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WLAN Laboratory

Lab 7. Wireless repeater – part 1, web browser interface

Objective:

The students will learn how to setup the Access Point with wireless repeater functionality to extend range of WLAN network.

Student Prerequisites:

- knowledge of the basic WLAN configuration,
- familiarity with the self-learning material of the course [1-3],
- basic knowledge of the Linux OS and Windows,
- basic knowledge of IPv4 addresses

Hardware and Software to be used in this lab assignment:

Two access points (or wireless router and access point), Cisco devices are preferred, but other devices with repeater mode are also possible. PC or laptop, one RJ45 cables., PC with WLAN card or laptop, in case of Cisco devices - serial console program (eg. Putty.exe), serial (RS232) cable. On some computers a converter USB <-> RS232 is also need.

Description of the Experiment:

During the exercise students configure (with web browser interface) WLAN devices and create wireless connection with repeater between WLAN AP and PC. Repeater device is use to extend range of the WLAN network.

Lab goals:

- The AP1 device are connected by wire to backbone network (faculty network), the repeater (AP2) connects the AP1 to PC client by radio links. Repeater is not connected to any Ethernet cable
- The clients station (PC) should receive their IP address from the faculty DHCP server, in public IP range.

Preparation, (in case of use Cisco devices):

I) Hardware reset

We assume that the AP device is in a configured state and its current configuration is not known. The first point to perform operations is bring the machine settings to a factory initial state.

II) If Cisco AP are used: connection via RS232 port

Connect PC RS232 port (9 pin socket or USB converter) to AP RS232 port (RJ45 socket) with serial cable. Run console terminal program (putty.exe) and set serial port parameters to: 9600 bps, 8 data, 0

parity, 1 stop, no flow control. Open connection and pres [enter] to get started. You should to get response chars from AP (“ap>”).

Note! Remember to set up putty with proper name of serial port, check the name in Windows device manager.

III) If Cisco AP are used: Enter privileged mode.

To configure AP you have to enter to privileged mode.

```
ap>enable
Password: Cisco
ap#
```

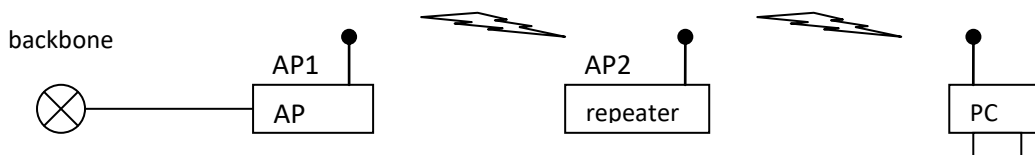
Cisco is the default password. If the password has been changed, reset the AP to factory defaults. If help is needed refer to the online documentation [1].

NOTE!! For more information about CLI operation refer to on-line documentation [1-3].

Lab phases/tasks:

I) Repeater set up.

Set up (with a web browser configuration interface) the wireless connection in repeater mode between the PC and the core network using two access points, AP1 in access point mode and AP2 as repeater.



a) Step 1

Propose IP/Mask addresses for each device and type them in the figure above.

Write the model of used AP devices:

Type in the Figure above the MAC addresses of each NIC (check AP MAC addresses in the AP status page).

b) Step 2

Configure the AP1 to access point mode: set the SSID name to C7_WLAN <computer_number>, set the radio channel to < computer_number >, set the infrastructure mode (Cisco devices) for the SSID name, **set radio transmitter power to minimum level**, do not set encryption on the radio link. Switch on the radio NIC.

c) Step 3

Configure the AP2 to repeater mode: set the SSID name to C7_WLAN <computer_number>, set channel to automatic selection, set (on Cisco devices) the infrastructure mode for the SSID name, enter the MAC address of AP1 as a destination of repeater connection, **set radio transmitter power to maximum level**, do not set encryption on the radio link. Switch on the radio NIC.

Note! SSID names have to be the same on both devices. On Cisco devices you have to set up “infrastructure mode” parameter to SSID names. The band (2.4 or 5 GHz) have to be the same on both devices. On Cisco devices, when the repeater devices connect to AP device, then repeater device switch off his Ethernet port. To continue the configuration of repeater after the connection to AP, you have to access repeater throw the radio link.

In case of others setup problems please check the manufacturer documentation [1-3] to identify proper repeater connection setup.

d) Step 3

Connect PC to your WLAN network. Test the connection between the PC and AP1 and AP2 (use the ping command).

Set automatic IP configuration (DHCP client) for PC. Reconnect the PC to the WLAN network. Test your final setup, use the ping command to Internet address (eg. 8.8.8.8) with continue mode (eg. **Ping -t 8.8.8.8** in Windows). The screen should show the message of successively sent packages. Do not interrupt the ping command, turn off the repeater power. The screen should display a few seconds delay in delivering the correct ping messages.

II) Secure the repeater connection.

a) Step 1

Change the configurations in AP1 and repeater (AP2) to secure radio link with WPA encryption.

b) Step 2

Set automatic IP configuration (DHCP client) for PC. Reconnect the PC to the WLAN network. Test your final setup, use the ping command to Internet address (eg. 8.8.8.8) with continue mode (eg. **Ping -t 8.8.8.8** in Windows). The screen should show the message of successively sent packages. Do not interrupt the ping command, turn off the repeater power. The screen should display a few seconds delay in delivering the correct ping messages.

Questions:

1. Describe what is causing the delay in delivering ping packets at the moment the repeater is turned off.

References:

[1] Cisco IOS Software Configuration Guide for Cisco Aironet Access Points – web page:

https://www.cisco.com/c/en/us/td/docs/wireless/access_point/12-3_7_JA/configuration/guide/i1237sc.html?referring_site=bodynav

[2] Cisco IOS Command Reference for Cisco Aironet Access Points and Bridges – web page:

https://www.cisco.com/c/en/us/td/docs/wireless/access_point/12-4_3g_JA/command/reference/cr1243g.html

[3] Basic Wireless LAN Connection Configuration Example – web page:

<https://www.cisco.com/c/en/us/support/docs/wireless-mobility/wireless-lan-wlan/68005-wlan-connect.html#diag>

[4] E. Perahia, R. Stacey, “Next Generation Wireless LANs 802.11n and 802.11ac”, Cambridge University Press, 2013

[5] P. Roshan, J. Leary, “802.11 Wireless LAN Fundamentals” Cisco Press, 2004.