NASA 2019 5/27 Lab

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Outline

- Wireless Security Protocol
- Wireless Network Structure of CSIE
- Lab

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Wireless Security Protocol

- WEP(Wired Equivalent Privacy)
- WPA(Wi-Fi Protected Access)
- WPA2(Wi-Fi Protected Access version 2)
- WPA3(Wi-Fi Protected Access version 3)

WEP

- Designed to provide the same level of security as wired networks
- Ratified as wi-fi security standard in 1999
- A few security flaws were discovered. WEP was abandoned by the Wi-Fi Alliance in 2004. (vulnerable stream encryption standard: RC4)

WPA

- Designed to replace WEP, adapted in 2003
- TKIP(Temporal Key Integrity Protocol)
- Via firmware upgrades, WPA could be implemented on existing WEP-enabled devices
- Flaw in WPA: still some weaknesses in WEP existed (RC4)

WPA2

- Mandatory for all new devices from 2006
- Includes CCMP(Counter Mode Cipher Block Chaining Message Authentication Code Protocol), a stronger encryption mode
- RC4 is replaced by AES
- Implements the mandatory elements of IEEE 802.11i.
- “Krack Attack” -> But most vendors have patched their implementation.

WPA3

- Some improvement of security.
  - Privacy on public wi-fi network
  - Protection against brute force attack
  - Etc

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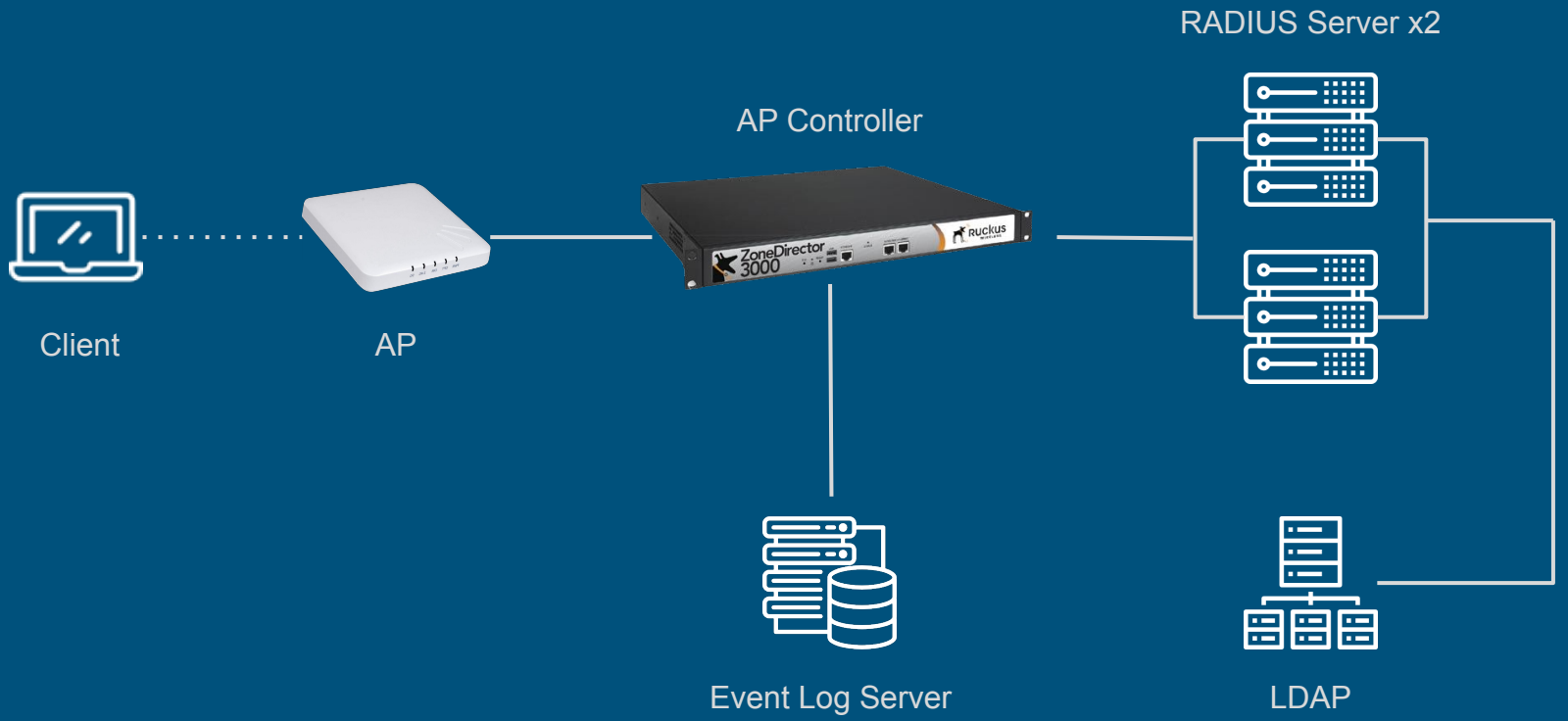
Infrastructure Overview



AP Controller

AP controller allows administrators to do the following tasks easily

- Apply changes Ex: add a new SSID to some aps.
- Monitor APs

AAA

- Authentication: Decide whether a client is a legitimate user of the system.
- Authorization: Determine what an authenticated client can do on the network.
- Accounting: Monitoring and recording a client’s use of the network.

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Requirements

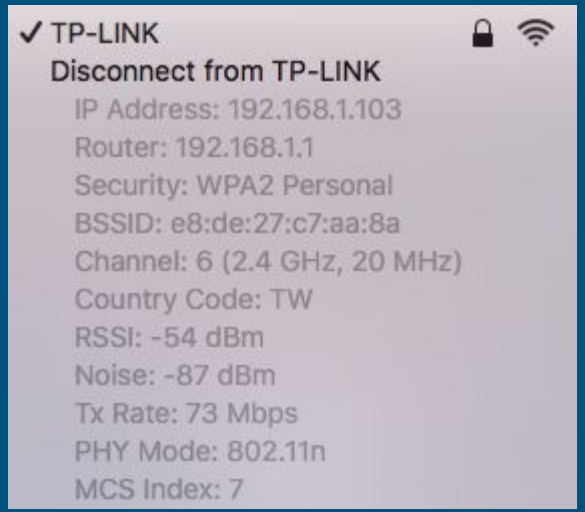
- R101, R102, R204 裡分別開了 2.4G 和 5G 的 SSID ([classroom]_[freq], classroom={101, 102, 204}, freq={2.4G, 5G})。(密碼：nasa2019)
- 測量地點
  - 教室內離AP最遠點
  - 教室內離AP最近點
  - 教室外隔著牆壁
- 請分別測量這些SSID的
  - Signal Strength
  - Transmission rate
  - Channel

Submission format [Example]

- SSID: 101_2.4G
- Signal Strength: -40 dbm
- Transmission Rate: 45 Mbps
- Channel:6
- Location: 離AP最遠處
- Put it under the HW7-NA-[studentID] folder. Submit it along with your HW.

Resources

- Mac
- Hold option key and click the  icon



Resources

- Windows
  - Wi-Fi Scanner
  - inSSIDer
  - Check the transmission rate

Resources

- iwconfig
- wavemon(sudo apt-get install wavemon)

Reference

- 2018 nasa lab ppt by 葉浩同
- https://www.howtogeek.com/339765/what-is-wpa3-and-when-will-i-get-it-on-my-wi-fi/
- https://en.wikipedia.org/wiki/Wi-Fi_Protected_Access
- https://www.howtogeek.com/167783/htg-explains-the-difference-between-wep-wpa-and-wpa2-wireless-encryption-and-why-it-matters/

Any Question?