UDP Encapsulation for IPv4 and IPv6 in DS-MIPv6

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Vijay Devarapalli (vijay.devarapalli@azairenet.com)
Use of UDP encapsulation in DS-MIPv6

- UDP encapsulation is used in DS-MIPv6 for NAT Traversal
- Two formats supported
  - IPv6-in-UDP-over-IPv4
  - IPv4-in-UDP-over-IPv4
- There is an issue when multiple protocol headers are encapsulated in UDP
  - Hard for the recipient to figure out what follows next
- Note: No port number associated with MIPv6 today
Use of UDP encapsulation in DS-MIPv6

- Indicating the type of protocol header in the UDP header would be desirable
- Multiple options are available
  - Nothing new, mostly re-using known concepts
- Pick one option for DS-MIPv6
  - Same solution would be applicable for PMIPv6 too
Alternative 1

- Parse the protocol header that comes after the UDP header
  - For e.g look for the version field that says IPv4 or IPv6
    - This does not work for other encapsulated headers
- If DS-MIPv6 is not implemented in the kernel, then it is still an issue
Alternative 2

- One reserved UDP port per protocol header that is encapsulated
  - One UDP port for IPv6-in-UDP-over-IPv4
  - One UDP port for IPv4-in-UDP-over-IPv4
- If needed more ports can be reserved for each additional protocol header
  - For e.g., one for GRE later on
- Disadvantage is that the DS-MIPv6 application need to listen on each of these ports
Alternative 3

• One reserved UDP port and a DS-MIPv6 “tunnel type message”
  – The DS-MIPv6 tunnel type message will say what protocol header follows
  – Similar to MIPv4 NAT traversal (RFC 3519)

```
| 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 |
+-----------------------+-----------------------+-----------------------+-----------------------+
| Type                  | Next Header           | Reserved              |
| +-----------------------+-----------------------+-----------------------+-----------------------+
```

• Adds a 4 byte overhead for every tunneled packet
Alternative 4

- The encapsulated protocol header type is indicated in the BU
  - One reserved UDP port number is still needed
- A new mobility option in the BU/BAck
- Does not introduce per-packet overhead
Comments/Questions?