



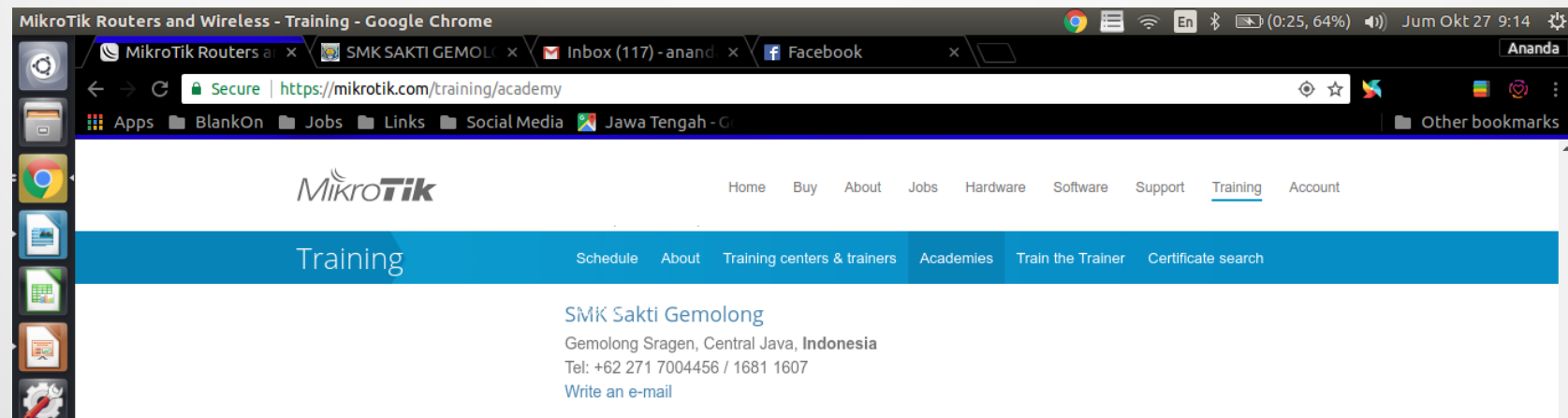
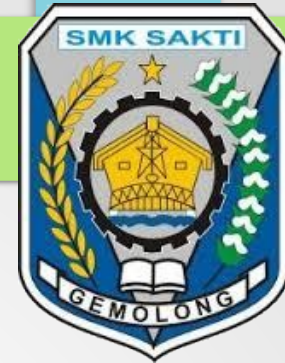
# **How To Implement Wireless QoS with WMM And DSCP In Mikrotik**

# Ananda Dwi Rahmawati



- SMK Sakti Gemolong, Sragen, Jawa Tengah, Indonesia
- Mikrotik Academy SMK Sakti Gemolong, Sragen
- Mikrotik Certified MTCNA, 2016
- Developer at BlankOn Linux Indonesia ( <https://github.com/BlankOn/wiki> )
- Member of SAGOS ( SMK SAKTI Goes Open Source )  
( <https://www.facebook.com/groups/sagos/> )
- 1st Winner of LKS Kab. Sragen 2017
- Internship at Btech ( <https://www.btech.id/> ), Bogor, Jawa Barat, Indonesia
- The only one female as presenter of MUM Indonesia 2017

# SMK Sakti Gemolong



“Thanks to SMK Sakti Gemolong”

# Goals



- What is QoS?
- What is WMM (Wi-Fi Multimedia) ?
- What is DSCP (Differentiated Service Code Point) ?
- How it's work?
- How to impelement it with Mikrotik?

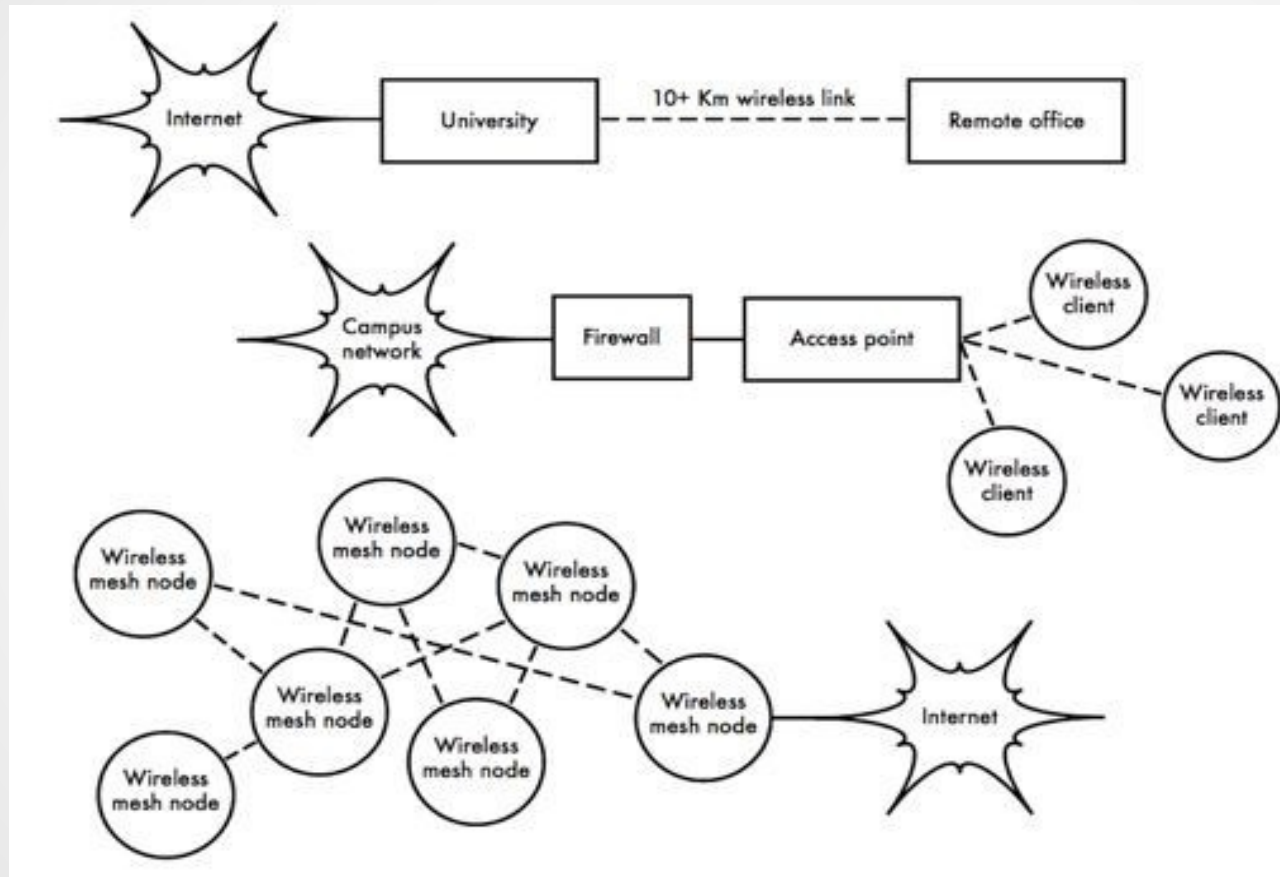


# Material



- Wireless
- Priority and services QoS
- WMM (*Wi-Fi Multimedia*)
- DSCP (*Differentiated Service Code Point*) and ToS (*The type of service*)
- Implementation

# Wireless



Source : <http://wndw.net/>

# Wireless

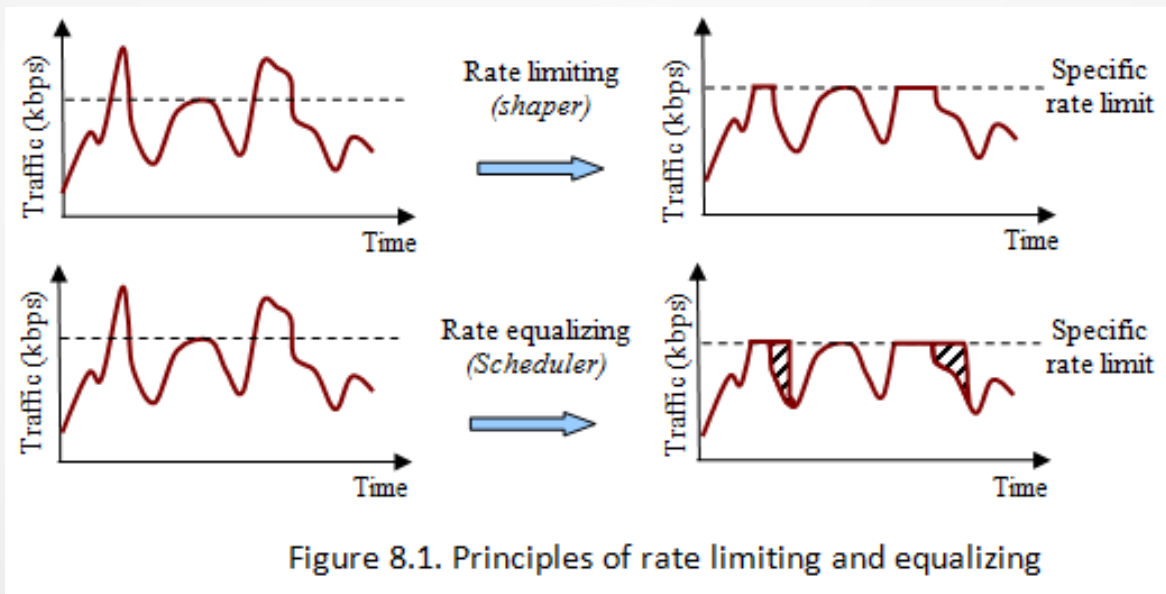


- Standard Protocol 802.11a/b/g/ac
- Low Up to 54 mbps ( depends upon standards 802.11g)
- Works on radio waves and microwaves
- Often visible to other wireless networks

# QoS



- The goal of QoS is to provide preferential delivery service for the applications that need it by ensuring sufficient bandwidth, controlling latency and jitter, and reducing data loss.



Source : <https://wiki.mikrotik.com/wiki/Manual:Queue>

# QoS



- QoS settings are available for both Layer 2 and Layer 3 of TCP/IP protocols
  - Layer 2: IEEE 802.1p for Ethernet
  - Layer 2: WMM
  - Layer 3: DSCP
  - Layer 3: Other

# Priority and Services QoS



- Queues are used to limit and prioritize traffic:
  - Limit data rate for certain IP addresses, subnets, protocols, ports, and other parameters
  - Limit peer-to-peer traffic
  - Prioritize some packet flows over others
  - Configure traffic bursts for faster web browsing
  - Apply different limits based on time
  - Share available traffic among users equally, or depending on the load of the channel

# WMM (Wi-Fi Multimedia)

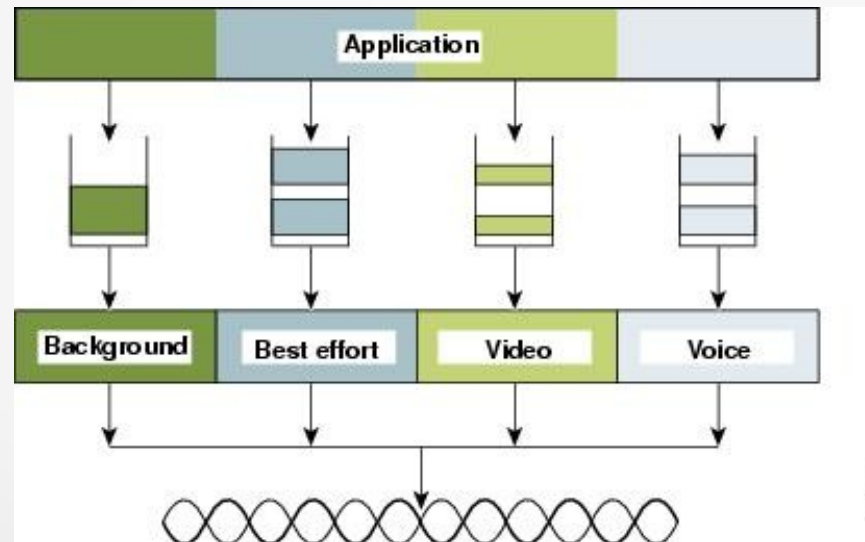


- Wi-Fi Multimedia (WMM), previously known as Wireless Multimedia Extensions (WME), is a subset of the 802.11e wireless LAN (WLAN) specification that enhances quality of service (QoS) on a network by prioritizing data packets according to four categories.
  - Voice
  - Video
  - Best effort
  - Background

# WMM (Wi-Fi Multimedia)



- WMM functionality requires that both the access point (AP) and the clients running applications that require QoS have WMM enabled.
- Priority level are not assigned by default



# WMM (Wi-Fi Multimedia)



802.1d 7, 6

Voice

Video

5, 4

Best Effort

0, 3

Background

2, 1

# Qos Priority



| PCP | Priority    | Acronym | Traffic types                      |
|-----|-------------|---------|------------------------------------|
| 1   | 0 (lowest)  | BK      | Background                         |
| 0   | 1           | BE      | Best Effort                        |
| 2   | 2           | EE      | Excellent Effort                   |
| 3   | 3           | CA      | Critical Applications              |
| 4   | 4           | VI      | Video, < 100 ms latency and jitter |
| 5   | 5           | VO      | Voice, < 10 ms latency and jitter  |
| 6   | 6           | IC      | Internetwork Control               |
| 7   | 7 (highest) | NC      | Network Control                    |

Source : <http://us.profinet.com/qos/>

# ToS and DSCP

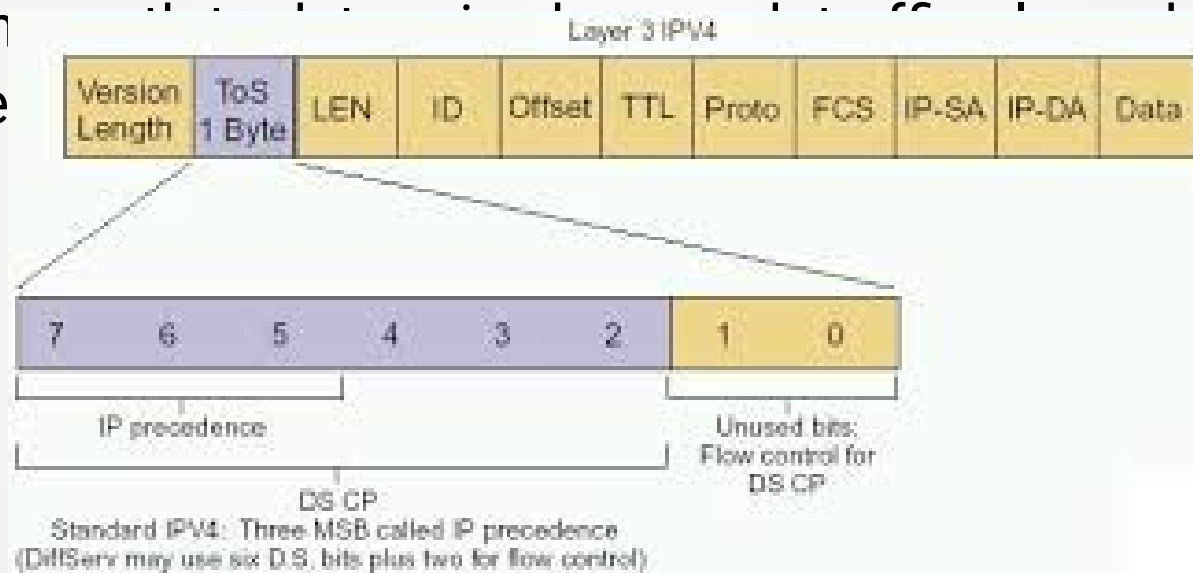


- DSCP (ToS) byte of IP packet is used to transport on the network the information regarding QoS
  - Advantage:
    - Set it only on the core router
    - Uses only 1 byte in the packet header
    - Can be done on VLAN
  - Disadvantage:
    - Cannot changed on encapsulated packets

# ToS and DSCP



- Is meant to be administered in a per-hop-based way, allowing each router on the network to prioritize traffic.



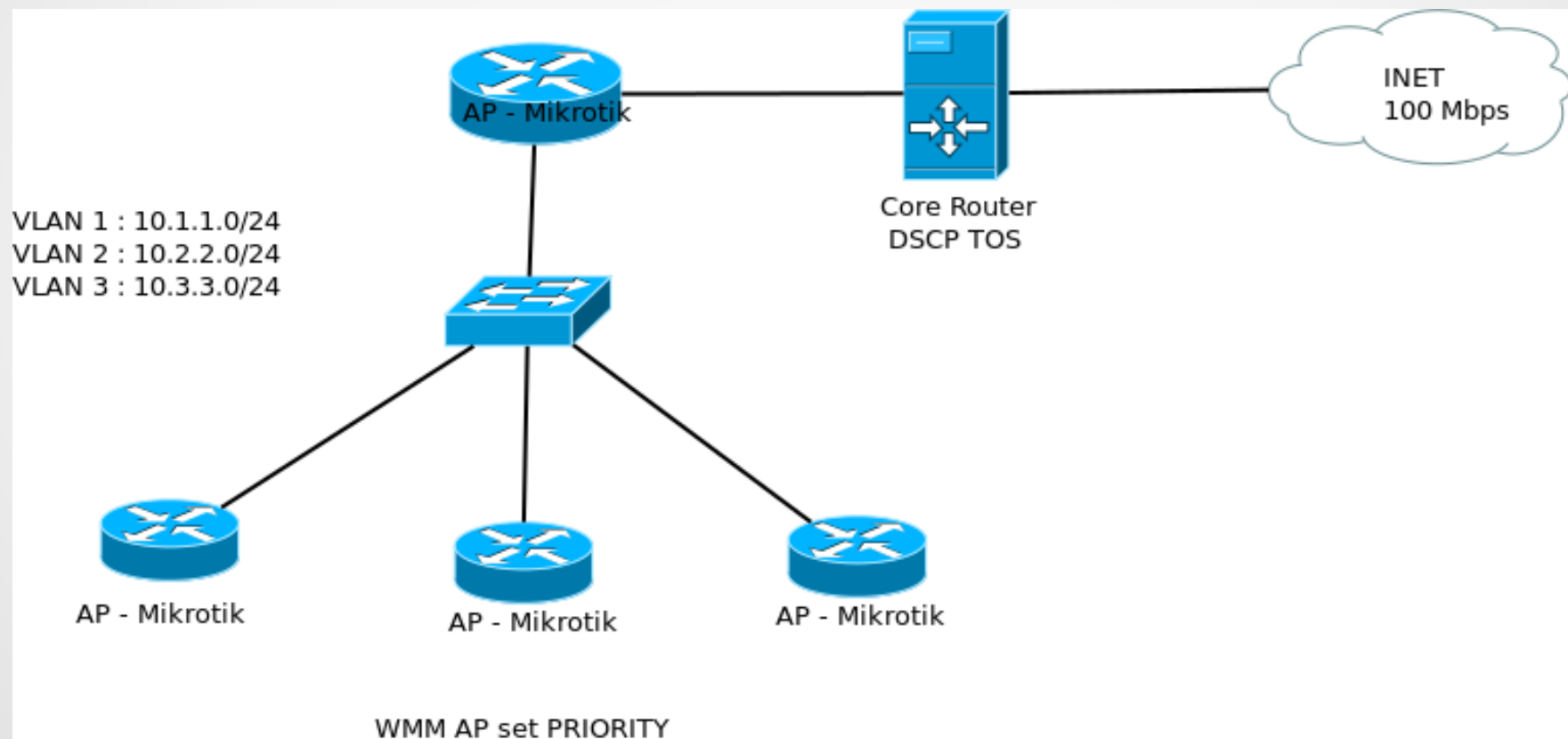
Source : <http://www.cantore.com/refdocs/QoS-OV-Equiv.html>



## How To Implement It with Mikrotik?



# Implementation



# Implementation



- On the Gateway Router
- On the AP
- On the CPE client device

# Implementation

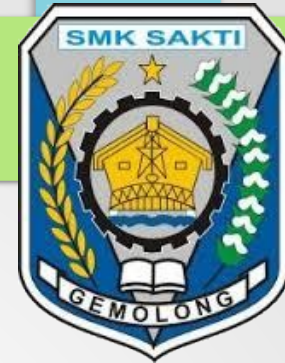


- DSCP ToS :
  - are applied by creat MANGLE rules on prerouting chain

```
[admin@Router-AP] /ip firewall mangle> add chain=prerouting  
comment=DSCP-TOS protocol=tcp new-dscp=4 action=change-dscp
```

```
[admin@DSCP-TOS] > ip firewall mangle  
[admin@DSCP-TOS] /ip firewall mangle> add chain=prerouting comment=DSCP-TOS protocol=tcp new-dscp=4  
action=change-dscp  
[admin@DSCP-TOS] /ip firewall mangle>  
[admin@DSCP-TOS] /ip firewall mangle>
```

# Implementation



- DSCP ToS :

| Firewall                                                                         |          |            |              |              |          |           |           |             |            |          |         |
|----------------------------------------------------------------------------------|----------|------------|--------------|--------------|----------|-----------|-----------|-------------|------------|----------|---------|
| Filter Rules NAT Mangle Service Ports Connections Address Lists Layer7 Protocols |          |            |              |              |          |           |           |             |            |          |         |
| + - ✓ ✗ 📁 ⚙ 00 Reset Counters 00 Reset All Counters Find all                     |          |            |              |              |          |           |           |             |            |          |         |
| #                                                                                | Action   | Chain      | Src. Address | Dst. Address | Proto... | Src. Port | Dst. Port | In. Inte... | Out. In... | Bytes    | Packets |
| DSCP - TOS                                                                       |          |            |              |              |          |           |           |             |            |          |         |
| 0                                                                                | ✓ cha... | prerouting |              |              |          |           |           |             |            | 51.0 KiB | 755     |
| http                                                                             |          |            |              |              |          |           |           |             |            |          |         |
| 1                                                                                | ✓ cha... | prerouting |              |              | 6 (tcp)  |           | 80        |             |            | 0 B      | 0       |
| ssh                                                                              |          |            |              |              |          |           |           |             |            |          |         |
| 2                                                                                | ✓ cha    | prerouting |              |              | 6 (tcp)  |           | 22        |             |            | 0 B      | 0       |

# Implementation



- On AP
  - Assigning priority from DSCP:

```
[admin@AP] > ip firewall mangle
[admin@AP] /ip firewall mangle> add action=set-priority chain=postrouting comment="DSCP into
WMM Priorities" new-priority=from-dscp passthrough=yes
[admin@AP] /ip firewall mangle>
```

- Matching DSCP value and change the priority :

```
[admin@AP] > ip firewall mangle
[admin@AP] /ip firewall mangle> add action=set-priority chain=postrouting comment="DSCP into
WMM Priorities" dscp=46 new-priority=7 passthrough=yes
[admin@AP] /ip firewall mangle>
```

# Implementation



- WLAN wireless settings :

```
[admin@Mikrotik] /interfaces wireless set wlan1 wmm-  
support=enabled
```

```
[admin@AP] > interface wireless  
[admin@AP] /interface wireless> set wlan1 wmm-support=enabled
```



# Thanks for your attention !

**Contact :**

[facebook.com/anandadwi.ae](https://facebook.com/anandadwi.ae)

[ananda.dwirahmawati313@gmail.com](mailto:ananda.dwirahmawati313@gmail.com)

**+62-813-26789108**