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1: what is VPN? Why do we need it?

VPN is a Virtual Private Network, and it is useful to hide your actual identity or location from observers, since your traffic is encrypted and indirect.

2: how does VPN work?(Briefly)

VPN works by encrypting your traffic and sending it through a gateway server for all future queries. This means that your personal machine is not directly communicating with the wider internet.

3: what is IP routing able? In lab7, what is IP routing table for? What do you need to do if you want your ip packet go through VPN tunnel? Why does it work?

The IP routing table tells the machine how to forward packets that arrive. In Lab7, we use it to tell the various actors in the VPN where to forward their packets to such that the tunnel is created. If you want a packet to go through a created VPN tunnel, you have to route the incoming IP to the tunnel connection in the IP routing table.

4: for telnet using Tun0, for receiving site (isolated hostV in our lab), what is the source ip it gets? How to set up it’s routing table for hostV so it can reply back? Reason?

The source IP it sees is the IP used by Host U to connect with the gateway. To respond, we need to declare that packets with that IP should respond to the gateway IP directly, and the VPN software on the gateway will reroute it back to the actual client (Host U).

5: why do we still need socket interface when we created tun interface?

The socket interface is still needed to communicate with the wider web once the packets make it through the tunnel.