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Platform partners

PXI is now reaching its sixteenth birthday and as a teenager is maturing nicely into adulthood. **David Owen** looks at how it is evolving

There have been many changes in PXI during those sixteen years. It has grown from a handful of very basic modules with limited performance objectives to a stage where there is now a wide breadth of products with steadily improving performance objectives and a philosophy of continuing to do more in the same space.

User expectations have changed as well, migrating from a status where "difficulties" were relatively common and software support sometimes patchy to a stage where now users expect the same experience of PXI as any other instrumentation control standard. There have been changes in the standard, notably the introduction of the PXIe standard in 2005, but the most dominant implementation remains the simple 3U PXI module.

Pickering Interfaces' PXI focus has been switching, and like other sectors of the PXI product family we have seen increasing densities (maybe not as dramatic as the change in semiconductors) through more compact switch designs and cleverer methods of putting them together. Who would have believed in those early days that a single slot PXI module would one day support 448 cross-point switches in a 2A matrix – a product we have just recently introduced.
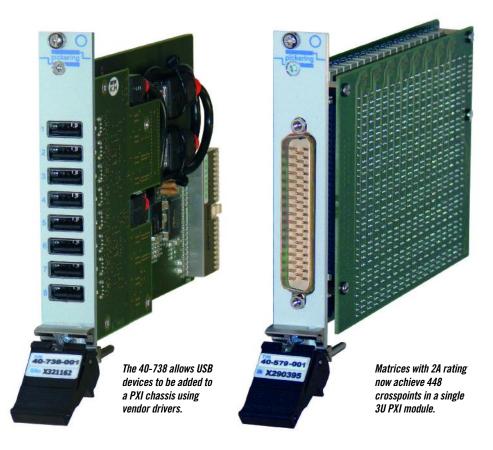
There are however limits to what can be achieved within the PXI form factor. Like all standards it has to make assumptions about what it specifies, and those specifications constrain what can be achieved. In the case of PXI it specifies a modular chassis system (fixes size), a connection system and form factor (impacts module costs), minimum power distribution capacity (limits what can be drawn) and cooling (recommends maximum power dissipation). In PXIe systems, BIOS and enumeration considerations may create issues on large systems, and not everyone wants to spread their computer PCIe bus over a large test system.

Other standards have exactly the same issues, for example AXIe, LXI and USB. The standards have made choices and from those choices consequences arise.

USB is a lightweight low cost interface, it lacks latching connectors, has limited power

The 40-738 allows USB devices to be added to a PXI chassis using vendor drivers.

Matrices with 2A rating now achieve 448 crosspoints in a single 3U PXI module.

delivery capability if USB power is to be used and sometimes lacks robustness. It is however good at what it is intended to do, that is provide a low cost interface that can be used in any reasonable form factor and is particularly effective for low power solutions.

AXIe is seen as a "big brother" to PXI, it has a bigger modular footprint, more power

and cooling capability and a great deal of interconnect flexibility on very fast serial interfaces (Ethernet and PCIe amongst them), but that comes at a higher cost.

LXI, like USB, is not modular and brings the possibility of bringing the web experience to instruments through industry standard browsers with no essential requirement for drivers to control them. It

generally requires an external power source (Power over Ethernet has not been adopted in instrumentation) and a controller which sets a need for a higher value instrument payload than USB. All these platforms come with fast data interfaces, LXI encouraging the use of distributed computing while PXI, AXIe and USB are more orientated to single PCs doing all the work.

PXI, LXI and Pickering Interfaces. For Pickering Interfaces, PXI has proven to be an excellent platform for switching. As an early entrant into the PXI market, we have seen exceptional company growth made possible by the success of the PXI standard. The form factor is well suited to the creation of switching solutions for medium scale functional test systems in a way that no other platform has matched.

Scaling to larger systems though is

60-102 allows Pickering Interfaces PXI modules to be used in a LXI control environment.

Multi-slot PXI modules like the BRIC allow larger switching solutions to be created.

problematic. Innovative solutions such as Pickering Interfaces' BRIC range, introduced in 2002, expanded the possibilities on the size of PXI switching systems by occupying more than 1 PXI slot and introducing an analogue backplane, independent of the PXI chassis, to connect switch building blocks together without the use and performance degradation of expensive cables.
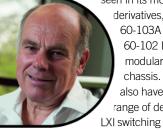
New techniques have increased the density of single slot switching systems, for example the recently introduced 40-579 has set new benchmarks (448 crosspoints) for a single slot 2A matrix.

As switching system size increases though, the desire to share a PXI chassis with instrumentation declines, the need to decrease cable interconnects increases and moving the switching system to LXI, a non-modular Ethernet controlled standard, becomes more attractive. While some have seen PXI and LXI as competing control platforms, Pickering has never seen it this way - they are just different.

This difference can be seen in the Pickering Interfaces' product range. Our first LXI product simply took a PXI chassis and added a fully LXI compliant control interface that conserves a very high degree of software compatibility with PXI, as seen in its modern derivatives, the 60-103A and 60-102 LXI modular chassis. We also have a range of dedicated LXI switching

As the backbone of your PXI system, the chassis provides the power, cooling, and communication buses of PCI and PCI Express for your controller and modules.
David Owen

solutions achieving switching system sizes which simply cannot be implemented in PXI in an effective way. We have always encouraged our customers to choose the best platform for their application rather than forcing them down a specific platform route.

The future is hybrid. We believe PXI will increasingly be used in hybrid systems, systems that contain a mixture of different product using different control interfaces. Software development improvements have made it increasingly easy to mix control environments. The arguments that apply to switching apply equally to instrumentation. As time goes on what can be achieved in PXI will increase, but it will also increase in the other platforms and increasing user demands will simply mean that, though the boundaries may shift for different control interfaces, the need for a spectrum of solutions will not go away. This is not confined to PXI, AXIe and LXI - USB also has its part to play. USB is an ideal solution for low cost remotely powered instruments and there are a range of scopes, power meters, data acquisition and other products that can be very effectively implemented in USB at lower cost than PXI. That is why we introduced the 40-738, a single slot PXI-based USB hub that allows eight USB devices (instruments or devices under test) to be introduced to a PXI chassis using their vendor Windows drivers to control them. We provide a means of programmatically connecting and disconnecting the USB devices.

Pickering Interfaces' expectation is that the incidence of hybrid systems will increase as PXI enters areas previously dominated by GPIB but is unable to effectively displace all those GPIB instruments. At the other end of the market there is the opportunity for USB to become part of the system. For extreme data processing requirements AXIe will have much to offer in the future.

It will get increasingly hard to describe larger test systems as having one unique interface, instead they will have a variety of interfaces and PXI will play an increasingly major part in that mix.

David Owen is business development manager for Pickering Interfaces