NETWORK SIMULATIONS USING CORE

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Abstract: During the last three academic years, between 2014-2017 the Laboratory of our faculty which is involved in Free Software Testing was the scene of a set of experiments în Network Simulations. The goal was to provide a set of training sessions to the students of the F.R. program of The Faculty of Sciences (F.R. means students learning from the distance). Three kinds of software was involved in our test and one had succeeded in being selected as the software support of the Networks Laboratory: CORE. The papers is illustrating the use of CORE în a small network simulation, one of those who will be presented in a book by a romanian editor.

Keywords: networks simulator, CORE, router, switch

1. INTRODUCTION

The training in networking and especially complex networking is particularly tricky, due of some technical and cognitive aspects involved:

- the cost and availability of the involved devices
- the limitations of the space offered for a student, being his/hers workplace in the laboratory
- the presence of various operating systems in a mixed network setup, including Linux which is widely used as a network server, router, gateway server, proxy server, web server etc
- the limited availability of some IOSes and firmware for routers.
- the contract who forced the teachers to work as trainers for the hardware providers (for example. CISCO)
- the need of some OS-users skills, especially concerning Linux.
- some legal limitations concerning scanning, sniffing on provider's networks

Between 2014, the year when Ubuntu 15.04 was delivered by Canonical on various channels ([5],[6],[7]) and this year, 2017, we have worked with Linux and some simulators in order to select one to be recommended to our students. One of them was particularly useful for us and an experiment with it is presented here within: CORE ([1],[2]). And because some other network simulators like Marionet and GNS3 seems to be used in France, the presentation of our experience with CORE may be interesting. The authors from the team of CORE are presented in [3]. Marionet, a special distribution was rejected in the selection process.

2. EXPERIMENTS

2.1. Wired networks

In some of our experiments, CORE, a product of was used in order to reproduce a small net-caffe like network, (Fig.1) involving computers, switches, router and also to explain how some device are conceived in order to reflect the main traffic towards a station which is monitoring the entire activity, as we can see in Fig.2.

The students was requested to open consoles on various equipments in the simulated networks, to send ICMPs from one to an other and to listen the network traffic using simple sniffers or traffic analyzers in the n10 node.

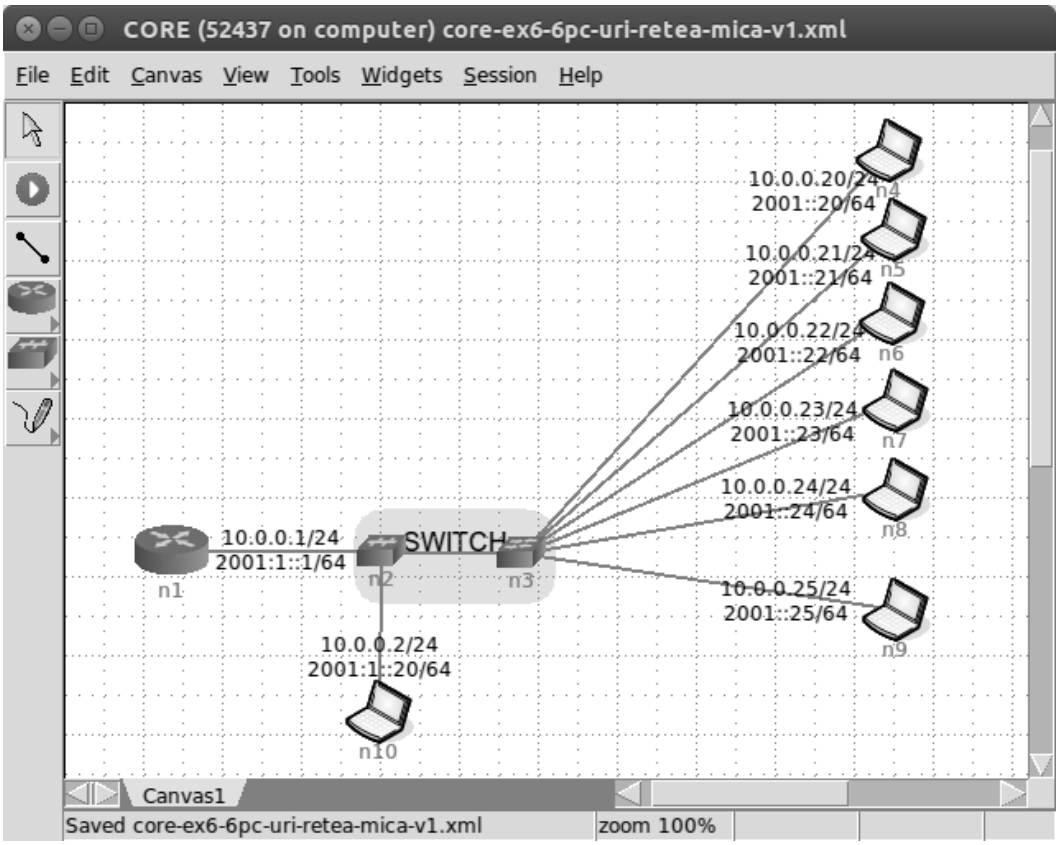

Fig.1. One of ours experiments: n1- router; n2- hub used as three ports repeater ; n3- switch ; n4-n9- some workstations; 10- sniffing point;

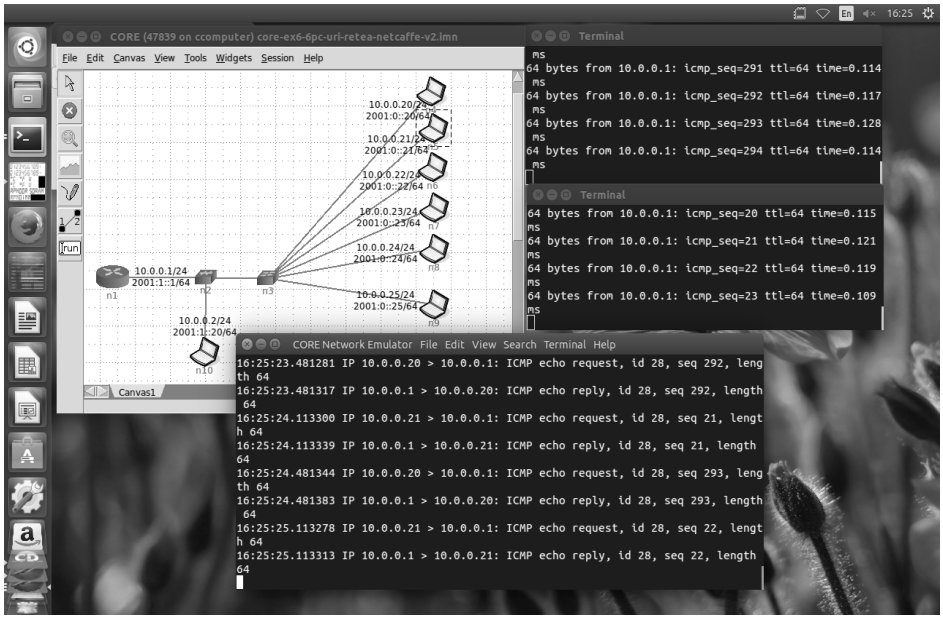

Fig.2. Running the experiment: Two workstations, simultaneously exchanging ICMPs with the router are monitored by the n10 station

2.1. Wireless networks

Some experiments included the simulation of wireless networks was made, too. The simulator is also able to simulate wireless networks, wlans. We have notice some issue which can be treated with caution. The import of the plan of the location have to be made at a right scale, otherwise the areas covered by antenna will not be correctly draw by the program, because they the circle will not be fitted with our plan.

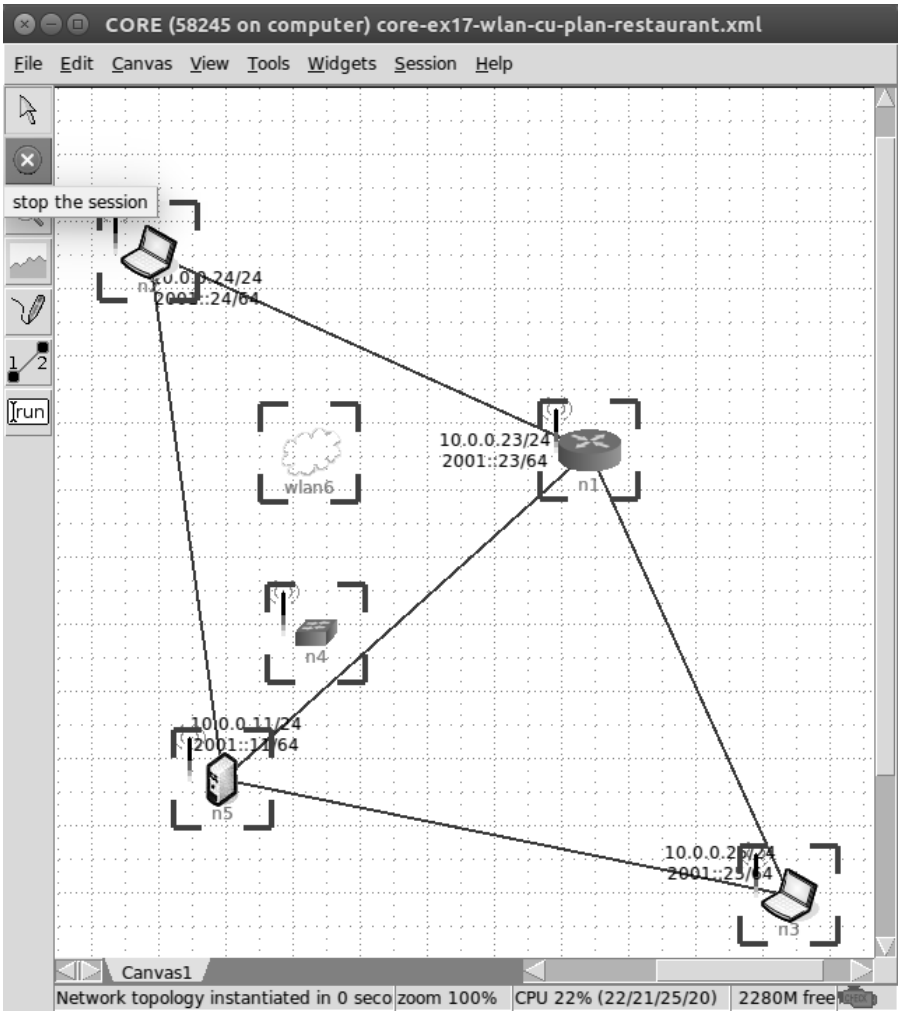

Fig.3. One of ours experiments: Students are required to remove the wires and create a wireless network.

3. RESULTS AND DISCUSSION

Comparing the CORE project and the GNS3 project, we can see why CORE seems to be well fitted to our purpose: Teaching the fundamentals of networking, in a *hardware producer free* manner.

Table 1. Some differences between two simulators: CORE and GNS3.

The CORE Project	**THE GNS3 Project**
Availability: On Linux or under a VM	**Availability:** On Linux and Windows or under a VM
Proprietary firmware or NOS: not needed.	**Proprietary firmware or NOS:** contract with CISCO may be needed.
Simulated devices: Routers, Switches, Hubs, wireless, etc.	**Simulated devices:** Routers*, Switches, Hubs, wireless, etc. routers only with proprietary firmware and NOS.

Fast instalation: Using Linux tools, from repository.	**Fast installation:** Not so fast, not so easy..
Commands: Linux compatible commands on consoles.	**Commands:** Not tested.
Details: Some details are not simulated: The numer of the ports wher a wire is connected is NOT simulated.	**Details:** Some minor details are simulated: The numer of the ports wher a wire is connected is NOT simulated.

4. CONCLUSIONS

Because our students have, had or will have enough experience with Linux (since they are already using the resource [8] in order to discover Linux), because Ubuntu Linux is free ([4],[5],[6] and the installer made by Canonical is simple enough to be used by a beginner, and because of the availability of CORE [1],[2] as part of the distribution made via on-line repository, considering Table 1, we have recommended CORE as a product for the training of our students. A course support was already written and sent to a romanian publishing house.

So, our students will have all they neeed: A manual, a free software and OS, a network laboratory, all in the same briefcase.

REFERENCES

[1] U.S. Naval Research Laboratory - Networks and Communication Systems Branch https://www.nrl.navy.mil/itd/ncs/products/core
[2] CORE Manual
https://downloads.pf.itd.nrl.navy.mil/docs/core/core-html/
[3] Acknowledgments https://downloads.pf.itd.nrl.navy.mil/docs/core/core-html/credits.html
[4] Kelly Thomas M, CCNA – Ghid de studiu independent CCNA Basics (CCNAB)
CISCO Systems, Editura BIC ALL, Bucuresti, 2005, 2007
[5] Ubuntu 15.04 (Vivid Vervet) http://releases.ubuntu.com/15.04/
[6] Ubuntu 15.04 - Ubuntu Wiki https://wiki.ubuntu.com/VividVervet/ReleaseNotes
[7] Index of /releases/15.04 http://old-releases.ubuntu.com/releases/15.04/
[8] Dan Popa – Caiet de laborator Linux http://infoifr.ub.ro/images/stories/documente/cursuri_fr_info_sem1/linux-labs.rar