Realtek
IPv6
User Guide V1.0

Change History

version	Date	Remark
1.0	2012/07/24	Create file of ipv6 user guide

1   IPv6 new feature list

    1.1   Web server

       1.1.1   Access web server by using link local and global IPv6 address

       1.1.2   Make sure your web browser is IPv6 ready. (chrome, firefox is IPv6 ready)

    1.2   **DHCPv6** server /prefix delegation/ client

       1.2.1   PC can get IPv6 address and DNSv6 server's address from DHCPv6 server

       1.2.2   Prefix delegation is used to get prefix from remote server and delegate them to PC from lan side.

       1.2.3   DHCPv6 client is used to get WAN IPv6 address from remote DHCPv6 server.

    1.3   Radvd

       1.3.1   Radvd is used to advertise router information

       1.3.2   Radvd is also used to advertise prefix information

    1.4   IPv6 over PPP

       1.4.1   IPv6 over PPP is support right now, and our DUT can get IPv6 link local address on PPP link, if there is a remote PPP server which is IPv6 ready.

       1.4.2   DUT support three ways to get global IPv6 address on PPP, SLAAC, DHCPv6 and Static mode.

    1.5   IPv6 Firewall

       1.5.1   IPv6 port filter

       1.5.2   IPv6 address filter

    1.6   IPv6 QoS

    IPv6 bandwidth shaping

    1.7   **MLD proxy**

    Only support MLDv1

    1.8   DNSv6 support

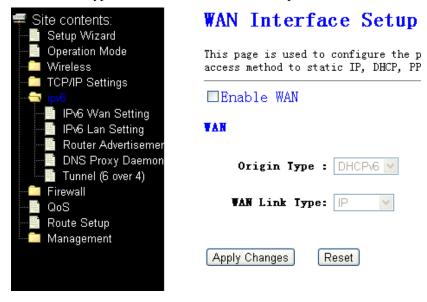## 2 web page' configuration

2.1 WAN page setup

2.1.1 origin type:

The origin type indicates how to get WAN's IPv6 address. There are three types supported-STATIC/SLAAC/DHCPv6.
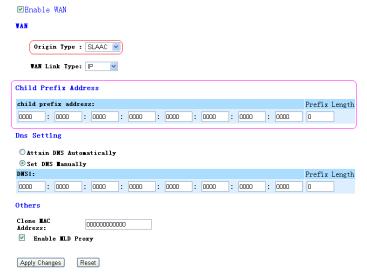
2.1.2 link type: IP/PPP

The link type indicates whether IPv6 is encapsulated over PPP link.
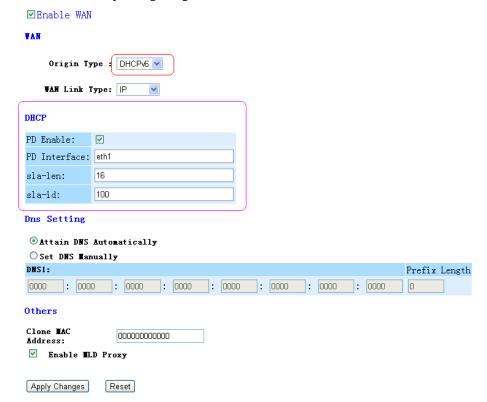

2.1.3 SLAAC configure

SLAAC-stateless address auto configuration, is specific to IPv6. In SLAAC mode DUT get a prefix from RA. It use the prefix to generate WAN's global IPv6 address and forms another prefix for LAN with child prefix. For more information please reference RFC 2462.
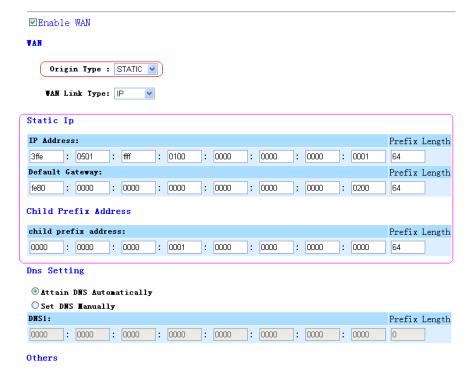

SLAAC configuration

2.1.4 DHCPv6 configure

DHCPv6 prefix delegation is used to get prefix from DHCPv6 server and delegate it to the LAN. Parameters of "sla-len" and "sla-id" is used to generate second level prefix with the first level prefix getting from DHCPv6 server.

☑ Enable WAN

WAN

Origin Type :	DHCPv6 ▼
WAN Link Type:	IP ▼

DHCP

PD Enable:	☑
PD Interface:	eth1
sla-len:	16
sla-id:	100

Dns Setting

◉ Attain DNS Automatically
○ Set DNS Manually

DNS1:   Prefix Length

| 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | | 0 |

Others

Clone MAC Address: | 000000000000 |

☑   Enable MLD Proxy

[Apply Changes]   [Reset]

2.1.5 STATIC configure

In static mode, IPv6 address, default gw and child prefix should be add manually.

☑ Enable WAN

WAN

Origin Type :	STATIC ▼
WAN Link Type:	IP ▼

Static Ip

IP Address: Prefix Length

| 3ffe | : | 0501 | : | ffff | : | 0100 | : | 0000 | : | 0000 | : | 0000 | : | 0001 | | 64 |

Default Gateway: Prefix Length

| fe80 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0200 | | 64 |

Child Prefix Address

child prefix address: Prefix Length

| 0000 | : | 0000 | : | 0000 | : | 0001 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | | 64 |

Dns Setting

◉ Attain DNS Automatically
○ Set DNS Manually

DNS1:   Prefix Length

| 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | : | 0000 | | 0 |

Others

2.2 LAN page setup

2.2.1 Global IP address

Global IPv6 address of LAN interface must have the same prefix as child prefix configured on WAN page.

2.2.2 DHCPv6 server

PCs on LAN side can get global IP and DNS information from DHCPv6 server.

2.2.2.1 DNS

DNS address should be link local address of LAN if DUT works as a DNS proxy. Otherwise, it should be the remote DNS server's global IP.

2.2.2.2 pool range

DHCP pool range should have the same prefix as child prefix on WAN page.

Configuring LAN setting

IP Address:								Prefix Length
3ffe	0501	ffff	0101	0000	0000	0000	0001	64

Configuring DHCPv6 Server

Enable	☑
DNS Addr:	fe80::2e0:4cff:fe81:96c1
Interface Name:	br0
Addrs Pool:	
From:	3ffe:501:ffff:0101::0001
To:	3ffe:501:ffff:0101::1000

[Save]

2.3 firewall configure

2.3.1 port filter

When enable port filter and add port range on the web, both IPv4 and IPv6 port filter function will take effect.

2.3.2 IP filter

Only source IPv6 address is supported right now.

IP Filtering

Entries in this table are used to restrict certain types of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.

☑ Enable IP Filtering
☐ Enable IPv4   ☐ Enable IPv6

Local IPv4 Address: [   ]

Local IPv6 Address: [   ]

Protocol: [Both ▼]   Comment: [   ]

[Apply Changes]   [Reset]

Current Filter Table:

Local IP Address	Protocol	Comment	Select
3ffe:508:0100::2	TCP+UDP		☐

[Delete Selected]   [Delete All]   [Reset]

2.4 Radvd configure

Router advertisement is used to advertise router information, pc can get gateway and prefix from it.   If you are interested in the detailed explanation about RA's parameters, please reference RFC 4861. The figure below shows default configuration of RA according to RFC 4861.

2.5 QoS configure

Only source IPv6 address is supported right now.

2.6 Status page

IPv6's related information is list on the webpage of status to make it easy to collect AP's WAN and LAN's IPv6 address, gw and so on.

TCP/IP Configuration	
Attain IP Protocol	Fixed IP
IP Address	192.168.1.254
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.254
DHCP Server	Enabled
MAC Address	00:e0:4c:81:96:c1
WAN Configuration	
Attain IP Protocol	DHCP
IP Address	192.168.2.150
Subnet Mask	255.255.255.0
Default Gateway	192.168.2.200
MAC Address	00:e0:4c:81:96:c9
LAN IPv6 Configuration	
Global Address	3ffe0501ffff0101000000000000001/64
LL Address	fe800000000000002e04cfffe8196c1/64
Default Gateway	fe800000000000002e04cfffe8196c1/64
MAC Address	00:e0:4c:81:96:c1
WAN IPv6 Configuration	
Link Type	IP link
Connection Type	DHCPv6
Global Address	20010db8111200000000000000000001/128
LL Address	fe800000000000002e04cfffe8196c9/64
Default Gateway	
MAC Address	00:e0:4c:81:96:c9

3　IPv6 server setup on Ubuntu

3.1　PPPoE server IPv6 support

3.1.1　add one line to PPPoe config file(PPPoe-server-options)

"ipv6 ::111,::2"

3.1.2　After modify, restart PPPoe-server.

3.1.3　Dial again, PPP interface can get an IPv6 link local address from server.

```
root@gw-server1:/etc# cat /proc/net/if_inet6
fe80000000000000000000000000000111 731 0a 20 80     ppp7
fe80000000000000000000000000000111 72e 0a 20 80     ppp59
00000000000000000000000000000001 01 80 10 80      lo
20010db8111200000000000000000200 72e 40 00 80     ppp59
3ffe0501ffff010000000000000000200 02 40 00 80     eth2
fe800000000000021478fffe57b7dc 04 40 20 80     eth0
fe800000000000020feafffe3f6180 02 40 20 80     eth2
fe800000000000020e2efffec0748b 03 40 20 80     eth1
```

from PPPoe server's point of view

```
# cat /proc/net/if_inet6
20010db8111200000000000000000001 2d 80 00 80     ppp101
3ffe0501ffff010000000000000000001 25 80 00 80     eth6
fe80000000000000000000000000000001 2c 40 20 80      br0
fe80000000000000000000000000000001 10 40 20 80     wlan1
fe80000000000000000000000000000001 02 40 20 80     wlan0
fe80000000000000000000000000000001 1f 40 20 80     eth0
fe80000000000000000000000000000001 23 40 20 80     eth4
fe80000000000000000000000000000001 22 40 20 80     eth3
fe80000000000000000000000000000001 21 40 20 80     eth2
00000000000000000000000000000001 01 80 10 80      lo
fe80000000000000000000000000000002 2d 0a 20 80     ppp101
3ffe0501ffff0100021234fffe567891 20 40 00 00     eth1
```

from PPPoe client's point of view

3.2　Radvd's setup

3.2.1　Install Route Advertisement Daemon on Ubuntu:

"sudo apt-get install radvd"

3.2.2　Edit configure file

"vim /etc/radvd.conf"

Example is the default value of radvd's parameters.

```
interface eth1
{
        MaxRtrAdvInterval 600;
        MinRtrAdvInterval 198;
        MinDelayBetweenRAs 3;
        AdvLinkMTU 1500;
        AdvReachableTime 0;
        AdvRetransTimer 0;
        AdvCurHopLimit 64;
        AdvDefaultLifetime 1800;
        AdvDefaultPreference medium;
        AdvSendAdvert on;
        prefix 2001:db8:0:1::/64
        {
                AdvOnLink on;
                AdvAutonomous on;
                AdvRouterAddr on;
        };
};
```

3.2.3　Make it run

"radvd -C /etc/radvd.conf"

3.3 DHCPv6 server's setup.

3.3.1 Install wide-DHCPv6 server.

"sudo apt-get install wide-DHCPv6 server"

3.3.2 Edit DHCP6s's configure file

"vim /etc/wide-DHCPv6/DHCP6s.conf"

The followings are a sample configuration to provide a DNS server address for every client as well as to delegate a permanent IPv6 prefix 2001:db8:1111::/48 to a client whose DUID is 00:03:00:01:00:E0:4C:81:96:C9.

```
option domain-name-servers 2001:db8::35;
host kame {
        duid 00:03:00:01:00:E0:4C:81:96:C9;
        prefix 2001:db8:1111::/48 infinity;
};
```

3.3.3 Make it run

DHCP6s interface

4 Commands useful for IPv6

4.1 ifconfig

ifconfig interface add/del IPv6/prefixlen

ifconfig br0 add 3ffe:501:ffff:0:2e0:4cff:fe81:96c1/64

ifconfig br0 del 3ffe:501:ffff:0:2e0:4cff:fe81:96c1/64

4.2 Ping6

ping6 -I interface destination

4.3 static Route

route -A inet6

route -A inet6 add default gw fe80::0200:00ff:fe00:0100 dev br0

route -A inet6 add default gw fe80::0200:00ff:fe00:a0a0 dev br0

route -A inet6 add 3ffe:501:ffff::/64 gw fe80::0200:00ff:fe00:a0a0 dev br0

route -A inet6 delete 3ffe:501:ffff::/64 gw fe80::0200:00ff:fe00:a0a0 dev br0