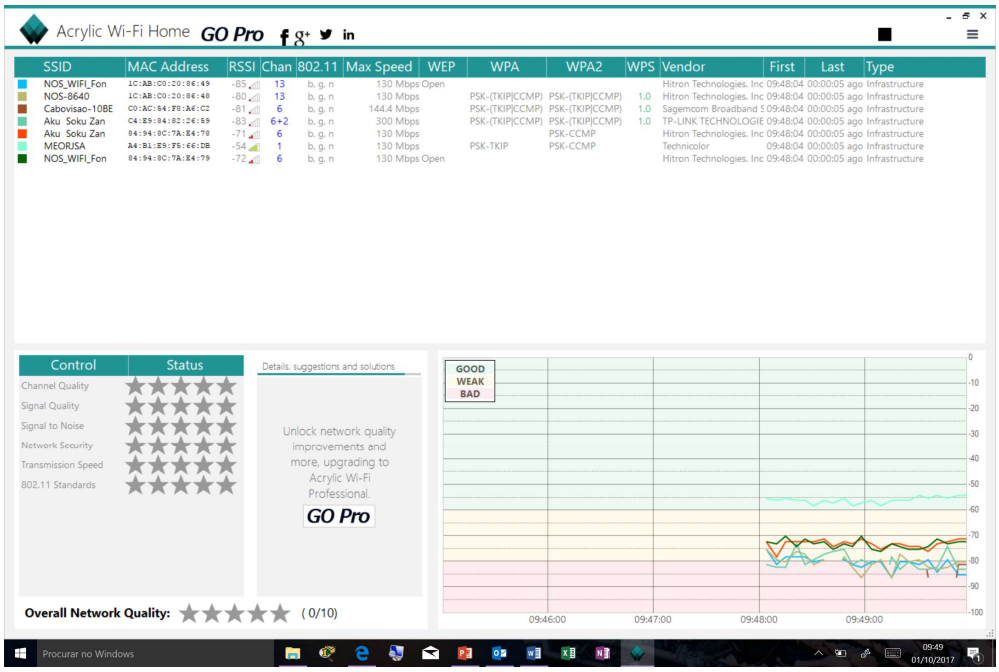
SISTEMAS E REDES MULTISERVIÇO

Practital Exercises nº 2 – WiFi e QoS em LANs

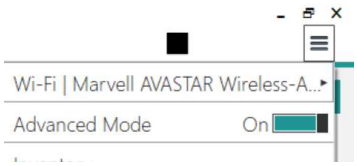
PART I - WiFi

The exercises in this section allow, through a basic tool, to perceive and consolidate the characteristics of the 802.11 x wireless networks (WIFI).

1. Download and install the Wireless Network Analyzer Acrylic Wi-fi Home (only available for Windows): https://www.acrylicwifi.com/en/wlan-software/wlan-scanner-acrylic-wifi-free/
2. Once the program is running, it does a scan to the existing wireless networks:



3. Answer the following questions:
    a. Did the software detect the networks with hidden SSID?
    b. Identify the network (s) operating in the latest 802.11 standard;
    c. What's the network with the strongest signal?
    d. Do any of the networks have aggregate channels? Is there any relation to the throughput provided?
    e. Where can you identify open networks? Explain the inconvenience of navigating in an open network.
    f. Identify a network with the most advanced security standards.
    g. In the upper right corner change to "Advanced" mode:



h. In the bottom window (example in the following image), if there is a large overlap of networks in the various channels in the band of 2.4 and 5GHz.

Would it be possible to reduce interferences between networks? Justify.

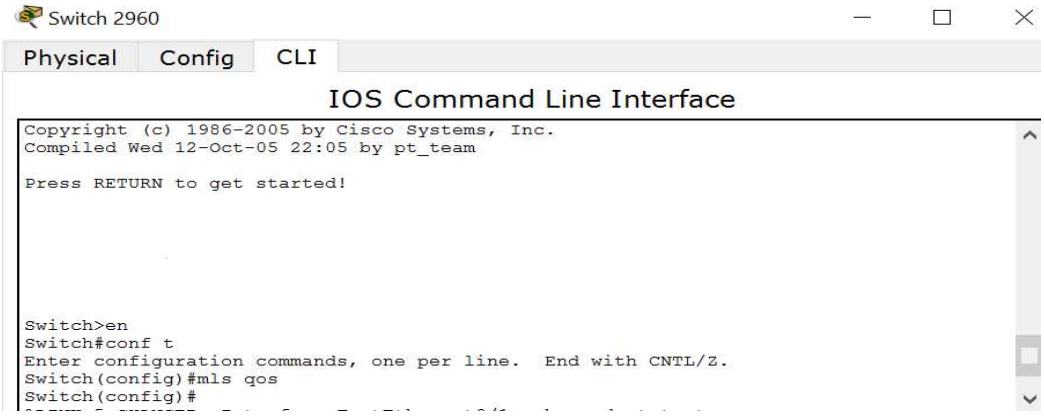
PART II – QoS in LAN

The following exercises aim to help consolidate the concepts of quality of service (Qos) and perceive, with a concrete example, how to implement Qos in a Switch.

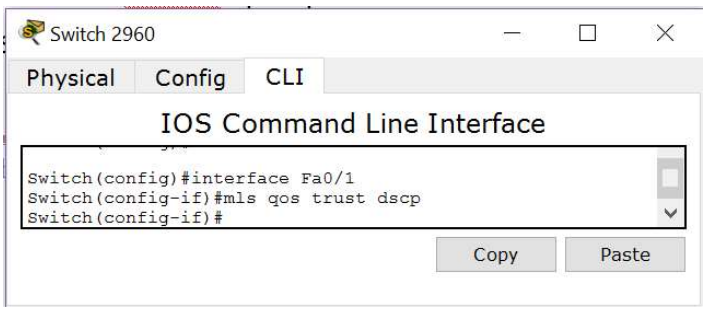
Classification in the Switch input queue

For the following exercises let's assume that there would be a PC configured with packet tagging through DSCP that would be connected to the Switch port Fa0/1. This PC would mark the Skype application packages with DSCP 40 (example).

1. Connect by console to the Lab 1 Switch 2960 and proceed to configuration mode as explained in the auxiliary document that was placed in Moodle.
2. For the classification of packages made on the PC to be processed by the switch, we must enable QoS in the Switch and indicate the classification method we used.
    a. Enable Qos on the Switch:



    b. Let the switch know that we intend to use DSCP for classification of traffic that comes from the PC1 (let's consider that we would have the PC that was previously configured with DSCP connected to the switch in the port Fa0/1).



    c. Create a class of Service (CoS) for the traffic that arrives at the Switch with the DSCP we assigned to Skype (in our example the 40):

```
Switch(config-if)#exit

Switch(config)#class-map skype
Switch(config-cmap)#match ip dscp 40
Switch(config-cmap)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

Policing and marking in the inbound queue

3. To set policing for our "Skype" traffic class (which we created in the previous point) create a policy that we will call "*Politicaskype*". This policy limits the throughput to 1Mb and burst traffic to 8000 packets. Traffic exceeding these limits will be marked to be discarded (Admission Control):

```
Switch(config)# policy-map politicaskype
Switch(config-pmap)# class skype
Switch(config-pmap-c)# trust dscp
Switch(config-pmap-c)# police 1000000 8000 exceed-action drop
Switch(config-pmap-c)# exit
Switch(config-pmap)# exit
```

4. This policy must be associated with the port connected to the PC in the direction of switch ingress (input):

```
Switch(config)# interface fastethernet0/1
Switch(config-if)# service-policy input politicaskype
```

Discard mechanisms in egress queues

The following will define how much buffer space is reserved in the output port queues of the switch. The Cisco 2960 has, by default, 4 output queues on each port with the following definition:

Table 34-9 Default Egress Queue Configuration

Feature	Queue 1	Queue 2	Queue 3	Queue 4
Buffer allocation	25 percent	25 percent	25 percent	25 percent
WTD drop threshold 1	100 percent	200 percent	100 percent	100 percent
WTD drop threshold 2	100 percent	200 percent	100 percent	100 percent
Reserved threshold	50 percent	50 percent	50 percent	50 percent
Maximum threshold	400 percent	400 percent	400 percent	400 percent
SRR shaped weights (absolute) [1]	25	0	0	0
SRR shared weights [2]	25	25	25	25

1. A shaped weight of zero means that this queue is operating in shared mode.
2. One quarter of the bandwidth is allocated to each queue.

The following table displays the allocation of traffic to the queues according to the package's DSCP:

Table 34-11 Default DSCP Output Queue Threshold Map

DSCP Value	Queue ID–Threshold ID
0–15	2–1
16–31	3–1
32–39	4–1
40–47	1–1
48–63	4–1

5. In this case, as our Skype traffic arrives at the switch with the DSCP 40, it will be placed in queue 1. We will reconfigure the QoS characteristics in the output queues to privilege queue 1 to which we will allocate 50% of the buffer (for the other three queues 20, 20, and 10% respectively):

```
Switch(config)# mls qos queue-set output 1 buffers 50 20 20 10
```

6. In the next action, we will set the threshold levels of the discard mechanism. Cisco uses WRED, which we studied in class, but in a proprietary version called WTD whose operation is similar. Let´s set the limits of 60% (minimum) and 90% (maximum). The remaining parameters define the allocated memory levels and the limit of that memory from which all packets are discarded:

```
Switch(config)# mls qos queue-set output 1 threshold 1 60 90 100 200
```

7. The settings you made were "saved" in the parameterization "queue-Set Output 1" which now has to be associated with the switch port that connects to the Internet (let's assume that the switch output to the Internet is the interface gigabitethernet0/1):

```
Switch(config)# interface gigabitethernet0/1
Switch(config-if)# queue-set 1
```

Configure Scheduling Algorithms

8. The last configuration will parameterize the scheduling algorithms in the outgoing queue. Cisco uses SRR (in the Shaped or Shared Round Robin versions as we studied in Chapter 1 in the theoretical classes). In our exercise we will define that the algorithm is the Shared Round Robin with the weights of 50% for queue 1 (where are our Skype packages), 20% for queue 2 and 15% for queues 3 and 4:

```
Switch(config-if)# srr-queue bandwidth share 50 20 15 15
```

Some commands to verify the QoS settings that are implemented:

Switch# show mls qos

Switch(config-if)# show mls qos input-queue

Switch# show mls qos interface [interface-id] [buffers | policers | queueing | statistics]

Switch(config-if)# show mls qos queue-set [qset-id]