Networks And Connectivity Essay, Research Paper

Networks and Connectivity ByGeorge Vagenas Trying to give a definition to the term COMMUNICATIONS we can say that Communications is the dispatch of a message from one point to another and the confirmation of the complete , right and conceivable receiving of the message by the authorized addressee . As we can see from the history there was a huge try to achieve the communication between people . The signals of smoke , the sounds of the drum , the fire were some of the basic ways for the transfer of a message in a era years ago . But these ways of communication was neither accurate nor has the certainty of the success . Also the transfer speed of the information was small , the size of the information tiny and the security of the communication was almost absence . The need for networks appears for the first time when Graham Bell set in use the telephone . He was talking with a friend of his with a single line , but later when he wanted to talk to another friend of his he needed to use another line to connect his phone and the phone of his friend . So imagine that he has X friends , he would need X(X-1)/2 lines and X-1 phones , that was impossible so the need of networks come up . The network first developed for the need of the voice communication but after the appearance of data communications need the same network was used . From the time that electricity and electronics had developed there was rapidly changes at the section of the communications . After the decade of the 1950 the computers started developing , and the communications started playing an important role in peoples life . Also the evolution of the voice communication has created an extensive telephone network which today covers a very large part of the planet , and computers have taken advantage of that network in a great rate so as to satisfy their needs for data communication . Terms Talking about our days , when we are referring to the term computer connectivity we have a complex of hardware , software and physical appliance, and we mean the way and how computers can communicate and share common sources with the use of an intelligent or common network . With the term Data Communication we mean the exchange of information under the form of data between Data Terminal Equipment . These information are data which compose from characters such as the letters of the alphabet , numbers , punctuation marks and other symbols . We have to define some key terms for better understanding of our subject. Information at the communications we mean every organized signal , whereas when we say data we mean the notation which represent the coded form of the information with the use of letters or symbols . The encoding happens with a specific way (usually digital) in order to make the information proper for process , storing or transfer . With the concept Data Transmission we determine the transfer of the information within physical appliance . By the evolution of the computers the Data Terminal Equipment reach the point to have enough process power to maintain a part of the application or a part of the data base . This architecture is the CLIENT / SERVER . It is useful to examine some computing environments , so we have single-user , multi-user and client / server computing . When we say single-user environment we usually referring in a network that has PC for Data Terminal Equipment . As the name says , they are the systems that allow access to one user each time . All the applications and the peripherals that the network offers can be available in only one user each time . The restrictions that the single-user environment set, we are trying to skip them with the multi-user environment . The multi-user systems share their abilities between the users with techniques which we characterize them as time sharing . In these environments we use dump terminals , one monitor and one keyboard . In a client / server computing environment every Data Terminal Equipment is a PC and the environment works like the multi-user environment . So every user with his own PC shares with the others the applications , and the peripherals that the network provides like printers , streamer, hard disks etc. Trying to compare this three environments we are going to see an example of how we can run an application in each environment . In a single-user system we load the application on the RAM of our PC and we execute it , from now on the CPU is occupied with this application only . At a multi-user environment the RAM is shared to many users while the CPU dedicates one percentage of the whole power to this application cause it has to serve and the other users . In contrast , in a client / server environment we load the application in our PC ( client ) from the file server and we execute and process it on our PC . Every time the application needs some data asks it from the server and then it processes It . LAN – WAN With the convenience that the modern telecommunications gives , every user has the ability to use the power of a workstation through Data Terminal Equipment . By now the Data Terminal Equipment aren t restricted to be in the same place with the workstation, but they can be installed in different places , different cities or even in different countries . So we have two different type of data communications which we distinguish them with the factor of the distance between the Data Terminal Equipment which are going to be connected . The LAN ( Local Area Network )and the WAN ( Wide Area Network ) . The only difference between LAN and WAN is the physical appliance that we use to connect the main computer with the nodes . So we are going to talk for the LAN which is most famous these days . Local Area Networks , are the networks that consist from a number of Data Terminal Equipment (nodes ) and exist in a restricted geographical area .

The basic elements that a LAN consist are these :¬ The physical appliance and the communication devices .¬ The Data Terminal Equipment ¬ The interface of every DTE that is responsible for the connection with the physical appliance .¬ The communication protocols or else the mechanism of the transmission checking .¬ And the software . In our days the most common networks are these that use the client / server computing environment . The most common physical appliance that we use in a LAN are the cables of twisted pair , coaxial cables ,optical fiber and the wireless links . Physical Appliance Cables of twisted pair , are the most common cables . They have the ability to passing through them analog and digital signals , they serve point to point and multipoint connections . We have two types of twisted pair cables , the Unshielded Twisted Pair ( UTP ), and the Shielded Twisted Pair with the transfer rate of 155 Mb per sec . Coaxial Cables , are the cables that first used in the networks . They have big noise resistance , resistance in the physical force and big transfer rate .We have two types of coaxial cable , the cable of the 50 +hm and the 75+hm. Fiber-Optic cable , is the newest physical appliance that we use today . Optical fiber have huge transfer rates and big resistance in the noise and the physical force even bigger than the coaxial cables . Wireless Links . We use wireless links for transmissions of high transfer rate . They have the disadvantage of information s low transfer security so for this reason we use techniques of encryption . Topologies Examining the LANs with the factor of the topology we have four different types : ¬ Star Topology¬ Bus Topology¬ Tree Topology ¬ Ring Topology The Bus and the Tree topology have common features so we usually we meet them together in a combination known as bus/tree . Star Topology . In the star topology every node connects point to point with a main computer and all the communications happens through this main computer . Every time that a node wants to sent data to another node , it transmits a request to send signal to the main computer in order to open the way to the desired node . In this case the main computer has the control of the networks communications . Bus & Bus/Tree Topology . At the bus topology the nodes are all connected in a high speed cable . One extension of the bus topology is the bus/tree topology where from the main route branch away lines which they create smaller bus . In the bus topology the nodes exploit the common cable way (bus) and transmits data in different time . The transmitted data are in the form of packets which go through from all the nodes and every node accepts only the packets that has his identity . Also the bus topology can serve and multipoint connections . Ring Topology . In the ring topology all the nodes are connected in closed cable way ( loop ) in which the data transmitted in a serial way at the whole ring from one node to the other . Every node of the network in this topology works as a repeater , that means that retransmit the data to the next node and so on. The data runs on the ring in the form of packets and they include the address of the dispatcher and the addressee . Every packet that comes in a , it is repeater recognized from him and either it keeps it if it is for this node or it is retransmitted to the next node/repeater . Very often we combine the ring topology , which is a point to point connection , with star wiring connections , with this way we create a star-ring form which take advantage of the star and ring topology . With the star-ring topology we can easy locate every problem that might come up in the network and cut off that part so that the rest to work . The most common problem for the ring topology , is the break of the ring but now we can easily repair it since we can add or remove nodes from the main point of the network . MECHANISMS OF TRANSMISSION When we are talking about mechanism of transmission we are referring to the way the nodes communicate between each other , and the procedures we use to check the right and conceivable receiving of the message by the authorized addressee . Some of the basic mechanism of transmission are :a. TOKEN BUS for the BUS topologyb. TOKEN RING for the ring topology TOKEN BUS . This protocol is complicated and requires the logical topology to be ring ( note not the physical topology but the logical one ) , and we use it in the bus networks .TOKEN RING . Is the most famous protocol which was developed by the IBM. It is the same with the token bus protocol but here we have in ring both the logical and the physical topology . We have also some other communication protocols for the transmission of the data between the nodes . Some of the most famous protocols are TCP/IP (the fundamental protocol of the Internet ) , SPX/IPX by the NOVELL and the XNS by the XEROX . But these are only important when we want to connect two LANs and we want to communicate at the same protocol Accordingly to the topology , the mechanism of transmission , the communication protocol between the nodes and the physical appliance we use the appropriate hardware , and we mean the right Network Interface Card ( NIC ) which we install it in the node . Ethernet Token Ring LAN Below we state two of the most famous LANs . ETHERNET . Is one of the first LAN that was developed by the XEROX on 1972 and later on it was evolved by DEC , Intel and XEROX on 1980 . It offers transfer rate 10Mbps in a bus topology through coaxial cable or twisted pair cable . TOKEN RING . IBM and Texas Instruments developed a strong and fast LAN that was named TOKEN RING which as the name implies it belongs to the ring topology and usually we use twisted pair cables . The transfer rate is either 4 Mbps or 16 Mbps . Looking ahead we can see that we are going to have a big revolution to the communications with high speed networks such as the ISDN (Integrated Services Digital Network ) which is in its first steps , high speed wireless networks and much more features like Video Conference , Video Telephony and many other .