

Wydział Informatyki Politechniki Białostockiej Sieci bezprzewodowe – Laboratoria	Data realizacji: 15.05.2019
Ćwiczenie Nr 4 Temat: 6. Zarządzanie zaawansowanymi parametrami transmisji Zespół Imię i Nazwisko 1. Bartosz Marciszewski 2. Paweł Łaskarzewski 3. Tymoteusz Hlebk	Prowadzący: mgr. Łukasz Szymowski Ocena

Zadanie 1

Treść zadania:

Przygotuj konfigurację sieci bezprzewodowej łączącej router z dwoma klientami.

Realizacja :

Konfigurację sieci wykonano na routerze Cisco do której podłączono dwa komputery

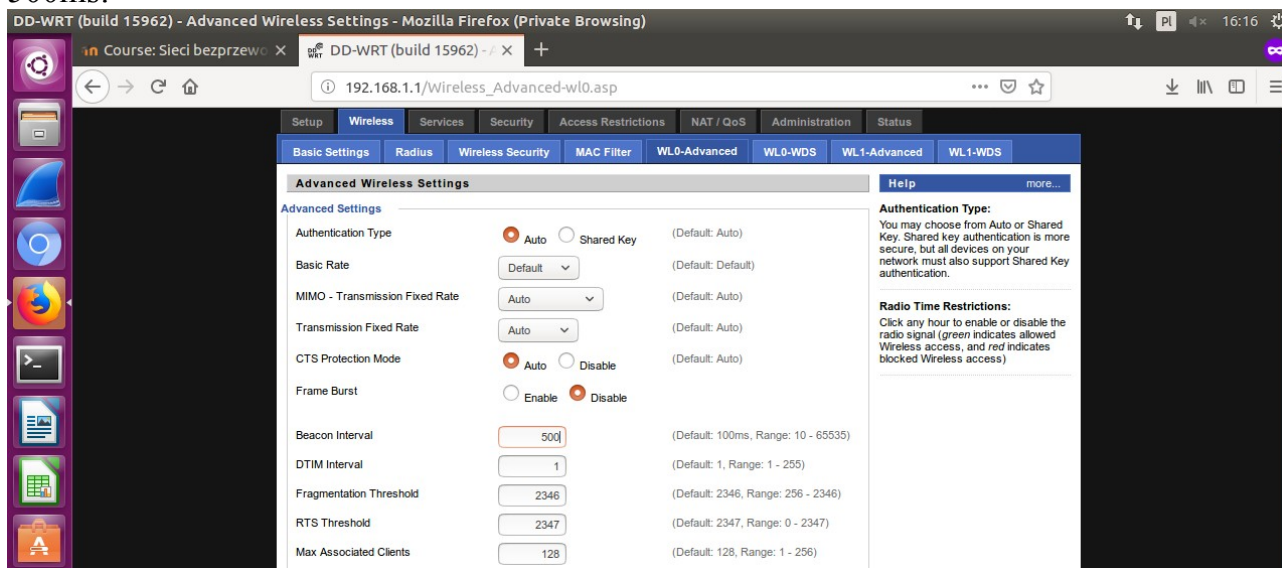
Zadanie 2

Treść zadania:

W konfiguracji routera zmień wartość 'beacon interval' na wartość 500ms, 1s, 5s, 10s (w miarę możliwości konfiguracyjnych).

Realizacja:

500ms:



1000ms

dd-wrt.com... control panel

Time: 16:29:07 up 16 min, load average: 0.02, 0.02, 0.00
WAN IP: 10.64.103.235

SetupWirelessServicesSecurityAccess RestrictionsNAT / QoSAdministrationStatus

Basic SettingsRadiusWireless SecurityMAC FilterWL0-AdvancedWL0-WDSWL1-AdvancedWL1-WDS

Advanced Wireless SettingsHelpmore...

Advanced Settings

Authentication Type

☒ Auto ☐ Shared Key

(Default: Auto)

Basic Rate

Default

(Default: Default)

MIMO - Transmission Fixed Rate

Auto

(Default: Auto)

Transmission Fixed Rate

Auto

(Default: Auto)

CTS Protection Mode

☒ Auto ☐ Disable

(Default: Auto)

Frame Burst

☐ Enable ☒ Disable

Beacon Interval

1000

(Default: 100ms, Range: 10 - 65535)

DTIM Interval

1

(Default: 1, Range: 1 - 255)

Fragmentation Threshold

2346

(Default: 2346, Range: 256 - 2346)

RTS Threshold

2347

(Default: 2347, Range: 0 - 2347)

Max Associated Clients

128

(Default: 128, Range: 1 - 256)

AP Isolation

☐ Enable ☒ Disable

(Default: Disable)

Authentication Type:

You may choose from Auto or Shared Key. Shared key authentication is more secure, but all devices on your network must also support Shared Key authentication.

Radio Time Restrictions:

Click any hour to enable or disable the radio signal (green indicates allowed Wireless access, and red indicates blocked Wireless access)

5000ms

DD-WRT (build 15962) - Advanced Wireless Settings - Mozilla Firefox (Private Browsing)

Course: Sieci bezprzewo x DD-WRT (build 15962) - x

192.168.1.1/apply.cgi

dd-wrt.com... control panel

Time: 16:31:58 up 19 min, load average: 0.16, 0.06, 0.01
WAN IP: 10.64.103.235

SetupWirelessServicesSecurityAccess RestrictionsNAT / QoSAdministrationStatus

Basic SettingsRadiusWireless SecurityMAC FilterWL0-AdvancedWL0-WDSWL1-AdvancedWL1-WDS

Advanced Wireless SettingsHelpmore...

Advanced Settings

Authentication Type

☒ Auto ☐ Shared Key

(Default: Auto)

Basic Rate

Default

(Default: Default)

MIMO - Transmission Fixed Rate

Auto

(Default: Auto)

Transmission Fixed Rate

Auto

(Default: Auto)

CTS Protection Mode

☒ Auto ☐ Disable

(Default: Auto)

Frame Burst

☐ Enable ☒ Disable

Beacon Interval

5000

(Default: 100ms, Range: 10 - 65535)

DTIM Interval

1

(Default: 1, Range: 1 - 255)

Fragmentation Threshold

2346

(Default: 2346, Range: 256 - 2346)

RTS Threshold

2347

(Default: 2347, Range: 0 - 2347)

Max Associated Clients

128

(Default: 128, Range: 1 - 256)

AP Isolation

☐ Enable ☒ Disable

(Default: Disable)

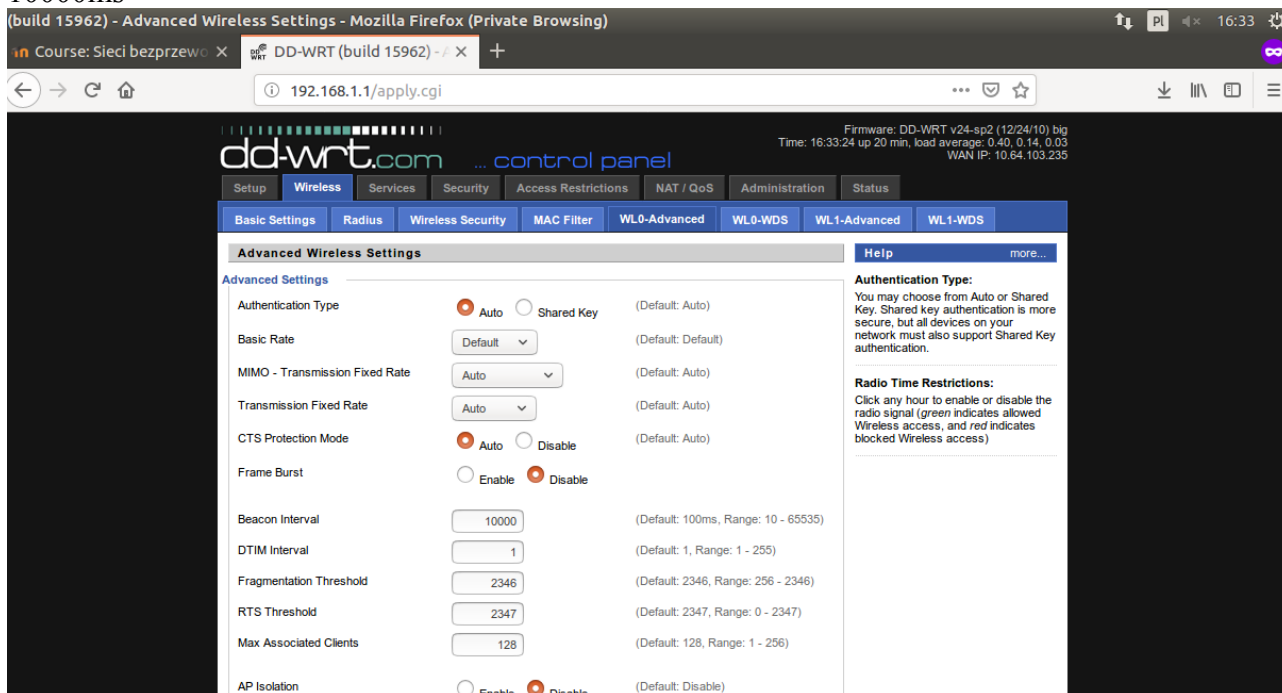
Authentication Type:

You may choose from Auto or Shared Key. Shared key authentication is more secure, but all devices on your network must also support Shared Key authentication.

Radio Time Restrictions:

Click any hour to enable or disable the radio signal (green indicates allowed Wireless access, and red indicates blocked Wireless access)

10000ms



Zadanie 3

Treść zadania:

Sprawdź zdolność przyłączania i skanowania routera przez stacje robocze oraz stabilność połączenia podczas transmisji długiego pliku.

Realizacja :

500ms

```
root@student-HP-Compaq-dc7900-Small-Form-Factor: ~
UP LOOPBACK RUNNING MTU:65536 Metric:1
RX packets:3109 errors:0 dropped:0 overruns:0 frame:0
TX packets:3109 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1
RX bytes:274926 (274.9 KB) TX bytes:274926 (274.9 KB)

wlan0 Link encap:Ethernet HWaddr 00:1d:43:20:01:67
UP BROADCAST MULTICAST MTU:1500 Metric:1
RX packets:3882 errors:0 dropped:0 overruns:0 frame:0
TX packets:3703 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:3177868 (3.1 MB) TX bytes:493219 (493.2 KB)

root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Białostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by TVK-NET PPHU A&K Chamerlinscy (Choroszcz) [46.52 km]: 5.521 ms
Testing download speed.....
Download: 13.91 Mbit/s
Testing upload speed.....
Upload: 8.11 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~#
```

Ilustracja 1: Prędkość pobierania przy 500 ms

1000ms

```
root@student-HP-Compaq-dc7900-Small-Form-Factor: ~
collisions:0 txqueuelen:1000
RX bytes:3177868 (3.1 MB) TX bytes:493219 (493.2 KB)

root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Bialostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by TVK-NET PPHU A&K Chamerlinscy (Choroszcz) [46.52 km]: 5.521 ms
Testing download speed.....
Download: 13.91 Mbit/s
Testing upload speed.....
Upload: 8.11 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Bialostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by TVK-NET PPHU A&K Chamerlinscy (Choroszcz) [46.52 km]: 4.002 ms
Testing download speed.....
Download: 11.83 Mbit/s
Testing upload speed.....
Upload: 14.53 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# █
```

Ilustracja 2: Prędkość pobierania przy 1000 ms

5000ms

```
root@student-HP-Compaq-dc7900-Small-Form-Factor: ~
Retrieving speedtest.net server list...
Testing from Politechnika Bialostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by TVK-NET PPHU A&K Chamerlinscy (Choroszcz) [46.52 km]: 4.002 ms
Testing download speed.....
Download: 11.83 Mbit/s
Testing upload speed.....
Upload: 14.53 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
^C
Cancelling...
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Bialostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by Elpos Sp z o.o. (Bialystok) [46.52 km]: 3.335 ms
Testing download speed.....
Download: 11.69 Mbit/s
Testing upload speed.....
Upload: 7.95 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# █
```

Ilustracja 3: Prędkość pobierania przy 5000 ms

10000ms

```
root@student-HP-Compaq-dc7900-Small-Form-Factor: ~
Retrieving speedtest.net server list...
^C
Cancelling...
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Bialostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by Elpos Sp z o.o. (Bialystok) [46.52 km]: 3.335 ms
Testing download speed.....
Download: 11.69 Mbit/s
Testing upload speed.....
Upload: 7.95 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Bialostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by TVK-NET PPHU A&K Chamerlinsky (Choroszcz) [46.52 km]: 4.98 ms
Testing download speed.....
Download: 9.69 Mbit/s
Testing upload speed.....
Upload: 5.73 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~#
```

Ilustracja 4: Prędkość pobierania przy 10000 ms

Wnioski

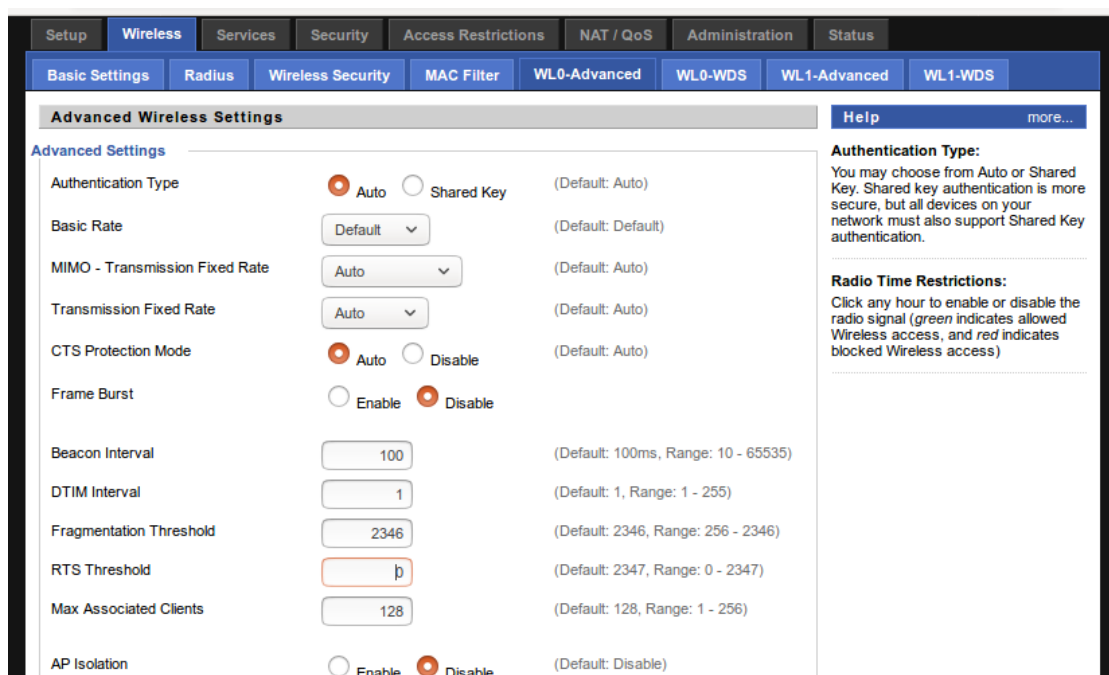
Im większa wartość 'beacon interval' tym mniejsza prędkość pobierania

Zadanie 4

Treść zadania:

Zmodyfikuj wartość 'RTS threshold' do minimalnej dostępnej w konfiguracji.

Realizacja:



Ilustracja 5: 'RTS threshold' wartość minimalna

Zadanie 5

Treść zadania:

Sprawdź przepustowość łącza (prędkość transmisji) podczas transferu długiego pliku.

Realizacja:

```
root@student-HP-Compaq-dc7900-Small-Form-Factor: ~
Download: 7.17 Mbit/s
Testing upload speed.....
Upload: 4.60 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Bialostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by IdeaLAN (Sokolka) [22.48 km]: 16.754 ms
Testing download speed.....
Download: 10.19 Mbit/s
Testing upload speed.....
Upload: 5.50 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Bialostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by Elpos Sp z o.o. (Bialystok) [46.52 km]: 4.253 ms
Testing download speed.....
Download: 7.76 Mbit/s
Testing upload speed.....
Upload: 10.11 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~#
```

Wnioski:

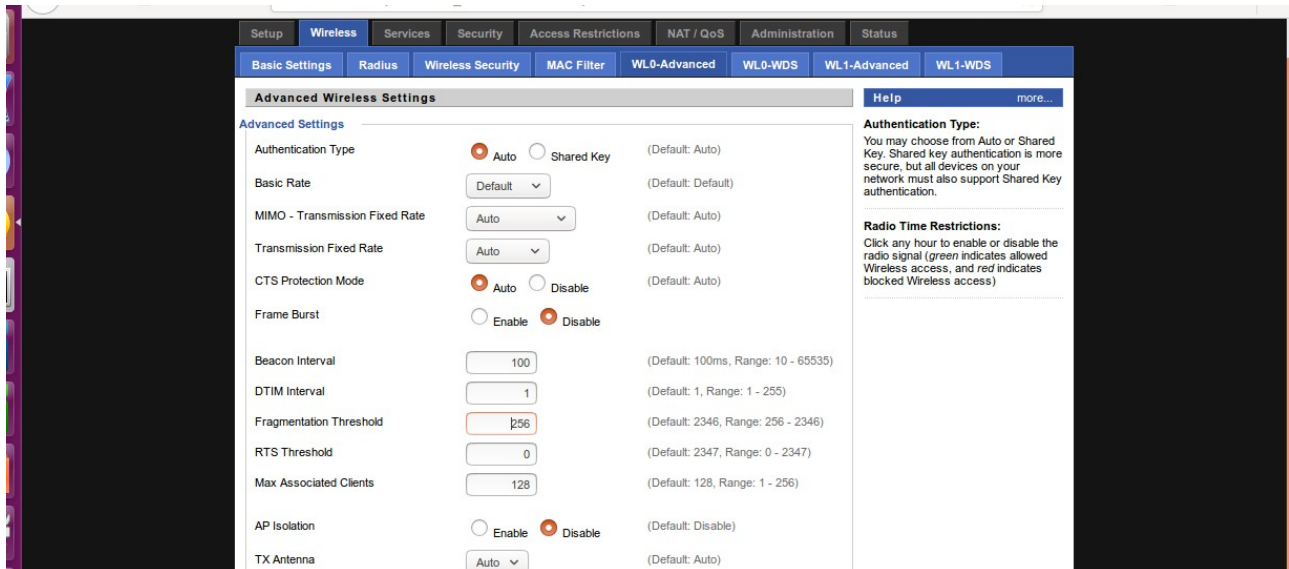
Ustawienie RTS threshold na 0 wpłynęło na zmniejszenie prędkości pobierania, gdyż parametr RTS threshold (Próg dla żądania wysłania) oznacza czas, który punkt dostępu odczekuje przed wysłaniem wiadomości RTS do komputera klienckiego. Skrót RTS oznacza Request to Send (żądanie wysłania).

Zadanie 6

Treść zadania:

Zmodyfikuj wartość 'fragmentation threshold' do minimalnej dostępnej w konfiguracji.

Realizacja:



Ilustracja 6: fragmentation threshold minimum

Zadanie 7

Treść zadania:

Sprawdź przepustowość łącza (prędkość transmisji) podczas transferu długiego pliku.

Realizacja:

```
root@student-HP-Compaq-dc7900-Small-Form-Factor: ~
Download: 5.93 Mbit/s
Testing upload speed.....
Upload: 11.20 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Białostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by Elpos Sp z o.o. (Białystok) [46.52 km]: 4.227 ms
Testing download speed.....
Download: 5.80 Mbit/s
Testing upload speed.....
Upload: 6.40 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Białostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by Elpos Sp z o.o. (Białystok) [46.52 km]: 3.753 ms
Testing download speed.....
Download: 7.17 Mbit/s
Testing upload speed.....
Upload: 4.60 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~#
```

Wnioski:

Fragmentation threshold ustawione na minimum wpłynęło korzystnie na prędkość pobierania

Zadanie 8

Treść zadania:

Włącz izolację AP.

Realizacja:

The screenshot shows the DD-WRT web interface for a DD-WRT (build 15962) router. The browser address bar shows the URL `192.168.1.1/Wireless_Advanced-wl0.asp`. The interface has a top navigation bar with tabs: Setup, Wireless, Services, Security, Access Restrictions, NAT / QoS, Administration, and Status. Below this is a sub-navigation bar with tabs: Basic Settings, Radius, Wireless Security, MAC Filter, WL0-Advanced, WL0-WDS, and WL1-Advanced. The 'WL0-Advanced' tab is selected, showing the 'Advanced Wireless Settings' page. The page is divided into two main sections: 'Advanced Settings' on the left and 'Authentication Type' and 'Radio Time Restrictions' on the right. In the 'Advanced Settings' section, the 'AP Isolation' option is checked (radio button is selected), indicating it is enabled. Other settings include Authentication Type (Auto), Basic Rate (Default), MIMO - Transmission Fixed Rate (Auto), Transmission Fixed Rate (Auto), CTS Protection Mode (Auto), Frame Burst (Disable), Beacon Interval (100), DTIM Interval (1), Fragmentation Threshold (256), RTS Threshold (0), Max Associated Clients (128), TX Antenna (Auto), and RX Antenna (Auto). The 'Authentication Type' section on the right explains that Auto or Shared Key authentication can be chosen, with Shared Key being more secure. The 'Radio Time Restrictions' section explains that radio signal can be enabled or disabled, with green indicating allowed access and red indicating blocked access.

Wnioski:

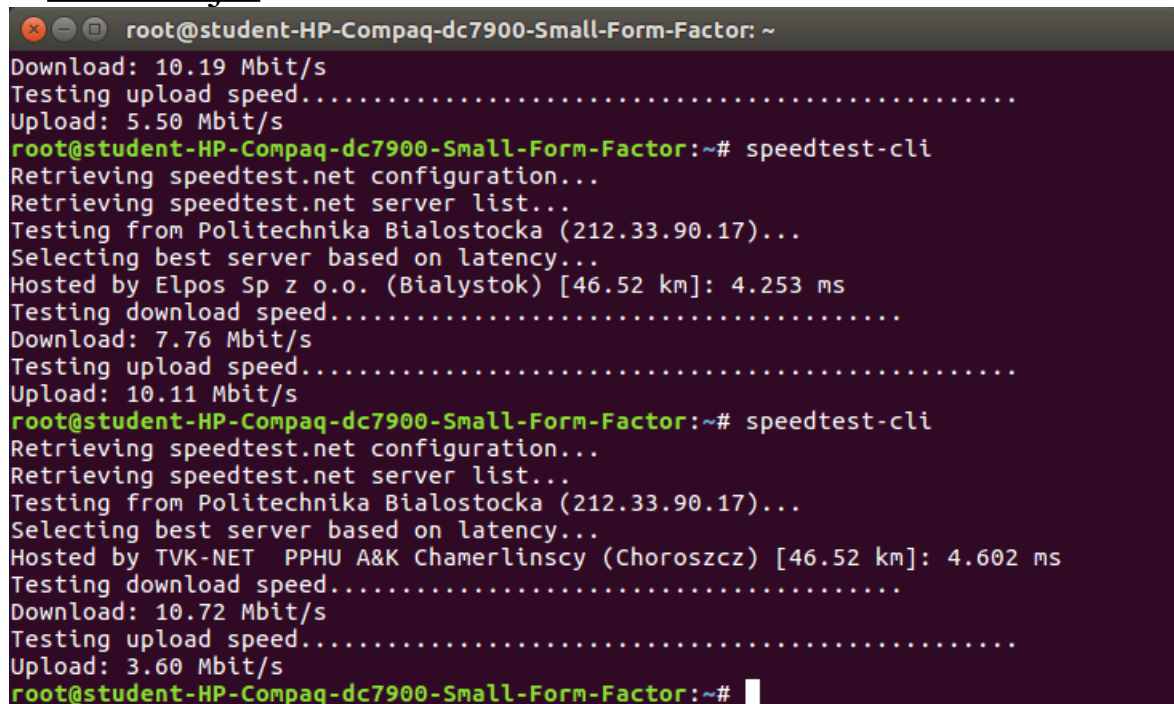
AP polega na blokowaniu możliwości komunikacji między sobą klientów tej samej sieci Wi-Fi. To znaczy, że każdy podpięty użytkownik będzie myślał, że jest sam w sieci lokalnej. Zapewnia to wyższy stopień bezpieczeństwa.

Zadanie 9

Treść zadania:

Sprawdź przepustowość łącza (prędkość transmisji) podczas transferu długiego pliku.

Realizacja:

A screenshot of a terminal window with a dark background and light-colored text. The window title is 'root@student-HP-Compaq-dc7900-Small-Form-Factor: ~'. The terminal shows the output of a speedtest. It starts with 'Download: 10.19 Mbit/s' and 'Testing upload speed...'. Then it shows 'Upload: 5.50 Mbit/s'. Next, it runs 'speedtest-cli', which retrieves configuration and server list, testing from 'Politechnika Białostocka (212.33.90.17)'. It selects a server hosted by 'Elpos Sp z o.o. (Białystok) [46.52 km]' with a latency of 4.253 ms. The download speed is 7.76 Mbit/s and the upload speed is 10.11 Mbit/s. Then it runs 'speedtest-cli' again, retrieving configuration and server list, testing from the same location. It selects a server hosted by 'TVK-NET PPHU A&K Chamerlinscy (Choroszcz) [46.52 km]' with a latency of 4.602 ms. The download speed is 10.72 Mbit/s and the upload speed is 3.60 Mbit/s. The prompt 'root@student-HP-Compaq-dc7900-Small-Form-Factor:~#' is visible at the end of the output.

```
root@student-HP-Compaq-dc7900-Small-Form-Factor: ~
Download: 10.19 Mbit/s
Testing upload speed.....
Upload: 5.50 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Białostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by Elpos Sp z o.o. (Białystok) [46.52 km]: 4.253 ms
Testing download speed.....
Download: 7.76 Mbit/s
Testing upload speed.....
Upload: 10.11 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~# speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from Politechnika Białostocka (212.33.90.17)...
Selecting best server based on latency...
Hosted by TVK-NET PPHU A&K Chamerlinscy (Choroszcz) [46.52 km]: 4.602 ms
Testing download speed.....
Download: 10.72 Mbit/s
Testing upload speed.....
Upload: 3.60 Mbit/s
root@student-HP-Compaq-dc7900-Small-Form-Factor:~#
```

Wnioski:

Izolacja AP wpłynęła korzystnie na prędkość pobierania, natomiast negatywnie na prędkość przesyłania