Arcnet Gateway

Transport across multiple networks

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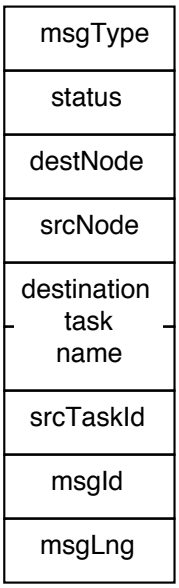
The Arcnet network is used to interface the SRM's to a VME Local Station. The Local Stations are networked via token ring. A means of communicating from a token ring node to any Arcnet node can be provided if the local stations provide a gateway service. This note describes a way to achieve gateway for the local stations.

Communication protocols used between the local station and an SRM are based upon use of the Acnet header, a task-to-task communication protocol developed at Fermilab for accelerator control systems. The implementation of the Network Layer in the local station systems uses this header to support task-to-task communications between two nodes on a single network. The essence of this scheme is to use multiple Acnet headers to describe the individual "hops" in communications between two tasks on nodes that span more than a single network. The Acnet header provides a wrapper or envelope to provide for delivery across one hop in the communications path.

As an illustration, take the simple case of a local station (LS1) which wants to display some memory that is located on an Arcnet node (`A3`) which is attached to another local station (LS2) which is considered to be node `A0` on the Arcnet network. For this case, two Acnet headers are sufficient. The Acnet header format is as follows:



LS1 sends a data request message, using the simple protocol used by SRM's, preceded by two Acnet headers. The first (outer) one is the one which specifies the request message type, the destination node LS2, the source node LS1, the destination task name `GATE`, the source task id of the original requesting task, the message id assigned by the requesting task, and the message length that includes both Acnet headers (18 bytes each) and the size of the data request message itself. The second (inner) header, which is treated as part of the message contents for the first hop, specifies the same request message type, the destination node `A3`, the source node `A0`, the destination task name

SRMD, the source task id of the GATE task, the message id assigned by the GATE task, and the message length which is 18 less bytes than the first message length.

For the return path, the reply message from the SRM that includes the memory data that was requested carries a near-copy of the second header described above, with the message type changed to a reply and the status word filled in. The GATE task receives the message because of the source task id. It uses the message id that it assigned with the request message to look up its copy of the first header and precedes that header with the reply message (including its Acnet header) that it just received. It then transmits it according to the source node of the original requester. The original requester receives the entire message including the two Acnet headers. Stripping away the two headers, the requested memory data remains. The status word may be returned copied into the first header (by the GATE task).

This scheme can be easily extended for more hops. The gateway logic becomes no more complicated, as it only handles getting the message across one hop. All of the intermediate destination tasks would presumably be gateway tasks. The user (original requester) must know the whole picture in detail. So, the scheme trades complexity of system software support for the detailed knowledge of the entire transaction that must be known by the user.

For routine maintenance needs of providing access by token ring nodes to data structures in SRM memory, the scheme should be more than adequate. The extendibility of the scheme may help with unknown future needs.