Acnet on UDP /IP

Local Station Implementation

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General plan

Acnet over UDP/IP is implemented by assigning node#s in the range `0900—09FF` to signify the use of UDP rather than raw network communications. Each Local Station front end, since it supports both raw and UDP network transactions, will have two node#s assigned: the raw node# (`0614` for example) and a UDP value (`0973`). These UDP node#s are assigned to each node as needed. Currently, assignments for the 71 installed Local Stations are in the range `0965—09AB`. If a Vax console, or any other host that supports this scheme, wants to send a message to a `09xx` node, it should use UDP encapsulation around the Acnet header-based message to be sent, and it should indicate its own UDP node# in the source node# word of the Acnet header. A database entry for a device that is sourced from a front end that can only speak UDP must specify a `09xx` value in the source node# field for that device. Vax DPM software will then use UDP to communicate the request to that front end, using a destination port# of 6801 decimal.

Local Station implementation

Support has been added to the Local Station software for an alternate UDP node#, and UDP-based Acnet messages sent from a Local Station will exhibit the `09xx` value in the source node# word of the Acnet header, as described above. Each Local Station knows its own alternate UDP node#, but it does *not* know that of other Local Stations. In addition to Acnet support, Classic protocol support has also been extended to use UDP when the target node# is in the UDP range. To derive the IP address for a target node, a "trunk 9" table is used that is simply an array of IP addresses indexed by the `xx` value from the `09xx` node#. Entries are automatically filled by a UDP Acnet message received from a node that specifies `09xx` as its source address. It is also filled by any UDP Classic or Acnet message sent from a local station that targets a given `09xx` node#. This IP address array is 256 longwords in length. It is currently stored at address `0x10FA00` in non-volatile memory. The local `09xx` value stored at `0x10507E` in the token ring table is sampled at reset time as the local UDP node# for that station.

Server function

Special considerations are needed for the Local Stations because of their built-in server functionality. A request message sent *directly* to a Local Station that includes in its list of idents references to nodes *other* than the receiving node will receive server support. This means that station will accept responsibility for collecting all the requested data from the other nodes for inclusion in its response to the requester. (Note that this feature is used for all Linac devices accessed via the Acnet RETDAT system.) To assist in this implementation, a convention is used that requires that the second word of the SSDN four-word record in the Acnet central database device entries also be used for the source node# field for that device. This is necessary so that a serving node can anticipate which nodes will respond to its forwarded request, which is sent via multicast network addressing in the case that more than one "real" source nodes are involved in the request. For the case of a forwarded UDP request, each reply from a contributing node will have the UDP node# in the source node# of the Acnet header. This is necessary because the serving node must find a match against the node#s in the SSDNs of the original request in order to know how to distribute the reply data into the

final reply message that will be returned to the requester.

From the above description of the server logic that interprets contributing node replies, it can be seen that this logic will not work in the case that the list of SSDNs in a request includes some raw node#s and some UDP node#s. This "mixed bag" request is not supported. For the case of RETDAT protocol, this situation will be prevented if a simple convention is followed for database entries. For devices from front ends that must be accessed via UDP, the UDP node# must be used both in the SSDN and in the source node# field of the database entry. Thus, Vax DPM will not form a "mixed bag" request.

One node# enough

To help workstation access to data from Local Station nodes, it is desirable to allow idents that use the raw node# to be accessible via UDP, even when the front end supports both raw and UDP. In this case, UDP is used because the *requesting node* has no other option, and the devices given in the database are identified as being sourced from raw node#s. To support this, UDP node#s that match the receiving node's UDP node# are converted to raw node#s when received in a request message, except in the case of the RETDAT protocol request that requires server support. The reason for this exception is that local node references are not separated out for Acnet protocols, as compared with the Classic protocol case. The local node acts as any contributing node.

Installation

The procedure for installation of this new UDP node# support is simple. Before resetting with the new system software installed, install the local node's UDP node# in the non-volatile memory address above. The other part is the IP address table. It can be copied from another Local Station, or it may be downloaded via the `ACNAUX` function called `IPATAB` (code=`0x11`) from a Vax. (At this writing, such functionality has not been included in the Local Station version of `ACNAUX`, but it can be easily added with logic analogous to that used to download the physical address table used for trunk zero nodes.)