The Design Philosophy of the DARPA Internet Protocols : Paper Review

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This paper on the Design philosophy of DARPA explains how the internet protocols were shaped and how they became the backbone for the modern-day internet revolution. The classic paper explains the fundamental goals required to develop the Internet architecture and how goals are set for the internet to sustain in the future. The key takeaway from this paper is to learn about internet architecture and how it's been implemented. Another key takeaway is the design of TCP and how the TCP protocol revolutionized the understanding of the classical internet.

The author starts the paper with how the layering of architecture into IP and TCP was not the original proposed design. Through continued testing and spending a fair amount of money the internet standards as we know them today such as TCP was set. The author further continues the paper by explaining the fundamental goal required for implementing the internet architecture. An alternative to the interconnecting network which was already established was proposed as the multi-media network which provided better performance so it was implemented. The author gives a glimpse of how the technique called packet-switching which was wireless and much better than circuit switching networks such as telephone networks was implemented which changed the understanding of the Internet and was considered standard. Another main component called the Internet gateways was introduced which helped in the store and forward which were interconnected by switches.

The author emphasizes the fact that the internet must be cost-effective and resources must be accountable. The above statement sometimes seems hypothetical because a large number of resources will be used in creating internet architecture and a huge budget is involved, and cost-effective goals are sometimes overlooked. The author briefly describes the survivability and sustainability of the internet. The key takeaway from this topic is the introduction of 'datagrams' which ensures survivability.
The concept of sending acknowledgment if the host sends the data successfully and if data transmission fails is also mentioned which sets this paper apart.

The fundamental aspect of this paper is the introduction of TCP and IP protocols. The readers exactly understand how the different types of service are introduced at the Transport Layer Level. Readers are also made aware of how some services such as XNET, and real-time digitized speech delivery which are out of the scope of TCP/IP must be supported by the internet. The above situations made the TCP and IP split into different protocols and provided separate services. The author also explains the origin of the UDP protocol as a result of the growing internet. We also know about the minimum set of assumptions such as a reasonable packet size is 100 bytes and how even the things that are out of the scope of these assumptions such as multicast are achieved at the transport level. The author further explains the loss of packets where if the packet is lost, the packets must be retransmitted which accounts for the traffic but while transmitting the copy of the packet is stored in between interfaces until the acknowledgment is sent from the receiver traffic can be reduced and the packet can be emptied from the intermediate buffer.

In the latter part of the paper, the author describes the datagrams and TCP. Readers understand the basic principle of datagrams which played a pioneering role in the success of the internet. The author conveys the principle of TCP which mainly focuses on the byte size of each packet rather than the total number of packets. In the section on TCP, we get to know the vital information regarding the TCP byte streams getting broken into smaller packet fragments which were moved to the Internet layer when TCP and IP

were separated. Another aspect was acknowledging the packets which were governed by breaking packets into smaller parts. We also learn about the flag variable introduced at the end of each packet.

In conclusion, this paper serves as a fundamental aspect of internet design principles that are even used today. The author does not complicate things and directly describes the governing principles in shaping the internet. Overall this paper gives a reader the basic idea required to know about the transport layer and internet layer protocol. One contradicting aspect in the paper is how there are a set of assumptions for the success of the internet but there are several services that are out of the box and no assumptions are made for those and to implement those in the existing architecture requires huge cost and resources. The important aspect is that this paper sets a standard for the development of new protocols.