

Homework #0 Solution

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1 Network Administration Preliminary

True/False

1. True. This is possible as long as routing is properly set up. For example, Google's DNS server 8.8.8.8 actually consists of several instances, each serving nearby regions.
2. True. MAC addresses are designed to be unique in the same broadcast domain (although end devices are able to explicitly assign a custom MAC address).
3. False. TCP belongs to Transport Layer, while IP belongs to Network Layer.
4. False. Upon receiving a packet, a hub broadcasts the packet to all ports except the incoming one, while a switch maintains a MAC-port lookup table and forward packets only to corresponding ports, eliminating redundant traffic.
5. False. The main difference is the capability of routing.
6. True. That's the definition.
7. False. A DHCP server assigns gateway to clients, but it doesn't have to be the gateway itself.
8. False. Traffic under the same subnet won't go through the gateway.
9. False. The number is limited by the number of available external IP addresses and ports (1024-65536).
10. True. However performance may suffer.

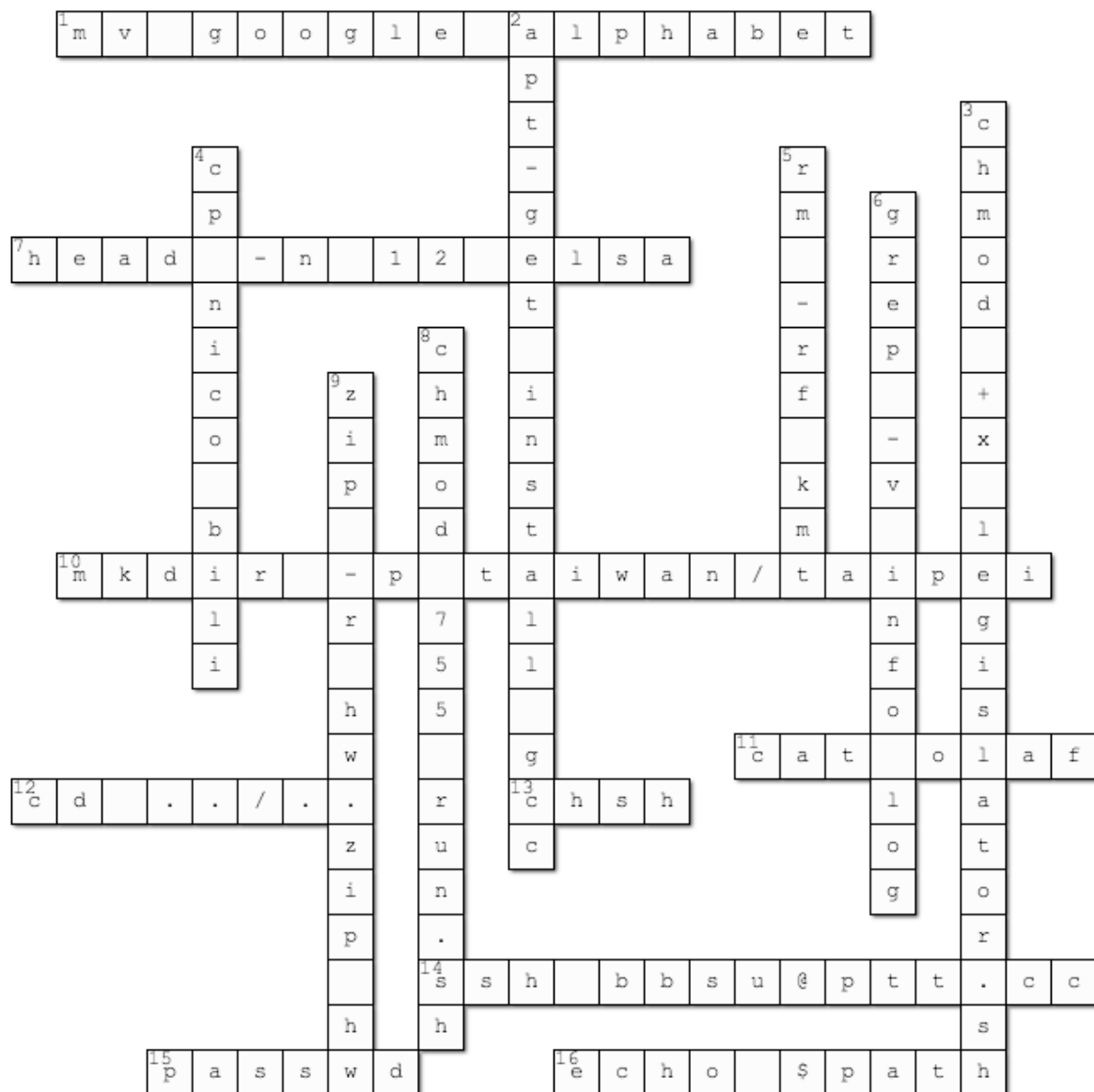
Multiple Choice Question

1. *c*) IPsec VPN. It belongs to Network Layer.
2. *c*) 192.168.0.0/14. The reserved IPv4 ranges for private networks are 10.0.0.0/8, 172.16.0.0/12 and 192.168.0.0/16. 192.168.0.0/14 is larger than 192.168.0.0/16 and includes public IPs.
3. *c*) 192.168.1.0. Valid IP addresses of the given subnet 192.168.0.0/23 range from 192.168.0.1 to 192.168.1.254, the reserved ones are 192.168.0.0 (network) and 192.168.1.255 (broadcast).
4. *d*) Yes, with proper routing configuration on the router. NAT is required to access the Internet since remote routers don't know how to route packets back to you with your private IP, but this is not the case.
5. *c*) NT\$60,000. Prices around 1,800 USD can be found on Amazon.
6. *b*) Increase the wireless signal strength of each AP. The key is to reduce noise on wireless channels, or make devices use different channels. Since there are only 3 disjoint channels for WiFi at 2.4GHz but dozens at 5GHz, encouraging users to switch to 5GHz may help. Without making APs operate at different channels, increased signal strength may in turn interfere with transmission between other devices and lower overall network quality.
7. *b*) DHCP snooping. Switches with this feature can be configured to only forward DHCP offer messages coming from trusted ports, preventing users from setting up another DHCP server in the network. This technique is important since such users are able to set up fake gateways to eavesdrop other users' traffic, and even perform man-in-the-middle attacks.

8. c) Protect your identity on the Internet from being tracked. To fully achieve this, you should use more powerful approaches such as Tor.

2 System Administration Preliminary

2.1 Word Puzzle



Created on TheTeachersCorner.net Crossword Maker

1. zip -r hw.zip hw
2. cp nico bili
3. mv google alphabet
4. mkdir -p taiwan/taipei
5. cat olaf
6. head -n 12 elsa
7. chmod +x legislator.sh
8. echo \$PATH

9. `rm -rf kmt`
10. `grep -v info log`
11. `passwd`
12. `chmod 755 run.sh`
13. `apt-get install gcc`
14. `ssh bbsu@ptt.cc`
15. `chsh`
16. `cd ../..`

2.2 Common Words

Sample Answer

```
#!/usr/bin/env bash
# Print words appears at least n (default: 1) times both in file1 and file2
#
# Usage ./commonwords.sh file1 file2 [n]
function words {
    tr -cs '[:alnum:]' '\n*' <$1 |
    tr '[:upper:]' '[:lower:]' |
    sort | uniq -c | awk -v x=$2 '$1 >= x {print $2}'
}
comm -1 -2 <(words $1 ${3:-1}) <(words $2 ${3:-1})
```