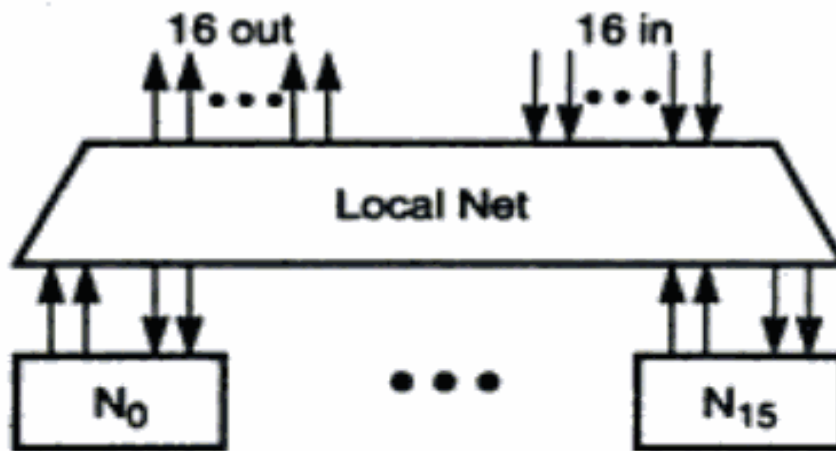


# MIT/MOTOROLA \*T PROTOTYPE

The \*T prototype is used to test the effectiveness of the unified architecture in supporting multithreading operations. It treats messages as virtual continuations, thus busy-waiting can be eliminated. Other optimization is that , it avoids the extra load and stores through multithreading and coherent cacheing.

## ARCHITECTURE OF \*T PROTOTYPE



(a) A brick of 16 nodes with 3.2-Gflops and 3200-MIPS peak performance, packaged in a 9-in cube

\*T prototype is a single address space system.

Above figure shows the basic architecture of prototype which contains 16 nodes ( $N_0$ - $N_{15}$ ) and the local network .The nodes were packaged in a 9-in cube which has the potential to achieve 3200MIPS or 3.2GFlops. These 16 bricks are interconnected by 4 switching boards and each board implements a 16 x 16 crossbar switch. There is no cables used in between these nodes.

The local network is built with 8 x 8 crossbar switching chips.1GB of RAM is used per brick with 200MB/links, the I/O bandwidth is 6.4GB/brick.

## The \*T node design

Each node is proposed to implement with 4 components

- A Motorola superscalar RISC microprocessor (MC88110)
- Memory controller
- Node memory and
- Network Interface Unit

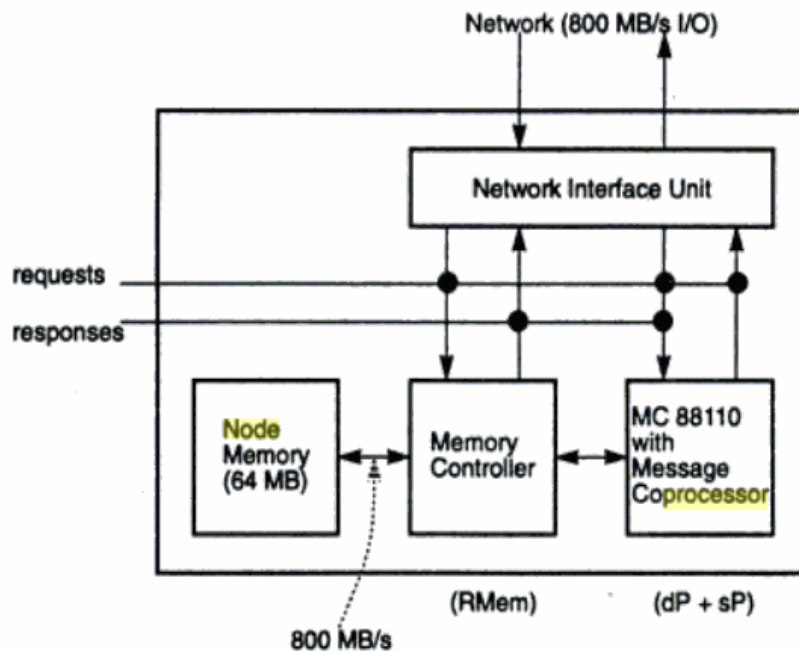


Fig: The MIT/Motorola \*T prototype multithreaded architecture

**Motorola Superscalar RISC microprocessor (MC88110):** It is a two-way superscalar processor driven by a 50-MHz clock. It is then modified as a data pointer(dp) and MC88110 family allows additional on-chip SFUs with reserved opcode space, common instruction issue logic, caches and provides direct access to processor register.

A synchronization coprocessor(sp) is implemented as an 88000 SFU.

- The dp is optimized for long threads and in dp concurrent integer and floating point operations were performed whereas sp is optimized for simple, short threads.

- The dp handles incoming continuation while the sp handles incoming messages, rload/rstore responses, and joins for messaging or synchronization ie, the sp off-loads simple message handling tasks from the main processor (the dp), thus the dp will not be disrupted by short messages.

Memory Controller: It handles the requests for remote memory load or store as well as the management of node memory(64 MB).

The Network Interface Unit: It receives or transmits messages from or to the network.