

HKT

How to plan and deploy GovWiFi
- its IPv6 now!

Jul 2013



HKT - a PCCW Group member



Discussion Items

- 1. Background of the GovWiFi Project**
- 2. Challenges to the Service Operator**
- 3. How ready is the GovWiFi ?**
- 4. How ready is the mobile client devices ?**
- 5. Customer experience on IPv6 over WiFi network**

1. Background of the GovWiFi Project

GovWiFi Project Highlight

1. A Government project initiated and managed by OGCIO
2. Total service outsourcing (HKT is the service provider)
3. 1st Generation GovWiFi service from 2007 to 2012
4. 2nd Generation GovWiFi service from 2012 to 2017
5. Free public WiFi services, covering at least 422 indoor and outdoor sites
6. No pre-registration is required

New requirement in the 2nd Generation GovWiFi

- **1st Generation GovWiFi**
 - Launched in 2008
 - Support IPv4

- **2nd Generation GovWiFi**
 - Launched in Dec 2012
 - Support both IPv4 and IPv6

IPv6 became a mandated requirement

2. Challenges to the Service Operator

Prerequisite to Provide a IPv6 WiFi

To support GovWiFi's IPv6 requirement, HKT's broadband network must also be IPv6 ready :

- HKT already obtained IPv6 address space since 2010
- HKT started enabling IPv6 on its network since 2011

A Service Operator's Considerations

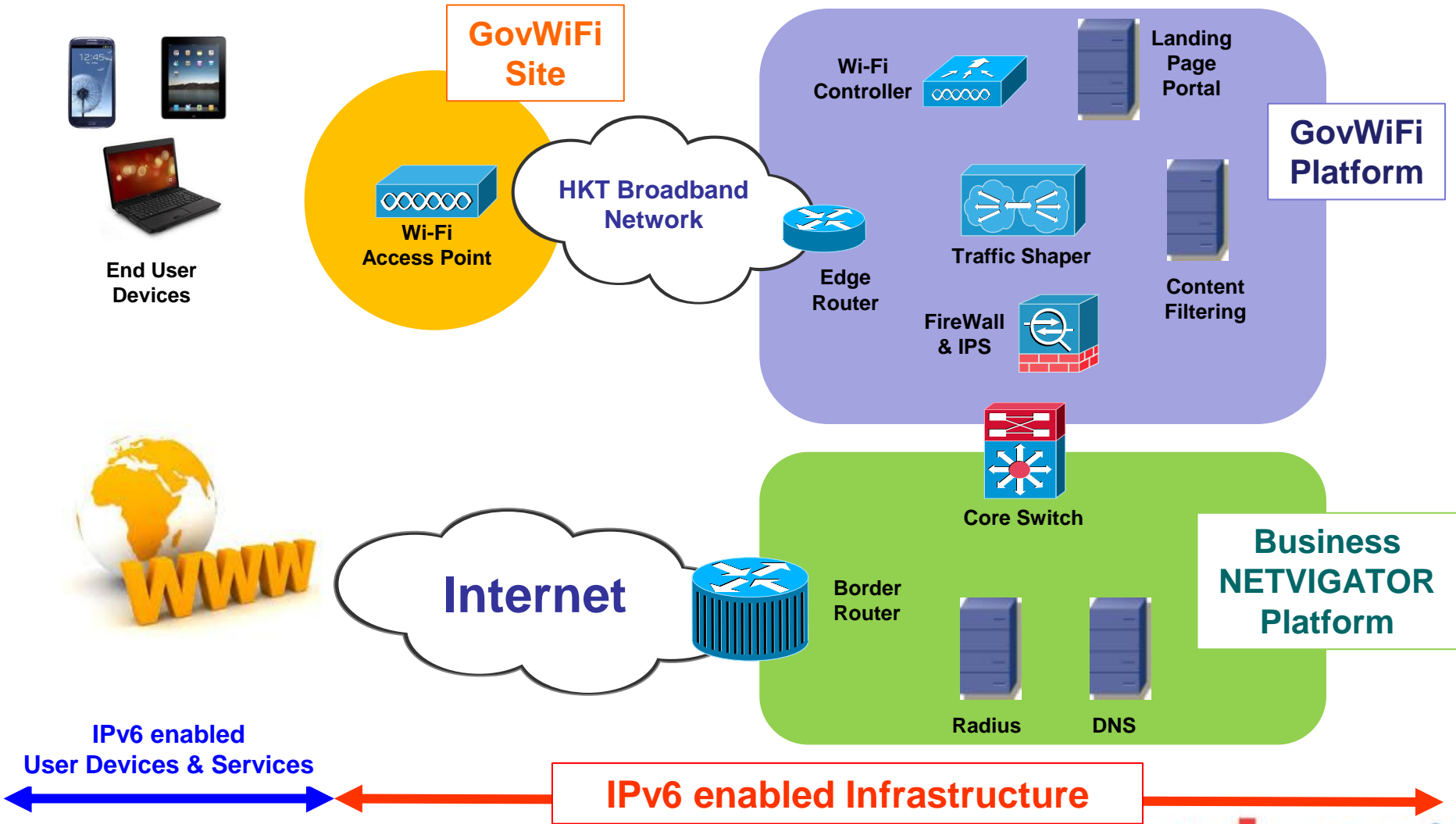
- IPv6 Deployment Strategy
 - Market readiness (vendor support, customers ...)
 - Cost effectiveness and timing
 - Customer and Operation Supports

Typical challenges faced by service operators

- Shortage of IPv4 address space
 - Need to get IPv6 ready (if haven't deployed) asap before IPv4 become exhausted
- Equipment Testing
 - Equipment may have teething problem on IPv6 features
 - in particular, those new equipment type and features.
- Customer Support
 - Difficult to support on customer's reported fault case when it is not sure which Internet Protocol were being used
 - e.g. some devices does not auto fallback to IPv4 when IPv6 connection failed once IPv6 connection started

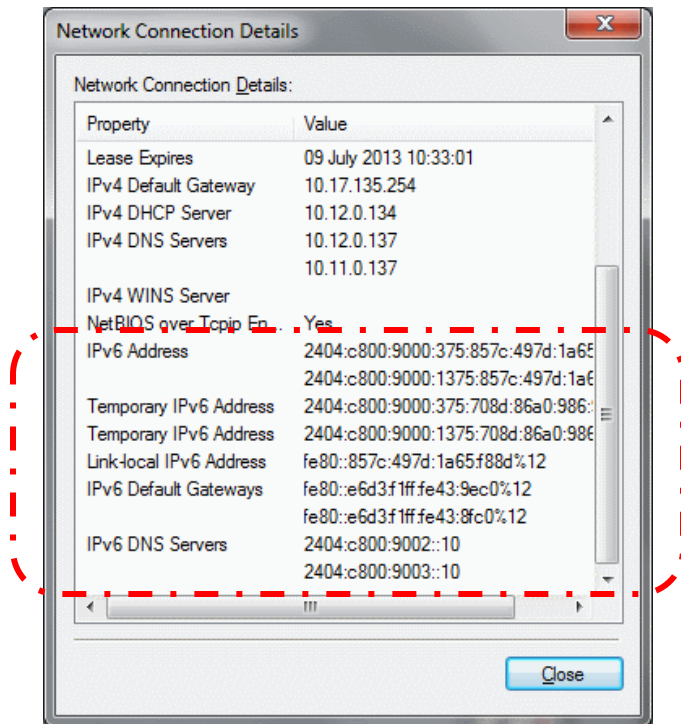
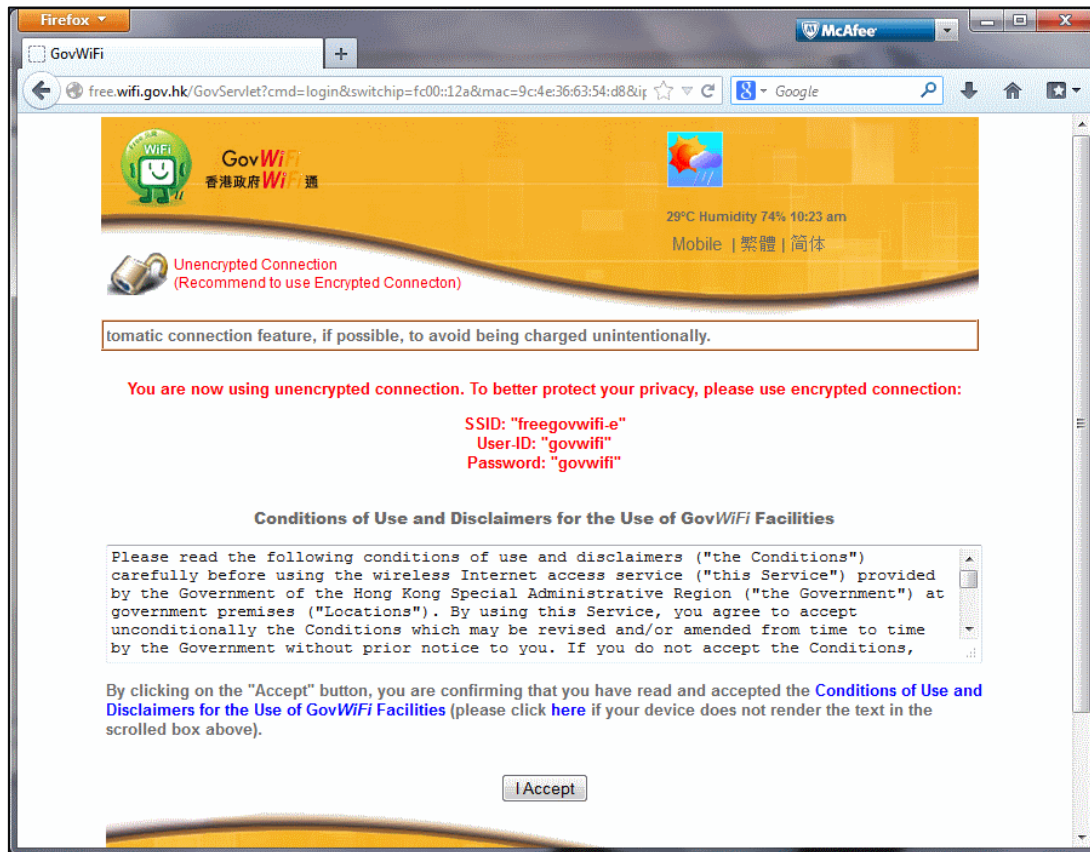
3. How Ready is the GovWiFi for IPv6 ?

Network Overview



An example of GovWiFi connection via IPv6

– A PC running Windows OS example

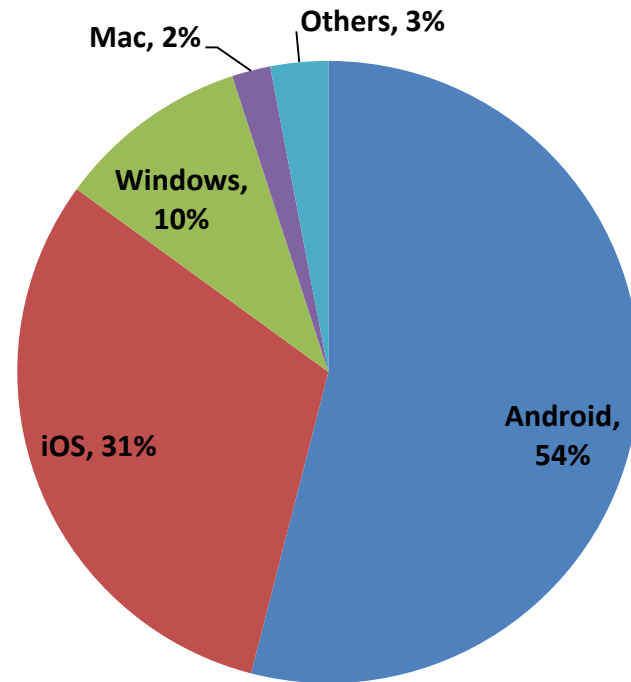


4. How Ready is the mobile client devices ?

A typical Wi-Fi hotspot end user device profile

Smart phones and tablets are the most used for Wi-Fi in general :

1. **Android 54%**
2. **iOS 31%**
3. **Windows 10%**
4. **Mac 2%**



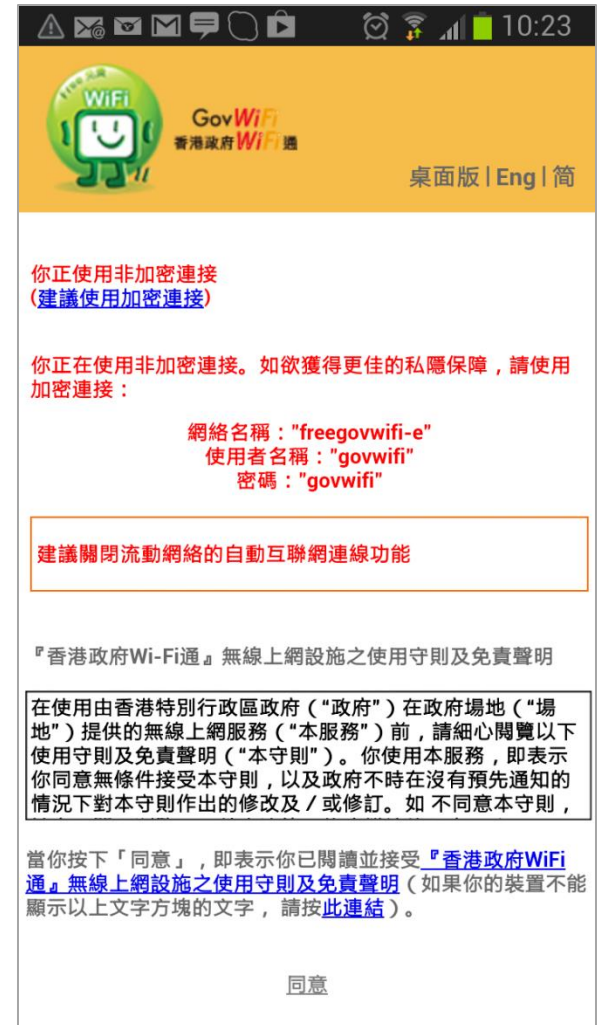
IPv6 Supported OS

OS	Version (or later)
AIX	4.3
Android	4.2
Cisco IOS	15.2
Fedora	13
FreeBSD	9.0
HP-UX	11i
IBM i	7.1
iOS	4.1
Juniper JUNOS	12.2
Mac OS X	10.7
OpenBSD	5.2
OpenVMS	8.3
Red Hat Enterprise Linux	6
Solaris	10
SUSE Linux Enterprise Server	11
Symbian	7.0
Ubuntu	11.04
Windows	XP, Vista, 7, 8
Windows Phone	6.5

5. Customer experience on IPv6 over WiFi network

How to tell if I am using IPv6 or IPv4 ?

- Can make use of the GovWiFi to test it out
- Connect to GovWiFi at many designated locations



The screenshot shows the GovWiFi mobile interface. At the top, there is a status bar with various icons and the time 10:23. Below that is a header with the GovWiFi logo and the text "GovWiFi 香港政府WiFi通". To the right of the header, it says "桌面版 | Eng | 簡".

The main content area contains the following text:

你正使用非加密連接
(建議使用加密連接)

你正在使用非加密連接。如欲獲得更佳的私隱保障，請使用加密連接：

網絡名稱："freegovwifi-e"
使用者名稱："govwifi"
密碼："govwifi"

建議關閉流動網絡的自動互聯網連線功能

『香港政府Wi-Fi通』無線上網設施之使用守則及免責聲明

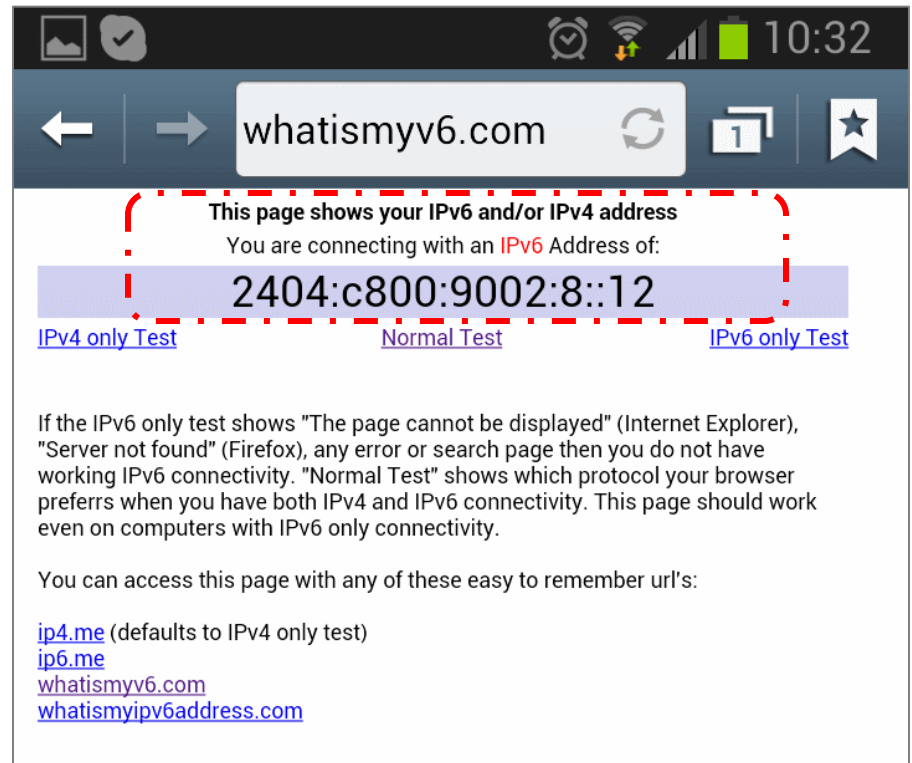
在使用由香港特別行政區政府（“政府”）在政府場地（“場地”）提供的無線上網服務（“本服務”）前，請細心閱覽以下使用守則及免責聲明（“本守則”）。你使用本服務，即表示你同意無條件接受本守則，以及政府不時在沒有預先通知的情況下對本守則作出的修改及／或修訂。如不同意本守則，

當你按下「同意」，即表示你已閱讀並接受『香港政府WiFi通』無線上網設施之使用守則及免責聲明（如果你的裝置不能顯示以上文字方塊的文字，請按此連結）。

同意

How to tell if I am using IPv6 or IPv4 ?

- Visit the web at whatismyv6.com
- It will indicate whether you are connected via IPv6 or IPv4
- The corresponding address will also be shown



This page shows your IPv6 and/or IPv4 address
You are connecting with an IPv6 Address of:

2404:c800:9002:8::12

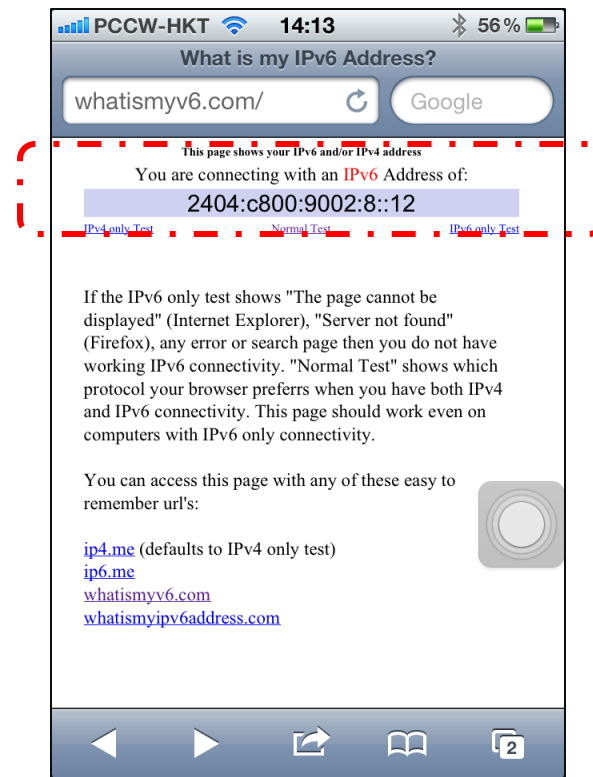
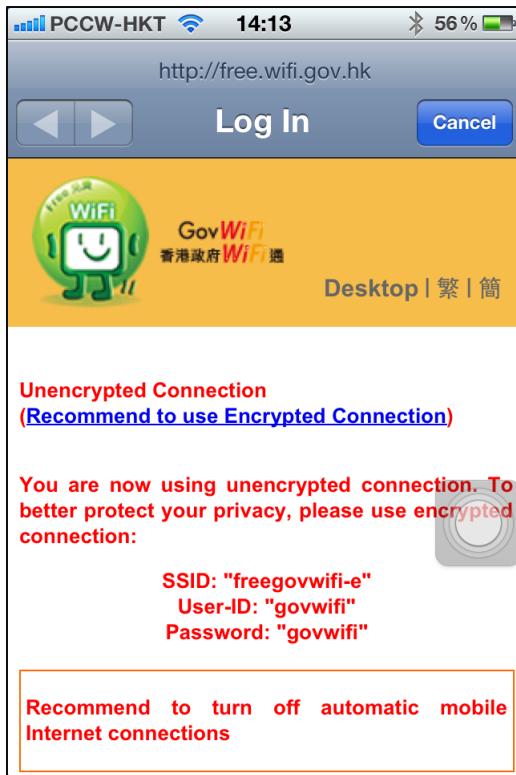
[IPv4 only Test](#) [Normal Test](#) [IPv6 only Test](#)

If the IPv6 only test shows "The page cannot be displayed" (Internet Explorer), "Server not found" (Firefox), any error or search page then you do not have working IPv6 connectivity. "Normal Test" shows which protocol your browser prefers when you have both IPv4 and IPv6 connectivity. This page should work even on computers with IPv6 only connectivity.

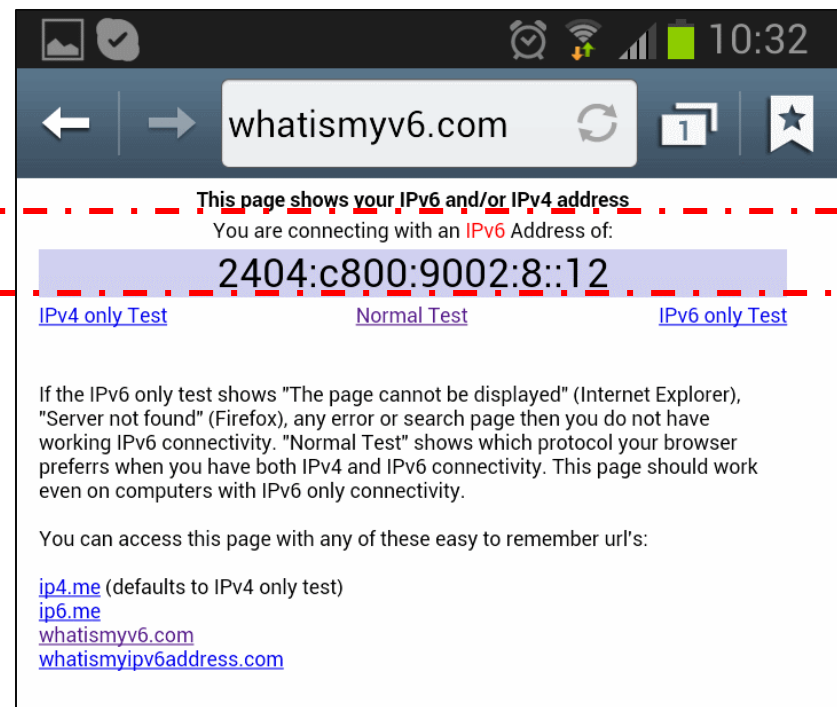
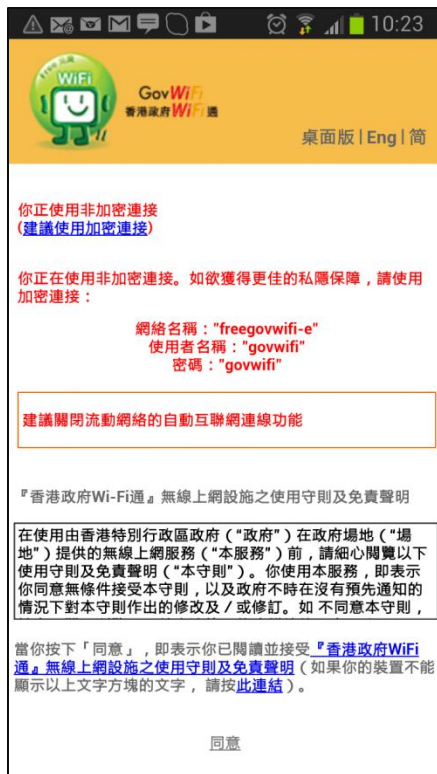
You can access this page with any of these easy to remember url's:

ip4.me (defaults to IPv4 only test)
ip6.me
whatismyv6.com
whatismyipv6address.com

How can I tell if I'm using IPv6 – An iPhone example



How can I tell if I'm using IPv6 – An Android example



How to verify if IPv6 is actually used ?

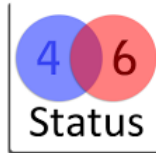
- Visit IPv6 only web sites, e.g.
 - Google at ipv6.google.com
 - Facebook at v6.facebook.com
- These pages will not be found if you are not using IPv6



IPv6

How to verify if IPv6 is actually used

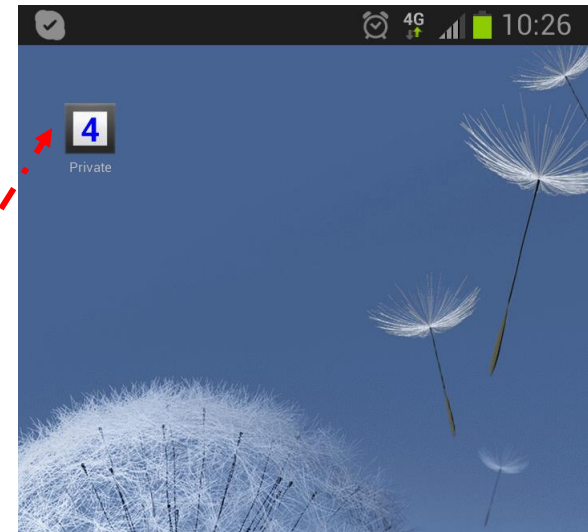
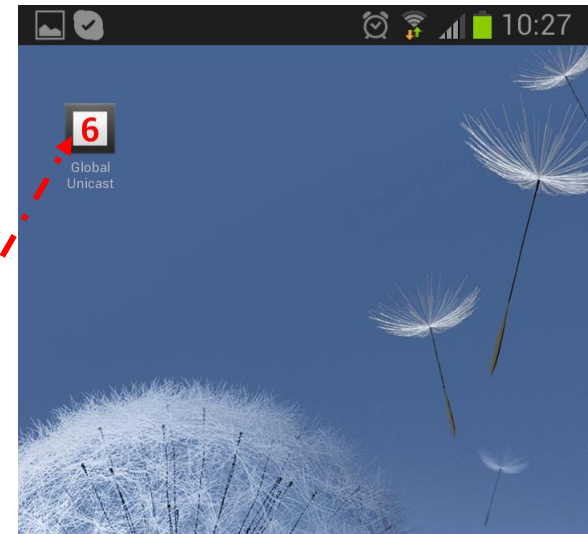
- Or via an App (Android only) named “IPv6 Status”



- Its widget show what protocol is being used **dynamically**

A number “6” indicates IPv6 is being used

A number “4” indicates IPv4 is being used



End

Some Devices do not show the assigned IPv6 address - could be misleading to end users

- **Note:** some devices do not show the assigned IPv6 address in their native Network Settings page
- Show only IPv4 address even it is IPv6 connected



HKT's IPv6

- **Lesson Learnt**

- Allocate more time and resources for testing equipment, in particular, for new equipment type or feature
- Provide sufficient tools and trainings for the frontline to help supporting customers, in particular, during the IPv4 and IPv6 transition period

HKT's IPv6

- **IPv6 Deployment Strategy**

- **Cost effectiveness**

- Access (CPE) router

- High-end models: IPv6 supported – no additional cost
- Low-end models: still limited choices, cost a lots more for IPv6
 - » Shall go down rapidly in near future

- **Customer and Operation Supports**

- Dual-stack approach
- Cater both IPv4 and IPv6 services/clients for smooth transition

HKT's IPv6

- **Implementation**

- Routing arrangement with upstream and peering partners
- Network equipment upgrade and testing
 - Network equipment: backbone, core, edge, & access routers
 - Servers: DNS & Radius etc.
- IP address allocation plan
 - Huge IP address space - sufficient for many decades
 - Good allocation planning has long term benefit on routing efficiency
 - by business function: Broadband, TV, Mobile etc.
 - by system function: internal infrastructure and customer etc.
 - by geographic: Network Operation Center and Data Center etc.
 - by class of service: e.g. premium and standard etc.

Possible Implementation of IPv6 Network

Dual protocol

- Straight forward
- Dual stack devices get both IPv4 and IPv6 address
- Visit IPv4 sites via IPv4
- Visit IPv6 sites via IPv6

NAT64 & DNS64 (translation tech.)

- Complicated implementation
- Devices get pure IPv6 address from DHCP
- Visit IPv4 sites via IPv6 proxy gateway or NAT router
- Visit IPv6 sites via IPv6

IP Configuration on Client Devices

DHCP in New Generation GovWiFi

- IPv4 capable devices

Receive IPv4 private address only, e.g. 10.16.10.1

- Dual stack devices

Receive both private IPv4 and public IPv6 address

IPv4 = 10.16.10.1

IPv6 = 2404:c800:9000:0010::4

HKT's IPv6 Support

- **Business NETVIGATOR enabled IPv6**
 - MI: Q3 2011
 - DIA: Q3 2012
 - AO: Q4 2012
- **IP address**
 - Our Prefix 2400:c800::/32