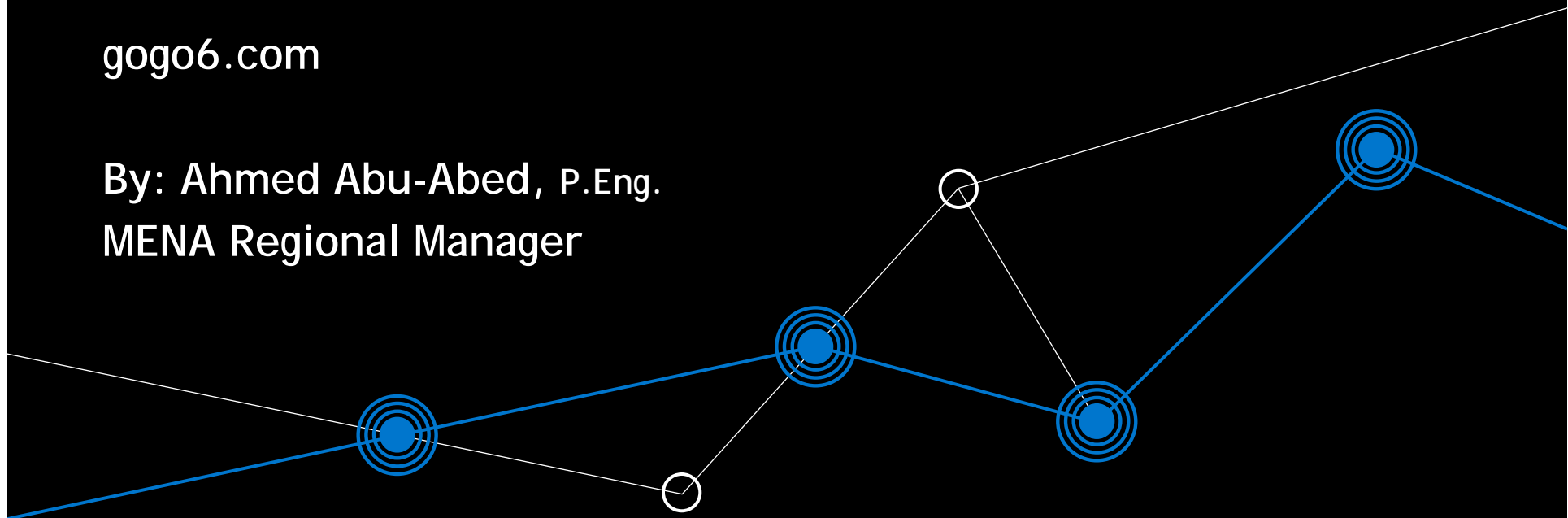


Enabling IPv6 Access

gogo6.com

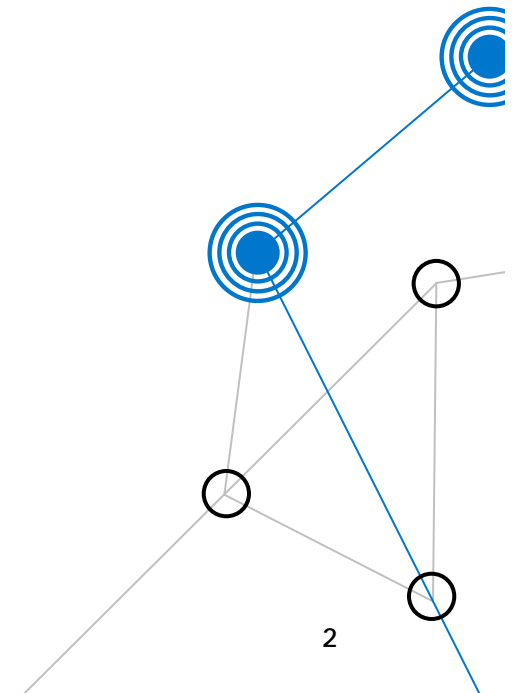
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MENA Regional Manager

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Today's Presentation

- Introduction
- IPv6 Access and CPE Examples
- Problem Definition
- Solution Criteria
- Product Introduction
- CPE for IPv6
- Network Transition to IPV6 Access



1. Introduction - Company History

Canadian company - started IPv6 consulting in late 1990s and released a product based on this experience

Previously known as Hexago.

Experience

- Active participants in IETF IPv6 Working Groups - Softwires, IPv6 WG, Mobile IPv6 WG, V6Ops WG
- Co-founders of the IPv6 Forum
- Long term involvement in the 6bone network, 6NET, Moonv6
- Designed 6TAP exchange
- Hands-on deployment experience in 4 continents

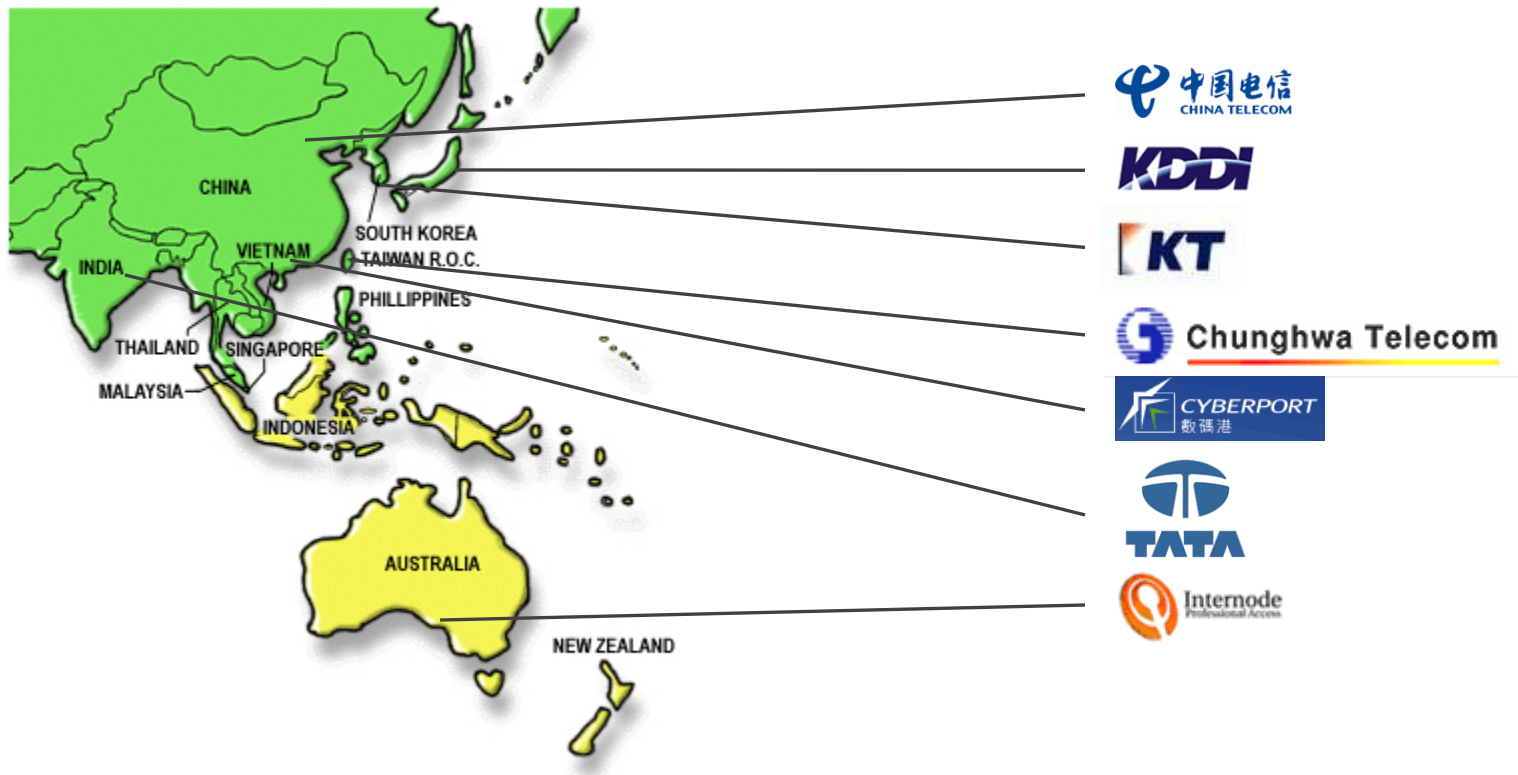


Accomplishments

- Launched Freenet6 (www.freenet6.net) in 1999 which has provided IPv6 access to over 150K people
- Released the Hexago / gogo6 Gateway in 2004
- Launched go6.net, in partnership, in 2007

IPv6 Trials and Deployments

gogo6 (also known as Hexago) Asia Pacific operator customers who completed IPv6 trials or deployments:



How to go to IPv6 ?

Dual stack

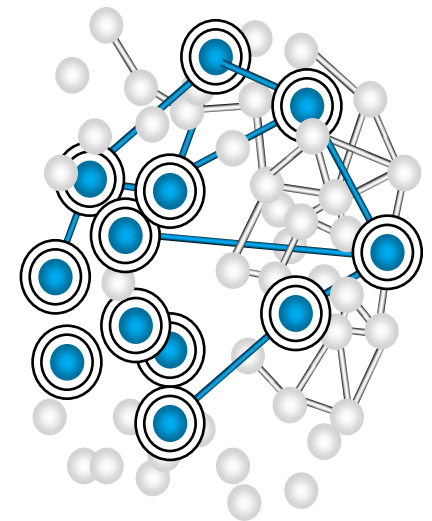
- Established two completely independent networks
- Convert nodes in network to dual-stack. Can sometimes upgrade but usually have to buy new
- Naturally occurs in refresh cycle
- Dual-stack node does not mean dual-stack network

Tunneling

- Creates tunnels or bridges over parts of network that are not converted yet to IPv6
- Involves encapsulating v6 packet in v4 packet

Translation

- Conversions need to be very specific



Dual Stack is Not the Only Solution

Cost

- Need to replace big parts of the access network

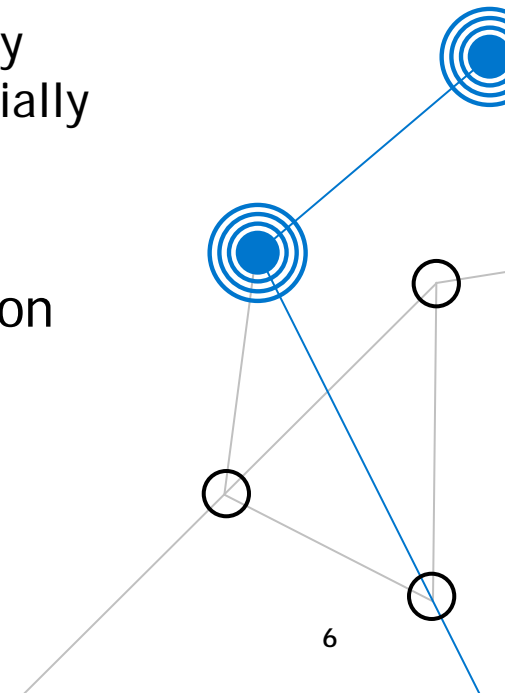
Security

- Not all network products are available i.e. security products (DPI, IDS and even firewalls)

Relevance

- IPv4 addresses will likely run out before IPv6 is widely deployed which makes dual stack less likely than initially anticipated

When upgrading a network, tunneling and/or translation are practical parts of the solution



Solution Overview: Tunnel Broker

gogoSERVER

- IPv6 service delivery platform for fixed and wireless networks
- Deploy IPv6 services over IPv4 network
- Deploy IPv6 only networks
- Provide interoperability between IPv6 & IPv4 networks, terminals and services



gogoCPE

- Plug 'n' play IPv6 CPE
- Plug into Ethernet port anywhere in the LAN to get IPv6 with static addr.



HAP6 (Home Access Platform)

- Platform to deploy home IP services and remotely control cameras, music storage disks, etc.

2. IPv6 Access and CPE Examples

1. Home Network with Static IP address

- For webcams, etc.
Another source of revenue for ISP

2. Energy meter with IP that can be remotely accessed

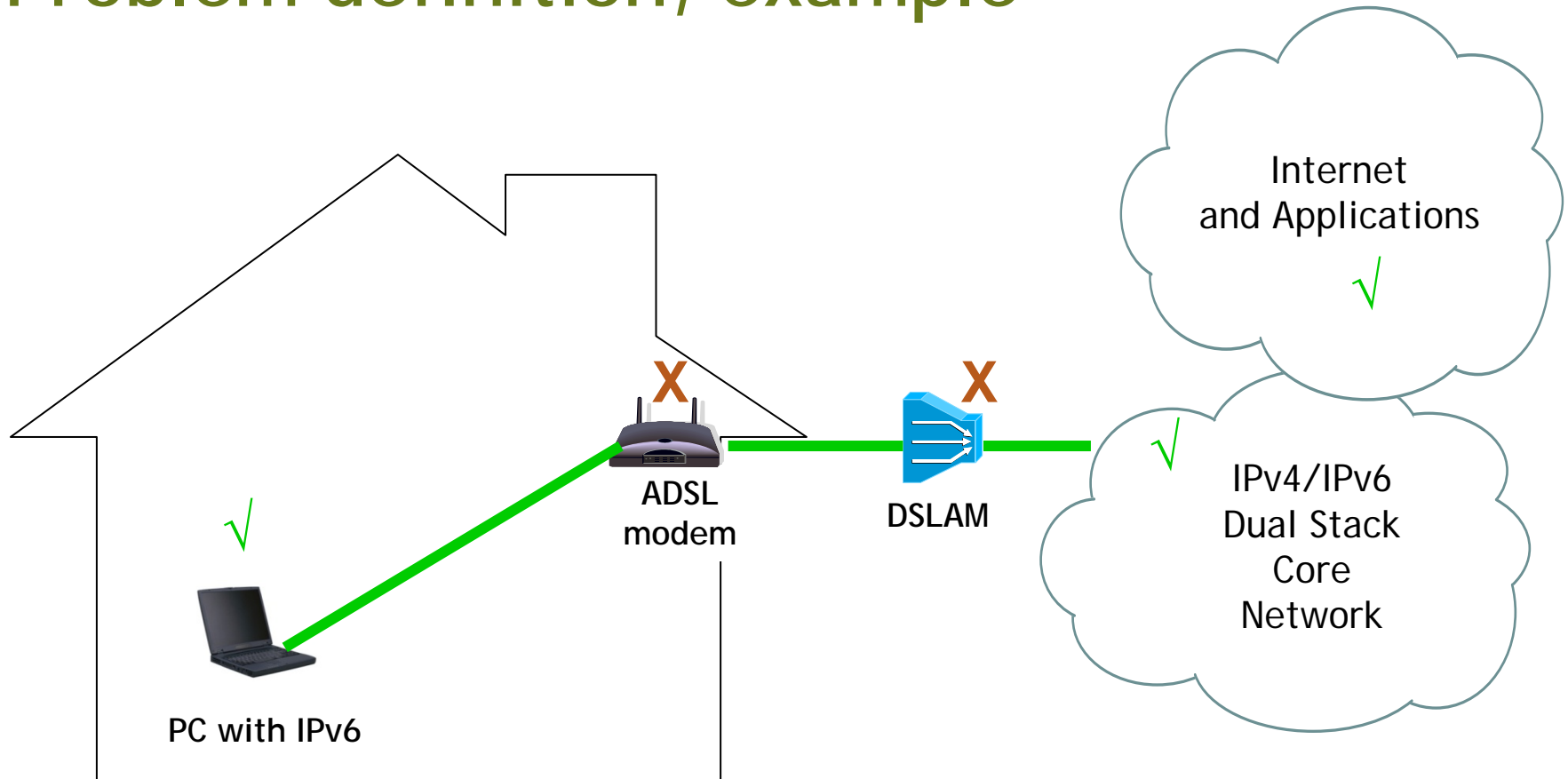
3. A 3.5G mobile service where user is always logged on to his data service

- In all cases IPv6 address solves the problem
- BUT, how does the CPE (or device) implement AND use IPv6 over legacy IPv4 networks ?

3. Problem Definition , part 1

- On a PC an IPv6 client can run, but
On a "black-box" IPv6 cannot be enabled, for example ADSL modem
- Also, how can an operator provision 1000s of subscribers with IPv6 ?
Manual configuration not practical, needs to be automated

Problem definition, example



✓ = IPv6 Ready

✗ = IPv6 not capable

Problem definition, part 2

- Legacy IPv4 Devices/Routers are in between IPv6 Device and Dual-Stack Core

A v4-to-v6 transition mechanism is needed

- NATs need to be traversed along the way

Many different types of NATs exist (cone, symmetrical, nested). Solution must support them all

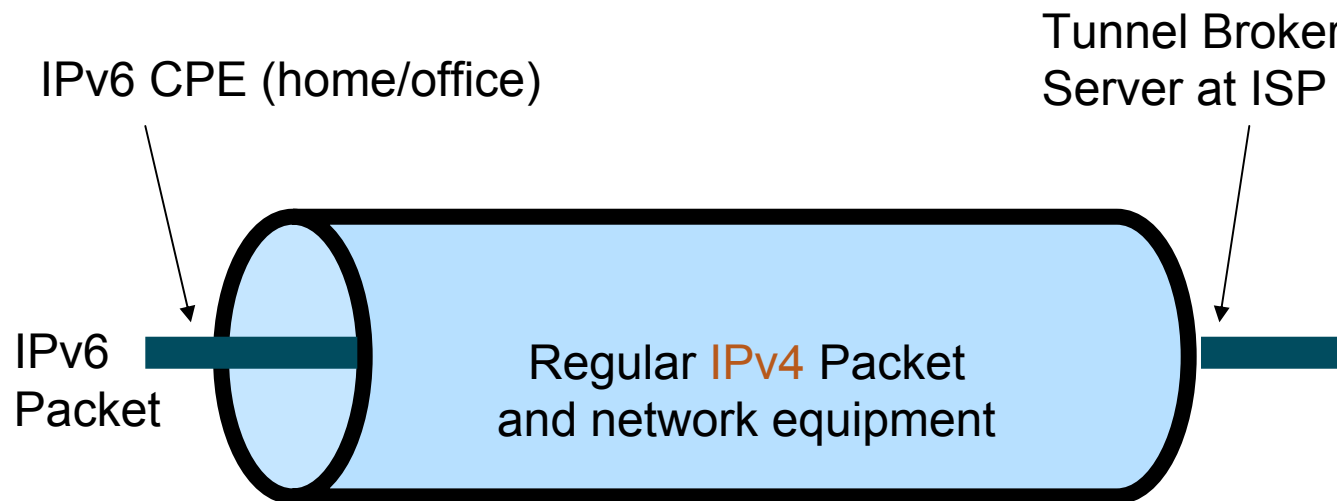
- Applications may only be IPv4 accessible

Even with IPv6 ready network, the applications may not understand IPv6. Solution must hide the IPv6 identity from Applications-capable-of-IPv4-only

4. Solution Criteria for IPv6 CPE

- Consumer device
 - Must be plug & play and affordable*
- Coexistence
 - Access BOTH IPv4 and IPv6 networks plus applications*
- CPE client must be configurable remotely by ISP
- ISP needs to use TSP Protocol at both client (CPE) and server (gateway at ISP core)

5. Product Introduction: TSP Tunneling



gogo6 enables IPv6 TSP Tunneling

and enables IPv6 capability at the existing IPv4 CPE site

What is TSP ?

- Tunnel Setup Protocol, defined by RFC 2893
- Provides a *negotiated* tunnel
 - Thus called a 'tunnel broker' solution.*
 - gogo6 supplies CPE and Server TSP devices*
- Tunnel is between CPE (home) and gateway (ISP core)
 - ISP core should be IPv4/IPv6 dual stack ready*
- TSP automates the setup of manual tunnels
 - Automatic tunnels (6to4, Teredo, ISATAP) may result in clients changing their IPv6 address. Manual tunnels better for offering static IPv6 addresses.*

Implementing TSP Solution

Description

- An IPv6 service delivery platform using TSP Protocol
- Extends IPv6 from the core to the edge of the network (last mile or last hop)
- Provides interoperability between IPv6 & IPv4 hosts, networks and services

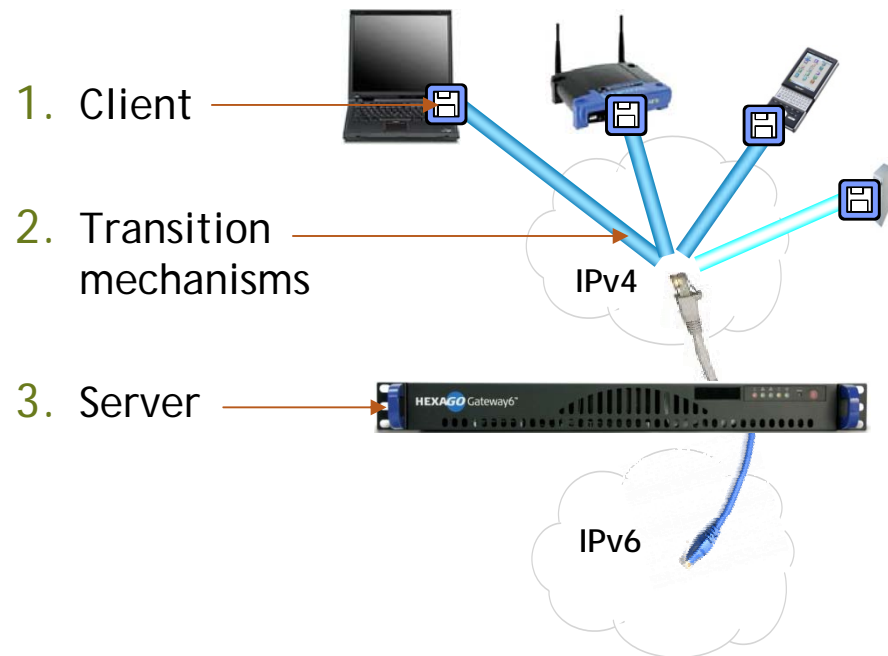
Value Proposition

- Enables IPv6 services to work over IPv4 networks

USP

- The only IPv6 service delivery platform sold today

Consists of 3 parts:




gogoSERVER

- 1U Internet appliance
- 2 x 1GbE interfaces
- Supports up to 50,000 tunnels
- IPv6 in IPv4 tunneling
- IPv4 in IPv6 tunneling (DSTM)
- IPv4 >IPv6 & IPv6 >IPv4 HTTP proxy
- IPv6 >IPv4 & IPv6 >IPv4 NAT-PT
- NAT traversal
- RADIUS support
- IPv6 permanent (or temporary) addresses
- Node and network mobility
- IPv6 prefix delegation
- Authentication, Authorization & Accounting (AAA)
- Automatically update DNS information
- Monitoring



7. CPE Details: gogoSERVER Client

Small footprint - uses v6 resources already in OS 
BSD licensed. Source code and OPENWRT port available
Deployed in three ways:

1. Software download for computer
 - Is available on Windows 2000, Server 2003, XP, Linux, FreeBSD, OpenBSD, NetBSD, Solaris, OS X, VxWorks
2. gogoCPE - "Plug 'n' play" hardware device
 - Plug anywhere in network to provision IPv6 to LAN
3. Ported to various CPE devices



gogoCPE

- The D6 hardware platform will be used in two ways:
 - gogoCPE: runs the gogoSERVER Client. Used to deploy IPv6 over IPv4 networks
 - My Home Portal: used to deploy IPv6 services over IPv4 networks
- Plug 'n' play. Deployed by plugging into back of home router/modem. Eliminates all NAT traversal issues. Can be mailed to end customer

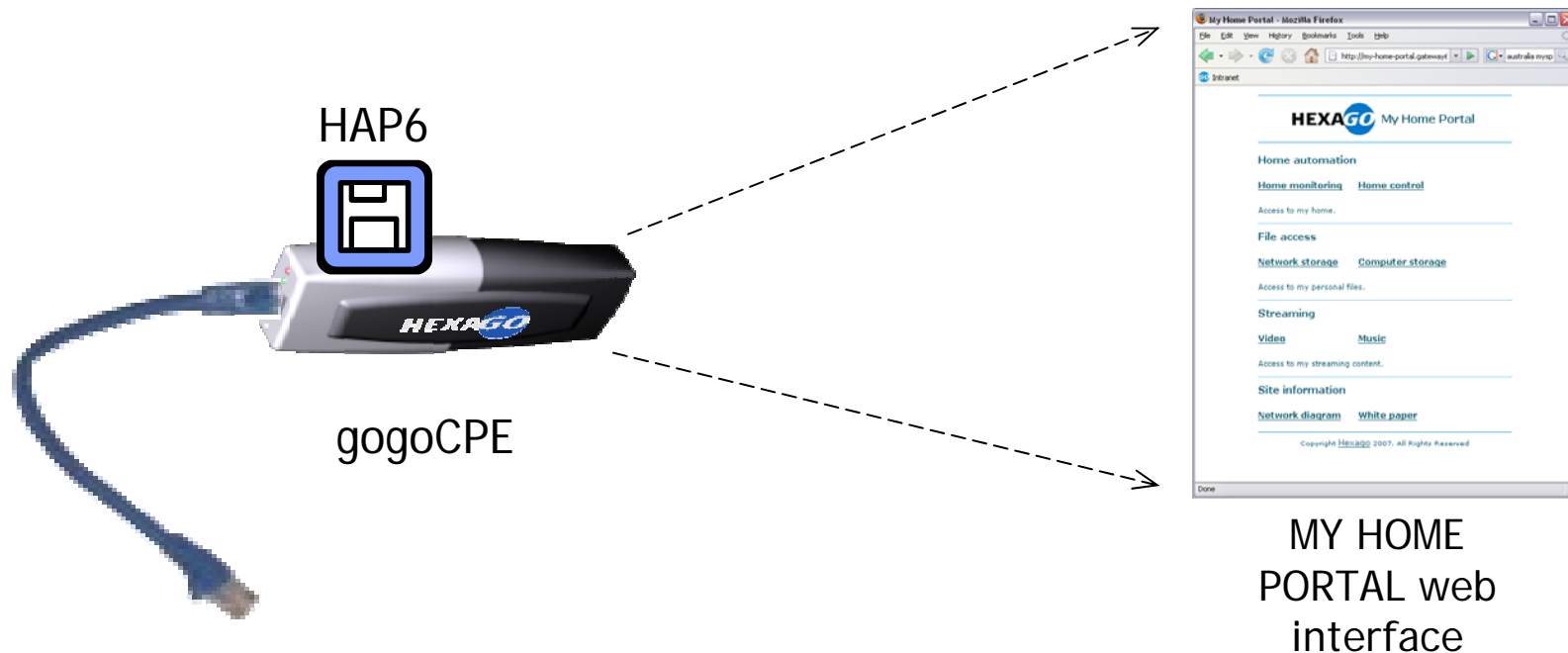


Deployment CPE

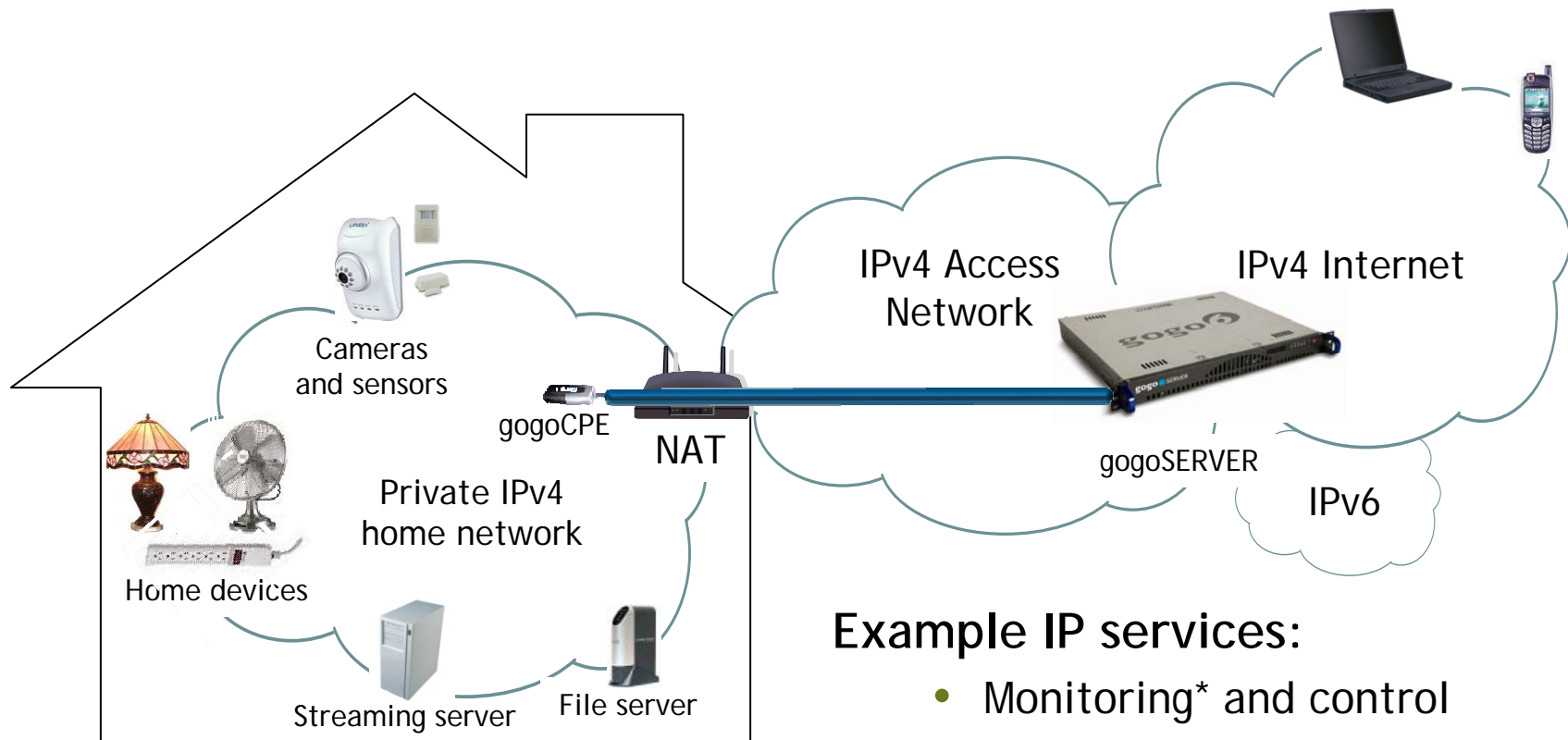
gogoCPE contains the TSP client, the HAP6 client and a web server

gogoCPE has a globally routable URL

Web server provides interface to services



My Home Portal Services



Example IP services:

- Monitoring* and control
- MyWebsite
- File sharing*
- Streaming
- BIGBIG Mail*

Benefits

Business

- Little change for customer - customer uses IPv4 equipment
- Low investment required
- Generate incremental revenue with a new class of services
- Start small and add new services over time
- Gain valuable IPv6 operational experience for the future
- Starts deployment of IPv6 for the future

Product

- Lower cost to deploy
- Plug 'n' play installation
- Does not require a dedicated computer
- Allows multiple devices and services without conflicts

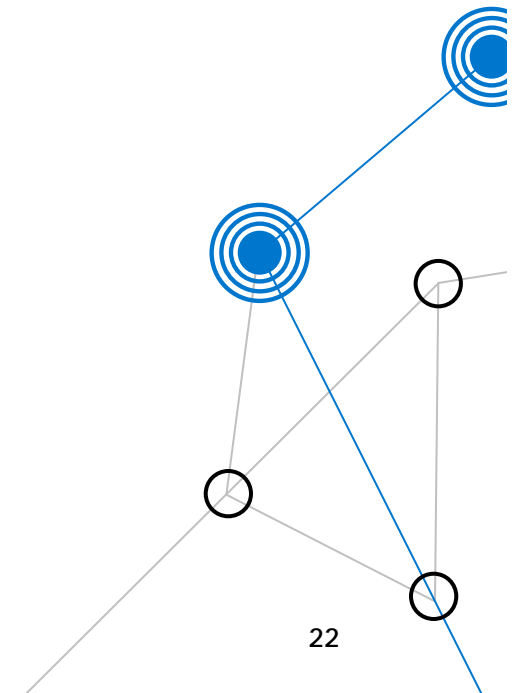
8. Network Transition to IPv6 Access

Tunneling

- Tunneling protocol is used to establish tunnel between client and gogoSERVER server
- Utilizes the Tunnel Setup Protocol (TSP), DSTM, L2TP (prototype) and others soon

Translation

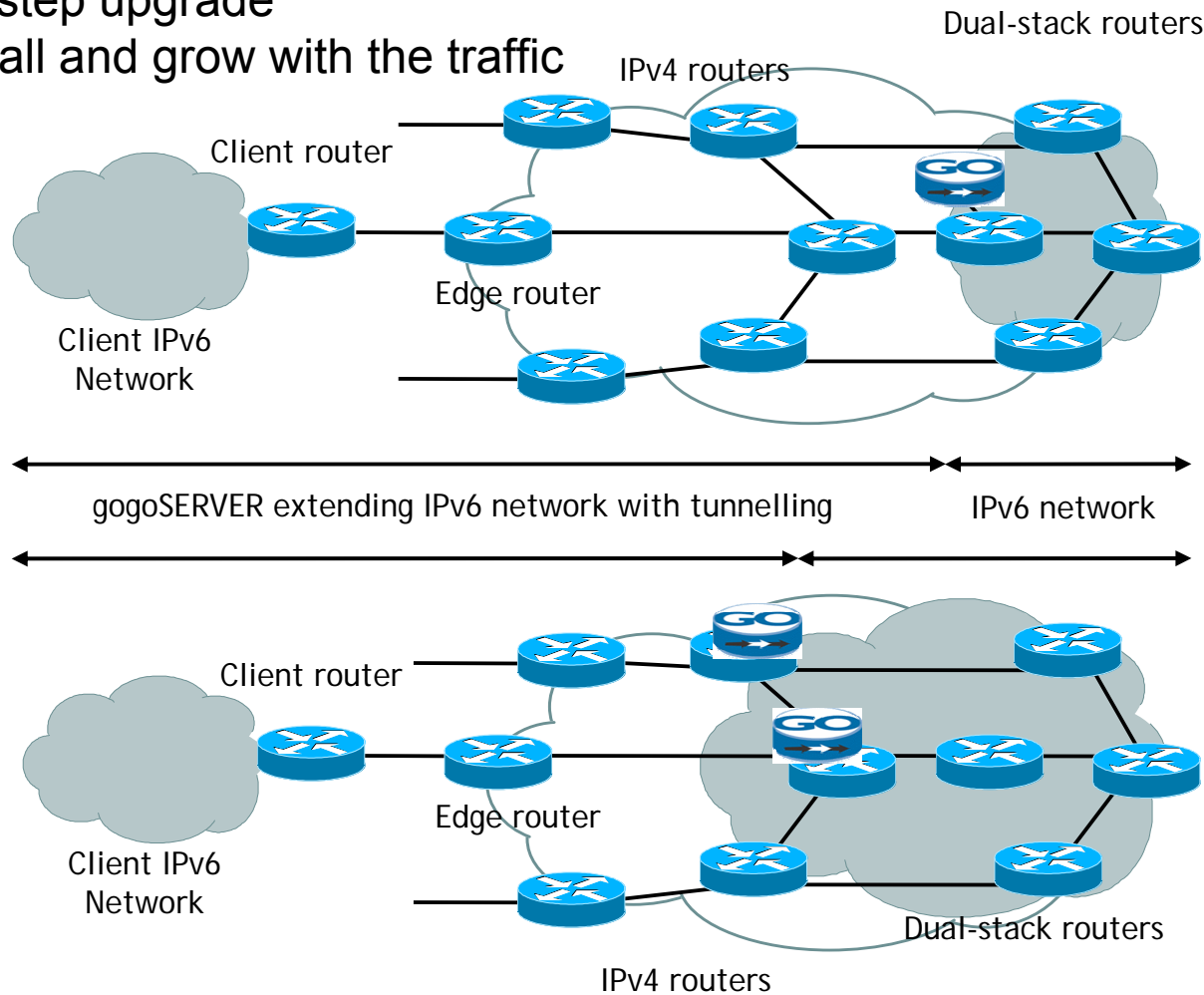
- IPv4 >IPv6 & IPv6 >IPv4 HTTP proxy
- IPv6 >IPv4 & IPv6 >IPv4 NAT-PT and ALGs



Tunneling Adds IPv6 Gradually

Step by step upgrade

Start small and grow with the traffic



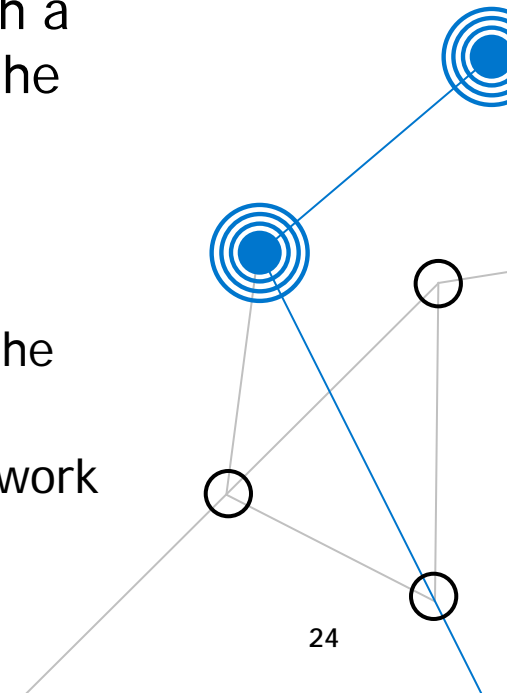
Gradual Growth

Scaling is a key advantage of the gogoSERVER solution

- Clients can be preconfigured and left alone
- The client will automatically find the closest gogoSERVER
 - Redirect function in TSP makes this possible
 - Anycast or client discovery mechanisms finds closest gogoSERVER

The operator can deploy the clients and start only with a few gogoSERVER servers and then add capacity as the traffic volume increases

- All users get IPv6 support
- As traffic increases more gogoSERVER are deployed
- In the end the tunneling will only be used to bridge the access network, the last mile
- Becomes a permanent deployment in part of the network where there is no need to replace the equipment

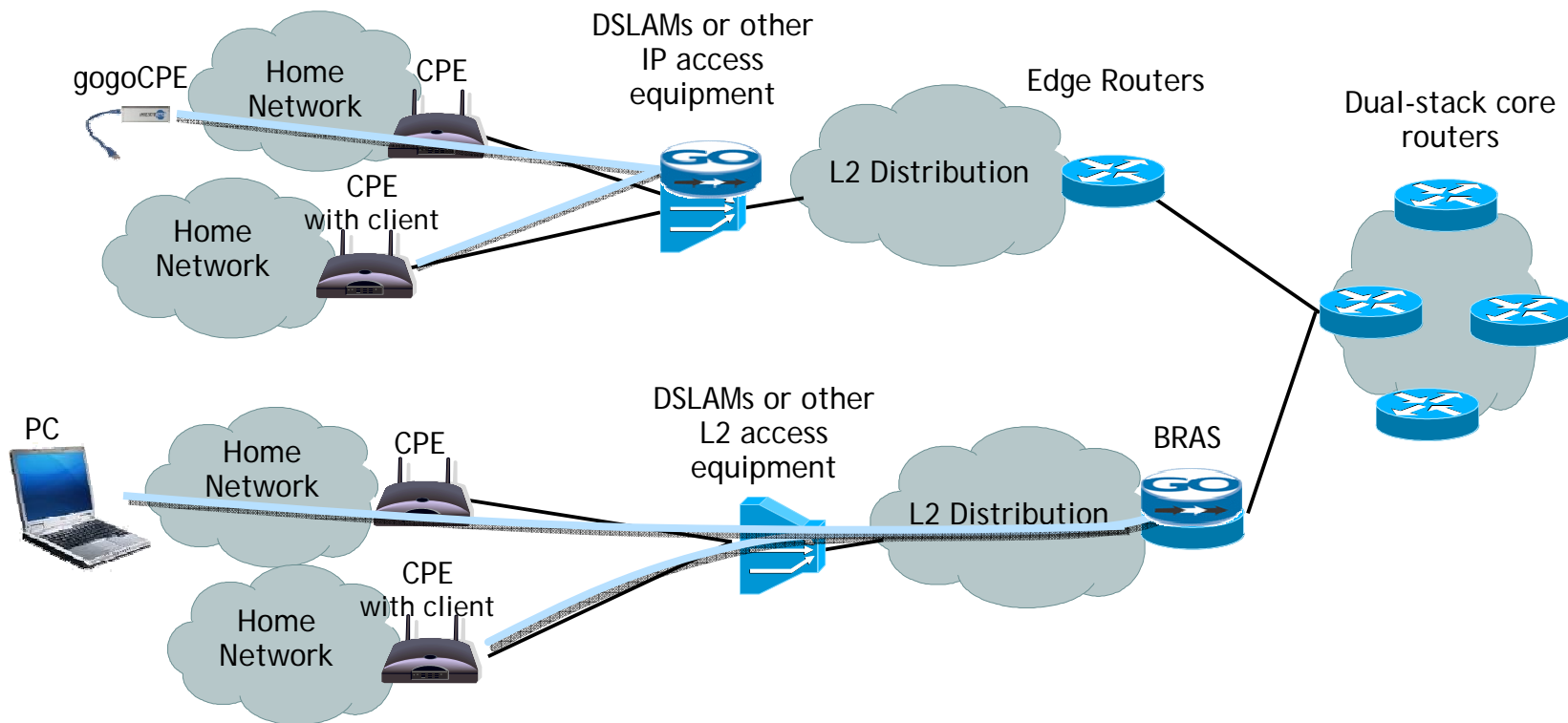


Tunneling As An Edge Upgrade

The gogoSERVER becomes an upgrade of the access equipment

An option to replacing the access

The tunnel can be terminated in the CPE device, a dedicated device or in a PC



Conclusion

- IPv4 and IPv6 coexistence needed for consumers
- TSP tunnelling provides an ideal client-server solution
- Clients can be hardware plug & play unit to gain consumer acceptance to IPv6
- gogo6 provides commercial solutions to enable IPv6 access that coexists with IPv4
- Solution is future-proof as it can also do reverse tunneling when IPv4 becomes scarce but needed

Thank you.

gogo6.com

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