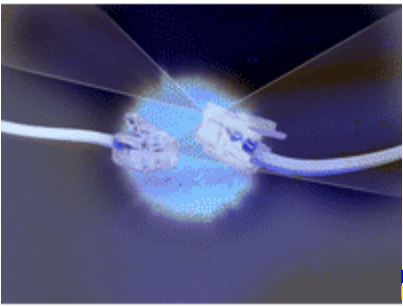


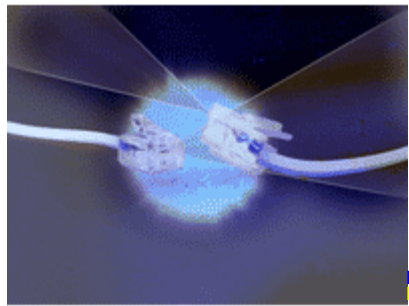
# Mobile Routing

- Goal is to allow a host to be disconnected from one network and connected to another
  - With normal IP addresses, host would either become unreachable, or it would need to get a new IP address somehow (DHCP, manual reconfiguration)
  - Want to create a transparent mechanism for relocation – “Mobile IP”



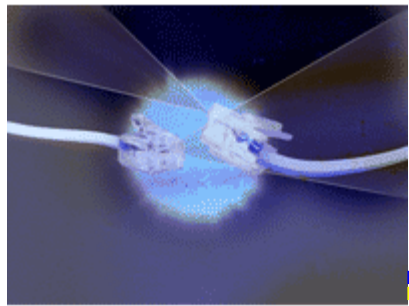
# Mobile IP

- Mobile node assigned permanent *home address*
- Add functionality to one router, the *home router*
  - Router attached to original, or *home*, network of mobile node (same network number as home address)
  - Serves as *home agent* for mobile node



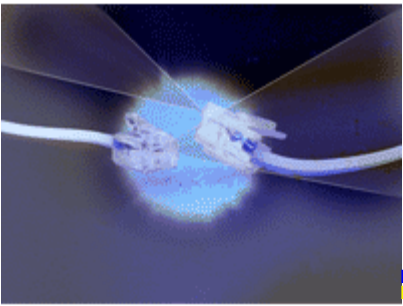
# Mobile IP (cont.)

- May also require *foreign agent* – second router attached to same network as mobile node
- Agents advertise presence on network with agent advertisement messages
  - Mobile node may also solicit message when it attaches to a new network
  - Mobile node must learn address of home agent before it starts moving



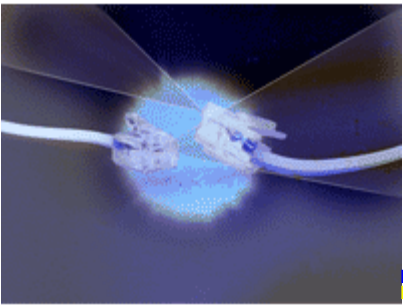
## Mobile IP (cont.)

- When mobile node attaches to network and receives agent advertisement, if the agent is a foreign agent, mobile node registers with agent
  - Mobile node supplies home agent address
  - Foreign agent contacts home agent and supplies *care-of address* (usually foreign agent's IP address)



# Forwarding Messages

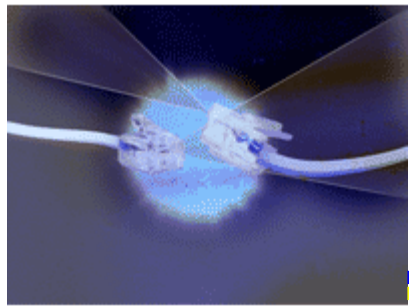
- Home agent impersonates mobile node using *proxy ARP*
  - Sends out ARP messages with its own MAC address and mobile nodes home address, so other nodes on network think home agent is mobile node
- Nodes send message to mobile node using permanent home address; home agent receives messages



# Forwarding Messages (cont.)

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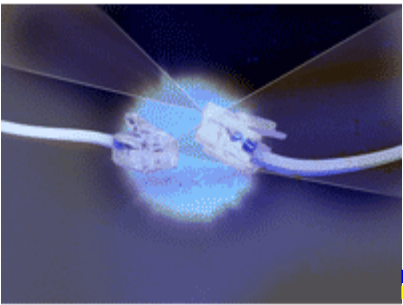
- Home agent forwards message to foreign agent using IP tunneling
- Foreign agent unwraps IP message, delivers to the MAC address of mobile node (recorded when mobile node registered on foreign network)



# Eliminating Foreign Agent

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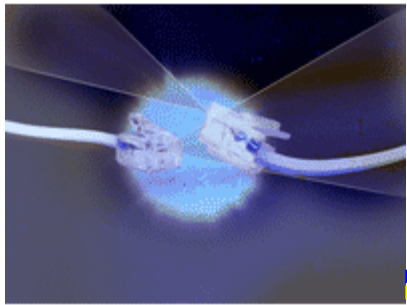
- Mobile node can function as its own foreign agent, provided it can obtain an IP address on foreign network
  - Maybe use DHCP
  - Assigned IP address is used as care-of address
- When mobile node sends, it puts its home address in source address; any replies are routed as described



# Route Optimization

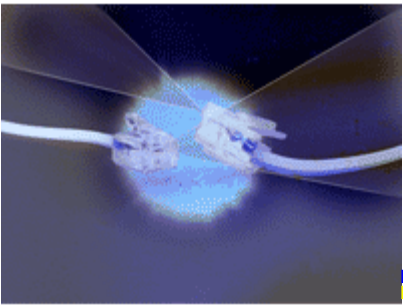
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- Forwarding through home agent can be significant overhead
  - Suppose mobile node is talking to another node on the same foreign network; every packet to mobile node must go clear to home node and be sent back through IP tunnel to foreign agent
  - Referred to as “triangle routing problem”



## Route Optimization (cont.)

- To resolve, let sending node know care-of address for mobile node
  - Sending node creates tunnel directly to foreign agent
- Home agent sends *binding update* back to sending node when it forwards a packet
  - Requires special software in source node
  - If source understands, it can create entry in *binding cache*, use this to tunnel message next time it sends to mobile node



# Route Optimization (cont.)

- Problem if binding caches become out of date when mobile node moves
  - Foreign agent can send *binding warning* if mobile node no longer on network
  - Sender then removes cache entry, goes back to sending through home agent
  - Only works if foreign agent is not mobile node
- Related area – ad hoc networks