PROJECT MAC

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Computer Systems Research Division

Request for Comments No. 12

Moving the Multics ARPA Network Attachment to the 6180

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This memo gives an overview of the plans for moving the Multics ARPA Network attachment to the follow-on machine. Relevant detail-level discussion is included where appropriate.

Hardware

."ABSI"

The indispensible step in the move from the 645 to the 6180 for the Network is the production of an "Asynchronous Bit-Serial Interface" (ABSI), which will interface the Network IMP (Interface Message Processor) to the 6180 IOM via common peripheral channels. There are two major reasons underlying the need to produce a new "special interface" (the Network term for the class of such boxes), instead of employing the existing 645 "GIMPSPIF" (GIOC-IMP Special Interface): 1) the GIMPSPIF does not work with a "distant" IMP port, but the "local" IMP port does not work with a special interface more than 30 feet away and the 6180 is some 1700 feet away from the IMP (which cannot be moved to Building 39 because there are three PDP-10's and some leased lines attached to it). 2) the GIMPSPIF is half-duplex. However, acknowledging a long-known problem, Bolt, Beranek and Newman (BBN, the purveyors of IMP's) have legislated that all new special interfaces must be full duplex. (This was at our urging, and had been planned for anyway.)

In view of the fact that the new special interface could not be produced by Honeywell within either the time or the cost frame required, it was decided to engineer it "in-house". Initial design work was done by Rick Gumpertz as a lab course project. As of March 26, he is being assisted in the fabrication and checkout effort by another undergraduate, John Williams. They are being supervised by Ken Pogran. Parts are being provided by Honeywell, which will have the right to fabricate "production models" after our prototype is completed.

A detailed task list for the ABSI was evolved at the beginning of March targetted for May 1 completion. At present, we are about a week behind that schedule.

.New IMP

In response to a request by Professor Saltzer which listed nine uses for Network ports at M.I.T. (each IMP offers only four ports), ARPA has agreed to place a second M.I.T. IMP in Building 39. Unfortunately, Telco cannot arrange lines for it until September. At present, BBN is hesitant to allow us to attach the Building 39 IMP to the Tech Square IMP via private connection (ESL data boxes used as 50kb modems on the ends). This matter is still open, but we are proceeding on the assumption that initially the 6180 will employ the same port (on the Tech Square IMP) as the 645. The intent is to get it onto the new IMP as soon as possible, but this may well turn out to be September.

.Port Conversion

In view of the rather large gap between the anticipated departure of the 645 (June) and the anticipated arrival of the phone lines for the Building 39 IMP (September), it became necessary to convert the current Multics port to (in IMP jargon) a "distant interface". As the anticipated future uses of that port once Multics is on the new IMP would entail a distant interface port anyway, this step makes both short- and long-term sense. An order has been placed for having the port converted on May 15, which is the earliest possible date the 645 would be turned off, according to Bob Daley. We assume that if the date of turning off the 645 slips and if the schedule for producing a working ABSI slips, the port conversion can be rescheduled by making a phone call. It is even within the realm of possibility that the fabrication and checkout of the ABSI could be completed ahead of schedule, in which case we could request that the port conversion be performed prior to May 15; although it is not clear whether this would be easily accomplished, it's not clear it would be hard. May 15 remains the nominal date. (As implied above, once the port is converted Multics service on the Net is via the 6180 or not at all, as the ABSI is not being engineered to interface with the GIOC. Of course, it might happen to work, or the IOM might happen to be permanently available, but this is all problematical.)

.Cable

The final hardware project in the move from 645 to 6180 deals with pulling appropriate cables between Tech Square and Building 39. As there are various uses for such cables (e.g., Project MAC's "Displays for the Masses"), the pulling is in no way contingent upon the non-availability of the Building 39 IMP. Ken Pogran is overseeing this task; his report is being published separately. Cable should be in by mid-April.

Software

.IMP DIM

The necessity to go full-duplex on the ABSI implies, of course, that the IMP DIM's logic be altered. The IMP DIM is sufficiently modular, however, that the changes for full-duplexity are confined to one area. Raj Kanodia estimates one week for the coding (in progress) and about another for checkout. Thus, the IMP DIM should be ready by mid-April, well in advance of the availability of the ABSI. Note that BOS will be used for very early checkout of the ABSI, while it is being fabricated. As the ABSI has been designed to operate on both local and distant IMP ports, checkout of the full-duplex IMP DIM will be possible on the 645 Development Machine as soon as the hardware is ready. It is planned that checkout of the distant interface aspects of the ABSI will be performed by "borrowing" one of the two distant interface ports on the Tech Square IMP -- initially with the 645 Development Machine, and subsequently with the 6180 Development Machine.

It should be noted here that an IMP DIM installation on the 645 which features conversion to V2PLI is currently pending. As this IMP DIM is the basis of the full-duplex version, we hope to have it shaken down in the 645 service environment prior to the changeover. Dave Jordan has agreed to attempt to facilitate this desire if possible, depending upon how difficult it proves to get 6180 system installations under control. Sometime around the third week of April is probably the earliest we can hope for on this score.

.General Review of Software for 6180 Compatibility

We'll use check_object, if appropriate, when appropriate. (I.e., if there was an MC/SB I've overlooked it, and the help file isn't clear as to the circumstances in which it should be used, but at least I've heard of it and am worrying about it.) None of the Network software is in ALM. Also I'm given to understand (by my friendly neighborhood on-line consultant) that installed programs are being taken care of. Therefore, all we have to worry about are the private tools in >udd>CompNet>lib.

.Network Daemon

Note that all of the previously-discussed topics are more or less indispensible. Turning to a topic which, for a change, isn't critical, we're working on the problem of preparing the Network Daemon for operation in the "consoleless daemon" environment. (Ed Meyer has this task, in consultation with Tom VanVleck.) However, even if we don't have it ready by "May 15" all we'll need is a terminal to run the existing Network Daemon from until the consoleless version is set. May 1 seems like a plausible date on which to decide whether we'll need to make arrangements for the terminal.

User Migration

The transfer of files from 645 Multics to 6180 Multics is complicated for those users whose access to Multics is exclusively via the Network by the fact that they will only be able to determine if anything went wrong at a point in time when they will no longer be able to take personal, direct action to check that their files have been properly transferred by the "carry" command, they will not be able to login on the 645 to try the carry again, because the Multics IMP port will have been irreversibly switched to the 6180. An additional complication stems from the fact that they will probably want to work on the 645 as close as possible to the cutover point.

To attempt to resolve these complications, the following steps will be recommended, via help files and Network "RFC":

1. Do "help carry" to learn about the standard mechanism.
2. Do "help 6180.net" to learn about extra complications for Network users.
3. Perform the carry at a convenient time (the week of May 7 seems natural); presumably, in case the 645 happens to have problems on the day before the changeover, the carry would be attempted around the 11th or 12th at the latest.
4. Note that whole directories may be carried over "early" and you can take your chances on individual files on the last day.
5. After the changeover, if there are any problems which require more carries to be initiated, send mail to Padlipsky CompNet on the 6180 and we'll make them happen on the 645 (from Dumper SysDaemon, so there will be no access problems).
6. Any questions should be directed to Padlipsky CompNet on the 645 (via mail). We'd also be interested to hear from people who will be involved in the manuever even if they don't have questions, so as to get an idea of how many parties are involved.