

CAT IPv6 case study and Way forward

30 August 2011

Present by

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CAT TELECOM PCL.

Member of Thailand IPv6 Forum Committee

@CATIPv6



CAT TELECOM PCL.



- CAT TELECOM PUBLIC COMPANY LIMITED Change from The Communications Authority of Thailand
- <http://www.catelecom.com/>
- Found 14 August. 2003

CAT Telecom business and services

- Oversea Call
- L2/L3 Network Infrastructure Services
- Internet Gateway /Domestic eXchange
- Wire-line Broadband (xDSL,FTTx)
- Wire-less Broadband (WiFi Hotspot)
 - Macdonald's Store in Thailand
 - Community Zone in Thailand
- Mobile Services (3G)

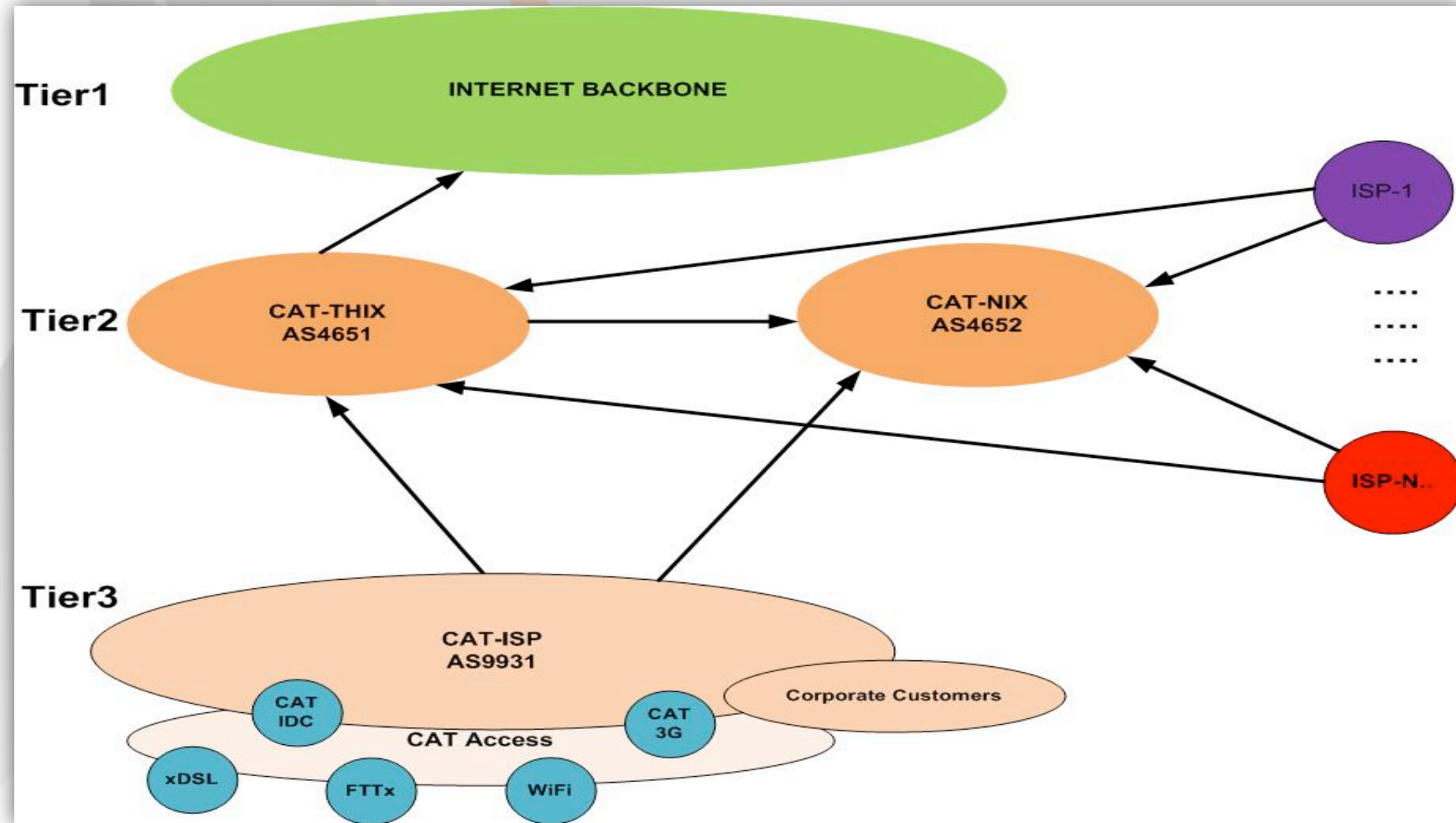
CAT Internet gateway and Services(1)

- CAT-THIX
 - Peer to up stream Internet Provider Tier1
 - Peer to Peer between Provider
 - Gateway for ISPs in Thailand
- CAT-NIX
 - Peer to ISPs in Thailand for exchange

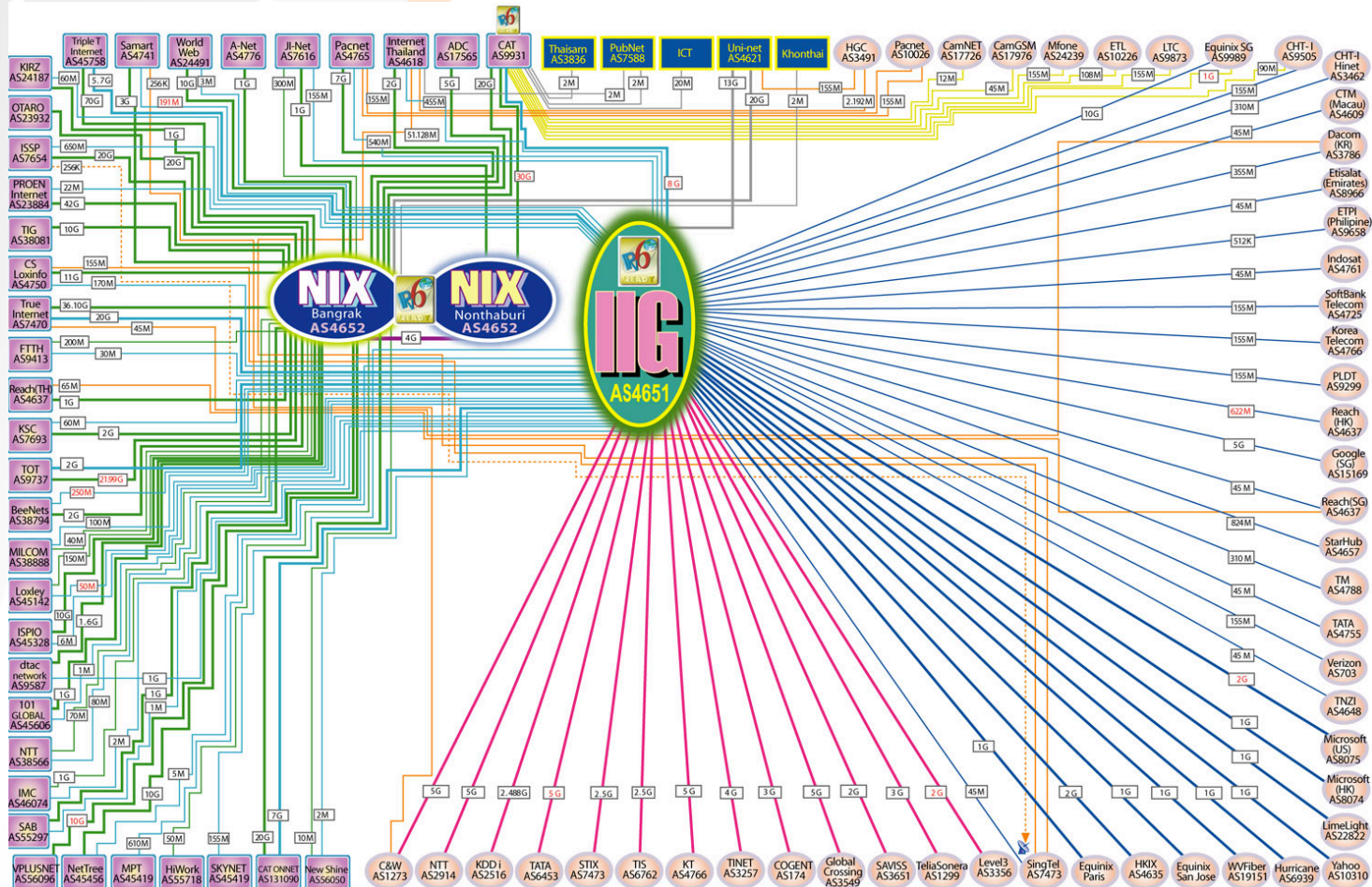
CAT Internet gateway and Services(2)

- CAT Corporate Internet (Business)
 - Speed 10 M – 1 G
 - Offered 5 Packages plan (Inter/Domestic)
- CAT Broadband Internet (Residence)
 - CAT-Hinet (xDSL)
 - Speed up 2–8 M downstream
 - Speed up 1-2 M upstream
 - CAT OnNet (FTTx)
 - Speed up 12 M-100 M downstream
 - Speed up 2-10 M for upstream

CAT Where are in the Internet ?



CAT Big Picture Internet gateway map



CAT IPv4 Resource Usage

- **Dynamic** : IPv4 Assignment for residential customers (xDSL, FTTx)
- **Static** : IPv4 Assignment for Business, Corporate Customers, Infrastructure and some Package Broadband services

CAT and IPv6 (1)

- CAT IPv6 Resource
 - 1 IPv6 Prefix 2001:0c38::/32
- CAT IPv6 Working Group (<http://catipv6.wordpress.com>)
 - Awareness IP
 - Inventory Survey
 - Knowledge about IPv6 to STAFF
 - Make action plan deploy IPv6 Transition/
Migration

CAT and IPv6 (2)

- Representative to joint Thailand IPv6 Forum
 - Promote IPv6 deployment in Thailand
 - Co ordinate MICT

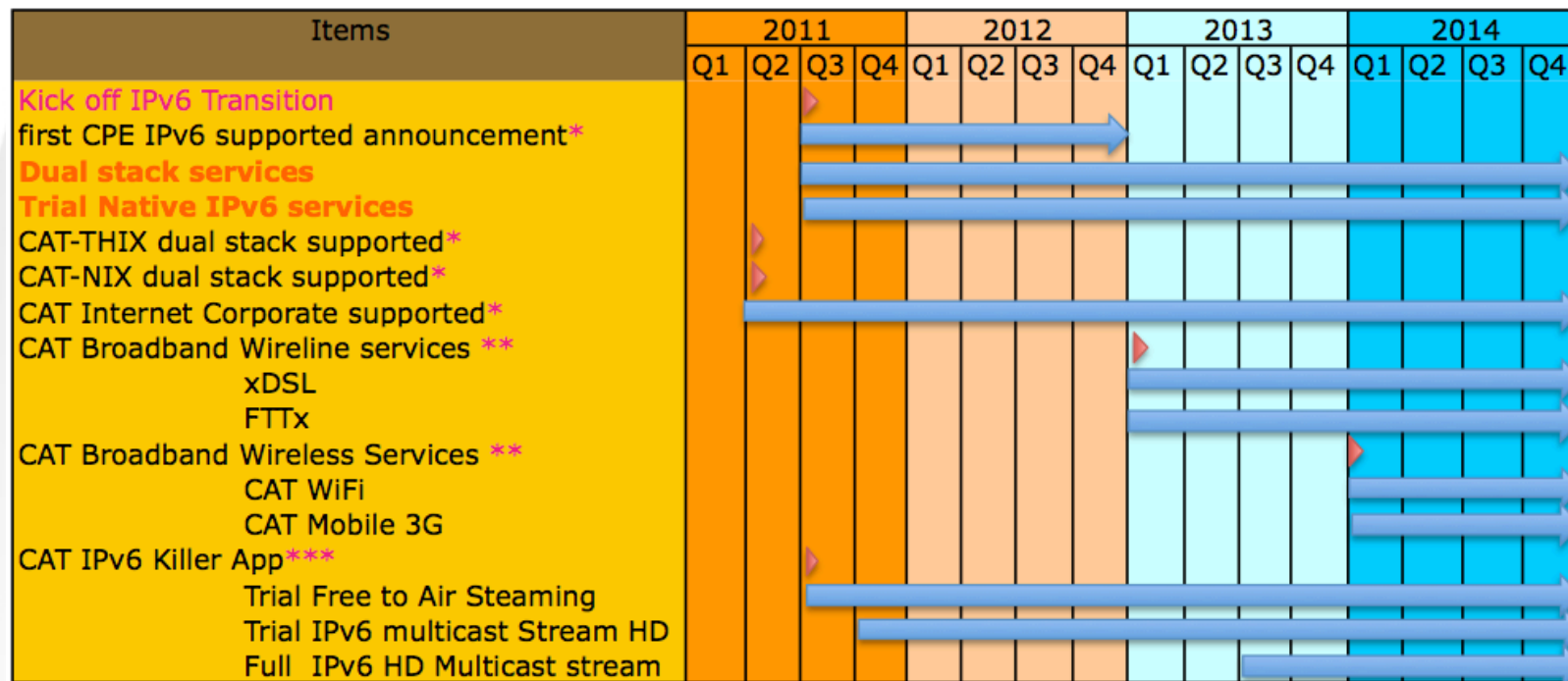
- R&D CPE IPv6 Supported
 - CAT and PSU Development

CAT IPv6 Milestones

- 2000-2010 : Trial and Testbed
 - Study learn prepare procure devices supported IPv6
 - Soft-launch CPE IPv6 supported
- 2011 :
 - CAT start transition with first Project dual-stack Internet server Facilities
 - **START !** We plan to deploy IPv6 link to customer in the Q4 of Years
 - Trial IPv6 Multicast for steaming HD on IPv6 link

CAT IPv6 Roadmap in the Future

4 years plan
CAT IPv6 Roadmap deployment



Symbol

- * IPv6 Ready
- ** IPv6 Deployment plan
- *** Test-driven IPv6 Solution

CAT IPv6 Implement plan

Recommend the Transition Technologies

| Services Offering | Phase | Potential Techniques |
|---|--|---|
| Internet Broadband <small>CAT-ISP</small> | 1 <small>First CPE IPv6 supported</small> | LNS with private IP addresses re-use, Dual-Stack in Core |
| | 2 | 6rd <small>From the beginning of 2013</small> |
| | 3 | Dual-stack + Stateful/Stateless AFT to get to IPv4 content * <small>From the beginning of 2014</small> |
| Internet Corporate <small>CAT-ISP</small> | 1 <small>First CPE IPv6 Supported</small> | Dual-stack + LNS <small>Began in 2011</small> |
| Internet Transit <small>CAT-THIX,CAT-NIX</small> | 1 | Dual-Stack <small>Began in 2011</small> |
| Virtual Private Network <small>CAT-ISP</small> | 1 | 6PE/6VPE <small>Began in 2011</small> |

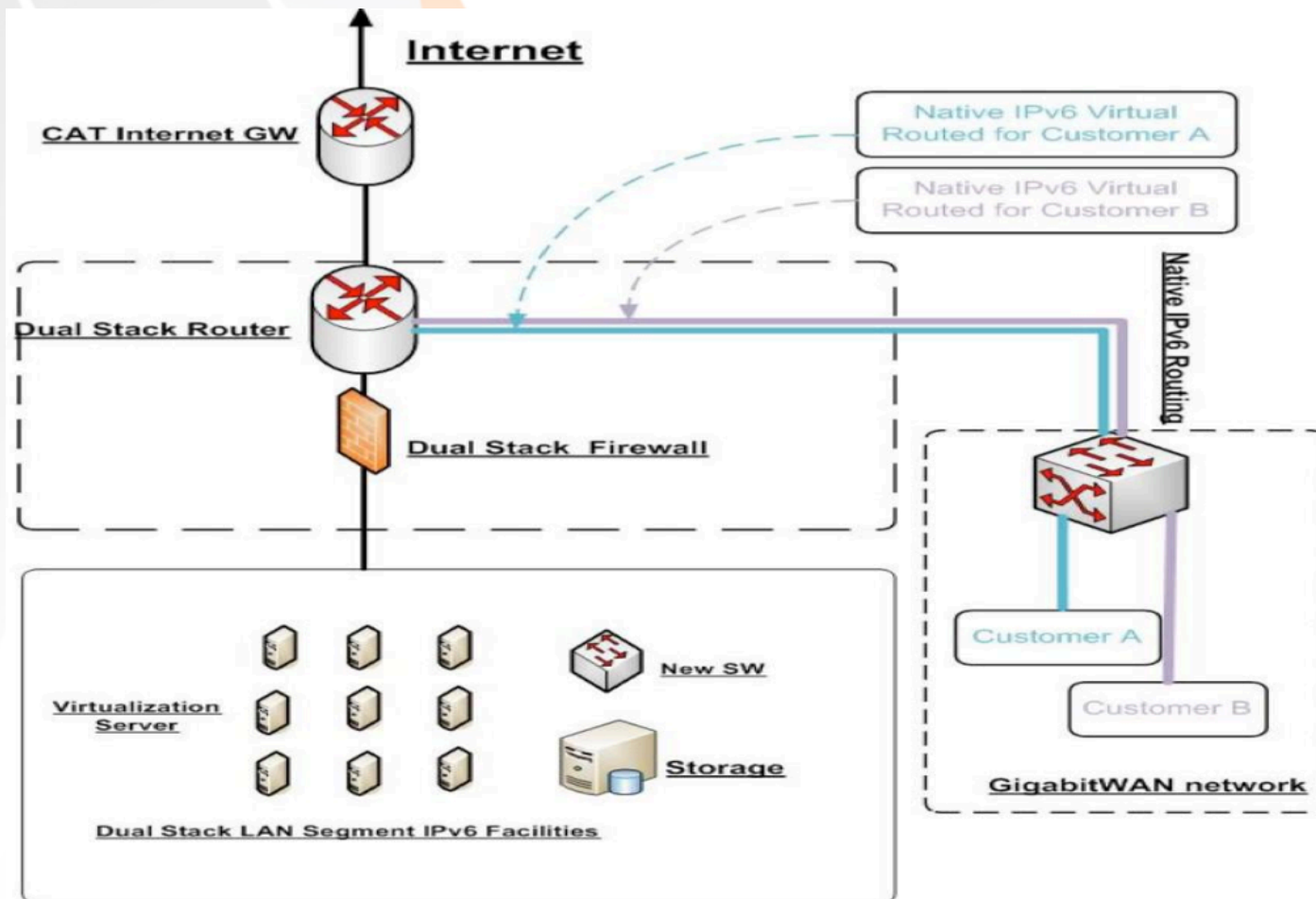
What we have done in detail (1)

- Dual stack network CAT-THIX, CAT-NIX, CAT-ISP (corporate services)
- **Dual-stack Internet Server Facilities**
- IPv6 Peering with upstream Provider
 - Google, HE, Cable&Wireless, Yahoo, Facebook
 - More than **4,000 IPv6 Prefix Route**
- IPv6 Peering with Domestic ISP , Academy network (THAIREN network)

What we have done in detail (2)

- Interim CAT IPv6 Solution
 - CPE IPv6 supported (Done)
 - Trial Free to Air Steaming (Testbed)
 - Tunnel Broker Server (during implement 2011)
 - CAT IPv6 Portal Website (during implement 2011)
 - IPv6 Knowledge Base to Customer
 - IPv6 Technical Contact Point to Customer
- Cert. IPv6 Global Forum

What we have done in detail (3)



CAT IPv6 with World IPv6 day(1)

- We proud to present with MICT and IPv6 Forum Thailand (8 June 2011)
 - CEO Seminar
 - IP Awareness
 - Share IPv6 experience from Vendor/Provider
 - Promote IPv6 Policy from MICT
 - Sponsor Dual-stack internet services
 - CPE IPv6 supported announcement @CAT Booth
 - CAT Booth Offered IPv6 services to Customer

CAT IPv6 with World IPv6 day(2)

Amari Watergate, Thailand

8 June 2011



CAT IPv6 with World IPv6 day(3)

- Cert. IPv6 Global forum (website IPv6 ready)
 - www.cattelecom.com
 - www.hgw6.cattelecom.net
 - catscreen.hgw6.cattelecom.net
- Google Analytic Program
 - www.hgw6.cattelecom.net
 - Catscreen.hgw6.cattelecom.net

CAT IPv6 with World IPv6 day(4)

Google Analytic

Overview » [www.hgw6.cattalecom.net](#) (Edit account settings)

15 Jul 2011 - 14 Aug 2011
Comparing to: 14 Jun 2011 - 14 Jul 2011

All Starred Day Week Month Year

Website Profiles + Add new profile

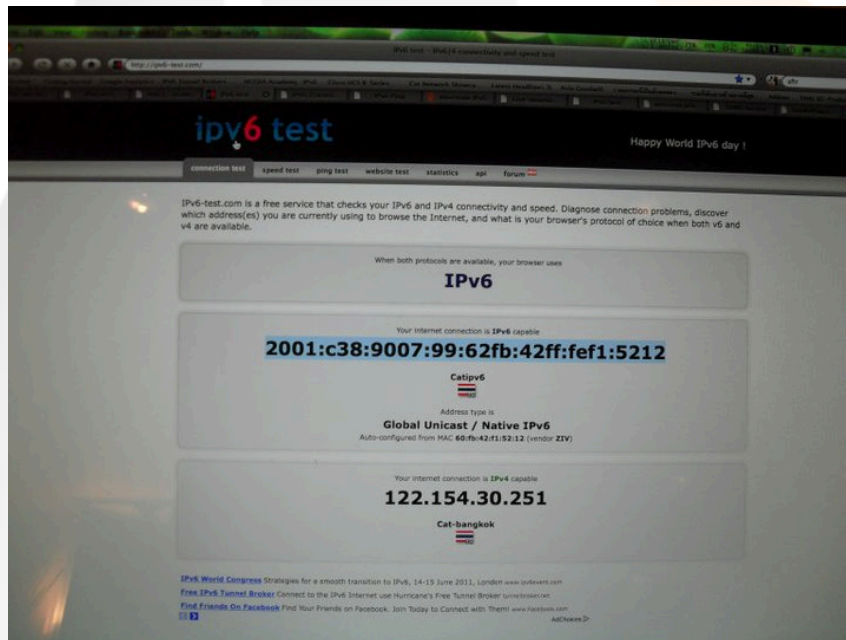
| Name↑ | Reports | Status | Visits | Avg. Time on Site | Bounce Rate | Completed Goals | Visits % Change | Actions |
|---|-----------------------------|--------|--------|-------------------|-------------|-----------------|--|---|
| http://catscreen.hgw6.cattalecom.net UA-23752279-2 + Add new profile | | | | | | | | |
| catscreen.hgw6.cattalecom.net | View report | ✓ | 28 | 00:00:41 | 39.29% | 0 | -34.88% | Edit Delete |
| http://monitor.hgw6.cattalecom.net UA-23752279-3 + Add new profile | | | | | | | | |
| monitor.hgw6.cattalecom.net | View report | ✓ | 9 | 00:00:00 | 100.00% | 0 | -59.09% | Edit Delete |
| http://www.hgw6.cattalecom.net UA-23752279-1 + Add new profile | | | | | | | | |
| www.hgw6.cattalecom.net | View report | ✓ | 278 | 00:00:31 | 89.21% | 0 | -4.47% | Edit Delete |

Find profile: Show rows: 10 1 of 1

- Measurement Client

CAT IPv6 with World IPv6 day(5)

CAT IPv6 Booth **Dual-stack + 6to4 Automatic Technique**



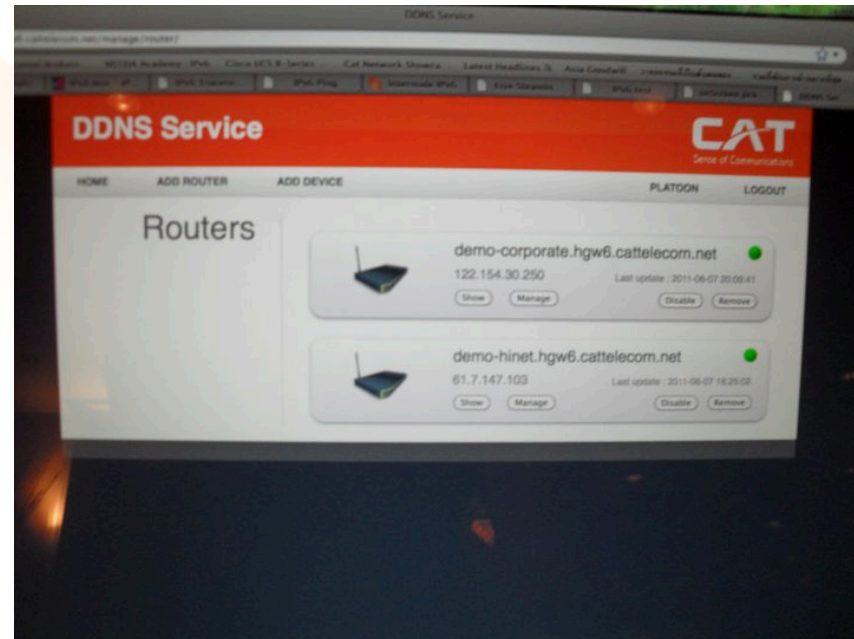
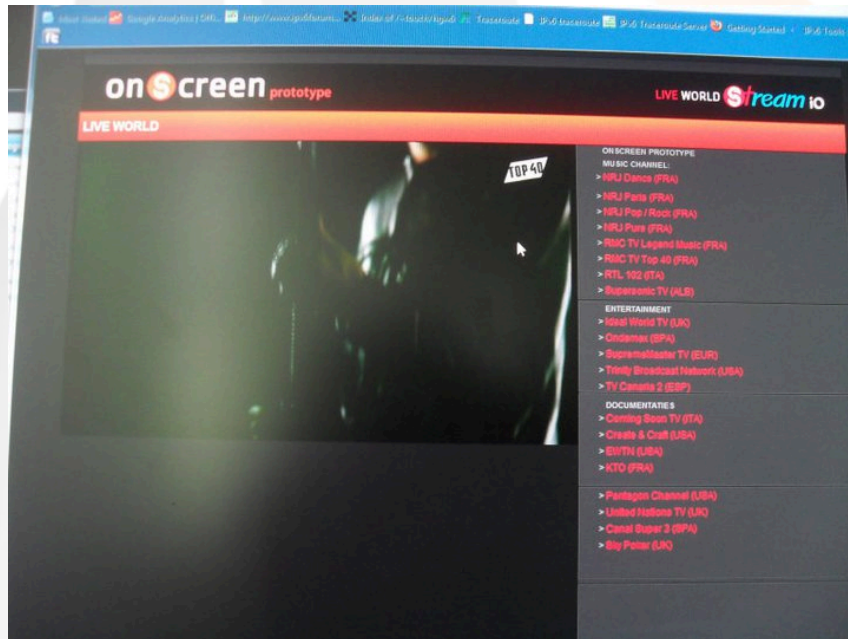
This is a detailed view of the IPv6 test results page. It features a navigation bar at the top with the same links as the previous screenshot. The main content area is organized into three distinct sections:

- Browser Protocol:** 'When both protocols are available, your browser uses **IPv6**'.
- IPv6 Connectivity:** 'Your internet connection is IPv6 capable' with the address **2002:ca2f:fa78:1001:226:bbff:fe14:d894**. Below this, it identifies the 'Internet Assigned Numbers Authority' and states the 'Address type is 6to4'. It also shows '6to4 mapping to IPv4 address 202.47.250.120' (Auto-configured from MAC 00:26:bb:14:d8:94 (vendor Apple, Inc)).
- IPv4 Connectivity:** 'Your internet connection is IPv4 capable' with the address **202.47.250.120**. It identifies the ISP as 'CATISP-CoreNetwork'.

CAT IPv6 with World IPv6 day(6)

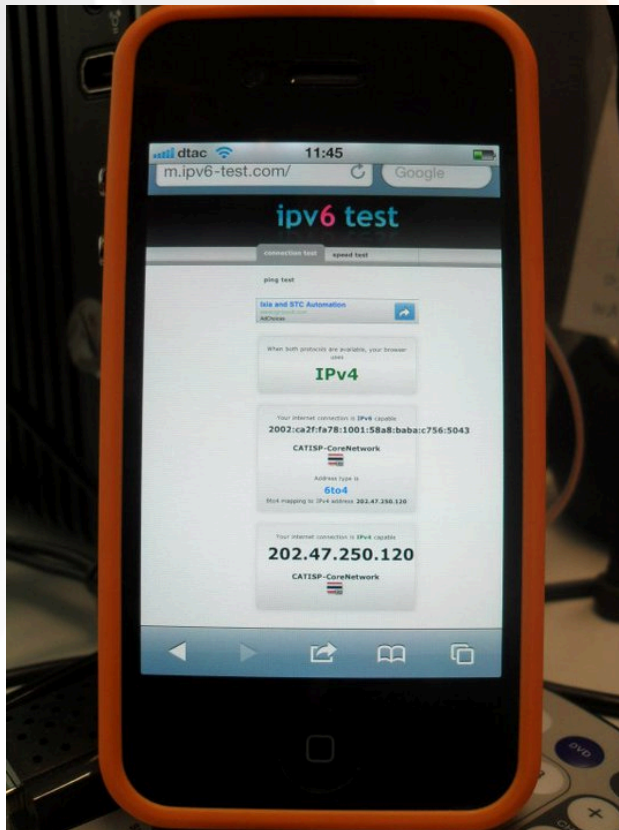
**CAT IPv6 Onscreen prototype
Free to Air Steaming services**

CPE IPv6 Supported

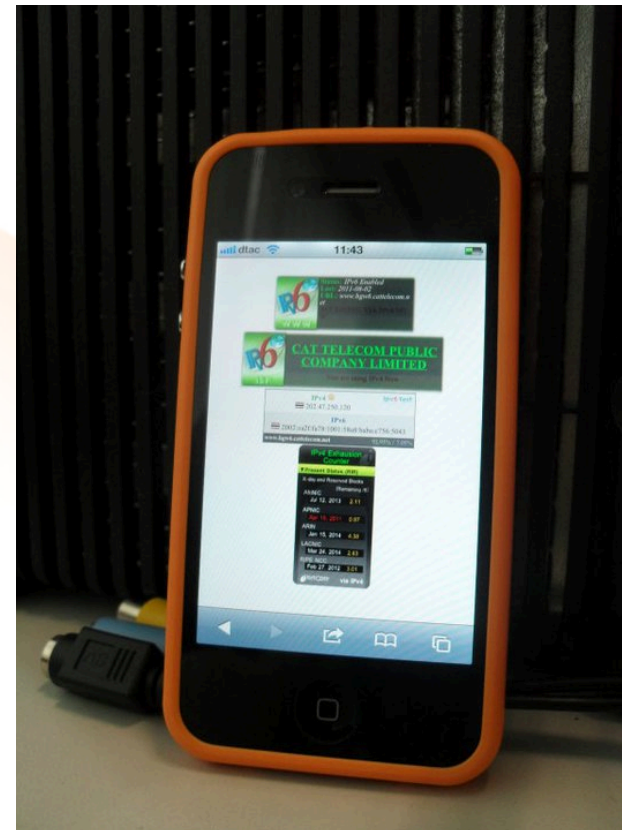


CAT IPv6 with World IPv6 day(6)

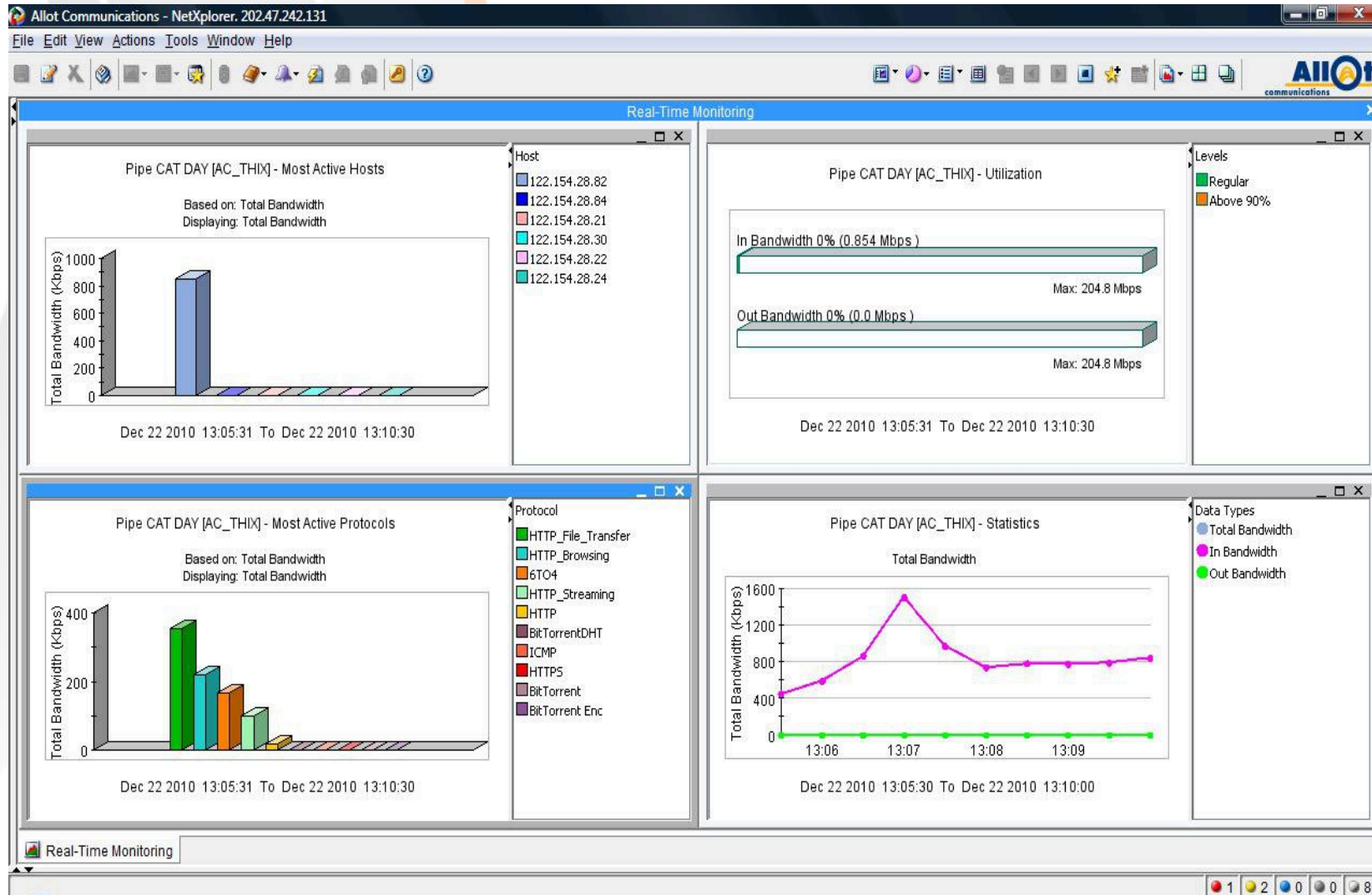
iPhone via CPE IPv6 support



CAT IPv6 Web site



Traffic 6to4 Automatic Technique



CAT CPE IPv6 Supported (1)



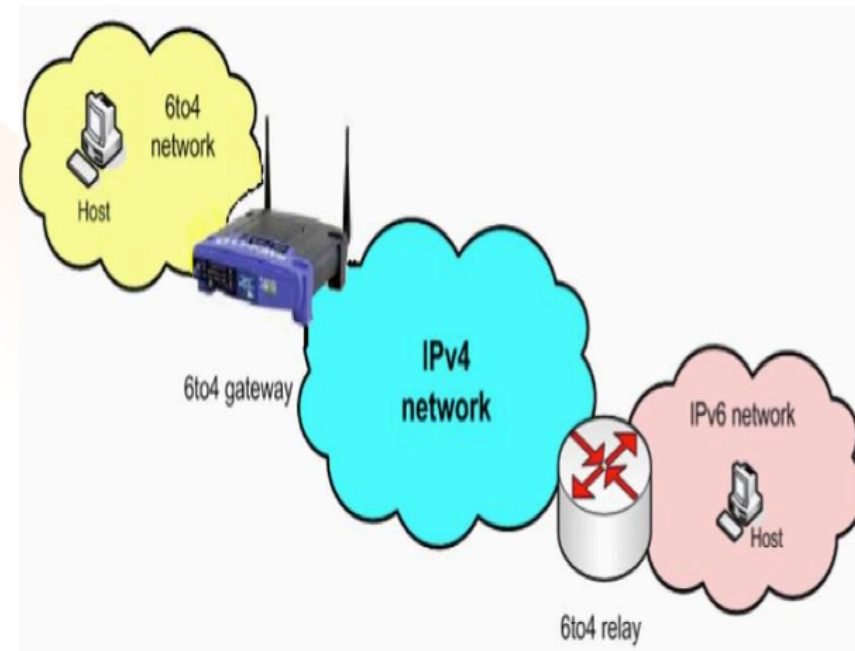
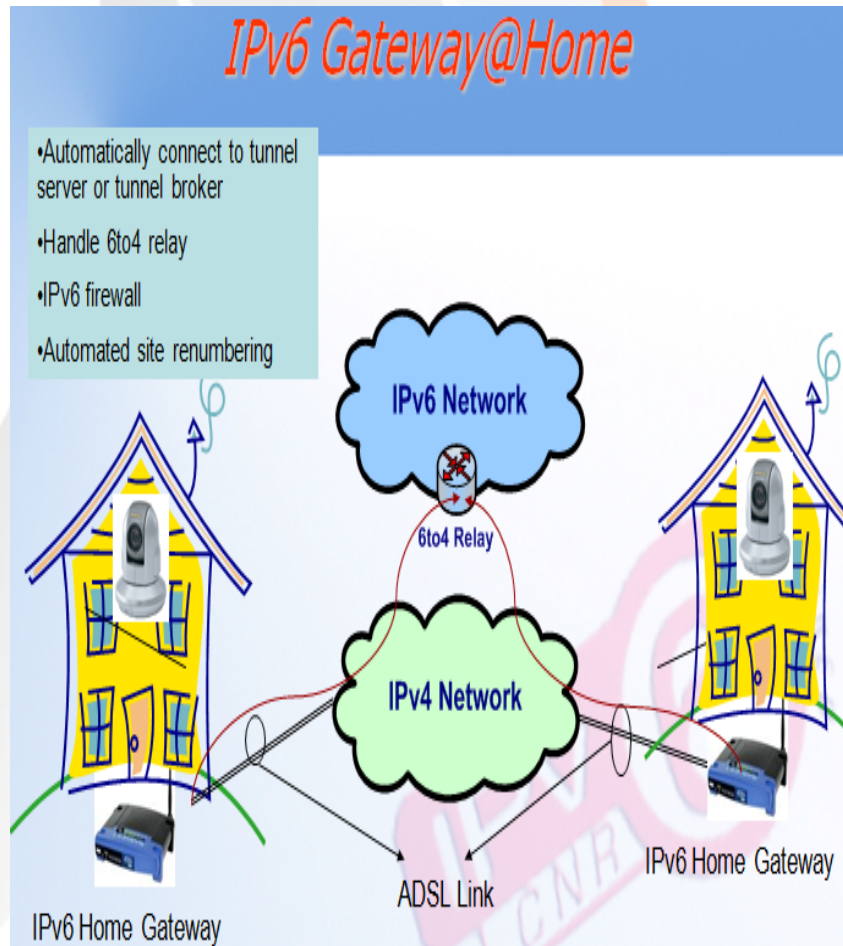
Logo ID: 02-C-000290



CAT-PSU R&D Project

- First CPE in Thailand IPv6 supported
- <https://www.ipv6ready.org/db/index.php/public/logo/02-C-000290/>

CAT CPE IPv6 Supported (2)



CAT CPE IPv6 Supported (3)

How to manage

- WiFi Router
- Web-base management

Bundle Feature

- DDNS6 Feature
- CAT CPE IPv6 Monitoring

The screenshot displays the 'DHCP Clients - Administrative Console' in a Windows Internet Explorer browser. The page title is 'IPv6 HomeGateway Administration Console'. The browser address bar shows 'http://122.154.28.82/cgi-bin/webif/status-leases.sh'. The page content includes a navigation menu with options like Info, Graphs, Status, System, Network, VPN, and HGW6. The main content area is titled 'DHCP Leases' and contains a table with the following data:

| MAC Address | IP Address | Name | Expires in |
|-------------------|---------------|-----------------|------------|
| f4:0b:93:48:d3:0c | 192.168.8.121 | BLACKBERRY-2E06 | 1min 56sec |
| 00:1a:73:d0:54:f4 | 192.168.8.111 | sompot-Notebook | 1min 55sec |
| 00:26:bb:14:d8:94 | 192.168.8.137 | Ps-MacBook-Pro | 1min 47sec |
| 00:02:72:53:0b:40 | 192.168.8.132 | winsuperlite | 1min 30sec |

Below the DHCP Leases table, there is a section for 'Additional information' which includes an 'Address Resolution Protocol Cache (ARP)' table:

| MAC Address | IP Address | HW Type | Flags | Mask |
|-------------------|---------------|---------|---------------|------|
| 8C:7B:9D:D9:EA:99 | 192.168.8.133 | ETHER | C (completed) | ** |
| F4:0B:93:48:D3:0C | 192.168.8.121 | ETHER | C (completed) | ** |
| 00:09:2D:D1:A5:14 | 192.168.8.114 | ETHER | C (completed) | ** |
| 00:1A:73:D0:54:F4 | 192.168.8.111 | ETHER | C (completed) | ** |
| 00:26:BB:14:D8:94 | 192.168.8.137 | ETHER | C (completed) | ** |
| 00:02:72:53:0B:40 | 192.168.8.132 | ETHER | C (completed) | ** |

The page also includes a status bar at the bottom with 'Done' and 'Internet | Protected Mode: On'.

CAT CPE IPv6 Demo (1)

- SSID “CATIPv6-WiFi”
- Try Connect !
- Feature Demo
- Test-Drive to IPv6 test website !
 - ipv6-test.com
 - www.hgw6.cattелеcom.net
 - Catscreen.hgw6.cattелеcom.net

CAT CPE IPv6 Demo (2)

- Connected M2M to my office with AFP protocol
 - `Afp://time-capsule.hgw6.cattелеcom.net`
- Live Free to Air Streaming prototype
 - `http://catscreen.hgw6.cattелеcom.net`



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THANKS YOU