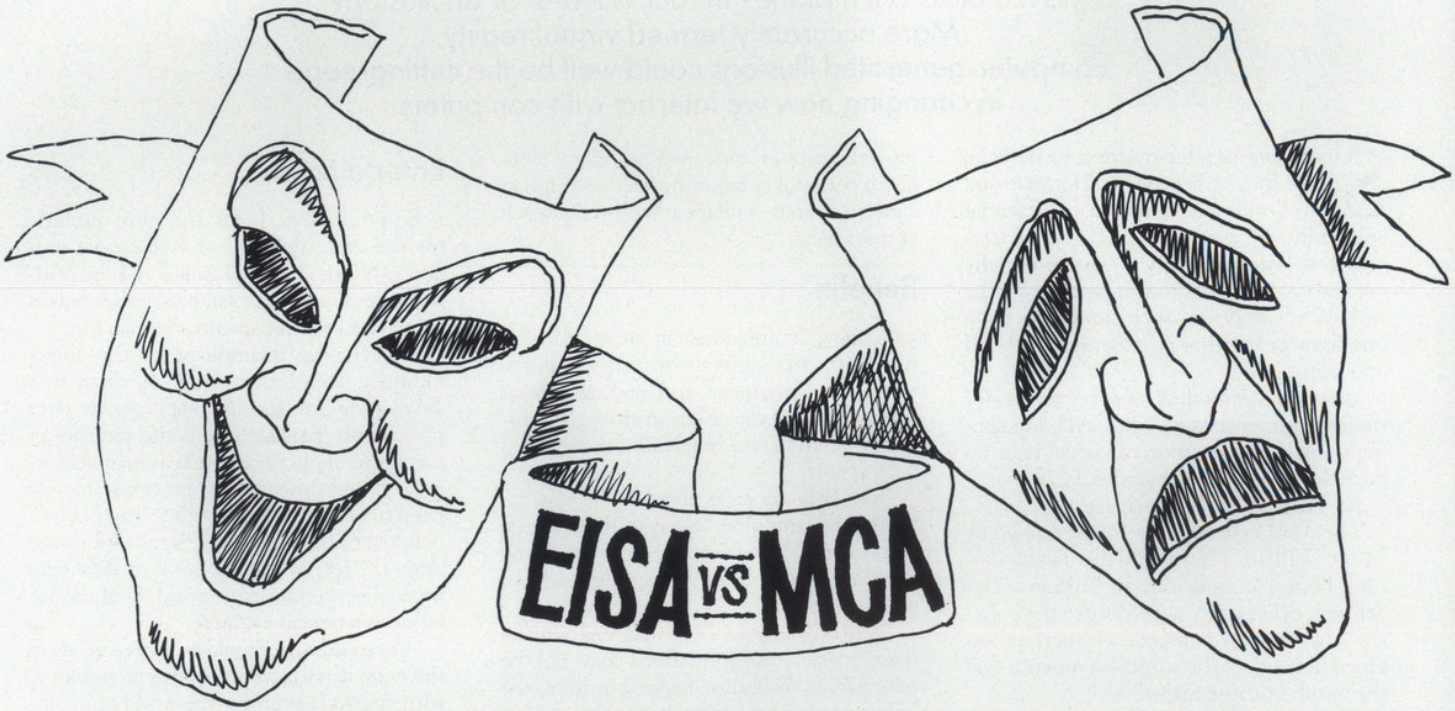
EISA

CURT GOWAN

The debate over MCA versus EISA probably started the day after IBM first announced Micro Channel Architecture. Noel Cheer of IBM and Curt Gowan of Hewlett Packard continue the discussion.



In comparing the two 32-bit personal computer I/O buses – the Extended Industry Standard Architecture (EISA) and the Micro Channel Architecture (MCA) – it is easy to get caught up in a specifications game and miss the fundamental issue.

The purchaser of a high-performance PC has to make a business decision between:

1. An open standard developed by multiple vendors, providing freedom of choice to users at all performance levels; and
2. A proprietary strategy driven by a single vendor, designed and marketed to lock the user to that one vendor.

The development of an open standard requires participation by industry leaders to determine direction and objectives, an open review process, and publicly-available documents which can be used to design products to meet that standard. This process, which is used for the IEEE, IEC and ANSI computer, electronic and safety standards, was followed in the development of EISA.

MCA, on the other hand, was developed in isolation by one vendor to support that vendor's marketing strategy.

Current evidence indicates that MCA is not succeeding:

1. Designing MCA-compatible systems is difficult for IBM-licensed vendors. An article in US *PC World* says:

> This article examines all the production MCA clones we could get our hands on .... We used five MCA boards – all of which worked flawlessly in our reference IBM PS/2 Models 70 and 55SX – to test MCA compatibility. To our surprise, not one of the clones was fully compatible.
>
> January 1990, pp. 98-106

On the other, hand Hewlett-Packard, Compaq, and the other leading EISA vendors are working closely with the developers of EISA boards to ensure that their boards conform to the specification and are fully compatible with EISA systems.

2. Bus-master boards, which take control of the bus in order to transfer data without burdening the CPU, are required to fully exploit either MCA or EISA. It turns out that developing bus-master I/O boards has been harder for MCA than for EISA. From another article:

> So far, MCA hasn't delivered on its bus-master potential, partly because IBM has provided little support for board designers until recently. By contrast, EISA seems to be enjoying a glut of bus-master support, largely due to productive industry-wide collaboration, prompt publishing of detailed specs, and the talents of a star member of the EISA chip-set – the Bus Master Interface Controller.
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> January 1990, pp. 73-4

After three years, there are only 30 bus-master MCA boards available. Already, 25 bus-master EISA boards have been announced for first-quarter shipment.

3. Convincing users that everybody needs MCA has proven to be very difficult for IBM.

The IBM PC/AT was discontinued when the original MCA-only PS/2 line was introduced in April 1987. Customer resistance was so severe that IBM was forced to introduce the ISA-bus PS/2 models, which have consistently made up one quarter of PS/2 sales month after month for more than a year.

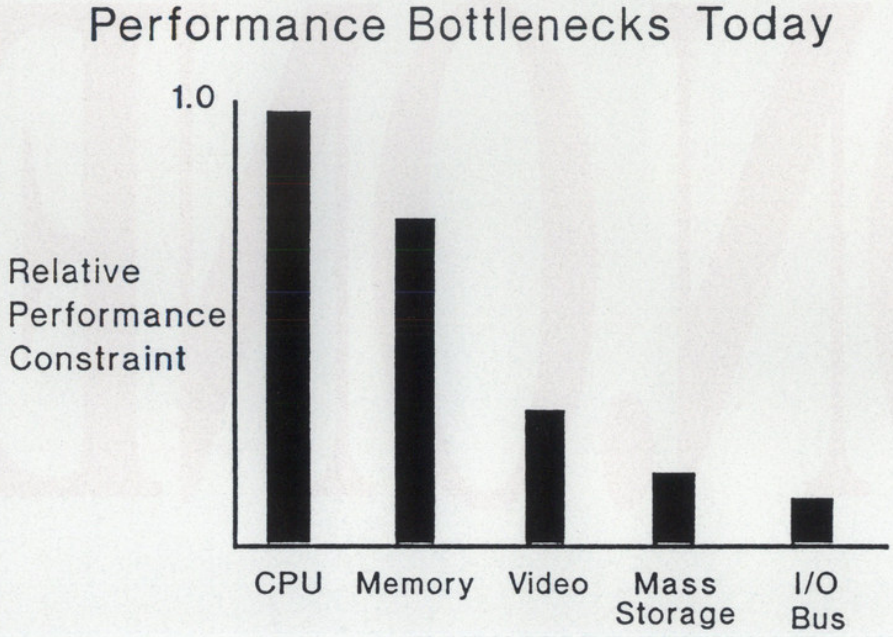
Despite the massive 'Don't Miss the Bus' advertising campaign positioning MCA as a requirement for every user, the MCA share of the PC market has dropped to 30% – down dramatically from a peak of 45% a year and a half ago.

The truth is that high-performance I/O is not required by most users. Recognition of this reality is a key part of the EISA/ISA strategy.

To summarise, the real issue is not technology. The real issue is business – between an open standard developed by multiple vendors and a proprietary strategy driven by a single vendor. ■

Micro Channel

NOEL CHEER



It's hardly news to anyone to suggest that the way we use PC's today is quite different from the way we used them seven or eight years ago. But not many people realise that we're asking our PC's to do a lot more than they were designed to do, which is a delight to their designers and a challenge to those who must configure them.

The original IBM PC, and the scores of compatibles and clones that followed, were designed for SUST (Single User Single-Tasking), one task at a time, which took up practically the whole attention of the processor.

Doing more

But now we want to do more things, like:

- **Multitasking:** Through the use of windowing environments, we want several tasks to run at once, and we want to be able to switch between them rapidly.
- **Lush Graphics:** Lots of colours and rapid screen refreshes, often up to 30 per second to mimic TV animation.
- **Background Host-PC Communications:** And at such a speed that the user is unaware of any delay.
- **Complex Networking:** Involving vital data which must not run the risk of being lost through system hang-ups.

So, we want the PC to do more, *and* to do it faster and more reliably than ever before.

Sometimes you need a revolution

You can't upgrade a Morris Minor to a Porsche by just adding increments: a bigger engine, a more throaty muffler, wide tyres and so on. There comes a point in the development of every machine when you've got to go back to the drawing board and fundamentally change things.

That happened for IBM PC's in the mid-1980s. The top-of-the-range PC/AT had so many 'string and sticky-tape' feature cards and small modifier programs (TSR's) plugged in all over it that it was apparent that something needed to be done. Some users found satisfaction in faster clocks and turbo-chips, but the long-term answer was to make a more radical change.

IBM's response came in 1987 with the Personal System/2, in which all models, except the smallest, had a radically new data path or bus, built to handle those new demands. To satisfy SUST and entry-level users, the Model 30 was allowed to keep the original architecture and became a sort of improved PC/AT, reborn in a PS/2 cabinet and with a PS/2 keyboard, hard disks, floppy disks and fabrication techniques.

What Micro Channel gives you

What do you get with the IBM Micro Channel Architecture (MCA) that you didn't have before? In simple terms, a different *kind* of PC, one built more like a mainframe and designed to permit new applications not suited to SUST architectures. The difference is so fundamental that IBM calls them Personal *Systems* rather than PC's. Some of these differences and benefits include:

- **Programmable Option Select:** That's a formal way of saying that adapter cards don't have DIP switches (which are a source of malfunctions as well as irritation), but instead are indentified by the PS/2 itself so that system configuration is automatic.
- **Level-Sensitive Interrupts:** An interrupt is the means by which a device signals that it needs attention from the main processor chip. On the Family 1 architecture, an I/O device could issue an interrupt (like a single beep on a telephone) and have it ignored; it didn't happen often, only at sensitive moments! With more and more PC's networked together, there is a much lower tolerance to lost interrupt lock-ups. IBM's Micro Channel Architecture uses an interrupt system that ensures that the phone keeps ringing until it gets answered.
- **Extra Ground Planes:** You'll notice that the connectors on an adapter card for the Micro Channel have a lot more lands. That's because many of them are ground or earth lands, which extend the shielding between signals. You've got to do this sort of thing if you want to drive the card hard and fast ... safely.
- **Burst Mode Data Transfer:** Instead of the data moving around within the system a byte or two at a time, MCA data surges around in blocks of 10 megabits per second.
- **Multiple Intelligent Processors:** This provides for up to an additional 15 processors mounted on adapter cards. An additional processor can look after an entire sub-system, such as communications or graphics, while the main processor processes. This is a very powerful platform on which to base entirely new applications.

When you want to clear the way for an entirely new class of applications, you need to do all the major hardware changes first, and then tell the industry what the new opportunities are. IBM has done that with the Micro Channel Architecture.

On RISC too

IBM has incorporated the Micro Channel Architecture into the new RISC System/6000 family of mid-range computers. Coupled with its second-generation RISC architecture (multiple parallel processors) and AIX (IBM's standards-compliant implementation of UNIX), the Micro Channel Architecture puts the performance of the RISC System/6000 at the top of the benchmarks.

Now that the novelty 'micro' computer has become a business-place necessity, and now that it is being asked to participate in networks and co-operative ventures with host mainframes, an architectural shift becomes a necessity. That's why IBM built the Micro Channel Architecture: "Right for Today, Ready for Tomorrow." ■