Review of Cerf and Kahn's article

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In the article “A Protocol for Packet Network Intercommunication”, Cerf and Kahn describe a protocol to be used for communicating and “sharing of resources” between different networks. Protocols that existed till then allowed communication between the same network only. The protocol served as a precursor to the Internet protocols we know today.

The article introduces several key concepts of Internet protocols which have become common today. These ideas include

1. Packet Fragmentation
2. Acknowledgments
3. Addressing Formats
4. Ports
5. Sliding Window based transmission
6. Packet sequence numbers

The article also introduces gateways and routing between different networks. The manner in which packets from one network will be handed over to the next network has been defined. Packets which are bigger than the the maximum size the network can handle are fragmented into smaller sized packets.

The article talks about a transmission control program (curiously abbreviated as TCP) which actually interacts with the processes which need to send and receive data. It also performs activities such as packet multiplexing and de-multiplexing. It is in-charge of managing the packet between different programs. A 16 bit port number is introduced for this purpose. The TCP is also in-charge of re-assembling the data packets at the destination using the sequence numbers. An acknowledgment scheme is introduced for detecting packet loss. The TCP detects packet loss and determines which packets may need to be re-sent. Duplicate packets are detected using the packet sequence number.

Protocols in those days existed as monolithic structures, different from the layered approach we are familiar with today. The article, although doesn't explicitly define a

protocol stack, it has contributed in some way to their development by defining the transmission control program as a separate program module and the end program not having to bother about network operations (as in the application layers today). The same authors have gone on to contribute the development of the TCP/IP protocol stack. However the protocol presented here is still in the older monolithic structure and not as a protocol stack.

The article also describes the responsibilities of the network and the transport layers as we know them now. The TCP has evolved into the transport layer. One of the aspects the authors failed to imagine was congestion and transport layer's responsibility in controlling congestion.

Overall the article has made significant contributions to the development of the TCP/IP protocol stack and is rightly considered to be one of the classic networks papers of all time. But the relevance of this paper today is in question. The problem with the article is that its too old. Monolithic protocols are out of fashion and a reader of modern times would gain precious little by reading this article. Although many significant ideas are introduced in the paper, the reader would be better off learning about them from other articles (eg: the RFCs on IP and TCP, OSI model). The paper though rightly considered a classic, is not recommended for reading.