GP/iw

MPS/SR/Note 73-9
14.2.1973

COMMUNICATIONS BETWEEN COMPUTERS

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It is agreed by all interested parties[1)2)3)4)] that the CPS shall be equipped with computerized control facilities of a "hierarchical" structure, i.e. :

- accelerator (sub-) systems are controlled by dedicated ("satellite") computers,
- the satellite computers are connected to a central computer and display system via a message switching system.

This structure differs in essential aspects from the present CPS computer facilities where one computer (plus the function generator) is available for tasks concerned with three accelerators. The single computer situation led almost automatically to a number of related policies, such as the central function generator, the central beam measurements computer, the single and universal data acquisition and control system (STAR). It must not be too surprising that some of such concepts should fit marginally into the new structure.

Communications between the various sub-systems are one essential aspect of a multicomputer structure and the communications node, the message switching system, can definitely become the most critical item if not taken care of properly.

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1) Contribution to the discussion on the use of a digital Control system for the CPS. MPS/RF/Note/3 (1965).
2) The expansion of the PS control system. MPS/CO Note 72-6
3) Minutes of meeting no. 9 of the controls committee.
4) Commentary on project "The Expansion of the PS control system." MPS/CO Note 72-42

The design of the message switching system (a computer-controlled matrix is planned) and its programming will be simpler if fewer communications are required. There must be an advantage in designing the multicomputer structure such that the communications are minimized. An optimum will result from a quantitative evaluation.

Necessary Communications

One line of communications is beyond doubt : the central display system must communicate with the satellites. However, here already a question can be raised : shall one display system have access to all satellites or shall there be e.g. one display system per accelerator, linked to the pertinent satellite(s)? We have at the moment 2 consoles for the PS (driven by the same IBM partition), and 1 console for the Booster (and an old-fashioned one for the Linac). Certainly, accelerator-dedicated consoles will reduce the requirement for switching. But even if there was one display system, the switching matrix would rather reduce to a "simple" fan-out if no other communications were required.

Are, in a hierarchical structure, other communications really required? This question is of crucial importance since it determines the structure of the massage switching system and a study of the links that could possibly be useful has been made[5]. To answer the question, a set of subsidiary questions wants answers :

- Can we draw advantage from retaining a central data acquisition system rather than slicing it up as accelerator systems are transferred to the new structure?

- What are the advantages of a central beam measurements computer as opposed to organizing beam measurements per accelerator?

5) Minutes of meeting no. 4 of the controls committee

- Do dedicated satellites need access to beam measurements? Could they get the data via the central computer and display system? Should process optimization including the beam be done on the satellite or on the central computer level?

- etc...

We have indeed not yet completely defined what level of tasks a satellite should deal with (why should Linac or Booster be run with one computer when several are talked about for the PS? Hardware control only or accelerator optimization?). It is, to my mind, up to the controls committee to complete the questionnaire and to answer it. Only when well established quantitative answers exist can we usefully go on with the design of the message switching system and with the implementation of those satellites whose tasks are connected to the questions raised.

Distribution : (closed)

Controls Committee
Machine and Areas Committee