Date	Name 1	Name 2	Name 3	Zaliczenie

WLAN Laboratory

Lab 5. Wireless bridge – part 1

Objective:

The students will learn how to use the Access Point with wireless bridge functionality to build radio link bridge.

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 with WLAN bridge functionality (this same model), PC or laptop, two RJ45 cables., PC with WLAN card or laptop, serial console program (eg. Putty.exe), with Cisco PP: serial (RS232) cable, RJ45 Ethernet cables, on some computers a converter USB <-> RS232 is also need.

Description of the Experiment:

During the exercise students create wireless connection in bridge mode between backbone (core) network and PC, using two AP/Bridge devices and a wireless connection.

Lab goals:

- The AP1 device are connected by wire to backbone network (faculty network), AP2 are connected by wire to a PC client. AP1 and AP2 are connected with wireless link.
- 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].

IV) If Cisco AP are used and hardware reset are not available: Software erase the existing configuration

If there is an existing configuration on the AP, erase the configuration and reload.

```
ap#erase startup-config
…
ap#reload
…
```

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

Lab phases/tasks:
I) Bridge connection.
Set up (with web browser configuration interface) the wireless connection in bridge mode between the PC and the core network using two access points. Properly connected bridge will allow you to download the IP address of the PC with the faculty DHCP server.
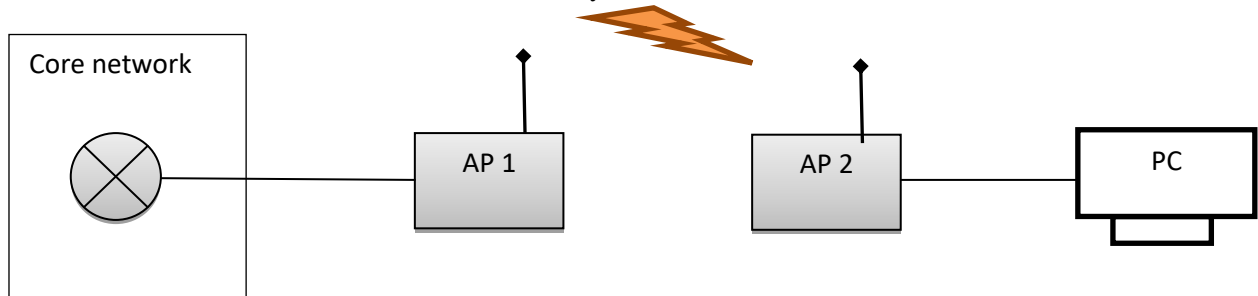
   a) **Step 1**

Select two devices AP (with the "bridge" or "workgroup bridge" mode) or Bridge (the same type). Propose IP/Mask addresses for each device and type in the Fig. above.

Note! Not each AP device can provide "bridge" or "workgroup bridge" modes, and the name of "bridge" or "workgroup bridge" mode can be different for different devices and manufactures.
Write the model of used devices: ....
Identify and write below what kind of a bridge functionality (modes) are available on the device (AP):
…………………………………………………………………………………………………

   b) **Step 2**

Select 2.4 GHz band. Configure the AP1 to "root bridge" mode (or "access point mode in case of using "workgroup bridge" on AP2): set the SSID name to C2_WLAN <computer_number>, set the radio channel to < computer_number >, do not set encryption on the radio link.
Configure the AP2 to bridge mode, and create the wireless connection with AP1.

Note! SSID names have to be the same on both devices. On Cisco devices you have to set up "infrastructure mode" parameter to your SSID name. The radio band (2.4GHz) have to be the same. In some of AP devices you will have to provide MAC address of opposite bridge AP device to establish the connection. On same devices are several MAC addresses (several NICs), usually you will need MAC addresses for wireless NICs. In case of different setup problems please check the manufacturer documentation to identify proper bridge connection setup.

c) Step 3

Test the connection between the AP1 and AP2 (use the ping command).
Connect network in the target configuration (see Figure above).
Test your final network (use the ping command and a http:// address in a web browser).

II) Secure the Bridge connection.
a) Step 1

Change the configurations to set up secure radio link with WPA encryption.

b) Step 2

Test the connection between the AP1 and AP2 (use the ping command).
Connect network in the target configuration (see Figure above).
Test your final network (use the ping command and a http:// address in e web browser).

Questions:

1. List and describe bridge modes available on your devices.

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.