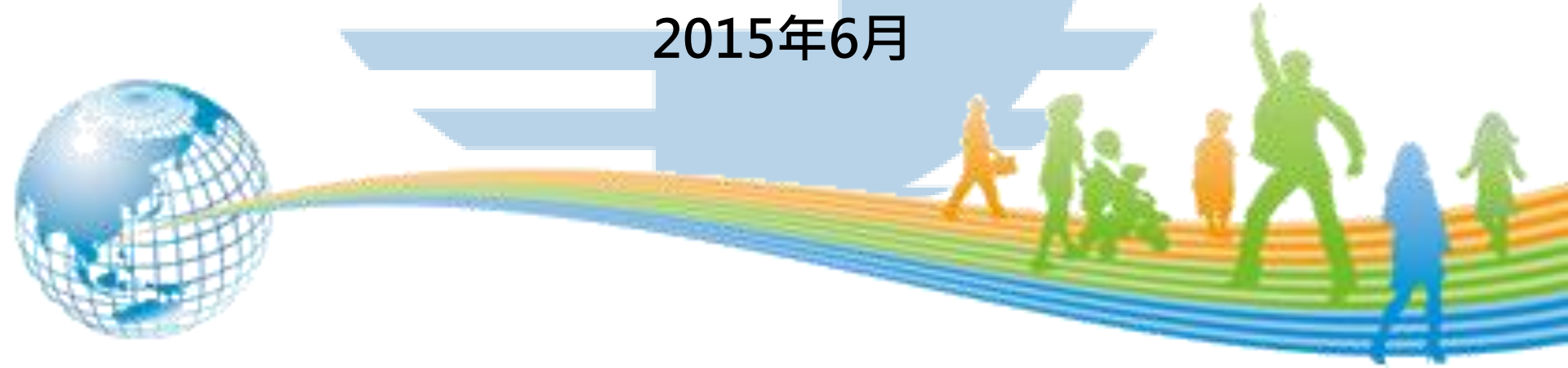
RIPE-631
IPv6 Troubleshooting for Residential ISP Helpdesks

報告人: 朱彥如
中華電信研究院 寬網所
2015年6月



內容

- 前言及簡介
- 查測流程及範例
- 結語及討論

前言 (1/2)

- 隨著IPv6的引進，尤其在雙堆疊環境中，須正視IPv6對既有障礙查測流程的影響
- 即使企業或ISP尚未引進或提供IPv6，員工、用戶或企業夥伴仍可能使用某種形式的IPv6連線
  - 即使問題非肇因於自己的網路，為了服務的暢通，有時仍須進行IPv6障礙查測
- 為了有效管理網路，企業及ISP必須及早規劃並建立一套專屬的IPv6網路障礙查測做法

前言 (2/2)

- RIPE-631針對ISP家庭用戶常見的IPv6連線問題，提供基礎的障礙查測技術及解決方案

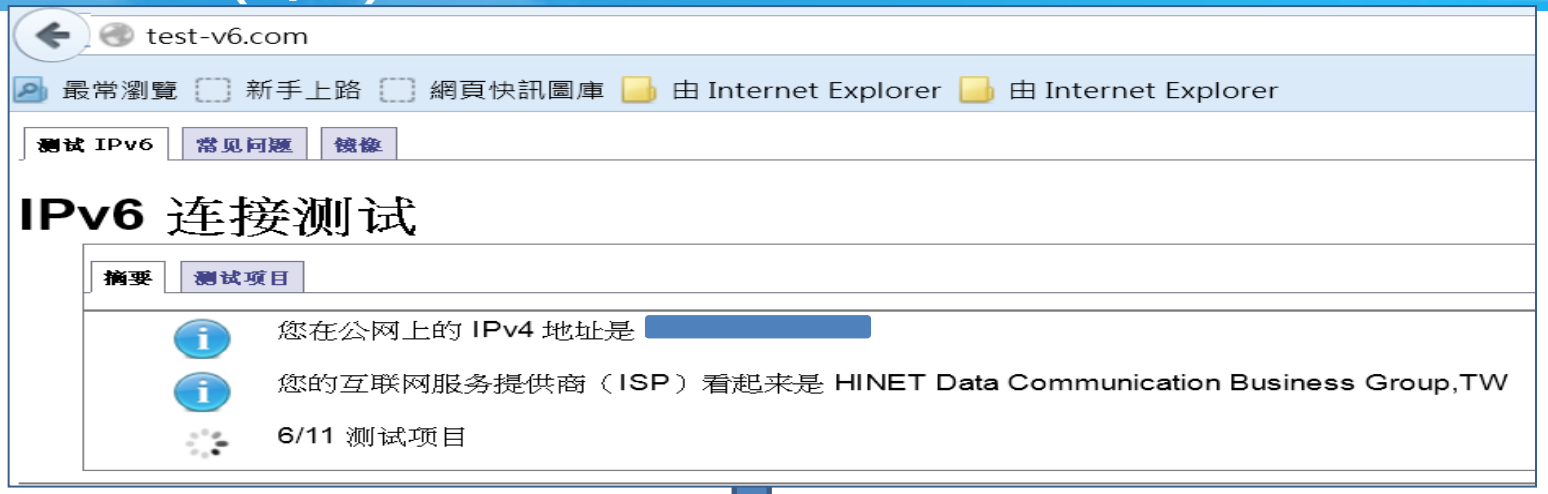
IPv6 Troubleshooting for Residential ISP Helpdesks

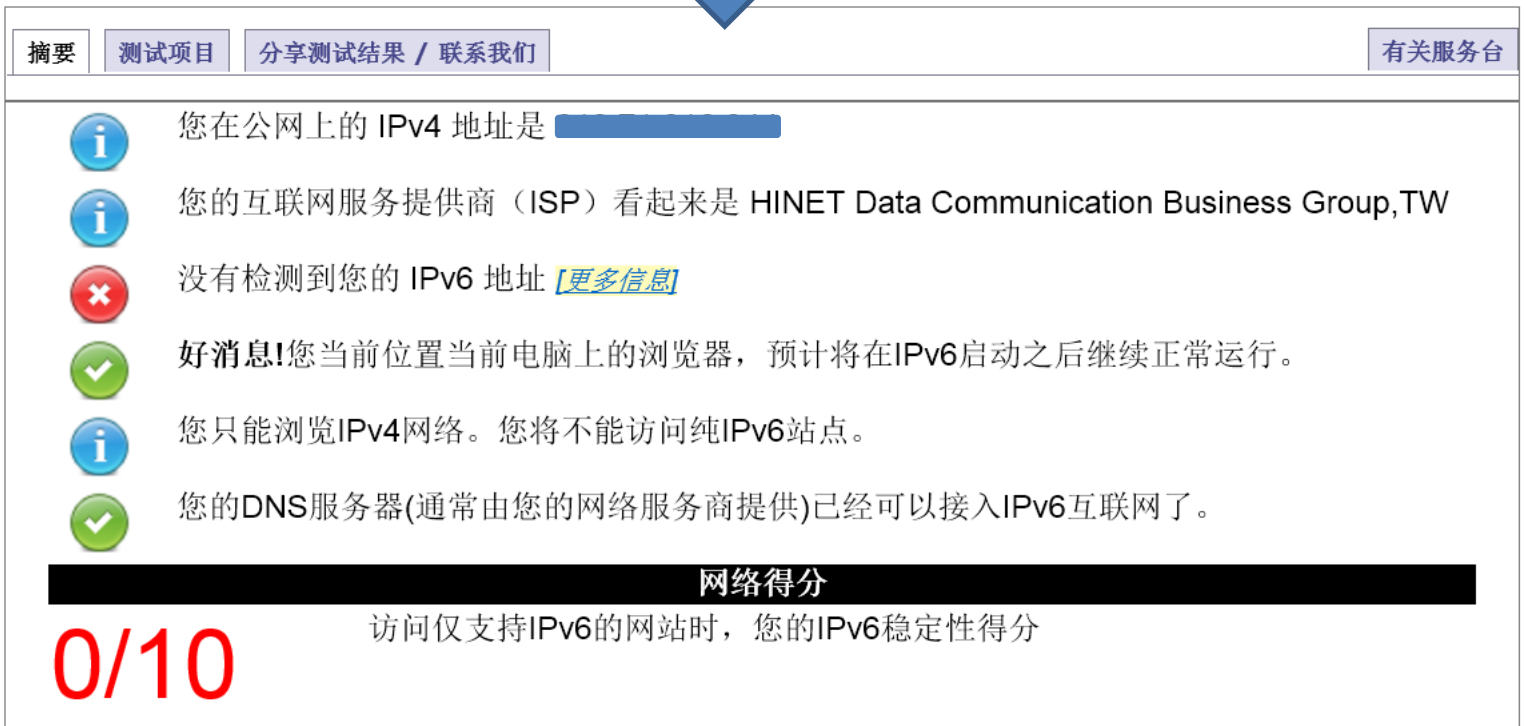
Using test-ipv6.com

簡介 (1/4)

- 2015年2月成為RIPE-631正式文件
- 由一群具有數十年IPv6維運經驗的資深工程師所撰寫
  - 來自Time Warner, Comcast 及 Yahoo 的網連菁英
  - Jan Žorž is from go6.si
- 首先， 用戶須連線IPv6障礙查測網站 (http://isp.testipv6.com/)
  - 檢查用戶瀏覽器的行為，並將檢測結果以簡單的錯誤代碼回報給ISP的客服單位

簡介 (2/4)


test-v6.com
最常瀏覽
新手上路
網頁快訊圖庫
由 Internet Explorer
由 Internet Explorer
測试 IPv6
常见问题
镜像
IPv6 连接测试
摘要
测试项目
您在公网上的 IPv4 地址是
您的互联网服务提供商（ISP）看起来是 HINET Data Communication Business Group,TW
6/11 测试项目


摘要
测试项目
分享测试结果 / 联系我们
有关服务台
您在公网上的 IPv4 地址是
您的互联网服务提供商（ISP）看起来是 HINET Data Communication Business Group,TW
没有检测到您的 IPv6 地址 [更多信息]
好消息!您当前位置当前电脑上的浏览器，预计将在IPv6启动之后继续正常运行。
您只能浏览IPv4网络。您将不能访问纯IPv6站点。
您的DNS服务器(通常由您的网络服务商提供)已经可以接入IPv6互联网了。
网络得分
0/10
访问仅支持IPv6的网站时，您的IPv6稳定性得分

簡介 (3/4)

- 用戶連上測試網站後，分別以 雙堆疊網域名稱、IPv6-only網域名稱、IPv4-only網域名稱、IPv6位址、IPv4位址進行連線測試

簡介 (4/4)

- RIPE-631 依據診斷結果，提出特定的處理動作

code	short description	recommended action
112	IPv4, plus Broken IPv6	IPv6 related attempts are timing out. This is not a quick fix. Verify the proper IPv6 address has been provisioned; verify the IPv6 route is correct. Check for unexpected or outdated firewalls and firewall rules. Other ideas are at broken.html. Of all the status codes, this is the one that suggests that users will have problems with many major web sites today, due to timeouts with IPv6. (You can remember this code as the Emergency number for many parts of the world; much like America's 911).
4	IPv4 only	Provision working IPv6 to the user; ensure the user has a modern home router and a modern operating system. Note that Teredo might have been detected; but if it was, we found that it was not used for normal named web sites (only for raw IPv6 address connections).
4t	IPv4 plus Teredo	Provision working IPv6 to the user; ensure the user has a modern home router and a modern operating system. Teredo will be ignored when a useful IPv6 service is found.
46	IPv4 + IPv6	Rejoice!
46t	Dual Stack, Possible Tunnel	This is not necesarily an error. Make sure that the ISP mentioned for both IPv4 and IPv6 look reasonable.
624	6to4	Provision working IPv6 to the user; ensure the user has a modern home router and a modern operating system. 6to4 will be ignored when a useful IPv6 service is found.
64	NAT64	This is probably not an error. We found IPv6 to work fine; but we found IPv4 only works with named urls (and not raw numbers). This may break a few applications like Skype, but otherwise IPv4 mostly works.
64t	NAT64, Possible Tunnel	A cross between '64' and '46t' above. NAT64 is in use; and the ISP is possibly different for IPv4 vs IPv6. Check the ISP names for sensible values.
6	IPv6 only.	This is expected in some lab and experimental setups only. Note that to reach this status, the IPv6-only user will have to connect to ipv6.test-ipv6.com (or similar mirror sites).

使用目的及對象

- 為ISP面對IPv6家庭用戶的客服單位，提供一個基本且通用的基礎
  - 針對最常見的IPv6連線議題，提供技術及解決方案
  - 提供穩固的第一步
- 企業 IT helpdesks 及其他第一線支援人員 也可從中找到有用資訊
- 對尚未建置IPv6的ISP也有助益
  - 客戶可能有意或無意間使用IPv6轉移機制(Tunnel Broker、6to4、Teredo)，而遭遇IPv6連線問題

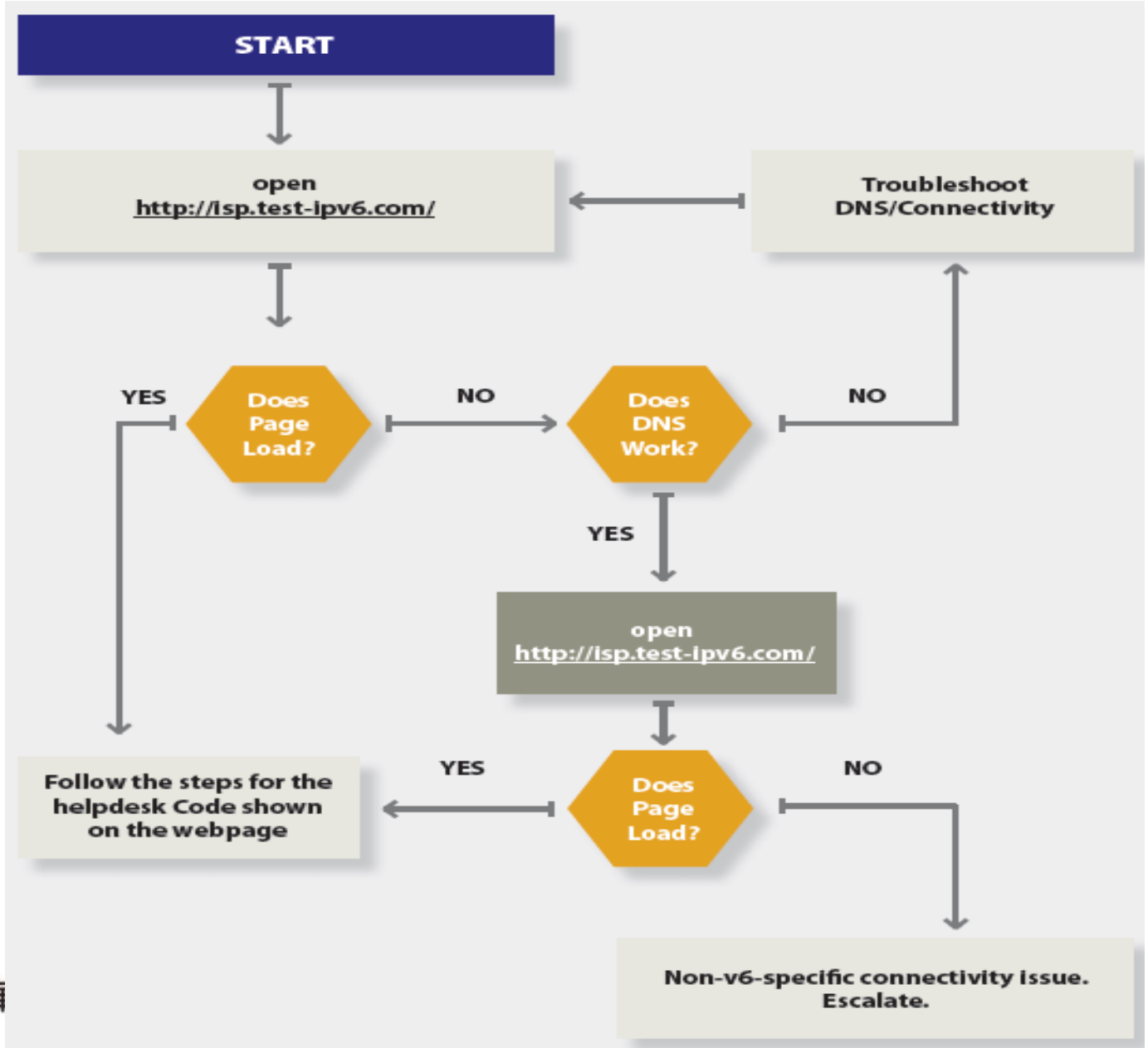
使用須知 (1/2)

- 極度仰賴IPv6連線測試工具- IPv6障礙查測網站 http://isp.testipv6.com
- 對客戶可能使用的家用路由器，客服技術人員必須熟悉其設定，或查詢相關設備文件
- 客服技術人員可能須要判定用戶使用的IPv6位址是否由所屬公司配發
  - 若客戶使用第三方提供的Tunnel Broker，IPv6位址就不是由ISP配發
  - 須提供客服技術人員所屬公司配發之IPv6 Prefix列表

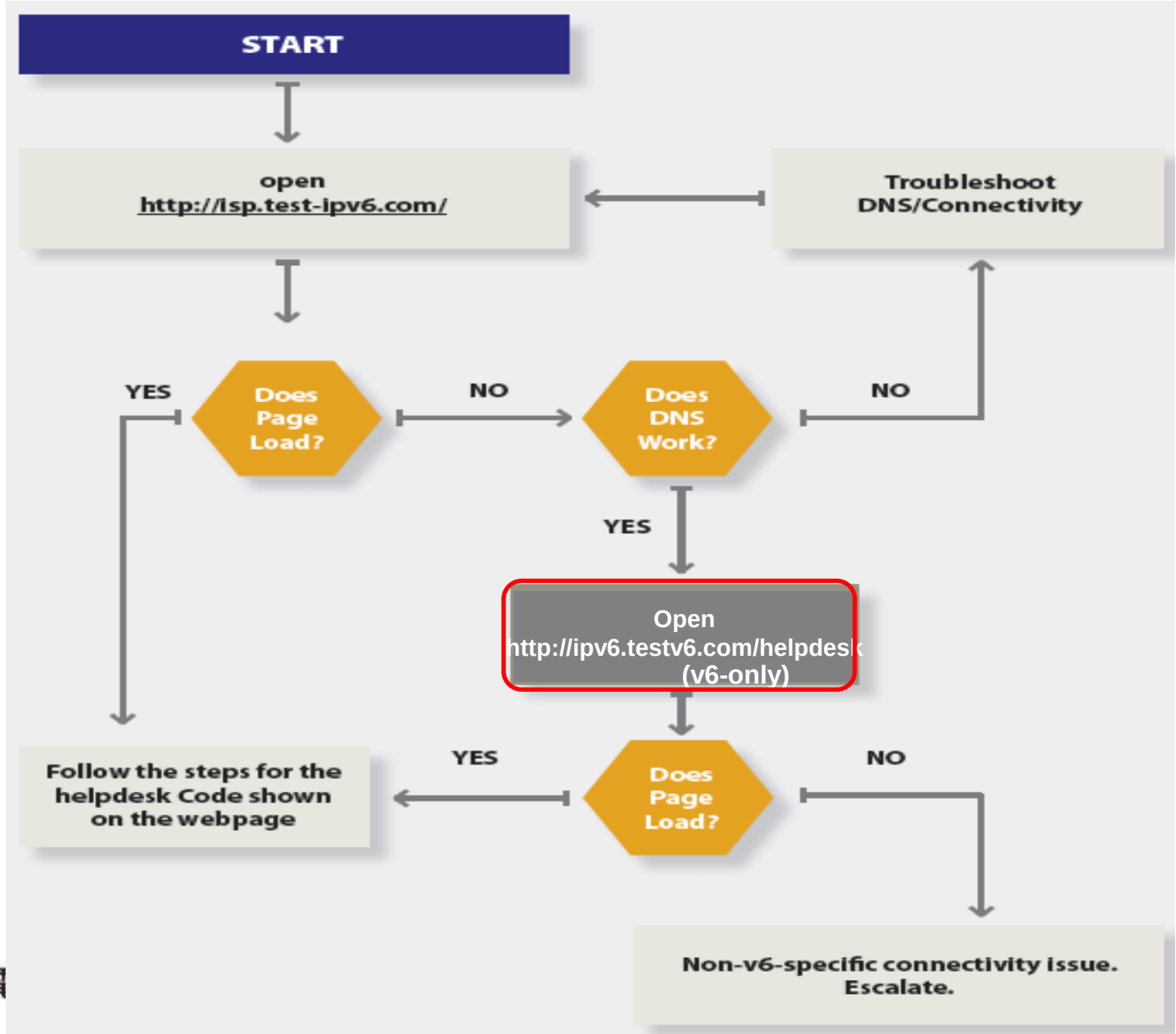
使用須知 (2/2)

- 不同時間點都可能出現向上呈報問題(Escalate)的指令
  - 並非所有問題都可依賴此文件來解決
- 非‘一體適用’的版本，僅提供可以客製化的平台
- 維運小組可根據此文件，加上個別化需求，整合成符合公司需求的障礙查測文件

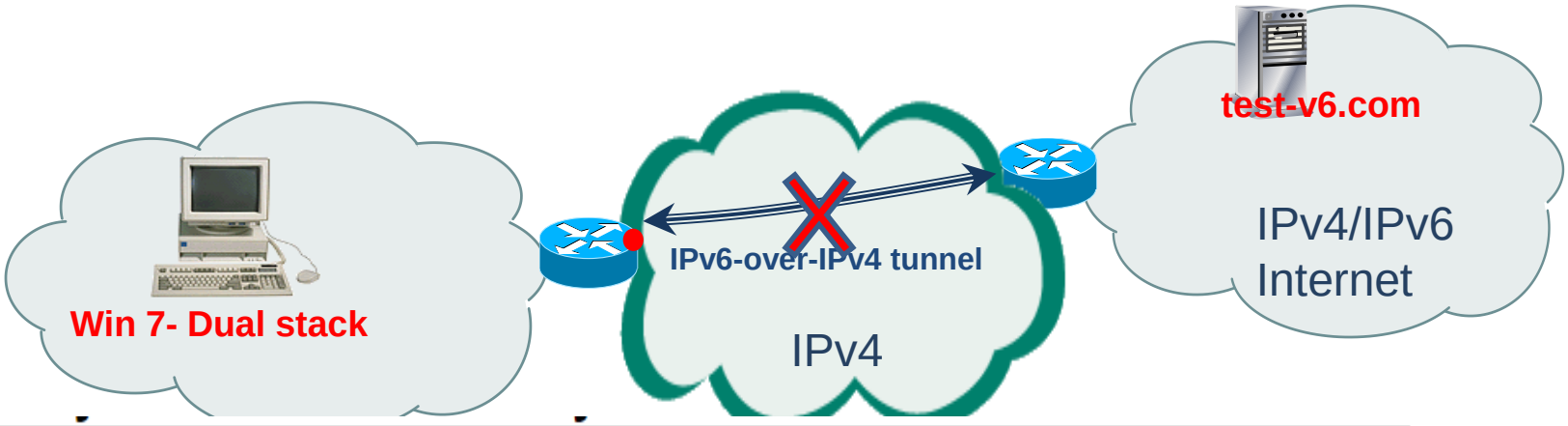
基本障礙查測流程 (1/2)


START
open
http://isp.test-ipv6.com/
Troubleshoot
DNS/Connectivity
YES
Does
Page
Load?
NO
Does
DNS
Work?
NO
YES
open
http://isp.test-ipv6.com/
Follow the steps for the
helpdesk Code shown
on the webpage
YES
Does
Page
Load?
NO
Non-v6-specific connectivity issue.
Escalate.

基本障礙查測流程 (2/2)


START
open
http://isp.test-ipv6.com/
Troubleshoot
DNS/Connectivity
YES
Does
Page
Load?
NO
Does
DNS
Work?
NO
YES
Open
http://ipv6.testv6.com/helpdes
(v6-only)
Follow the steps for the
helpdesk Code shown
on the webpage
YES
Does
Page
Load?
NO
Non-v6-specific connectivity issue.
Escalate.

連線測試範例 (1/3)



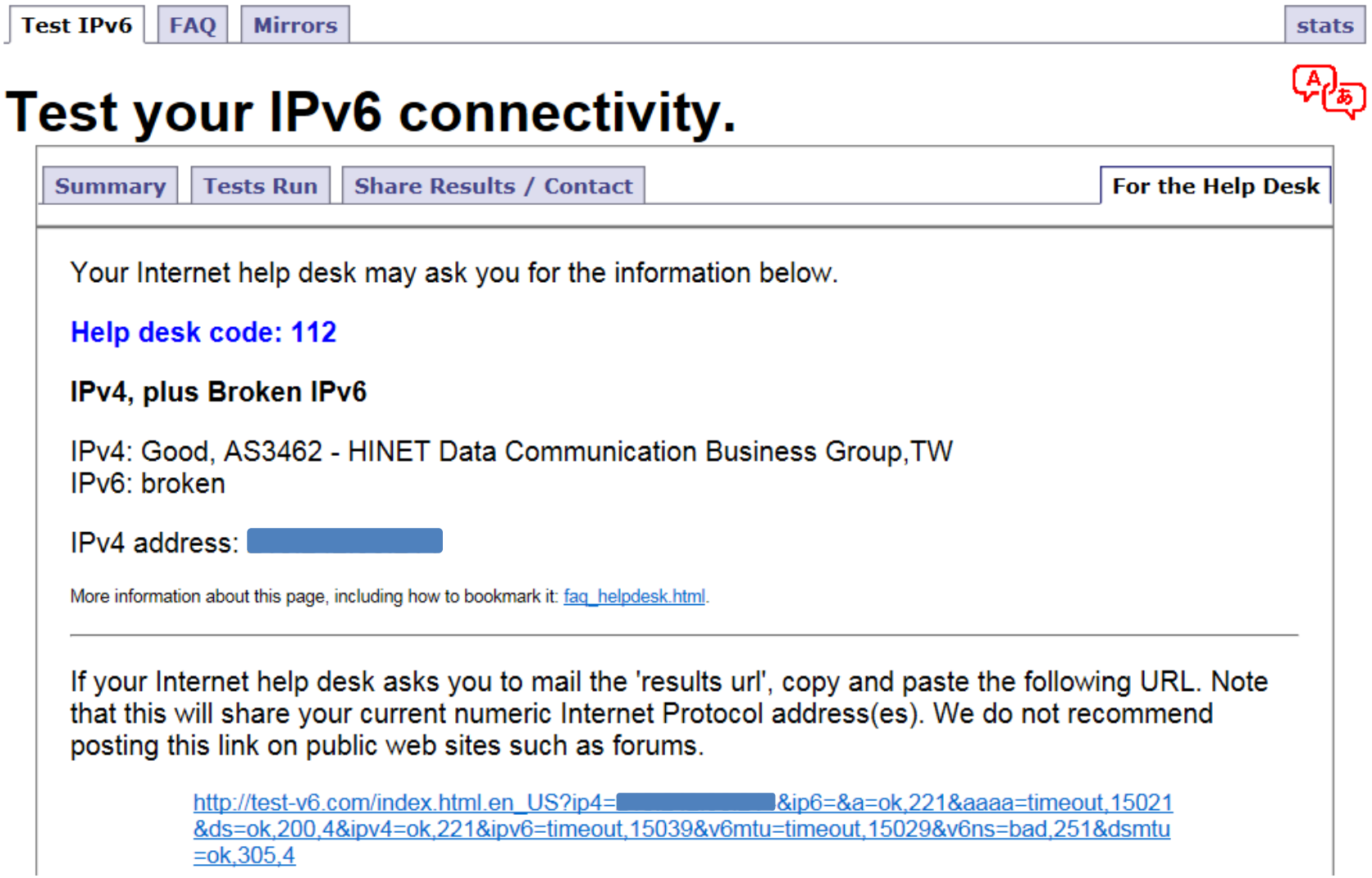
Summary | Tests Run | Share Results / Contact | For the Help Desk

- Your IPv4 address on the public Internet appears to be [redacted]
- Your Internet Service Provider (ISP) appears to be HINET Data Communication Business Group,TW
- No IPv6 address detected *[more info]*
- **Good news!** Your current configuration will continue to work as web sites enable IPv6.
- When a publisher offers both IPv4 and IPv6, your browser appears to be happy to take the IPv4 site without delay.
- Connections to IPv6-only sites are timing out. Any web site that is IPv6 only, will appear to be down to you.
- Your DNS server (possibly run by your ISP) appears to have no access to the IPv6 Internet, or is not configured to use it. This may in the future restrict your ability to reach IPv6-only sites. *[more info]*

Your readiness score

0/10 for your IPv6 stability and readiness, when publishers are forced to go IPv6 only

連線測試範例 (2/3)


Test IPv6
FAQ
Mirrors
stats
Test your IPv6 connectivity.
Summary
Tests Run
Share Results / Contact
For the Help Desk
Your Internet help desk may ask you for the information below.
Help desk code: 112
IPv4, plus Broken IPv6
IPv4: Good, AS3462 - HINET Data Communication Business Group,TW
IPv6: broken
IPv4 address:
More information about this page, including how to bookmark it: faq_helpdesk.html.
If your Internet help desk asks you to mail the 'results url', copy and paste the following URL. Note that this will share your current numeric Internet Protocol address(es). We do not recommend posting this link on public web sites such as forums.
http://test-v6.com/index.html.en_US?ip4=
&ip6=&a=ok,221&aaaa=timeout,15021
&ds=ok,200,4&ipv4=ok,221&ipv6=timeout,15039&v6mtu=timeout,15029&v6ns=bad,251&dsmtu
=ok,305,4

連線測試範例 (3/3)

Test IPv6 | FAQ | Mirrors | stats

Test your IPv6 connectivity.

Summary | Tests Run | Share Results / Contact | For the Help Desk

How this test works: Your browser will be instructed to reach a series of URLs. The combination of successes and failures tells a story about how ready you are for when publishers start offering their web sites on IPv6.

Click to see Technical Info

Test with IPv4 DNS record	ok (0.221s) using ipv4
Test with IPv6 DNS record	timeout (15.021s)
Test with Dual Stack DNS record	ok (0.200s) using ipv4
Test for Dual Stack DNS and large packet	ok (0.305s) using ipv4
Test IPv4 without DNS	ok (0.221s) using ipv4
Test IPv6 without DNS	timeout (15.039s)
Test IPv6 large packet	timeout (15.029s)
Test if your ISP's DNS server uses IPv6	bad (0.251s)
Find IPv4 Service Provider	ok (0.227s) using ipv4 ASN 3462
Find IPv6 Service Provider	timeout (15.038s)

障礙查測範例: Help desk code 112

1. 將HWG、Modem及用戶設備重新開機 (查測流程的標準步驟之一)
2. 確認用戶是否申裝IPv6，若有則繼續下一步
3. 確認用戶設備(HGW、modem)是否支援IPv6
   - 可能須進行Firmware更新，並重新啟動設備
4. 查測用戶IPv6位址
   - 若有使用家用路由器，先查測家用路由器
   - 忽略任何以”fe80:開頭及”::1”的位址

查測家用路由器 (1/2)

1. 確認WAN埠是否有IPv6相關設定
2. 若WAN埠上有IPv6位址，但LAN埠上沒有，參考設備文件來排除問題
3. 若WAN連線正常，檢查LAN端的自動供裝機制是否正確
   a. 檢查LAN介面是否具備IPv6 prefix
   b. 檢查路由器上RA機制的相關設定
   c. 檢查路由器上DHCPv6伺服器的相關設定
   d. 檢查用戶設備之IPv6位址，與路由器的LAN prefix是否相符

查測家用路由器 (2/2)

4. 若路由器提供LAN端網路正確的訊息，檢查用戶設備是否覆蓋路由器所提供的設定
   - 檢查用戶設備是否採用Static addressing，而不接受路由器的設定訊息
5. 請用戶重新測試，並提供新的測試結果
   - 若問題仍未解決，再次執行障礙查測
   - 若有需要，向上呈報問題

查測用戶IPv6位址

指令: ifconfig (Win)、ifconfig | grep inet6

用戶IPv6位址	問題及排除動作
All addresses start with [ISP allocated IPv6 space]	Network problem. •若採動態配發位址=> Escalate •若採固定配發位址=> 檢查用戶WAN、LAN介面及預設路由器設定
All addresses start with "fc" or "fd"	Check the router •用戶使用ULA位址
All addresses start with "2002:"	Disable 6to4 •http://support.microsoft.com/kb/929852
All addresses start with "2001:0:"	Disable Teredo •http://support.microsoft.com/kb/929852
One or more addresses start with 2001:db8: or 2005:123:456:789:	更換用戶設備或進行Firmware upgrade •用戶誤用撰寫文件或測試用的保留網段
Any other single address	用戶設備採手動設定，或用戶網路上有其他設備提供無效的IPv6服務
Multiple addresses: At least one does not belong to the customer's IPv6 address space	The device may have trouble determining which address to use. Source address selection problem? Network problem? Escalate.
Multiple addresses: none match our customer IPv6 address space; but at least one address starts with "2001:0:" or "2002:"	停用Tunnel介面後若僅剩單一位址，再重新測試 •http://support.microsoft.com/kb/929852
Still here?	Escalate :)

結語及討論

- 使用RIPE-631排除網路障礙，必須熟悉用戶路由器設定、所屬ISP配發之IPv6網段，也必須具備一定的IPv6背景知知識
- RIPE-631不是一體通用的障礙查測流程，而是提供一個可以增減內容、或整合其他維運系統的Template
- RIPE-631主要根據用戶連線IPv6障礙查測網站的測試結果，進行解讀並提供後續處理建議
- RIPE-631搭配測試工具，單一連線可同時進行多種測試，簡化流程

中華電信
Chunghwa Telecom

簡報完畢 敬請指教