

Lightweight 4over6 Interop Test Report

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Overall Introduction

- Lightweight 4over6 interop test at Tsinghua University, China, Oct.22-26, 2012
- 6 vendors and operators participated in the test
 - Tsinghua
 - China Telecom
 - Huawei
 - NetDominator
 - BII
 - Yamaha
- Each of the participators implemented lwB4 or lwAFTR or both.

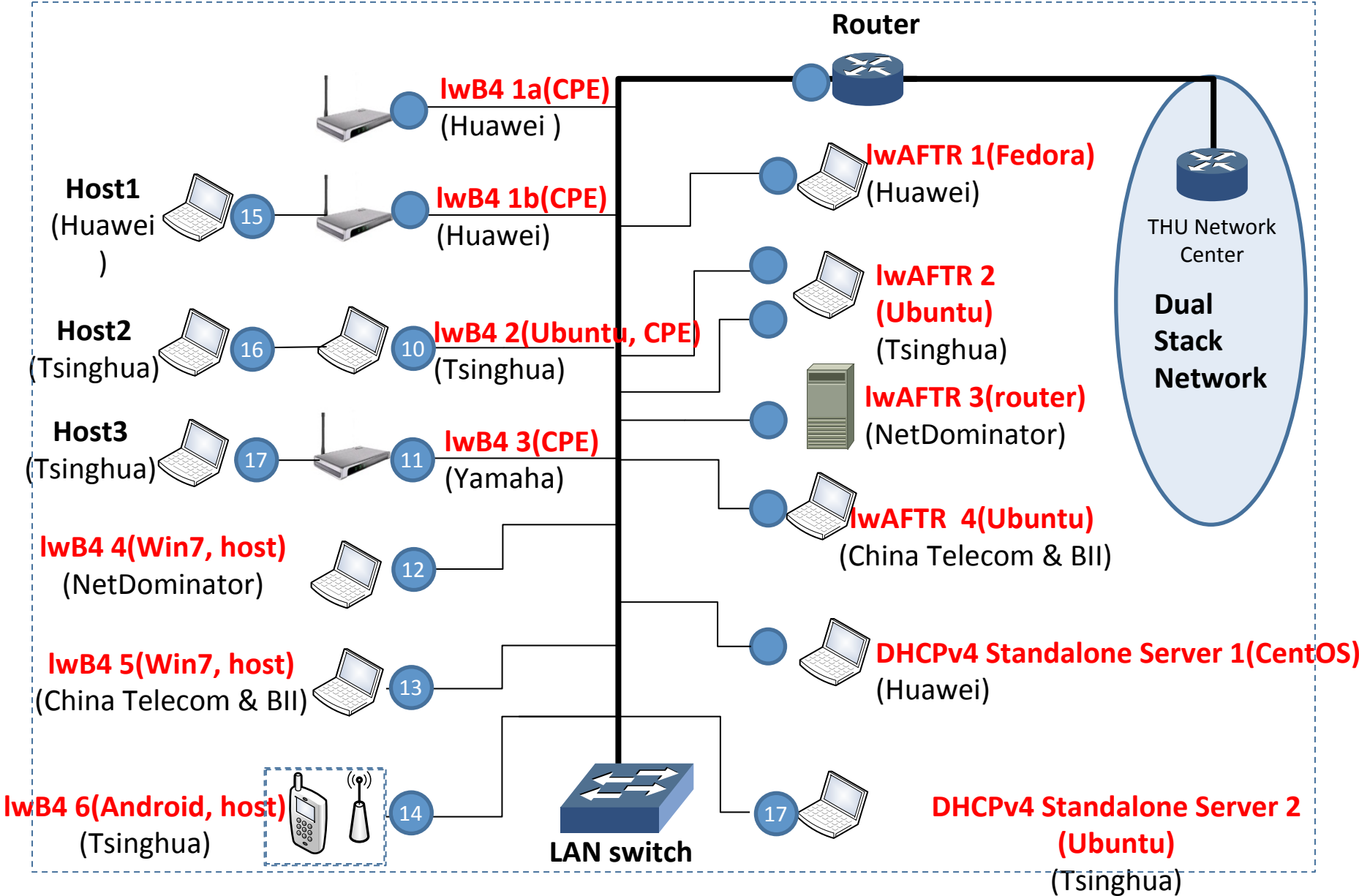
Overall Introduction

- Two kinds of extensions were introduced to allocate IPv4 addresses and port sets
 - DHCP Extension
 - DHCPv4 over IPv6 Transport
([draft-ietf-dhc-dhcpv4-over-ipv6](#))
 - DHCP Option for Port Set Assignment
([draft-sun-dhc-port-set-option](#))
 - PCP Extension
 - Using PCP to coordinate between the CGN and Home Gateway
([draft-tsou-pcp-natcoord](#))

Network Preparation

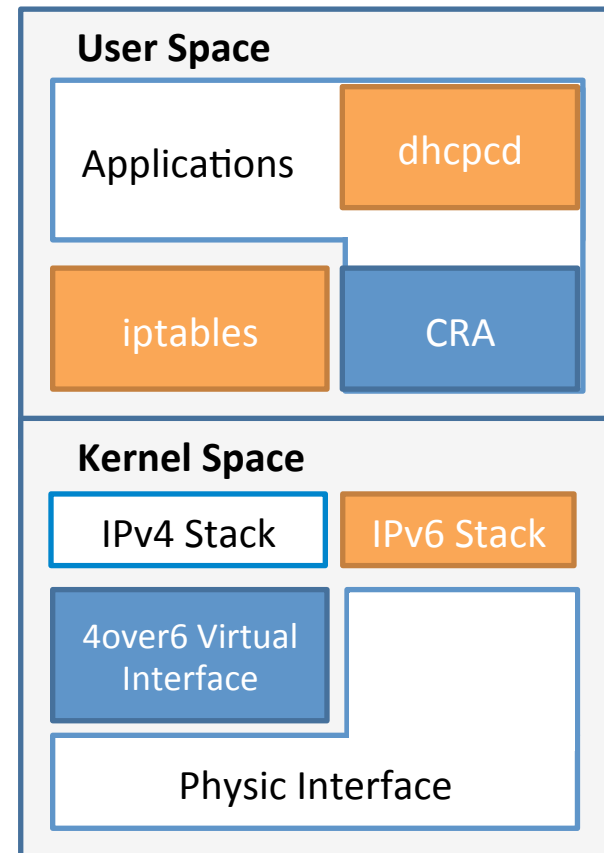
- IPv4
 - /28 in total
 - IPv4 addresses of lwB4s are acquired dynamically
 - IPv4 addresses of lwAFTRs are configured statically
- IPv6
 - 4 Global IPv6 prefixes
 - IPv6 addresses of lwB4s and lwAFTRs are configured statically

Test Topology



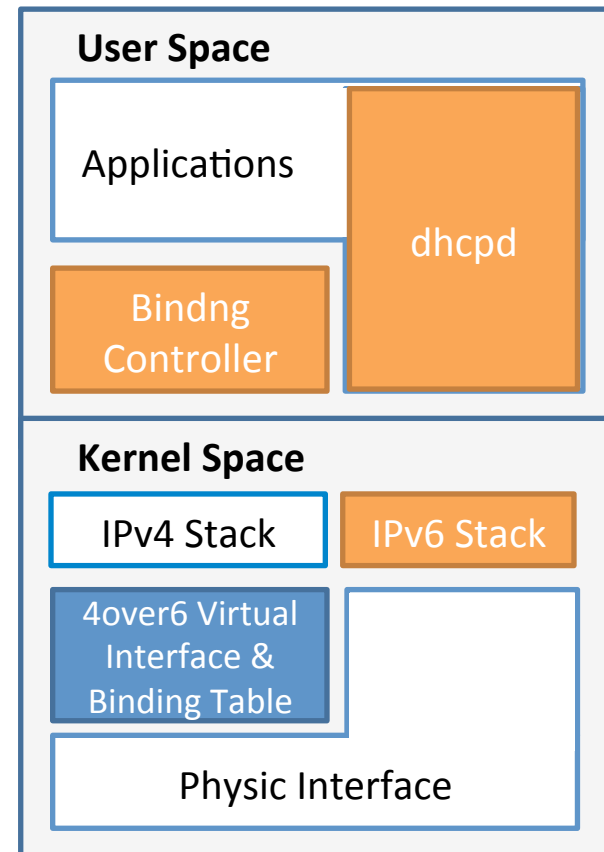
Example of Implementation

- lwB4 2 on Linux Ubuntu
 - DHCP client is based on dhcpcd (modification about 200 lines)
 - CRA is implemented by Standard C using socket APIs (about 600 lines)
 - NAT is implemented with iptables (just lines of commands)
 - Using Linux kernel module of 4over6 virtual interfaces to perform tunneling



Example of Implementation

- lwAFTR 2 on Linux Ubuntu
 - DHCPv4 server(TSV) with DHCP Port-set Option extension is based on ISC dhcpd
(modification about 500 lines)
 - Using Linux kernel module of 4over6 virtual interfaces to perform tunneling and v4 A+P – v6 binding
 - Using Standard C to implement the binding controller (about 200 lines)

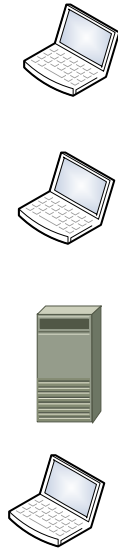


Test Cases and Results

7 IwB4s



4 IwAFTRs



X

X

Control Plane

Test Function
DHCP Initialization With Port-set Allocation
DHCPRELEASE
DHCP Renew
DHCPv4 over IPv6 Transport
PCP Initialization
PCP Renew

Data Plane

Category	Test Item
Web Browsing	Internet Explorer
	Mozilla Firefox
	...
Online Stream Media	www.ifeng.com
	www.youku.com
	...
Email	mail.google.com
	Foxmail
	...
Multimedia Entertainment	PPTV
	QQ Online Game
	...
Instant Message	MSN Messenger
	Skype
	...
P2P Download	Thunder Downloader
	Flashget
	uTorrent
FTP	Filezilla
VPN	OpenVPN
	...

Over 1400 test cases in total

Over 50
test
cases

Test Cases and Results

Category	Test Item	Result
Control Plane	DHCPv4 Initialization with Port-set Allocation	Passed
	DHCPRELEASE & Renew	Passed
	DHCPv4 over IPv6 Transport	Passed
	PCP Initialization	Passed
	PCP Renew	Passed
Data Plane	Web Browsing	Passed
	Online Stream Media	Passed
	Email	Passed
	Multimedia Entertainment	Passed
	Instant Message	Passed
	P2P Download	Passed
	FTP	Partially Passed
	VPN	Passed

FTP Passive Mode Issue

- The passive mode of FTP client is supported on lwB4 hosts and hosts behind lwB4 CPE, while the active mode is not.
 - Clients listens a port that is not within the port set, but there is no record in the binding table within the iptables

Conclusions

- Lightweight 4over6 is easy to implement.
- Interoperation between lwB4s and lwATFRs that come from different providers is performed well.
- Lightweight 4over6 supports IPv4 applications well.