in Mobile Network



- ❖ Android 5.0、iOS 4.3.1、Windows Phone 8 support IPv6 function
- ❖ Many Taiwan smart phone vendors do not implement IPv6 function in firmware for potential customer service issues
  - Because the ISPs still not provide the IPv6 service, no vendor wants to implement a (IPv6) function that can't be used now
- ❖ But it is also a hard decision for ISPs to enable IPv6 if there are no IPv6 capable phone, because no one can use this service
- ❖ *Which came first, the chicken or the egg?*
- ❖ We are cooperating with smart phone vendors to turn on IPv6 function as default



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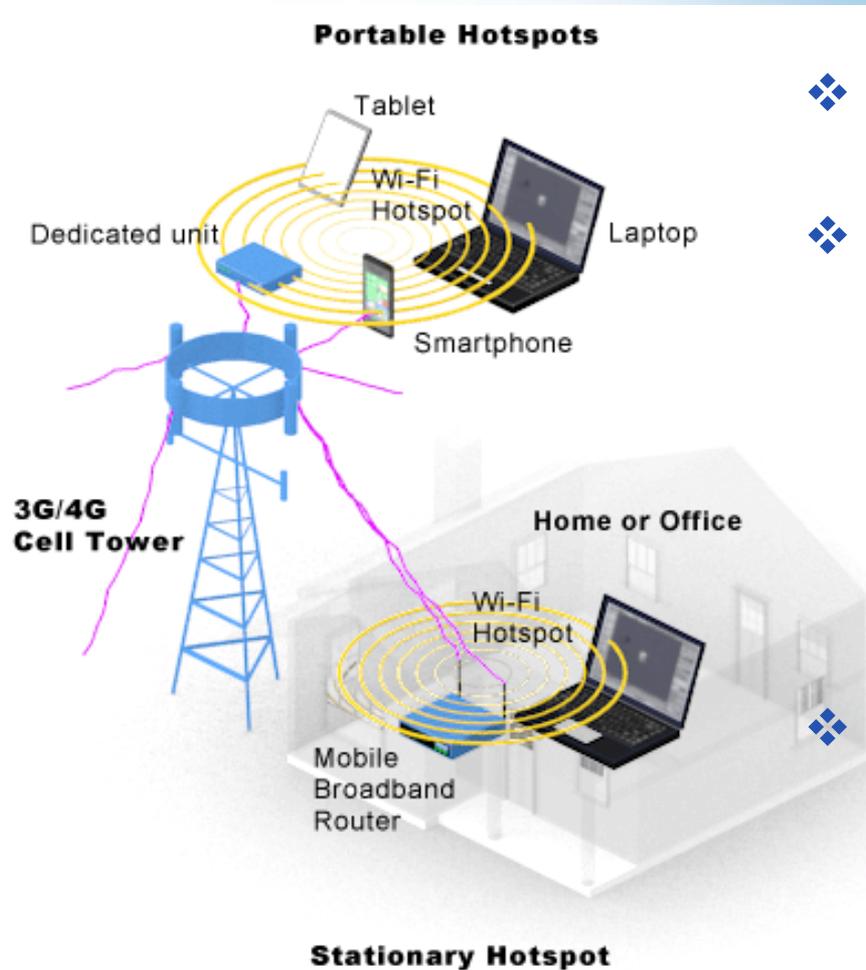
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# IPv6 WiFi Tethering Challenges



- ❖ Not like IPv4, there is no NAT in IPv6 world
- ❖ Three methods to implement IPv6 tethering in mobile:
  1. DHCPv6 Prefix Delegation
  2. SLAAC extending /64 prefix (RFC 7278)
  3. CLAT (Customer Side Translator)
- ❖ Challenges:
  - Android does not support DHCPv6 currently



# IPv6 WiFi Tethering Test



中華電信  
Chungwa Telecom

狀態

我的電話號碼  
未知

IMEI  
000703000020030

IMEISV  
01

**IP位址**  
111.71.232.2  
2001:b400:e300:0:e05b:984a:6c63:9f63

Wi-Fi MAC 位址  
60:AF:6D:99:0A:D2

藍牙位址  
無法使用

序號

開機時間  
0:45:09

設備狀態  
原廠

Hotspot Router

行動無線基地台

AndroidAP0AD2  
允許所有裝置以連接。

已連接的裝置

android-b3f5b47d14d481d0  
90:E7:C4:C9:DD:5B  
192.168.43.224

如何自其他裝置連接

1. 在共享行動網路連線的裝置上開啟 Wi-Fi。
2. 自可用的 Wi-Fi 網路清單中選擇 **AndroidAP0AD2**。
3. 輸入 **dgdi2817** 作為密碼以連接到 **AndroidAP0AD2**。

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# IPv6 WiFi Tethering Test



Wi-Fi optimization   
Minimize battery usage when Wi-Fi is on

Auto-switch to mobile network   
Use mobile data connection when Wi-Fi signal is weak

Hotspot sign-in   
Automatically open sign-in web pages for Internet access

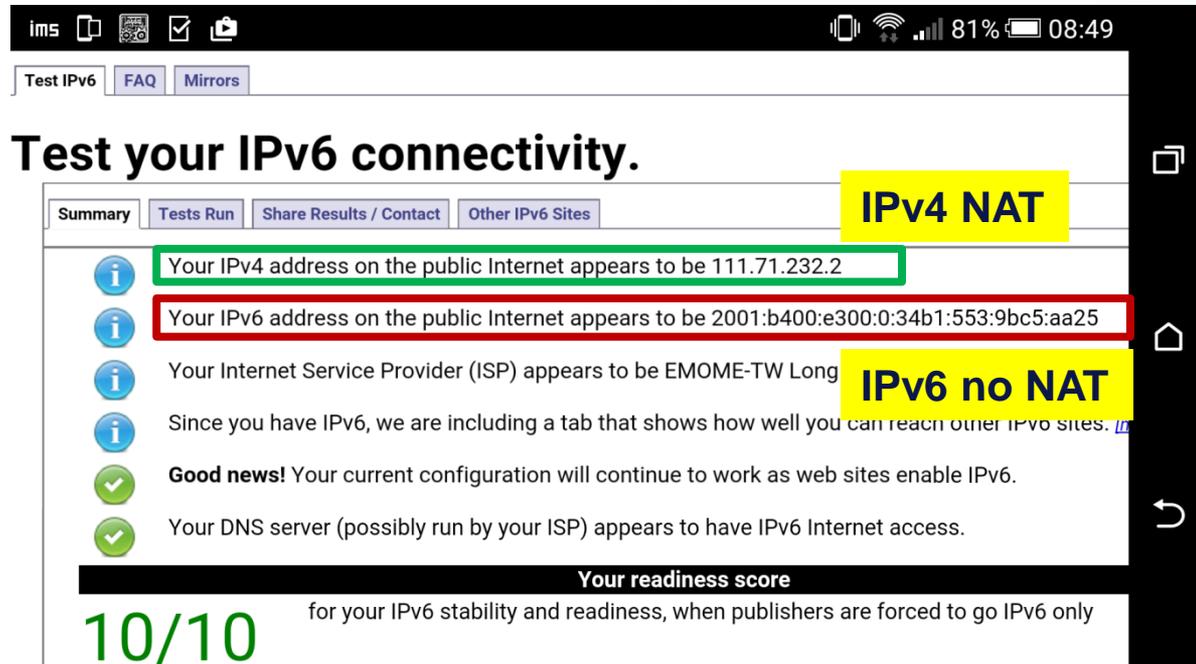
MAC address  
90:e7:c4:c9:dd:5b

IP address  
fe80::92e7:c4ff:fec9:dd5b  
2001:b400:e300:0:92e7:c4ff:fec9:dd5b  
2001:b400:e300:0:34b1:553:9bc5:aa25  
192.168.43.224

### WISPR SETTINGS

Auto login   
Login automatically when Wi-Fi connected

Hotspot Client



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# Summary

- ❖ CHT has already provided the FTTx based IPv6/IPv4 dual stack trial internet service since 2011
- ❖ Good news:  
More and more IPv6 CE Router device get the IPv6 Ready Logos
- ❖ We are looking forward the IPv6 progress and growth in Mobile and PWLAN in 2016 in Taiwan
- ❖ Customer experience is most important, our goal is customer feel nothing different in using IPv6 and IPv4





*Value Creator for  
Investors, Customers, Employees, and  
Society*

**Thank you!**

