LESSON E12_EN. ETHERNET PRACTICE THROUGH IMAGES. THE SMALL (MICRO) ISP.

Parent Entity: IPA SA, Bucharest, Romania, 167 bis, Calea Floreasca; Fax: + 40 21 316 16 20
Authors: Gheorghe Mincu Sandulescu, University Professor Dr., IPA SA, Bucharest, Romania, 167 bis, Calea Floreasca,
Mariana Bistran, Principal Researcher, IPA SA, Bucharest, Romania, 167 bis, Calea Floreasca, e-mail: san@ipa.ro. Consultations: Every working day between 9.00 a.m. and 12.00 p.m.

After learning this lesson, you will acquire the following knowledge:
- The placement and mounting of the NIC,
- The physical connection through Hubs and Switches,
- The practical achievement of a micro-ISP.

CONTENT OF THE LESSON

LEARNING OBJECTIVES:

After learning this lesson, you will have the ability to:
- achieve the mounting or replacement of NICs,
- achieve the practical physical connection between the components of nets, such as hubs , switches, NICs,
- achieve a micro-ISP.

1. ETHERNET PRACTICE THROUGH IMAGES.

The images from the following photos illustrate the practical mode of mounting and using the Ethernet elements and interfaces.

In fig. 4., 5., 6., the demonstrative steps of mounting the NIC on the motherboard of the PC are illustrated.
In these images, 4., 5.,6., the motherboard is not included in the frame of the PC.

The NIC is mounted with the mother board present inside the frame of the PC.

For this purpose, with the motherboard mounted inside the PC, the steps are as follows:

- the small metallic cover of the back of the PC is removed, in the position where the NIC (the front view of the NIC) will be mounted,
- the NIC is plugged inside the mother board.
- the front metallic element of the NIC is fixed with screws on the PC body.

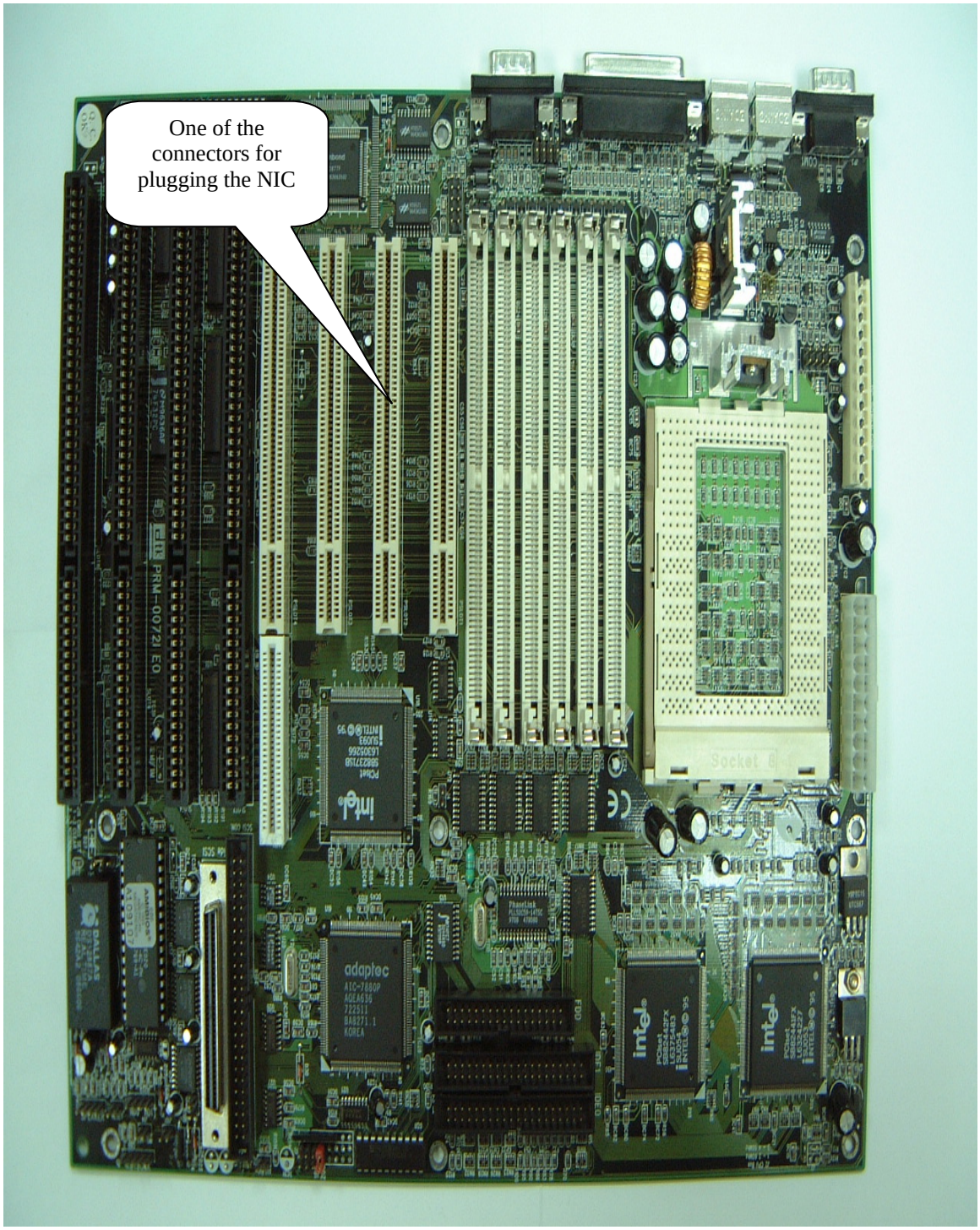

Fig. 1. The PC motherboard with the connectors for NICs.

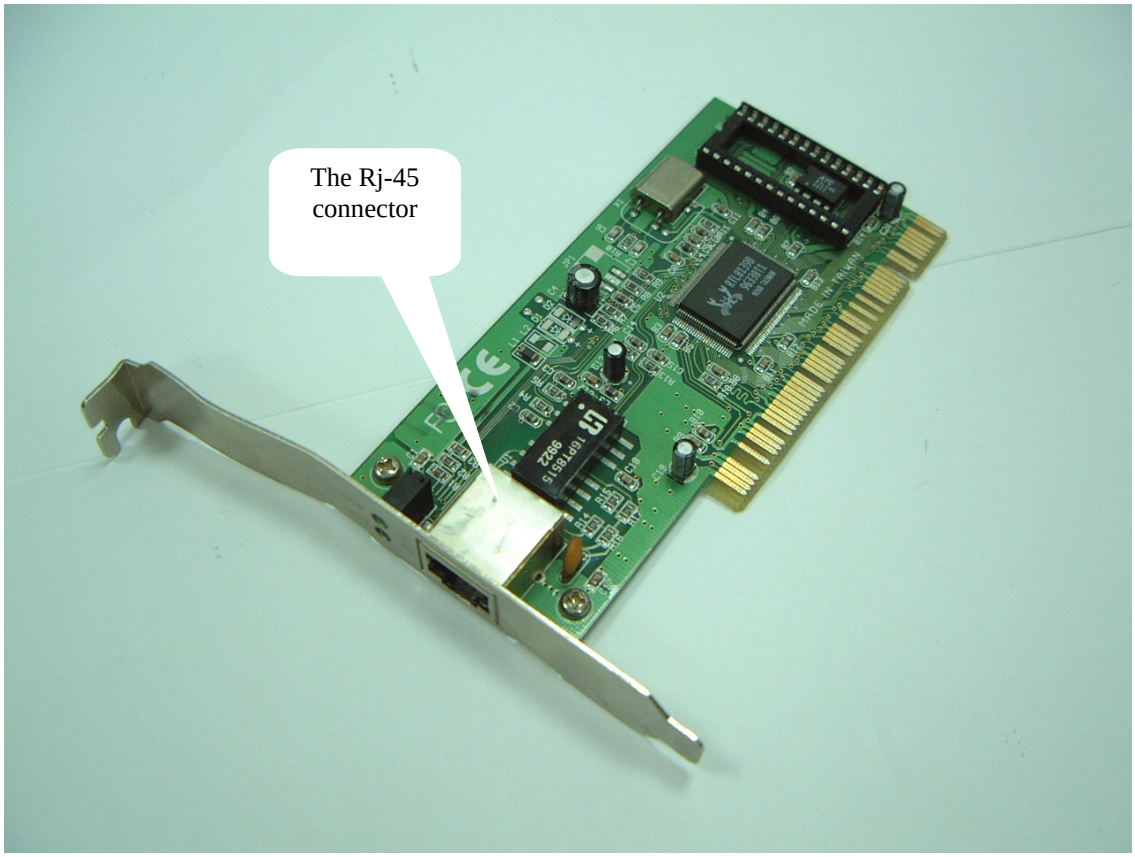

Fig. 2. The NIC.

Fig.3. Another view of the NIC.

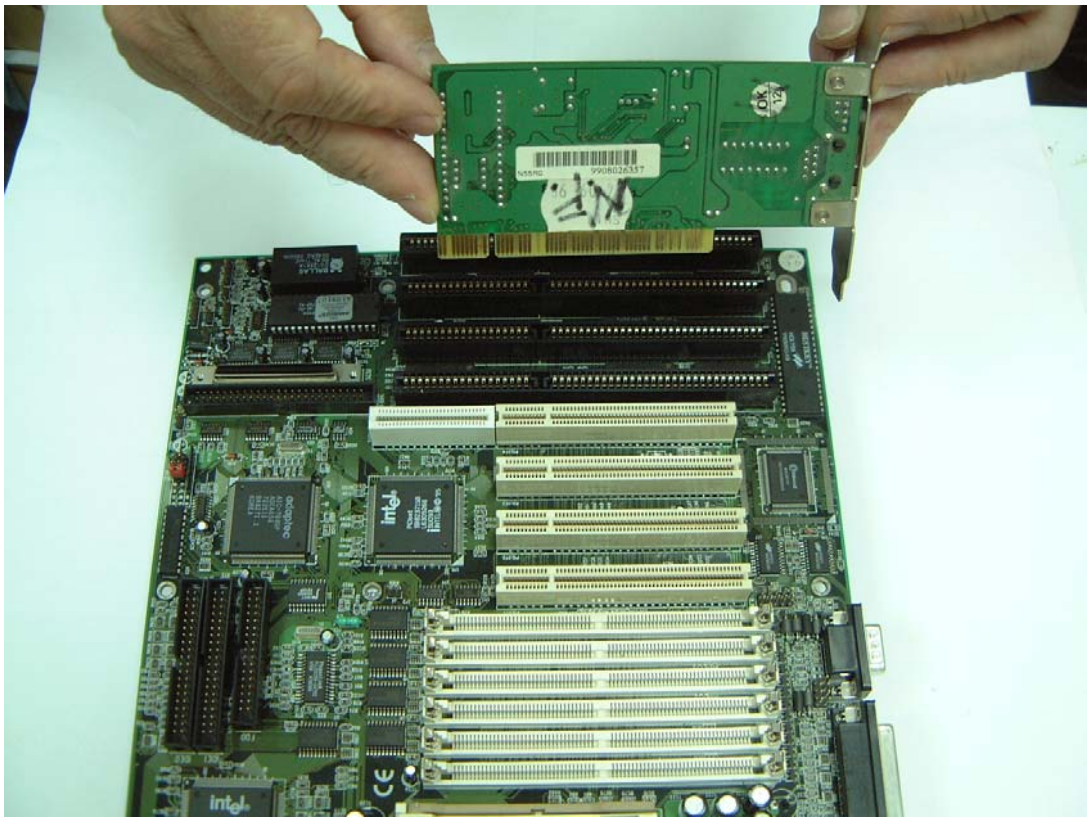

Fig. 4. The example of mounting the NIC on the free motherboard (outside the PC frame): first step

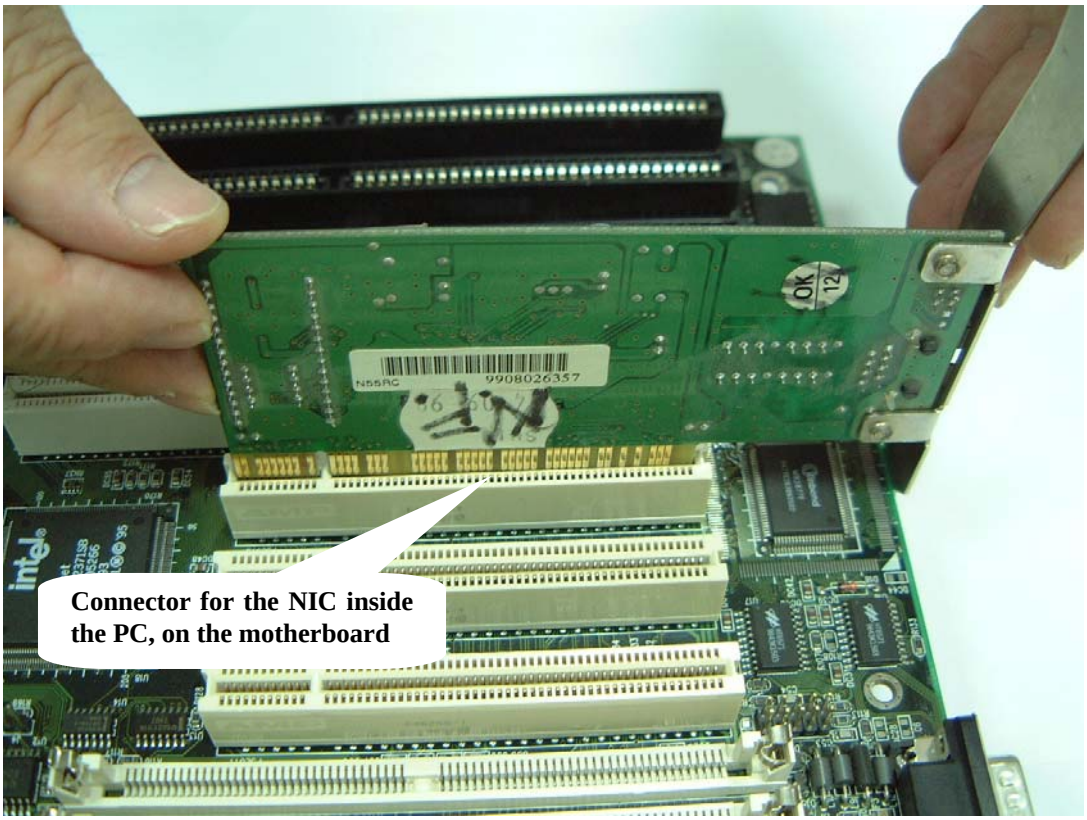

Fig. 5. The second step of mounting the NIC inside a motherboard (the NIC is presented outside of the motherboard)

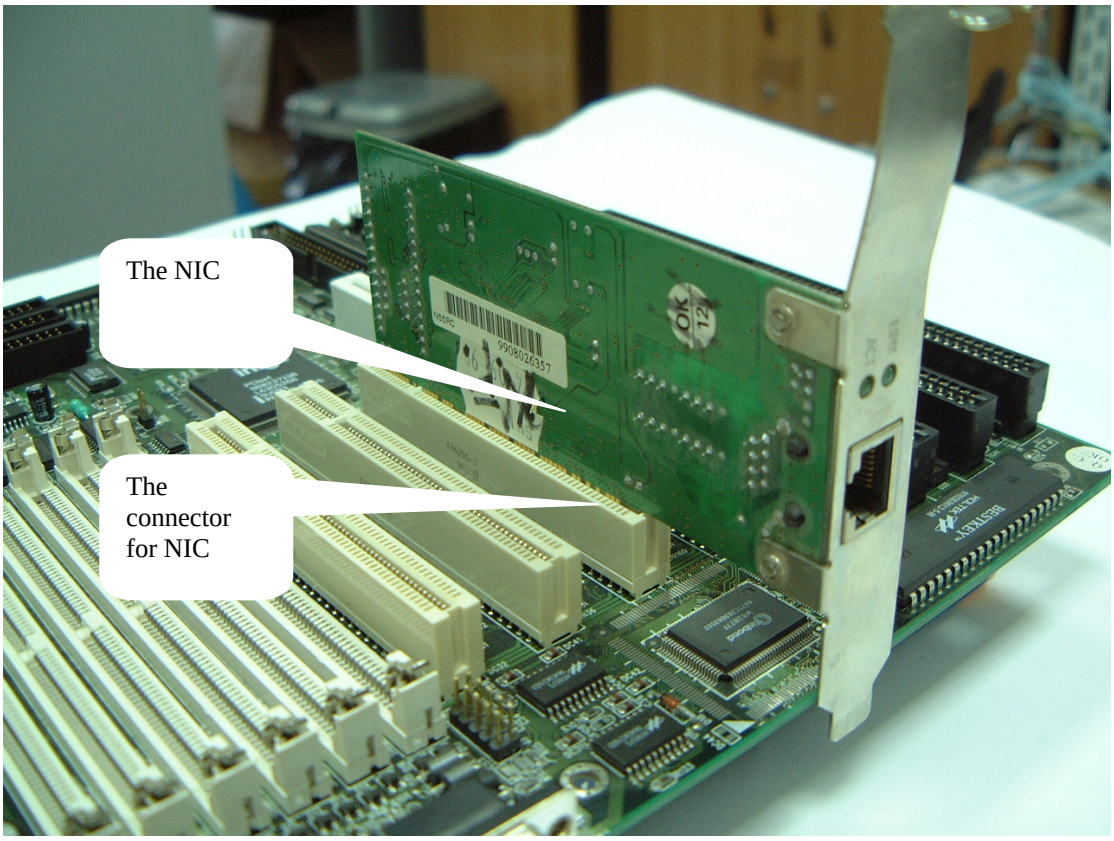

Fig.6 . The NIC mounted, demonstratively, on the motherboard.

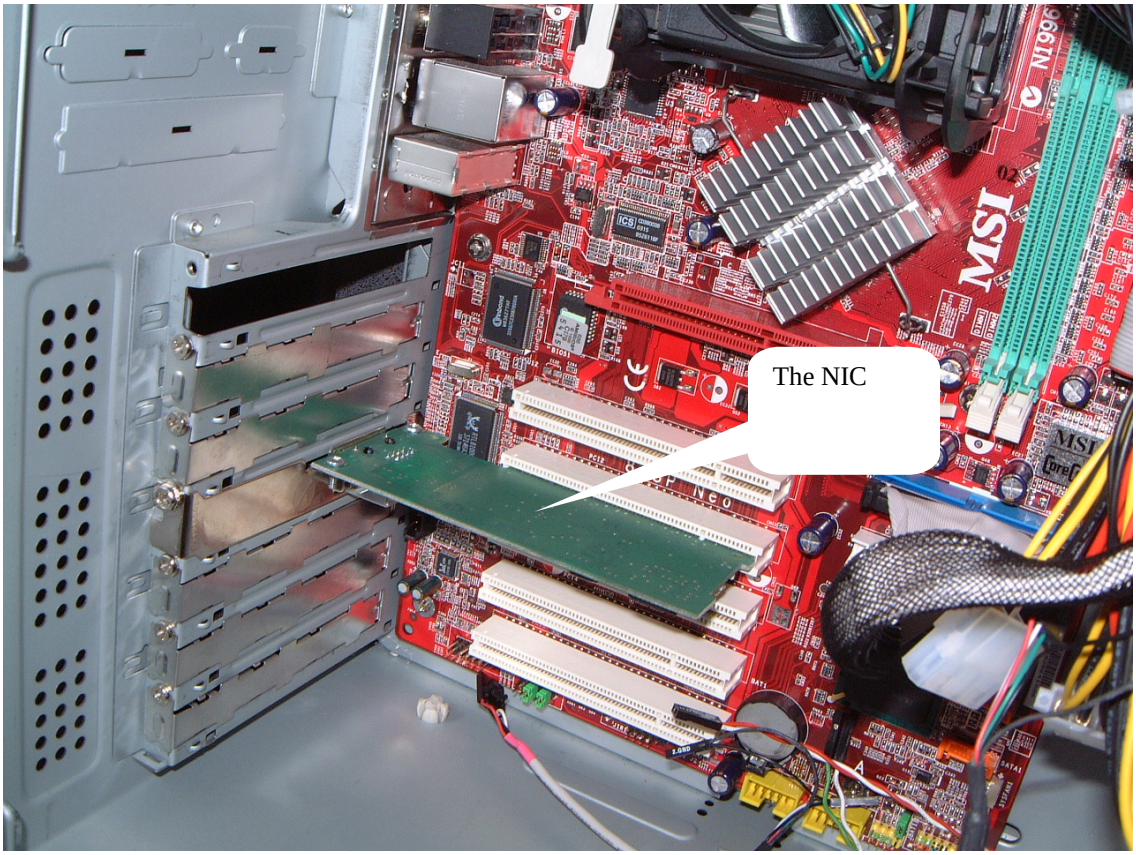

Fig. 7. The NIC mounted inside the PC and fixed with the metallic element on the back part of the PC

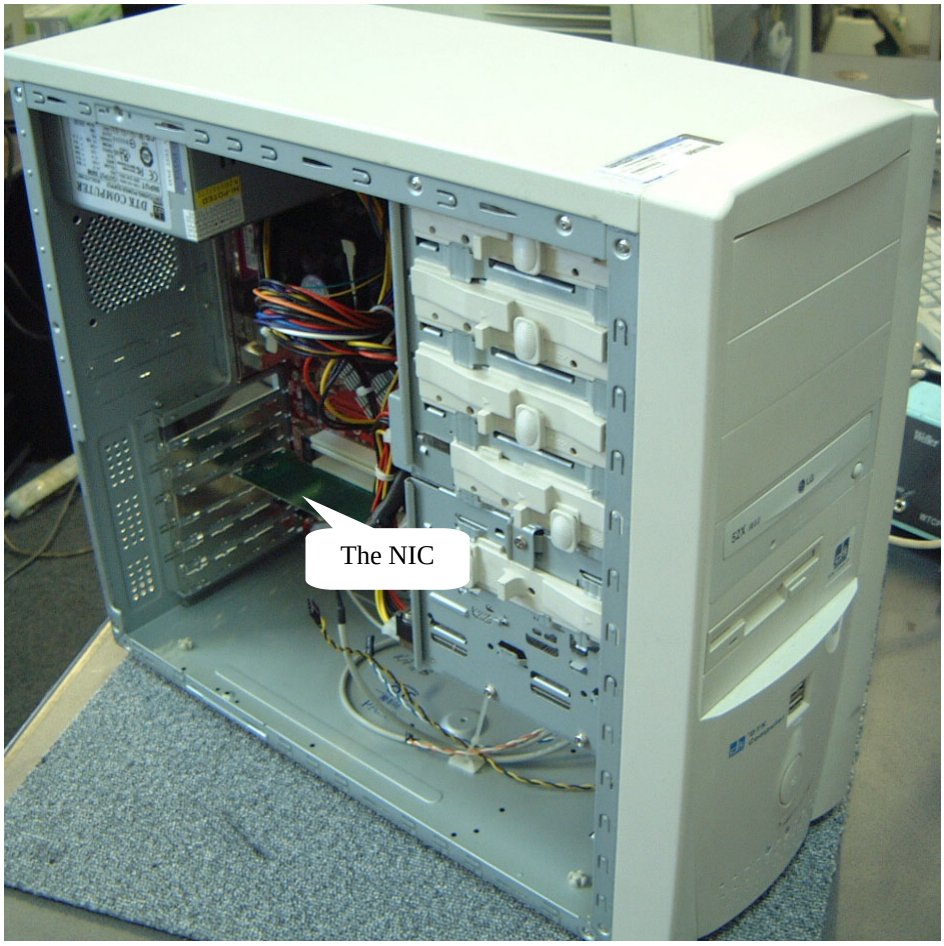

Fig. 8. The NIC finally mounted inside the PC

Fig.9. The NIC elements (the metallic plate with the connectors, including RJ-45), viewed from the back of PC

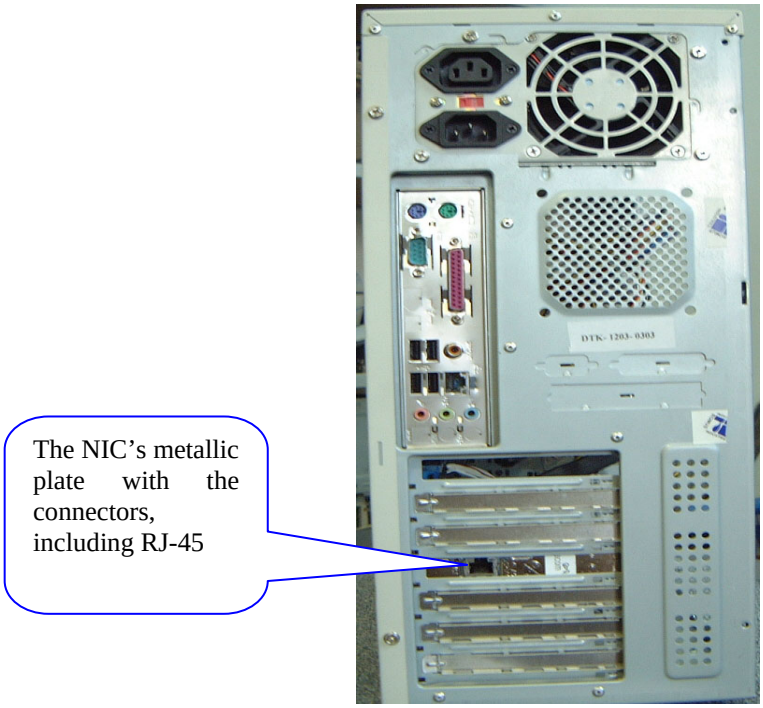

Fig. 10. The view of the back side of the PC.
Viewing a part of the NIC's metallic plate with the entry for the RG-45 connector.

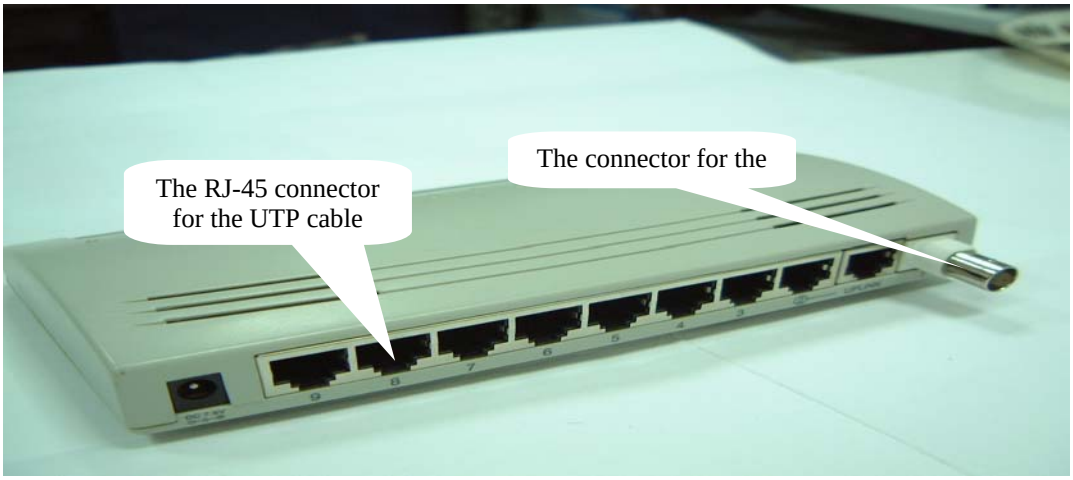

Fig. 11. An example of a Hub (8 –Port5 Mini Hub ESH-709 Encore ®)
with the possibilities for the connection of the UTP cable and the coaxial cable.

Fig. 12. Example of a Hub with 24 ports (3Com. SuperStack II ®) .

Fig. 13. A Hub (8 –Port5 Mini Hub ESH-709 Encore ®) serving 4 Partners of the star.

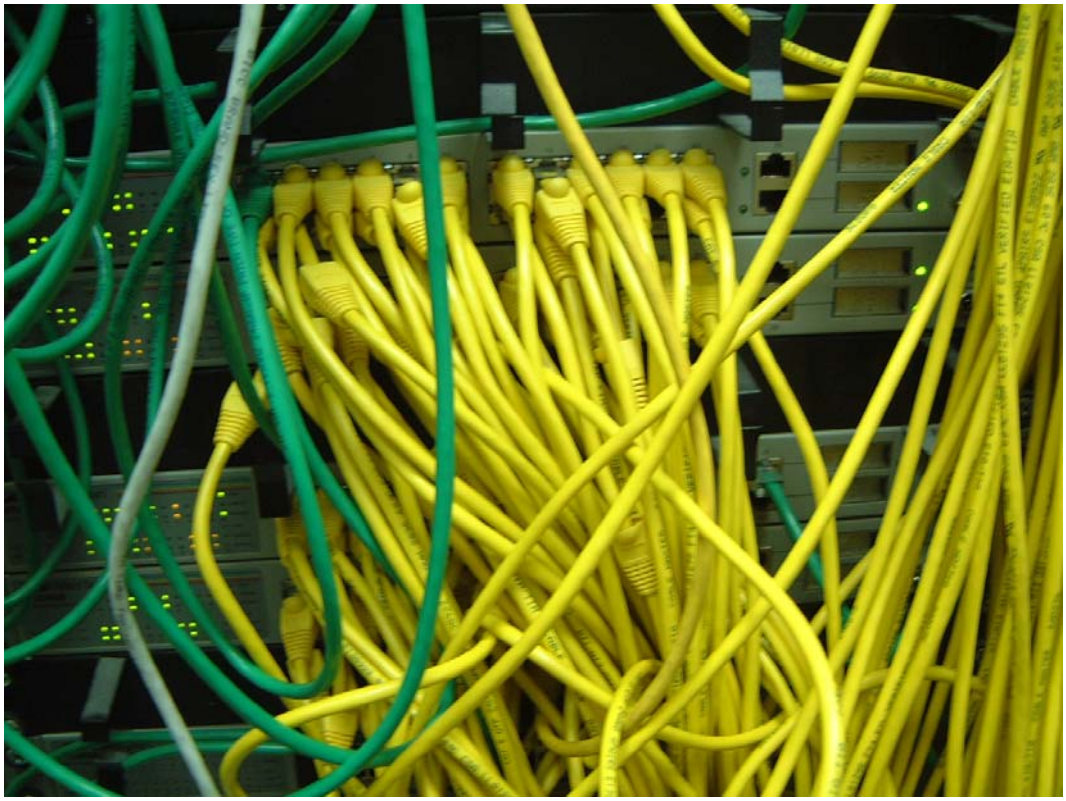

Fig.14. General example of the ‘in-star’ practical way of connecting multiple devices.

2. THE MICRO-ISP. THE ECONOMIC POTENTIAL SCENARIOS FOR THE MICRO-ISP. [1.], [2.]

Among the present trends in network services, the achievement of the micro ISPs is included.
The micro-ISPs are destined for serving small communities, for instance for a group of apartments or a building or 2 or 3 buildings, one big building, etc.

The number of clients / subscribers is estimated at a maximum of about 50 subscribers.

The configuration is simple and consists of:

- a non-expensive PC with the role of local Server and with 2 NICs, one towards the Hub and one towards the interface for the connection to the Internet
- a Hub,
- Cables,
- And the machines of the clients.

The economic evaluation (the evaluation does not guarantee the consequent results. These results are general assumptions for the most favourable, ideal environment) indicates, for a LAN with about 50 subscribers and connected to the Internet, the following:

Case 1.:
-The local network is connected to the Internet through optical fibre or stationary wireless or (when there are sufficient resources) a classical ADSL network.

- The costs of the investment, estimated in a very general manner, are the following:
  - the cost of the subscription to the ADSL of about 50 Euro/ month (to be verified at your ISP, for the respective time and respective prices); respectively 1 Euro / month for each subscriber (for 50 subscribers);.
  - the cost of the ADSL modem of about 200 Euro, respectively 4 euro / subscriber,

- a PC (preferably with UPS – Uninterruptible Power Supply) with the function of the Unix Server, plus 2 Hubs (or, preferably, Switches): about 500 Euro, respectively 10 euro per client.
- A Wi-Fi access point about 150 Euro.

The result is an effort of the network administrator and investor of about (with very large limits of approximation): 900 Euro.

If each subscriber bears the following costs (only informative and necessary to be updated):
- The general installation: about 20 euro,
- A personal interface (NIC and cables) of about 70 Euro
- The subscription of about 5 Euro / month

The result is that, in the most positive situation for the administrator / entrepreneur, the administrator amortizes the investment of 900 Euro in:

900 Euro / (50x20 + 50x5 – 50x1) =900/1450 months, respectively in less than 1 month, and accomplishes a monthly gain (including taxes) of [50x5 -50x1] Euro, respectively of about 200 Euro /month (with a high level of approximation). The situation may be different from case to case.

This situation may be an interesting starting-point for the activities of the Internet.

3. EXAMPLE OF A CONFIGURATION FOR THE MICRO-ISP.

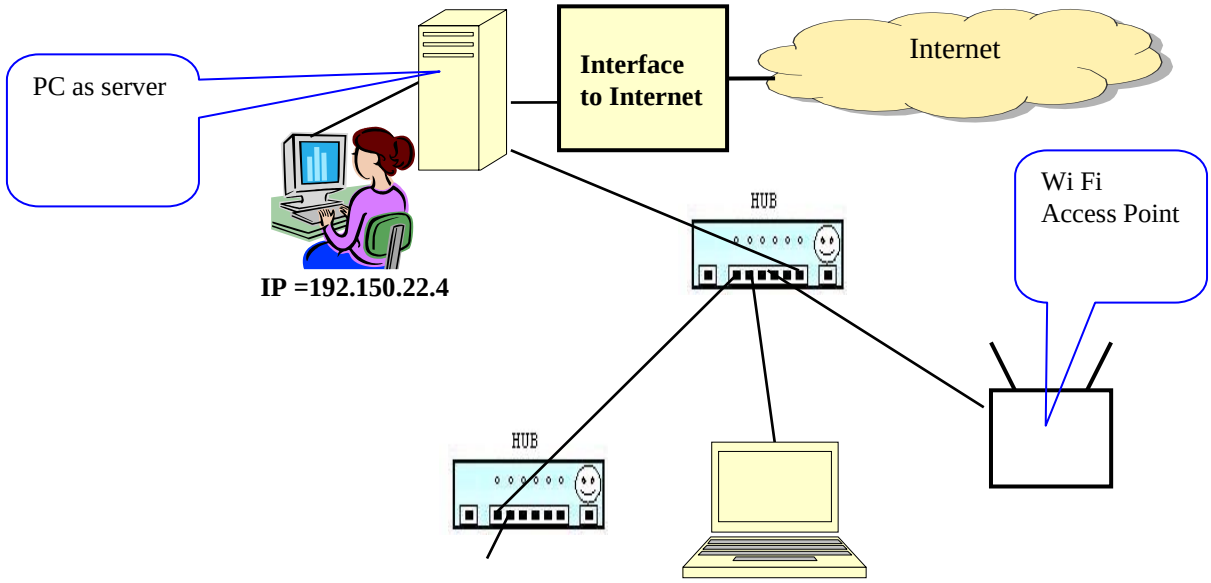

Fig. 3.1. The example of a micro-ISP configuration.

Some of the 50 subscribers may be connected through UTP cable and some through Wi-Fi wireless connections.

Key Point Summary Conclusions and Recommendations

The mounting of the net components is very simple and versatile.
The micro-ISP may be, in principle, efficient for the small communities.
It would be convenient for the configuration of the micro-ISP to include Wi-Fi facilities, so that the subscribers can be connected in wireless mode, when the environment conditions permit.

Study Guide

ESSENTIAL QUESTIONS TO EVALUATE THE ACQUIRED KNOWLEDGE

1. How is the practical mounting of a NIC achieved?
2. Why is the construction of a star network very versatile?
3. How must the people who mount the NIC be equipped?
4. What are the tendencies in the field of the NICs?
5. What are the important enhancements of NICs?
6. Does the Windows XP have the facility of recognizing the NIC through the Plug and play procedure?
7. Which is the most used mother bus inside PCs?
8. Which was the previous standard, before PCI, for motherboards?
9. Are the PC motherboards which also permit PCI also ISA slots?

10. Are NICs auto-switchable on 10 and 100 Mbps?

BIBLIOGRAPHY. REFERENCES.

[1.] Alexandre Chauvin-Hameau: *Wi-Fi. Maîtriser le reéseau sans fil*, ENI, Collection Resources Informatiques, Nantes, 2003, 2-7460-2058-8.
[2.] Olivier Pavie, Favie Pavie: *Monter un réseau sans fil*, Campus Press, Paris, 2003, 2-7440-1591-1.

IMPORTANT SUPPLEMENTARY BIBLIOGRAPHY. REFERENCES. (www)

SUPPLEMENTARY INDICATIONS ABOUT THE CONTENTS OF THE LESSON

It is recommended to also consult the documentations from: www.cisco.com

ANSWERS TO QUESTIONS

1. The practical mounting of a NIC includes:
   - the removal of the lateral cover of the PC,
   - the removal of the corresponding small plate which covers the NIC position towards the back of the PC,
   - plugging the NIC inside the motherboard,
   - the fixation, with screw, of the NIC's plate to the back end of the PC.
   - the mounting of the PC big plate to cover the lateral side of the PC,
   - plugging the net cable inside the NIC external connector.

2. Because the arms of the star are separated and, in case of troubles, a quick troubleshooting may be assured.
3. With the anti-static wristband connected to the PC case and non-magnetized screwdrivers.
4. The ISA NICs are cheaper, but the PCI NICs have a faster throughput and, consequently, they are obviously going to provide a better overall performance.
5. Buffering: the size of the RAM; DMA- Direct Memory Access; Bus mastering: control the bus with the direct exchanges with the RAM computer (without the CPU).
6. Yes.
7. PCI , because it supports 32 and PCI 2.1 , 64 bits and is faster.
8. ISA- Industry Standard Architecture, an old bus previously used by IBM.
9. Yes, but it must be verified at the purchase.
10. Yes.

WORDS TO THE LEARNER: "*Do not wait for opportunities. Create them.*" (After Bernard Shaw)