

Homework #6 OPNSense

Due Time: 2024/03/31 (Sun.) 21:59

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Instructions and Announcements

- **NO LATE SUBMISSION OR PLAGIARISM IS ALLOWED.**
- Discussions with others are encouraged. However, you should write down your solutions **in your own words**. In addition, for **each and every** problem you have to specify the references (the URL of the web page you consulted or the people you discussed with) on the first page of your solution to that problem.
- Some problems below may not have standard solutions. We will give you the points if your answer is followed by reasonable explanations.

Submission

- Please place your answers in the same order as the problem sheet and do not repeat problem descriptions, just organize them by problem number in a tidy manner.
- Please submit your pdf report via Gradescope. And, zip the pdf file and xml file, name the zip file “{your_student_id}.zip”, and submit it via NTU COOL. The directory layout should be the same as listed below:

```
{your_student_id}/  
+-+ {your student id}.pdf  
+-+ {your student id}.xml
```

Grading

- The total score for the correctness and completeness of your answer is 100 points.
- It's possible you don't get full credits even if you have the correct answer. You should show how you get the answers step by step and list the references.
- Tidiness score: 3 bonus points, graded by TA.
- Final score = correctness score + tidiness score.

Short Answers (20%)

- (5%) 在 OPNSense 防火牆 rule 的設定中，對封包的處置有 Block 跟 Reject 可以選擇。請說明兩者的差別，還有各自在什麼情況下較適合使用。
- (5%) 在 OPNSense 防火牆 rule 的設定中，Source 跟 Destination 選擇“interface net”和“interface address”的差別是什麼？
- (5%) 請說明什麼是“stateful firewall”以及“stateless firewall”。OPNSense 是屬於哪一種？
- (5%) 目前系館防火牆是用 pfSense 架設。請簡單比較 pfSense 與 OPNSense 的差異，至少列舉兩樣？

OPNSense (80%)

安裝 OPNSense 並設定這個系統有三個 VLAN interface: VLAN 5, VLAN 8, VLAN 99。對於每一小題，請寫下你詳細的設定步驟。如果需要的話，可以用圖片展示，也可以自己開其他虛擬機 (Alpine, Ubuntu, ...) 來做測試。

- (10%) 設定 10.5.0.0/24, 10.8.0.0/24, 10.99.0.0/24 給 VLAN 5, VLAN 8, VLAN 99 三個網路介面。
 - OPNSense 作為這三個網路介面的 DHCP server。
 - DHCP Server 所發的 offer 需包含 8.8.8.8 和 8.8.4.4 這兩個 DNS server。
- (10%) 設定以下 alias:

Alias Name	Value
GOOGLE_DNS	8.8.8.8, 8.8.4.4
ADMIN_PORTS	22, 80, 443
CSIE_WORKSTATIONS	ws1.csie.org ws2.csie.org ws3.csie.org ws4.csie.org ws5.csie.org

- (10%) 打開 OPNSense 的 SSH 功能。設定只有 VLAN 99 的機器可以透過 ADMIN_PORTS 連到 OPNSense。VLAN 5 與 VLAN 8 皆不允許。
- (10%) VLAN 99 的機器只能存取以下位址或機器：
 - Google DNS
 - CSIE WORKSTATIONS (請提供 traceroute 到 CSIE_WORKSTATIONS 的截圖，若你是 windows 本機可以加參數 -I)
 - 這台 OPNSense (請提供 ssh 到 OPNSense management interface 的截圖)
- (10%) VLAN 5 的機器可以 ping 到 VLAN 8 的機器，反之則不行。回想 Lab6
- (10%) 在 2024/03/14 整天，VLAN5 這個 interface 不能通過任何的封包。
- (10%) 請使用 hping3 或其他指令，每秒分別發送 0.1 Mb, 1 Mb, 10 Mb, 50 Mb 給 OPNsense server，觀察 reporting/traffic 中的 graph，試著分析圖形的變化。
- (10%) 到 System > Configurations > Backups 中，下載 config.xml，將檔名依照你的學號改成如 b86506054.xml 的檔名，連同作業 PDF 一起繳交。