Softwires implementation

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Development done for IPv4 MIPv6 Interworking

• The work deals with building a firmware with the following features:
  ▪ Softwires Concentrator (SC) capable
    ❑ Linksys will be able to work as IPv6 TEP
    ❑ MN will setup the IPv6 tunnel by using Softwires and the Linksys as SC
  ▪ It is a standalone component handled by Consulintel
• Both the the SI (MN) and the SC (NAS) are available
• MIPv6 runs over the Softwires tunnel
Softwires as solution for IPv4 MIPv6 Interworking (I)

SC is DS and it provides a valid IPv6 address (CoA) to MN (SI)

IPV4 clouds

MIPv6 in IPv6 VPN over IPv4 transportation

IPv4-only ASP

Dual-stack MSP

HA

IPv4
IPv6
UDP
L2TP
PPP
MIPv6

IPv6
MIPv6
Softwires as solution for IPv4 MIPv6 Interworking (II)

IPv6 address provided by the SC

L2TP header

MIPv6 IPv6

PPP

MIPv6 IPv6

PPP

L2TP header

MIPv6 IPv6

PPP

L2TP header

Data channel

UDP/IP

Control channel

L2TP – VPN tunnel
IPv4 interworking with softwires

IPv4-only ASP

Dual-stack ASP
TEP IPv6 provider

AAA-t

IPv6-only MSP

Consulintel’s Development

MN-t

MN-k

TEP

WRT54G

MSP-AAA

HA-a

AAA-t

TEP-a

TEP-AAA

MN

HA
Issues

• The Softwires tunnel has to be reestablished every time the MN changes its location (i.e. IPv4 address)
• This means that some extra work needs to be done in the user side
• Working on a possible Internet Draft on this
Implementation details

• **SC implemented into the Linksys WRT54G access router**
  - The firmware was modified to support the softwires protocol (both IPv4 in IPv6 and IPv6 in UDP/IPv4), DHCPv6, MIPv6 and many other features
  - Available also for other platforms:
    - Linux, BSD and possibly Windows

• **SI implemented into the MN**
  - Linksys
  - Ubuntu, kernel 2.6.16 with MIPv6 kernel patch
Integrated bootstrapping with DHCPv6

- Working on providing a NAS platform to show MIPv6 bootstrapping in integrated scenario:
  - DHCPv6 available
- WRT54G as access point (NAS) by Linksys
- The work deals with building a firmware with the following features:
  - For integrated scenario with DHCPv6 available
    - IPv6 capable
    - 802.1x capable
    - DHCPv6 relay capabilities
      - Both DHCPv6 server and client also provided
  - For IPv4 interworking
    - Softwires server capable. It is a standalone component handled by Consulintel.
Interfaces developed for DHCPv6

Consulintel's Development

MN

DHCP Relay / NAS

NAS-a

DHCPR-r

DHCP Server

HA-a

HA-b

HA-m

HA-DB/Manager

DNS

MASA-b

ASP-a

MASA-AAA

MASA-DB

MASA-d

*MN-a

MN-h

MN-n

MN-k
Steps for MIPv6 bootstrapping with DHCPv6

1. EAP Req. Id.
2. EAP Resp. Id.
3. RADIUS-EAP-Request
4. EAP-Request (MIPv6 features)
5. Authentication phase (N RTTs, depending on authentication method)
6. e2e EAP channel between MN and MASA AAA server (MN-a interface)
7. EAP-Answer (MIPv6 authorization)
8. Local HA selection
9. RADIUS-EAP-Answer (Local HA info.)
10. Stores Local HA
11. EAP Success
12. DHCPv6 Inf. Req.
13. DHCPv6 Relay-Forward with assigned HA.
14. HA selection based on MN preferences
15. DHCPv6 Relay-Rep. (HA info.)
16. DHCPv6 Inf. Rep. (HA info.)
17. IKEv2 + BU authorization / BU authenticated with 4285
18. Authoriz. & key exchange