

Global IPv6 Summit, Madrid

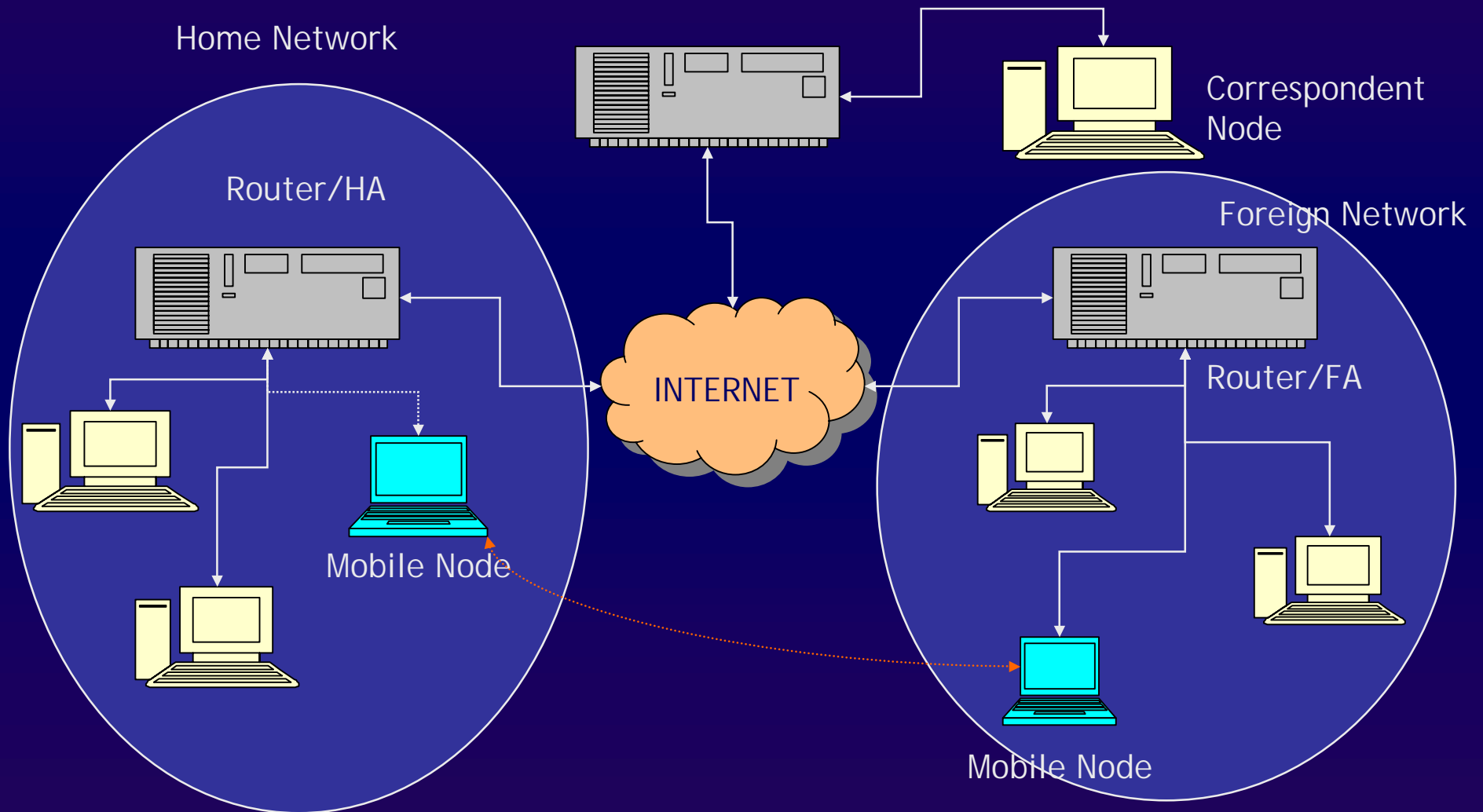
Mobile Internet Protocol under IPv6

Amlan Saha <amlan@3ui.com>
3UI.COM

Focus of presentation

- ◆ Mobile IPv4 overview
- ◆ Drawbacks of Mobile IPv4
- ◆ Features of IPv6 relevant to Mobile IP
- ◆ Improved roaming of IPv6
- ◆ Quality of service within IPv6
- ◆ The economic perspective
- ◆ IPv6 as the basis of an all-IP system
- ◆ In the horizon

Overview of Mobile IPv4



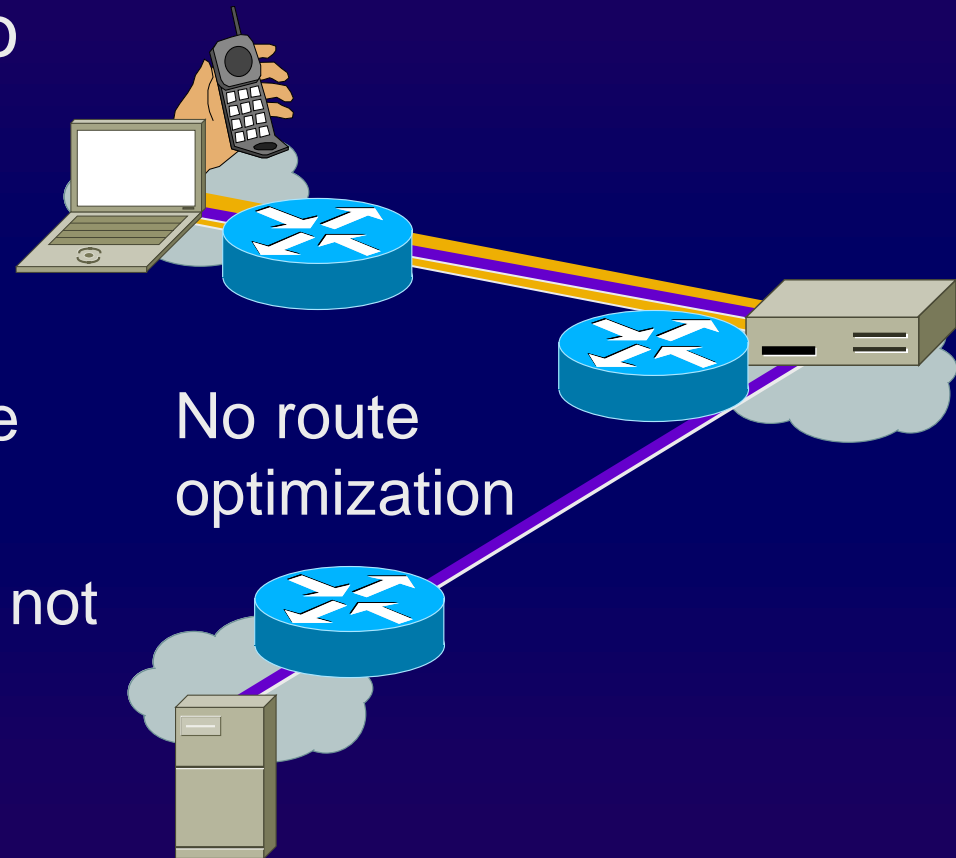
Overview of Mobile IPv4 (contd...)

- ◆ New concepts
 - ◆ Home Agent (HA)
 - ◆ Foreign Agent (FA)
 - ◆ Mobile Node (MN)
 - ◆ Correspondent Node (CN)

- ◆ In essence, MobileIP allows a node to retain its home network address while maintaining connectivity to the internet in a foreign network

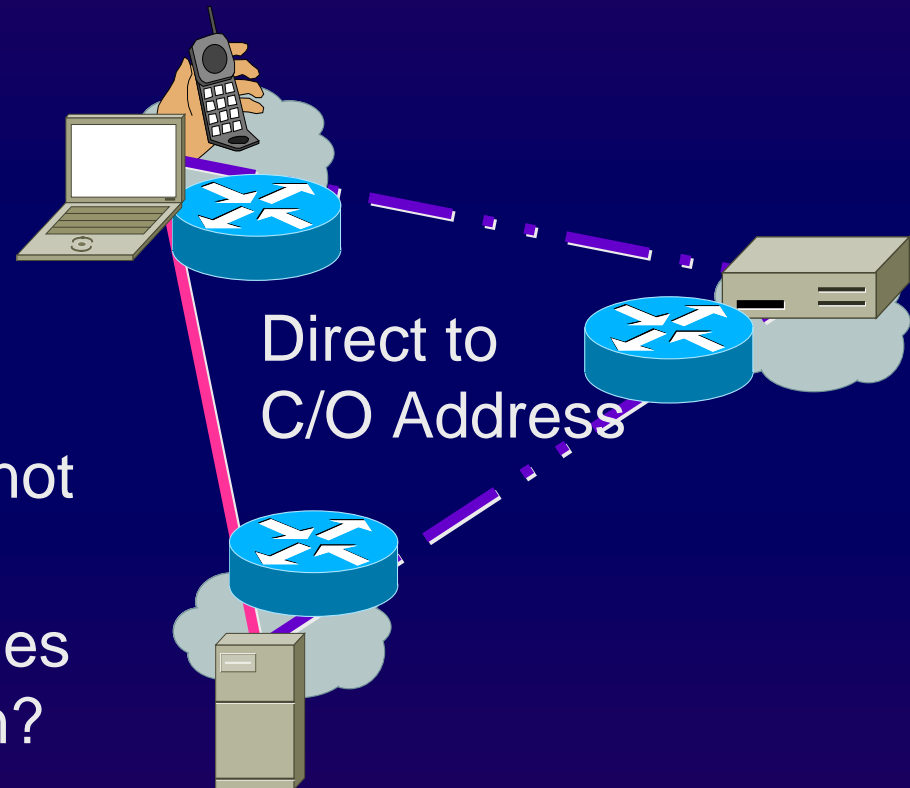
Mobile IPv4 – some issues

- ◆ Static device talks to home agent
- ◆ Issues
 - Scaling
 - Single point of failure
 - Path MTU
 - Security association not specified



Mobile IP under IPv6

- ◆ Static device talks to home address via care of address
- ◆ Issues
 - Scaling improved
 - AAA association setup not complete in RFCs
 - ngtrans - additional issues due to IP4/IP6 transition?



IPv6 features relevant to MobileIP

- ◆ Larger address space
- ◆ Auto configuration capabilities
- ◆ Router headers
- ◆ Security extensions
- ◆ Anycast addresses
- ◆ Encapsulation
- ◆ option processing for destination options
- ◆ quality of service and flow labels

Roaming in IPv6

- ◆ link local addresses
- ◆ automatic address configuration
- ◆ combination of advertised subnet program with the node's own hardware address = creation of its own care-of-address
- ◆ elimination of the Foreign Agent (FA)

Address auto configuration

- ◆ stateless address auto-configuration not requiring a manually configured server
- ◆ 48/64 bit MAC+network prefix from local router
- ◆ When an enterprise is forced to re-number because of an ISP change, IPv6 auto-configuration can eliminate the entire manual process
- ◆ allows mobile computers to receive valid forwarding addresses automatically no matter where they connect to the network
- ◆ reduces static router configurations, route parameters for mobile hosts

IPv6 header format

- ◆ Fixed header format
- ◆ Fewer fields (8 as compared to 12 in v4)
- ◆ all MIP updates are in extension headers
- ◆ no header length anymore
 - efficient router parsing
- ◆ option extension headers not parsed by intermediate routers anymore
 - less overhead in sending new binding update

IPv6 header compared to IPv4

4 bits Version = 4	4 bits IHL	8 bits Type of service	16 bits Total length	
16 bits Identification			4 bits Flags	12 bits Fragment Offset
8 bits Time to live	8 bits Protocol		16 bits Header Checksum	
32 bits Source Address				
32 bits Destination Address				
0 or more bits IP options				

IPv4

4 bits Version = 6	8 bits Traffic class	20 bits Flow label	16 bits Payload length	8 bits Next header	8 bits Hop Limit
128 bits Source Address					
128 bits Destination Address					

IPv6

IPv6 header parsing

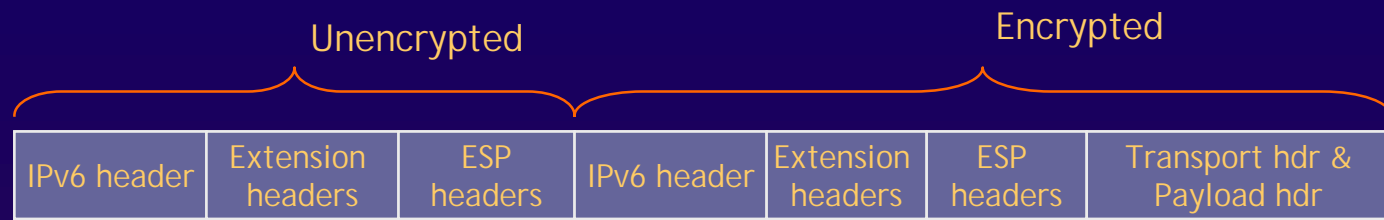
- ◆ destination options field
- ◆ before a routing header
- ◆ destination options field after a routing header
- ◆ mobile IP updates included in the destinations option without a routing header
 - the mobile IP update extensions are never parsed by the intermediate node

IPv6 security & authentication headers

- ♦ two security extension headers
 - authentication of IP packets
 - fully/partially encrypts IP packets
- ♦ before a routing header
- ♦ Transport mode



♦ Tunnel mode



IPv6 quality of service

- ◆ IPv4 carries a "differentiated services" byte.
 - the IPv6 counterpart is a "traffic class" byte
- ◆ additionally IPv6 carries a new 20-bit traffic-flow
- ◆ distinguishable traffic flow for optimized routing

In a nutshell - mobile IPv6

- ◆ all nodes can handle bindings
- ◆ small overhead for distributing bindings
- ◆ no need for foreign agent because of creation of its own care-of-address
- ◆ authentication mechanism
- ◆ seamless QoS
- ◆ IPv6 is here to stay
- ◆ MIP for IPv6 is the right thing
- ◆ IPv6 adoption is slow but picking up
- ◆ IPv6 does not threaten MIP

IPv6 – the propellant for Mobile IP

- ◆ Huge growth of mobile Internet terminals (using Mobile IP) will exhaust IPv4 address space
 - IPv6 brings enough IP addresses
- ◆ Ease of scalability
 - Supporting billions of new devices and huge amounts of new bandwidth
 - Simplified, cost-efficient architecture without NATs , Proxies, ALGs,...
- ◆ Always-on connection establishes a variety of new services
 - Push, location-based, etc.
- ◆ Integrated Security
- ◆ Efficiency: IPv6 improves efficiency in a number of areas.
 - Routing, Broadcast handling
- ◆ Quality of Service improvements
 - Fragmentation, Flows
- ◆ Mobility Across Access Technologies

Where to find ?

- ◆ These slides are available at :
<http://www.3ui.com/people/amlan/ipv6>
- ◆ My contacts:

Amlan Saha
Chief Technology Officer

3ui.com Pte Ltd
124A Telok Ayer Street
Singapore 068593

Email: amlan@3ui.com

Thanks
for your attention.