

# Network Organisation at the Electronics CAD Laboratory

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## *Abstract*

*This article treats problems of the hardware, software and computer network at the Electronics Computer Aided Design Laboratory, The Faculty of Electronic Technologies - The Technical University of Sofia. Some aspects of the computer communications at the Laboratory are described. Experiments with the new SCO VisionFS server are also involved. Unique for Bulgaria professional CAD software packages together with ways to import result from them to other software packages are outlined. The heterogeneous local computer network at the Laboratory is illustrated regarding the software necessary for the connection to the university computer network and the Internet. This computer network is being used for many years in the educational process as well as in the research activities carried out at the Laboratory and together with the university computer network proved to be efficient and capable of managing the complex software and hardware used at the Laboratory.*

## **Introduction**

In these days there is a great need of applying computer networks for the use of the complex software and hardware resources that are employed for professional applications in the field of the automated Electronics and Microelectronics design. These networks are also needed for connection with other laboratories in the Technical University - Sofia and the Internet.

## **Common Structure of the Laboratory (Hardware and Software)**

The Electronics Computer Aided Design Laboratory (ECAD) which is situated in Building No. 1 of the Technical University is equipped with hardware and software in the framework of the TEMPUS JEP 03038.

The hardware comprises IBM PC compatible computers - 486 DX2 / 66 MHz and PENTIUMs, and four SUN SPARCstations. Laser, jet and matrix printers, as well as a pen plotter, a scanner and a modem are also available in the Laboratory. One of the workstations and two of the Personal Computers are situated in Building No 2 of the

The software comprises operational systems **Windows '95**, **Windows 3.11** for the IBM PC compatible computers and **Solaris 2.5.1** for the SUN Workstations, as well as various application software like **CAD/CAM** systems (**CADENCE** and **SYNOPSIS** for the SUN workstations; **Design Centre**, **OrCAD**, **CADSTAR**, etc. for the IBM PC compatible computers), various word and graphics processing software, **Internet** software, etc.

The most interesting among the software packages are **CADENCE** and **SYNOPSIS** which are unique in Bulgaria and at the same time they are a professional tool on a world scale for Microelectronics design. These packages are compatible with the UNIX operational system (**Solaris**). The first one of the software packages is a powerful tool for Integrated Circuits design, the so called top-down design, from the highest hierarchical level to the layout of the circuit using leading world companies' technologies. The second one is used for the functional design of digital integrated circuits and the results of this design is a schematic of the circuit. The information interchange between these two software packages can be achieved in several ways, the most appropriate of which is the use of the **EDIF** format. In that way integrated circuit that are designed with the help of **SYNOPSIS** can be imported in **CADENCE**, thus completing the design cycles and obtaining the layout of the integrated circuit.

It is possible various kinds of graphics information, exported from these software packages, to be imported into other PC application software like **Microsoft Word**, **Corel Draw**, etc. using appropriate graphics formats which are compatible with these applications, for example **HP-GL** or **PostScript** - fig. 1.

The software packages in the field of Electronics and Microelectronics, designed for PCs are very convenient for student education, since they give the students a complete system of knowledge in that field.

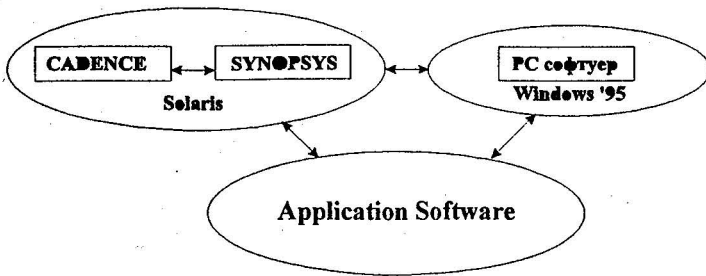


fig. 1. Software packages interface.

## Computer Network

The Laboratory computer network is based on two sub-networks - fig. 2

- **10Base-2 Ethernet** (coax, BNC) - between seven Personal Computers, using the **Microsoft NetBEUI** protocol;
- **10Base-T Ethernet** (UTP, RJ-45) - between the three SUN workstations, using the **TCP/IP** protocol.

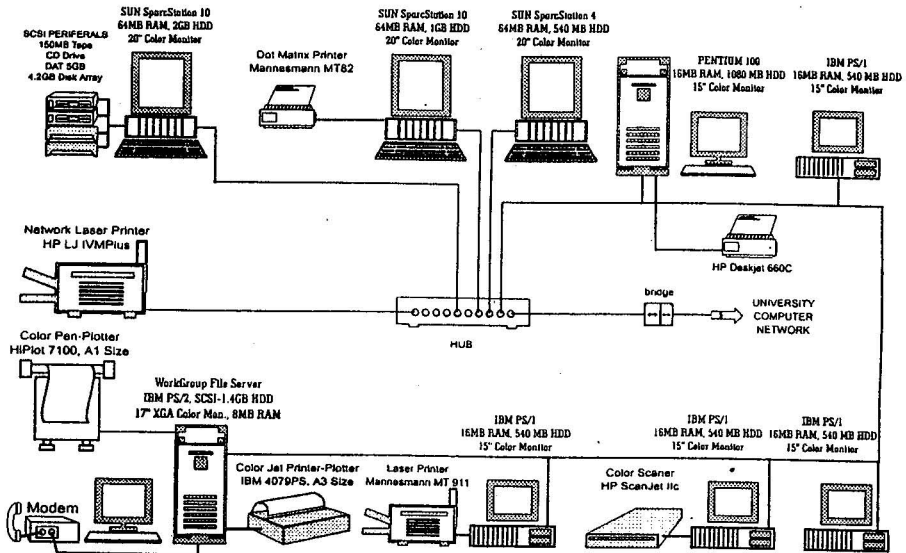
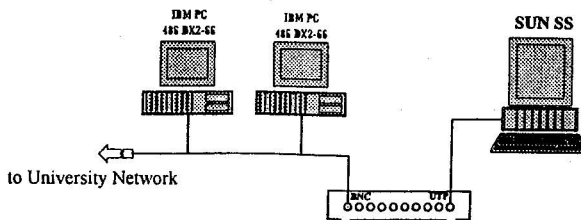


fig. 2. Network organisation at the ECAD Laboratory.

The two sub-networks are joint by **8-port HUB** and via it they are connected to the computer network of the Technical University, thus providing a connection to the other hardware resources of the Laboratory in Building No. 2 and the **Internet** - fig. 3.



фиг. 3. Computer network of the ECAD Laboratory in building No. 2.

The logical layout of the Laboratory network is the following: each computer shares its resources with all others (so called non-dedicated server). In fact the shared resources are:

- 4 SCSI hard disks with a total of 7 GB, attached to the SUN stations;
- 2 hard disks with a total of 2 GB, attached to two of the personal computers;
- 2 CD-ROM drives attached to a SUN station and a personal computer;
- DAT and CARTRIDGE archive drives attached to a SUN workstation;
- 4 printers, one of which is directly accessed from the network, and the three others - from print servers;
- 1 pen plotter and
- 1 modem, which is not being used for the time being because of the bad telephone links outside the Technical University.

The communication between the IBM PC compatible computers and the SUN workstations is based on the TCP/IP and NFS protocols. A **SCO VisionFS** server is experimentally installed on a SUN workstation for evaluation purposes. It represents a server software which is used without the need of client software installation. In that way the system administration is very easy. This server grants also access to the networked laser printer from the personal computers. Another advantage of this server is that it grants access to system resources (directories and printers) which are not local but remote and mounted (if they are directories) from another NFS server. A NFS server is installed on one of the personal computers, thus granting user access to PC hard disks from the SUN workstations.

The Laboratory has its own **World Wide Web** and **E-mail** servers and for the E-mail users a **POP3** server is installed and running.

In near future a local (for the Laboratory) **Domain Name Server** is foreseen to be set up. In that way the machine-name-to-IP-address will be easier and it will lower the network traffic to the university domain name server. The setup of a **firewall** is also possible and is being discussed.

## Conclusions

Many years of this computer network usage in the educational and research process, carried out in the Laboratory, as well as the communications with the university network and the Internet have proven its effectiveness and ability to serve the complex software and hardware, applied in the Laboratory.

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