A protocol for Packet Network Intercommunication

VINTON G. CREF & ROBERT E. KAHN

Paper review by
Ehsun Darody (810181050)

So far, many communication protocols have been developed for resource sharing and data exchange among computers that reside in the same network. In this paper we present a protocol that supports the sharing of resources that exist in different packet switching networks.

Individual packet switching networks may differ in their implementations such as: distinct way of addressing, different maximum packet size, different time delays and ... . We prefer that networks' interfaces remain as simple and reliable as possible and deal primarily with passing data between them.

We want to allow conversion between packet switching strategies at the interface (instead of the hosts) to permit interconnection of existing networks. Thus, the interface must play a central role in interconnection of the networks.

Gateways join individual networks. Since the gateway must understand the address of source and destination hosts, this information must be available in a standard format in every packet that arrives at the gateway, that is called internetwork header. Because of different maximum packet size in different networks, gateway sometimes needs to fragment a packet. In these situations, destination host should reassemble the packet.

Within a host we assume that existence of a transmission control program (TCP) which handles the transmission and acceptance of messages. Multiplexing and demultiplexing of segments of messages among processes are fundamental tasks of TCP. To do these, each packet must contain a process header that completely identifies the destination process.

A uniform internetwork TCP address space, understood by each gateway and TCP, is essential to routing and delivery of packets. Our suggestion is a 24-bit address composed of 8 bits for network address and 16 bit for host within that network.

The reconstruction of a message at the receiving TCP requires that each internetwork packet carry a sequence number which is unique to its particular destination port message stream. The flag field of the internetwork header contains two bits named ES and EM. The ES flag is set by the source TCP each time it prepares a segment for transmission. The EM flag is set on the last segment of a message. When a gateway fragments a packet, it should set or reset these flags properly.

TCP uses positive acknowledgement. A window strategy is used to control retransmission of packets and duplicate detection. Flow control carries out via dynamic window resizing.

When a packet arrives at the destination TCP, it is placed on a queue, which the TCP services frequently. If there are no more input buffers available to the TCP and if the TCP can't quickly use the arriving data, then the packet is discarded.

In order to send a message, a process sets up its text in buffer region in its own address space, inserts the requisite control information in a transmit control block (TCB) and passes control to the TCP. To receive a message in its address space, it uses receive control block (RCB).

We define the relationship between two or more ports that are in communication, or are prepared to communicate to be an association. Ports that are associated with each other are called associates. To create an association, TCP introduces some facilities such as SYC and REL.