LANs, WANs and MANs

[Name of the writer]

[Name of the institution]

Compare and Contrast of LANs, WANs, and MANs

Overview of the topic

In this topic, there is a need to compare LANs, WANs and MANs. The three types of networks are used by the companies for the communication purpose. Each one of them has their own purpose, significance and attributes. These three networks are important to enable the different functioning of the organization. Therefore, all these aspects regarding the topic will be discussed in detail.

Discussion of the topic

- **Local Area Networks (LAN)**

They are privately owned networks of up to a few kilometers. For example an office or school. They are used to connect personal computers and workstations, in order to share resources and exchange information. They are restricted in size, meaning that the transmission time, in the worst case, is known, which allows certain kinds of designs (deterministic) that might otherwise be inefficient. It also simplifies network administration. They usually use broadcast technology via a single cable to which all machines are connected. They operate at speeds between 10 and 100 Mbps. They have low delay and experience few errors. LANs are those which expands in a relatively small area. It is located inside a building or set of buildings.

Its extension is physically limited to a building or an environment of up to 200 meters (Amalina, 2013).

A LAN can be connected to other LANs over any distance via a telephone line and LAN radio. The waves can be formed from two computers to hundreds. All are connected together by various means and topologies. A computer responsible for keeping track of the network is called server and computers that are connected to it; they are known as nodes or workstations. LANs are capable of transmitting data at very high speeds, but the distances are limited. Generally these networks transmit data at 10 megabits per second (Mbps). It is important to note that these transmission rates are not expensive when they are part of the local network (Faulkner, 2012).

- **WANs (Wide Area Network)**

These are networks that are spread over a large geographic area. It contains a collection of dedicated machines to run user programs (hosts). These are connected by the network that carries messages from one host to another. These hosts LAN subnet access the WAN by a router. Therefore, they usually point to point networks. The subnet has several elements:

- Lines of communication: They move bits from one machine to another.
- Switch Elements: Specialized machines that connect two or more transmission lines. It is often called routers. Each host is then connected to a LAN in which the router is in charge of sending the information by subnet.

Each host is then connected to a LAN in which the router is in charge of sending the information by subnet. A WAN contains numerous wires connected to a pair of routers. If two

routers do not share Cable want to communicate, they must do so through intermediate routers. The entire packet is received at each of the intermediate and stored there until the required output line is free. It commonly comprises of multiple LANs in a large geographically interconnectedness- through optical fiber or air links, as satellites area. It is a type of computer network capable of covering distances from 100km to 1000 km, providing service to a country or continent. The larger WAN systems are: ARPANET, which has evolved into what, is now the global WAN Internet. They can operate at only 1.5 Mbps and are very expensive (Sadiku, 2013).

Many WANs are built by and for a particular organization or company and are private, others are built by internet service providers (ISPs) to provide connection to their customers. Today, the internet provides high-speed wan, and the need for private WANs has shrunk dramatically, while virtual private networks using encryption and other techniques to make that dedicated network continuously increasing. Typically the wan is a peer to peer network, namely packet switched network. WANs can use communications systems or satellite radio (Kizza, 2013).

- **MANs**

They are a larger version of the LAN and use very similar technology. Currently this category has fallen into disuse, usually only distinguish between LAN and WAN networks. Another type of network is applied in organizations is the metropolitan area network, or MAN (Metropolitan Area Network), is larger than the LAN version and are usually based on a technology similar to this. The MAN is a network of high-speed (broadband) ranging from a group of offices near a city. The metropolitan area networks allow reaching a diameter of around

50 km, depending on the scope between network nodes of the type of cable used (Hofstede, 2011).

A metropolitan area network is a network of high-speed (broadband) that covers a large geographic area. It comprises of loop networks based on bonding technology, so that the links are formed by multiple pairs of copper in order to provide the required bandwidth. Furthermore this technology ensures, because the links are made up of multiple pairs of copper and it is physically impossible to 4, 8 or 16 wires as both fails simultaneously. The concept of metropolitan area network represents an evolution of the concept of local area network to a broader scope, covering even major national areas that in some cases are not limited to a metropolitan area but can reach a regional coverage and by interconnection of different networks (Sadiku, 2013).

This type of network is a larger version of the LAN and is usually based on a similar technology; the main reason to distinguish a MAN with a special category is that it has adopted a standard to work, equal to the IEEE. The MAN networks also apply to organizations, groups of nearby corporate offices to a city; they do not contain switching elements, which divert the packets by one of several lines of potential output. These networks can be public or private. The metropolitan area networks comprise a particular geographical location "city, town", and distance covered is greater than 4 km are networks with two unidirectional buses, each of which is independent of the other as to the data transfer. It has been seen that all the three networks differ to a very large extent amongst each other. The networks carry immense value for all the companies to strengthen the existing communication structure. This is certainly a vital need for the organizations in this regard (Amalina, 2013).

Practical Application of Three Types of Networks

The networks of asynchronous transfer mode asynchronous transfer mode (ATM), emerge in 1986 as an idea by a group of engineers from telephone companies, in response to a demand for faster networks and higher bandwidth to accommodate the growth in file sizes and experienced industry applications. The first results were made public in 1988, with the publication by CCITT, about standards as part of the "blue book" on a family of digital fiber-based backbone networks and multiplexing and switching strategies for connecting these trunks. Digital trunks high bandwidth links were a family of fiber known as SDH (Synchronous Digital Hierarchy), also known as SONET. ATM is the technology used in SDH and SONET for multiplexing and switching, a method to build and operate networks, unlike all previous technologies (Faulkner, 2012).

ATM aims to solve two problems: high bandwidth and fast switching allowed taking bits and bringing them quickly link to another link on the same network. Until the advent of ATM, the network class implemented by an organization depended primarily on the distances. If the distances are short, network type LAN (local area network) are used. For longer distances, and even MAN WAN links are used. The problem, obviously, is that the equipment used in the LAN are not directly operating on the WAN or MAN, and the use of technology installed between the two, such as routers, thereby changing protocols is necessary. ATM, in turn, is based on SONET links constituting a family of hardware implementations, software and interoperable protocols and standards that can provide higher bandwidth when needed. By relying on the multiplexing and switching technologies, networks are achieved with negligible end-to-end delays. The combination of ATM and SONET provides the advantages of high bandwidth of the fiber, and the speed of network nodes, which depends only on the capacity of the systems themselves.

Therefore, the ATM philosophy is simple: once established the most efficient way of sending bits from one point to another network, there can be no system or application may require more bandwidth or minor delays (Kizza, 2013).

Conclusion

In the end, it can be said that the application of these three networks are crucial in the success of the organizations. These networks are implemented in accordance with the needs of the companies. Though, they prove to be very beneficial for the companies in accordance with their respective conditions. Therefore, all the issues and aspects related to the compare and contrast of LANs, WANs and MANs have been discussed in detail.

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