

Swansea University

An aerial photograph of Swansea University. The university's main campus is a cluster of modern, multi-story buildings with various roof colors, situated on a green hillside. To the left, a wide, sandy beach curves along the edge of a large bay. The water in the bay is a deep blue, with visible tidal patterns. In the background, the city of Swansea is visible, extending to the seafront. The sky is clear and blue.

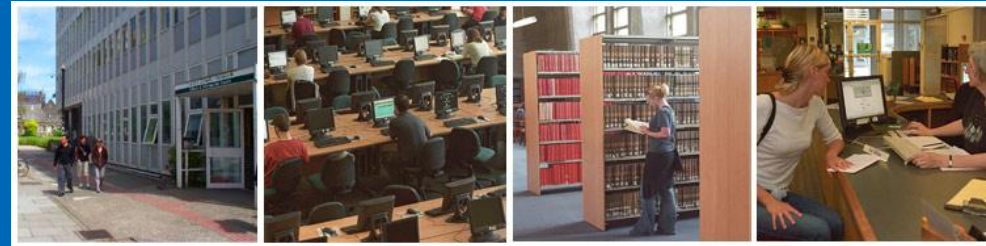
Library and Information Services

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Wireless Authentication & 802.1X

By Gareth Ayres



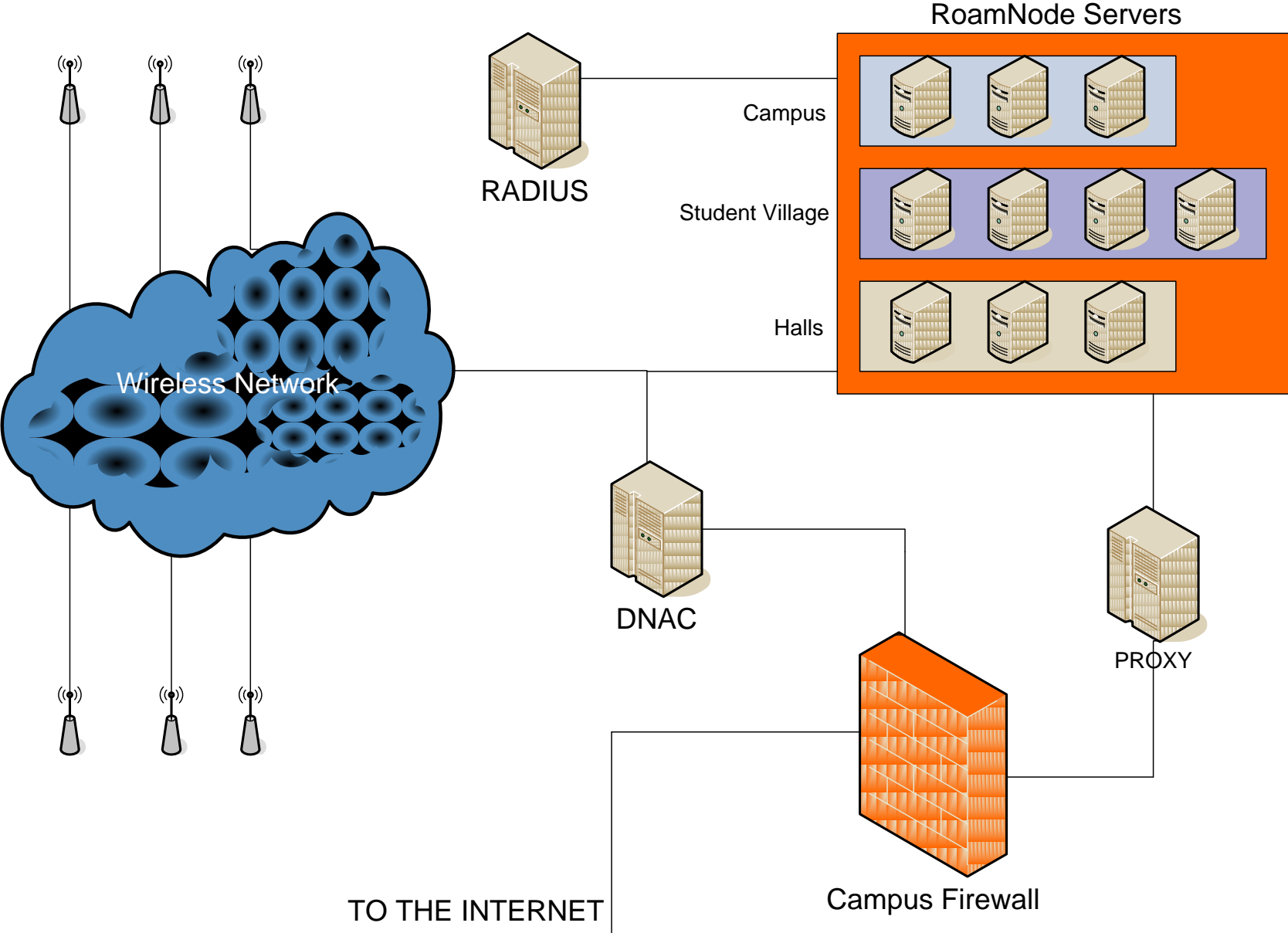
Agenda

- 1.0 Swansea's Current Wireless System
- 2.0 Requirements of new 802.1X System
- 3.0 Overview of new 801.1X Technologies
- 4.0 Design of New 802.1X Wireless System
- 5.0 802.1X Downfall's (So far)
- 6.0 Future Plans

1.0 The Current Wireless System

- Home made Wireless solution comprising of:
 - 700 Cisco Aironet AP's
 - 12 Cisco WDS & 1 WLSE
 - 10 RoamNodes
 - 1 DNAC (Dirty Network Access Controller)
 - Radius & IAS

1.0 The Current Wireless System

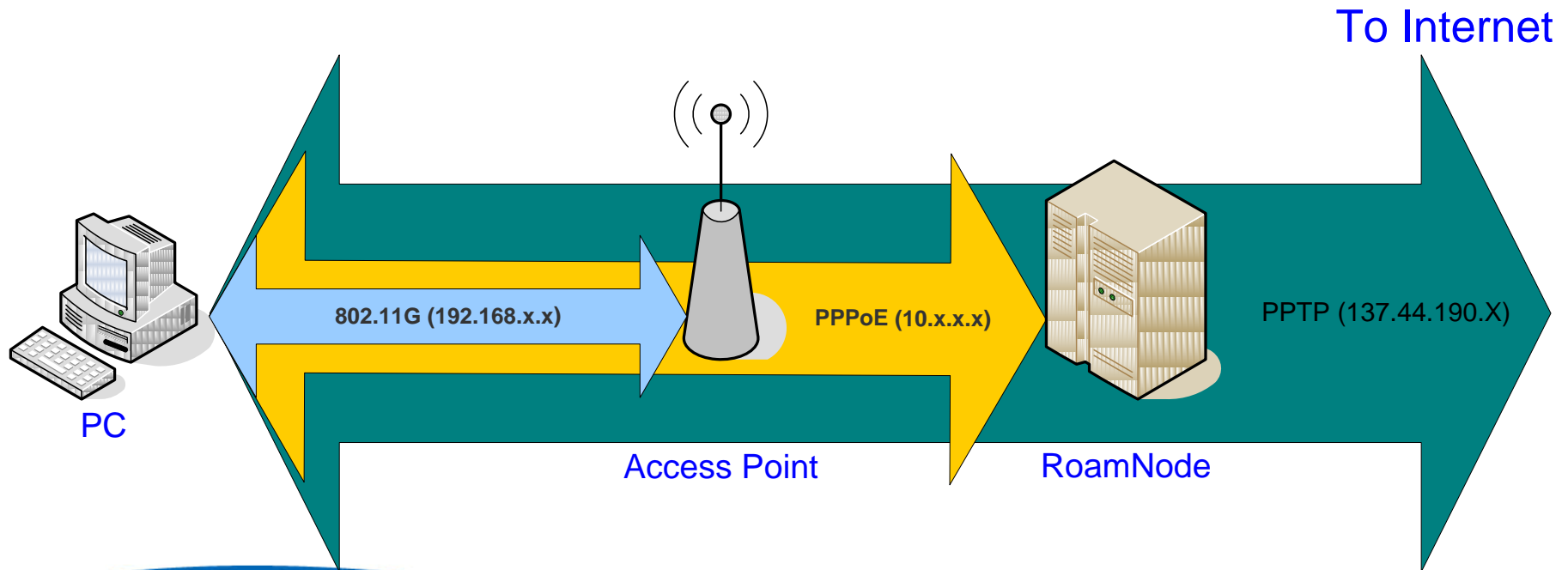


1.1 RoamNodes

- Developed by Bristol University
- 250 users per RoamNode
- Works by:
 - First establishes a PPPoE connection
 - Then creates a PPTP VPN tunnel and gets a internet ip address

1.2 RoamNode Tunnel

RoamNode Tunnel

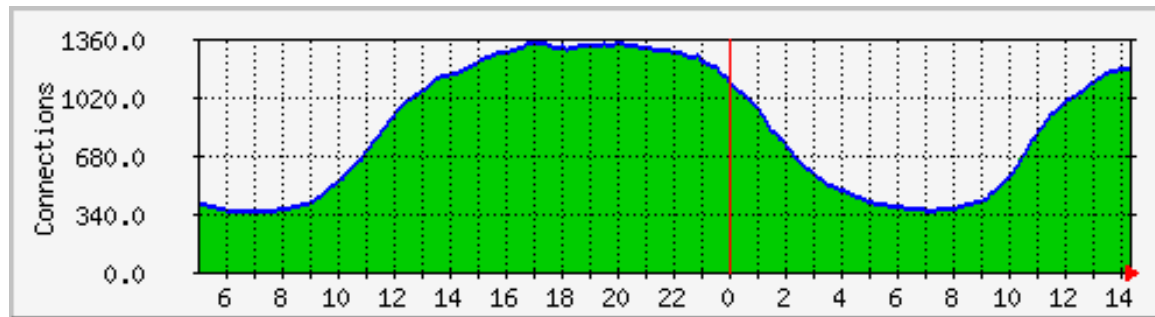


1.3 Downfalls of Current System

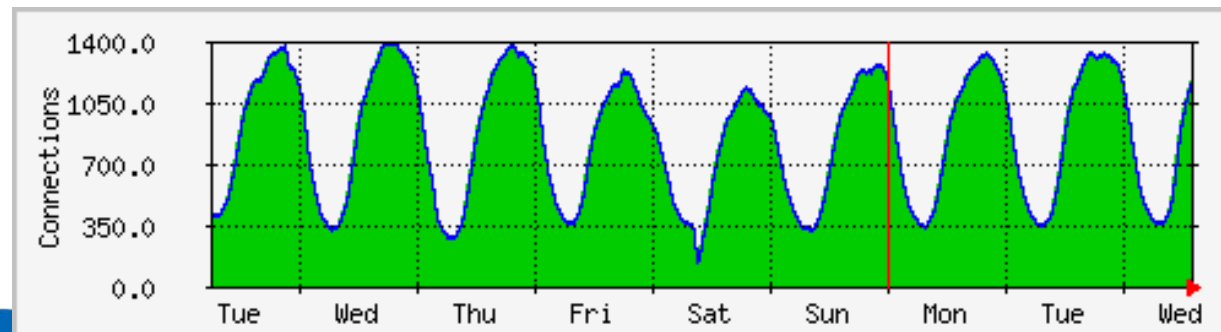
- ***Bottleneck Issues***
- ***Load Balancing***
- ***Single point of failure***
- ***Maximum Capacity***
- ***Complicated Logging***
- ***Complicated end user configuration***
- ***Difficult User Management***

1.4 Statistics from Current System

24 Hours (Wednesday 16th May)

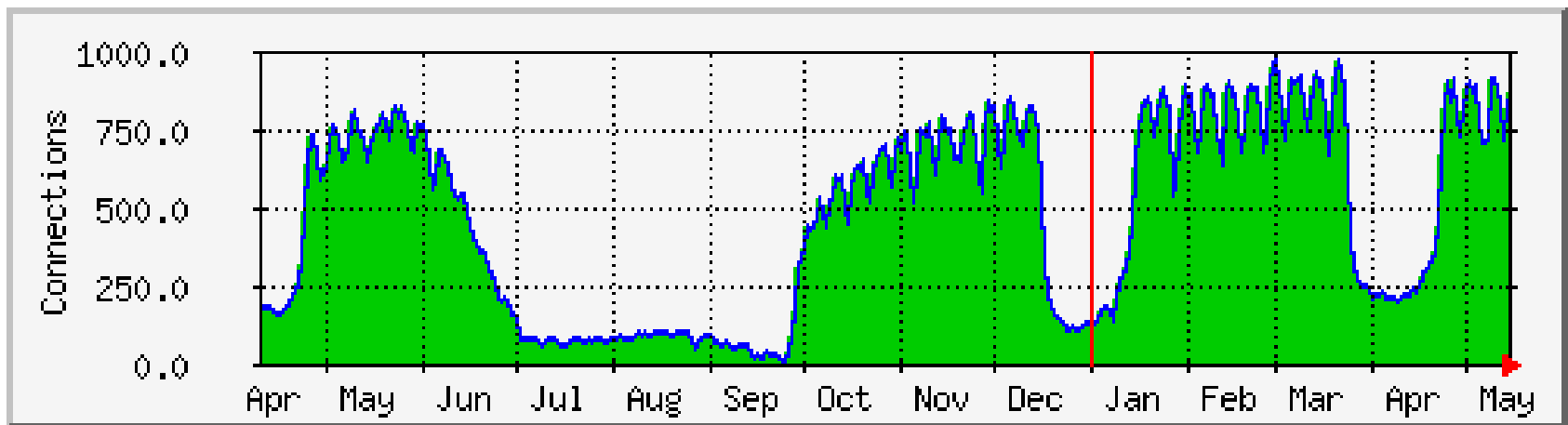


Weekly (8th May – 16th)



1.4 Statistics from Current System

Yearly (2006-2007)



2.0 Requirements of New System

- ***Remove any bottlenecks***
- ***Remove Capacity limits***
- ***Better Logging***
- ***Better Administration facilities***
- ***Easy End User Configuration***
- ***Segregation of Users***
- ***Improved Security***

3.0 Overview of 802.1X Technologies

- 802.1x
- EAP
- EAPoW
- PEAP - Protected Extensible Authentication Protocol
 - Cisco, Microsoft and RSA
 - Credentials + Server Cert
 - TLS tunnel
 - EAP-MSCHAPv2

3.0 Overview of 802.1X Technologies

- WPA - Wi-Fi Protected Access (WPA)
 - Replaces WEP technology
 - WPA = RC4 Stream cipher and TKIP
 - WPA2 = 802.11i = AES based algorithm CCMP

The use of all the above technologies and protocols is widely referred to as a 802.1X based Wireless System.

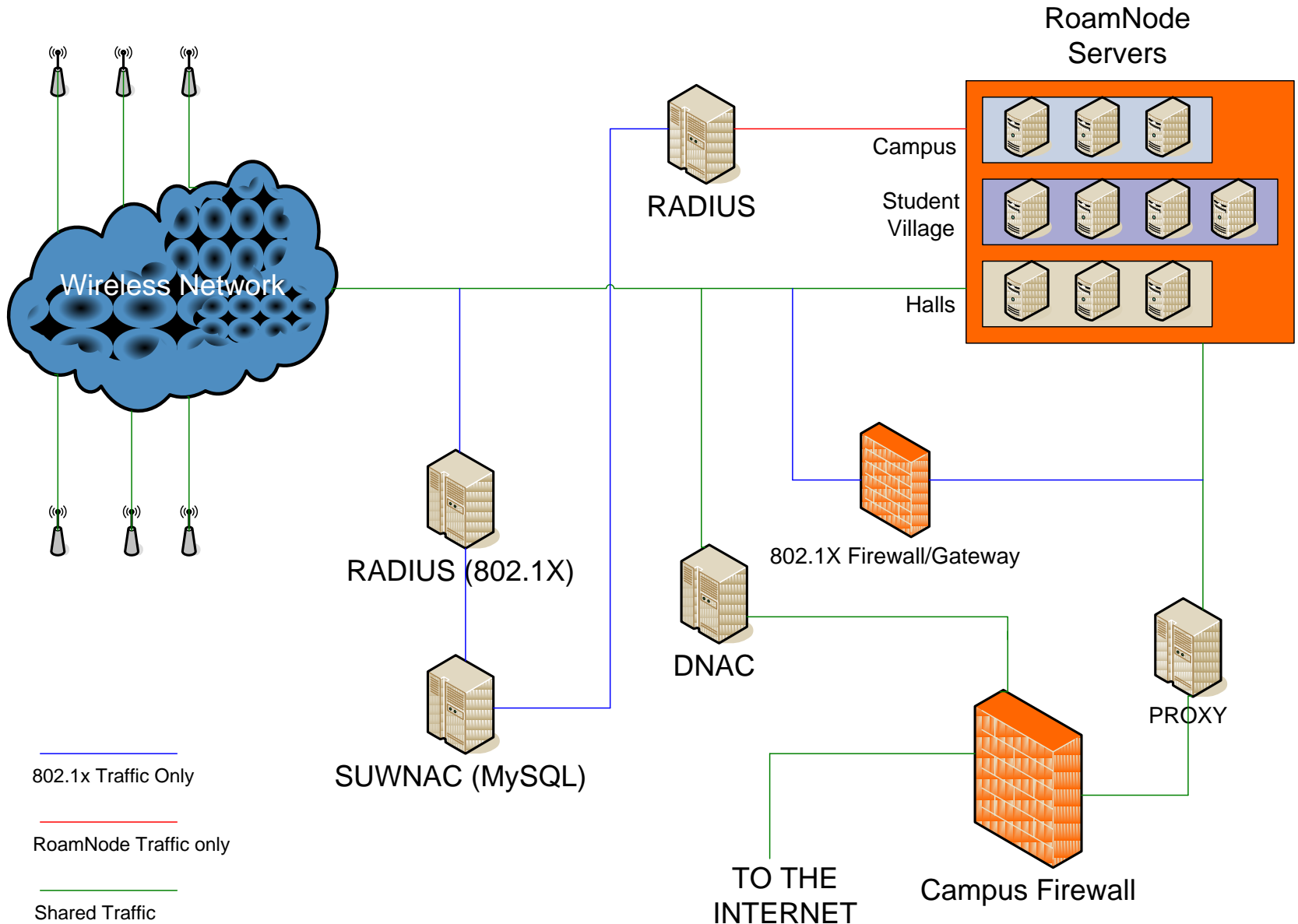
4.0 Design of 802.1X Wireless System

New and Old system will run together.

Each system will run on a separate SSID:

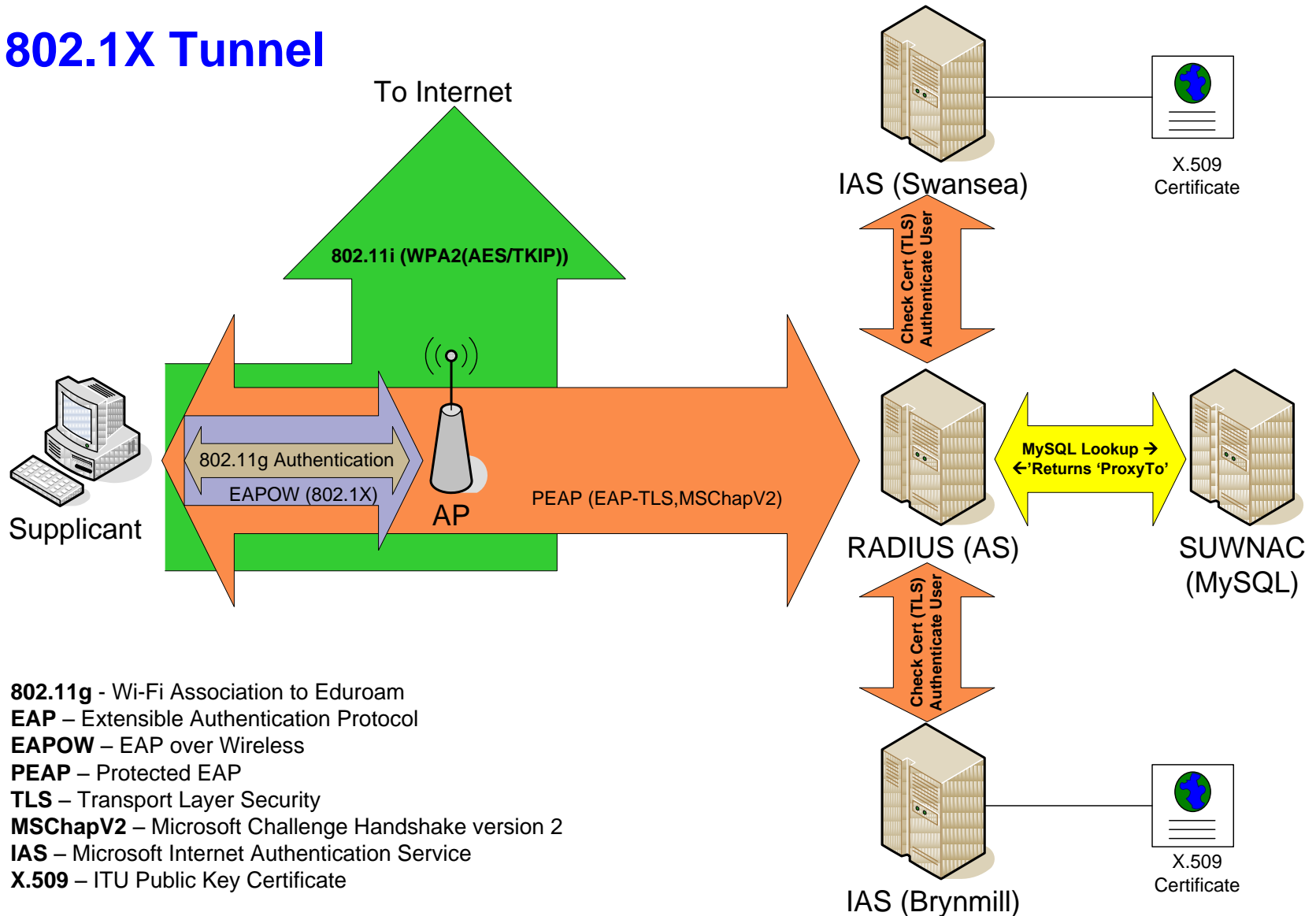
- **UNIROAM** - SSID of the current RoamNode system and will be broadcast and open (no encryption).
- **EDUROAM** – SSID of the new 802.1x system. It will also be broadcast but will be encrypted with WPA(1&2).(JRS).

4.0 Design of 802.1X Wireless System



4.1 802.1X Tunnel

802.1X Tunnel



802.11g - Wi-Fi Association to Eduroam

EAP – Extensible Authentication Protocol

EAPOW – EAP over Wireless

PEAP – Protected EAP

TLS – Transport Layer Security

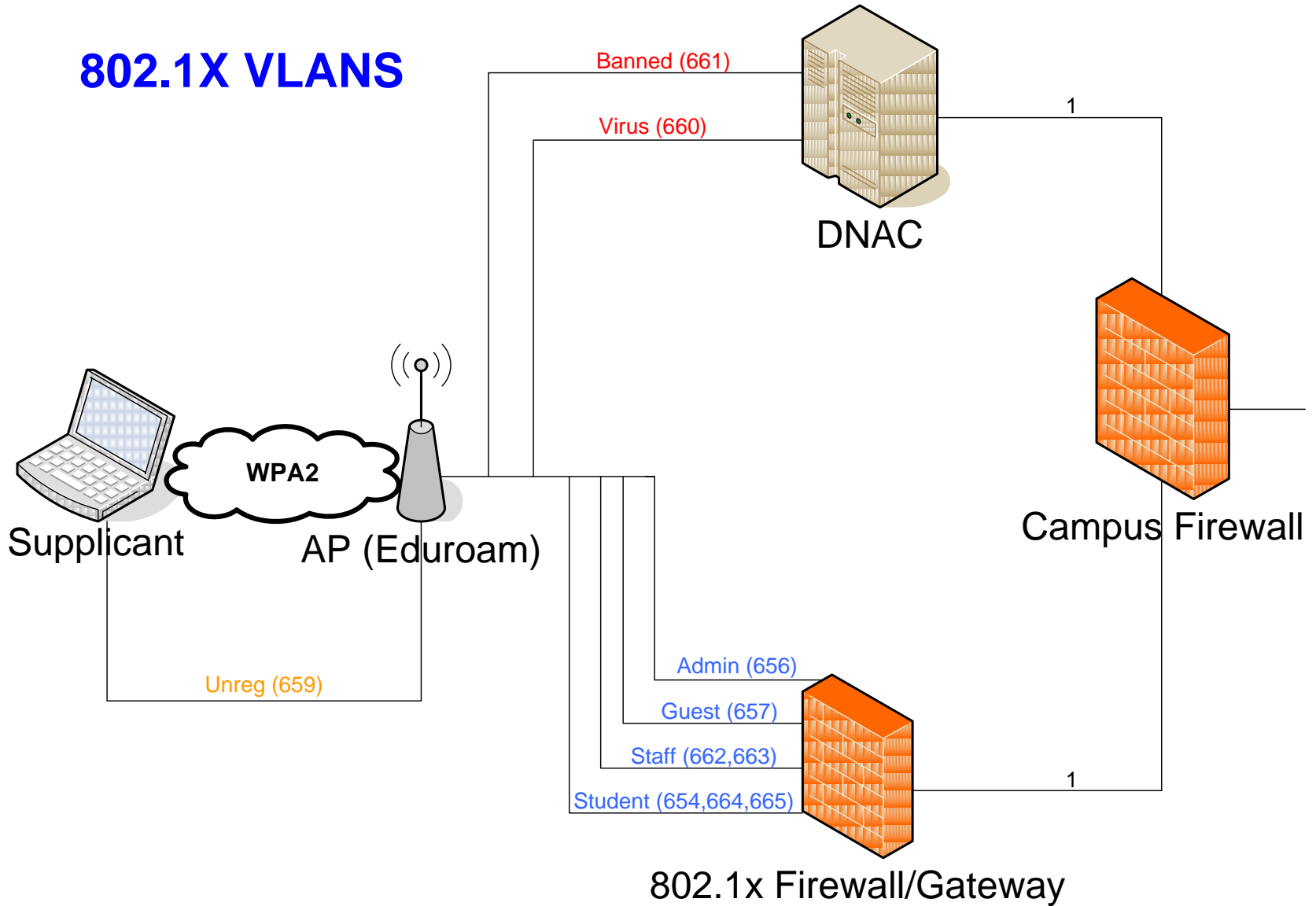
MSChapV2 – Microsoft Challenge Handshake version 2

IAS – Microsoft Internet Authentication Service

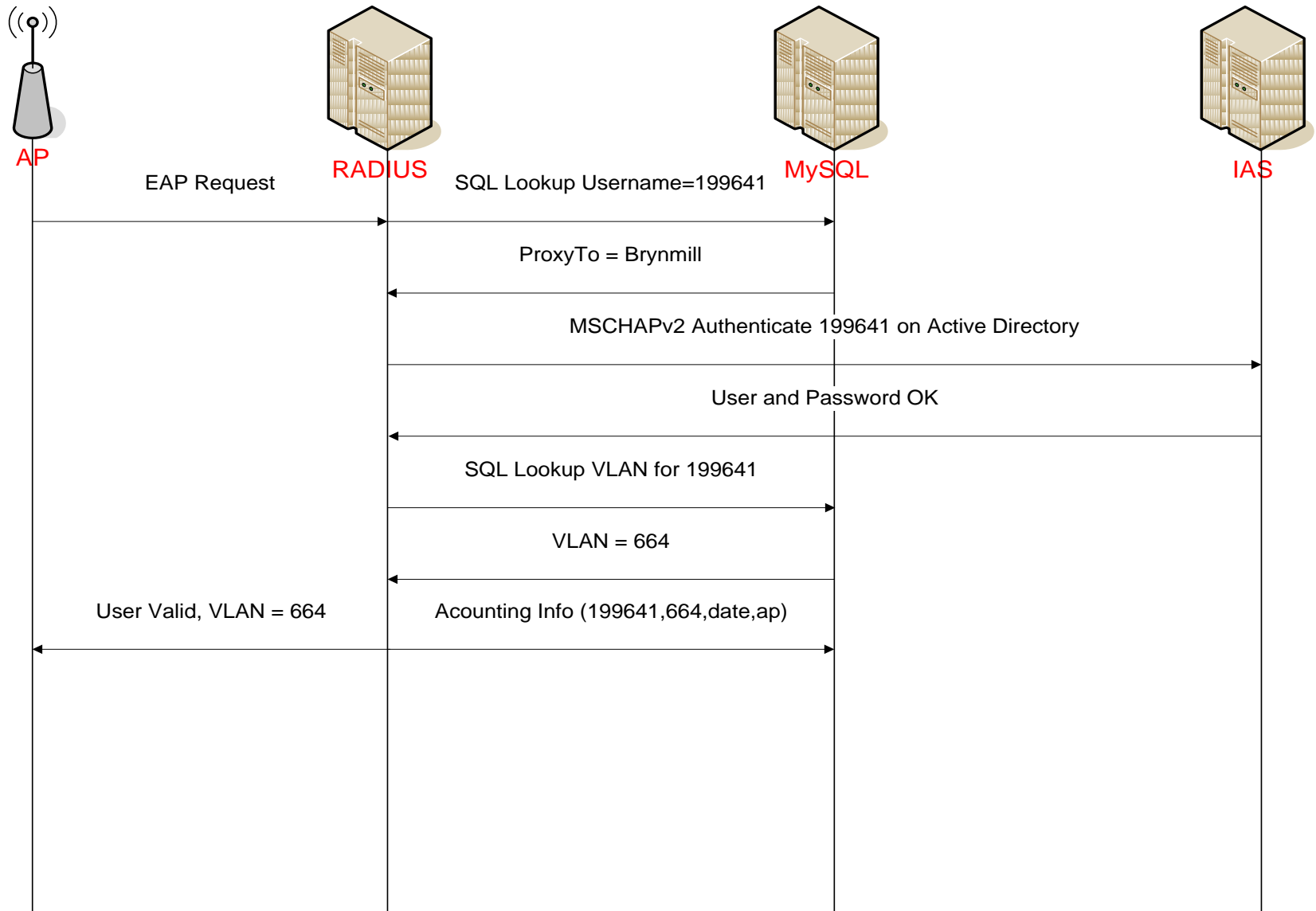
X.509 – ITU Public Key Certificate

4.2 802.1X VLANs

802.1X VLANs



4.3 802.1X VLAN allocation



5.0 802.1X Downfalls

- Supplicant Support
- Hardware Support
- Reactive not Preventative

6.0 Future Plans

- Develop a reactive traffic monitor
- NAC Product Integration (Preventative)
- Possibly integrate into campus wide wired network

Thank You

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