North American technology delivers soccer extravaganza

Pushing Performance

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Broadcast router leverages large custom backplane.

As top flight soccer goes, nothing is bigger than the fight among nations for global supremacy now under way in Brazil. The US is there. So are the Germans, Spaniards, Japanese and host Brazilians. And audiences the world are right on top of every bone-jarring tackle, soaring header, nail-biting corner kick and shootout in the 64-match competition thanks to critical, North American-made broadcast hardware.

Every one of the 12 stadiums from Rio de Janeiro to Recife for the world's most prestigious soccer event will have their own TV production facility equipped with Imagine Communications technology (www.imaginecommunications.com), including its new Platinum IP3 router designed and assembled in Toronto.

The router sets the first transmission link between the stadium and viewer. It will output the signal destined for stadium jumbotrons, fan zones and sports bars, as well as your 90 in. HDTV or 4 in. smart phone. These stadium studios were assembled in Munich, Germany, and transported to Brazil, each sufficiently compact to fit its own shipping container.

The IP3 boasts a 62-layer custom Module Interconnect (or MI, commonly referred to as a back- plane) built by **HARTING** in Elgin, IL, one of the global connector companies three facilities – the others are in the UK and China – that design and assemble custom backplanes.

Such a large board helps the router to pack tremendous signal throughput and functionality in a frame about the size of a three-drawer filing cabinet.

The router's architecture addresses the relentlessly increasing demand for bandwidth to accommodate more channels and greater signal complexity. In a multi-frame configuration, the IP3 can support video matrices beyond 2Kx2K with- out the need for external distribution amplifiers or combiners – eliminating the need to take the system off the air.

Launched last year, the IP3 boasts enormous configurable processing capacity. Each of its 64 input slots has 3 Gb/s pathways to the video and audio crosspoint modules connected to the MI, as do the 64 output slots. Most users will only fill some of the slots to begin with, rather than pay for functionality they don't currently require. That makes it a cost effective investment for a wide range of users, according to Imagine Communications product manager Paul Greene.

"It's the potential for expandability that makes even those users more interested because in the future, as the need arises, they can expand the system – while it's on air," said Greene.

The **HARTING** MI was a significant design achievement in its own right – a two-year development project by the two companies. Imagine Communications needed a complex, passive backplane, designed under proper rules and manufactured with suitable PCB base materials and interconnect systems to help deliver the desired speed for moving massive amounts of data across a shared bus.

The Module Interconnect had to be tall enough to support the Platinum IP3 router's large quantity of I/O card slots, said Greene. "You need a certain amount of space for each one of those 64 input and output cards, so you wind up with a fairly tall board with an enormous amount of connectivity in that space. That's what drove this particular operation to be so specialized."

The MI measures 46 x 15 in., making it the largest backplane ever manufactured by **HARTING** at the Elgin plant that also serves the Canadian market. It's 3/8 in. thick, weighs 10 lb and has 17,000 contact points. Only a handful of North American facilities have the equipment and expertise to assemble such a board. (Standard backplanes typically have a maximum 18 x 12 in. surface and 1/16 in. thickness.)

Designing this interconnect board for a new, state-of- the-art router was a dynamic process. Imagine Communications and **HARTING** engineers went back and forth to find that sweet spot where Imagine Communications' desires for maximum capability intersected with the latter's understanding through testing and prototyping of what was deliverable.

The **HARTING** staff coordinated the work of their contract PCB designers and manufacturers and drew on the expertise of their engineering colleagues at **HARTING** global headquarters in Germany for feasibility studies and critical signal integrity testing that set the specific design rules for this backplane.

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The first step sees a PCB vendor etch each of the 62 copper layers individually with the desired pattern. The layers are stacked using alignment holes, then pressed together using a combination of pressure and heat.

Next, the PCB goes to drilling, plating and solder masking (applying the typical green surface color) and silk-screening of all lettering. Every step has virtually no margin for error. **HARTING** takes the completed PCB, installs all components, then performs final testing.

Assembling such a board requires equipment large enough to accommodate its dimensions, including a suitably large screen printer, pick-and-place and press-fit machines and re-flow oven. **HARTING** is one of the few in North America with such equipment.

Large custom backplanes tend to have components affixed by both soldering and press-fit methods. “Press-fit technology is not something a lot of manufacturers understand or know how to do,” said Carl Olson, engineering manager at **HARTING** in Elgin. “Doing it wrong can damage components or render the backplane a write-off.”

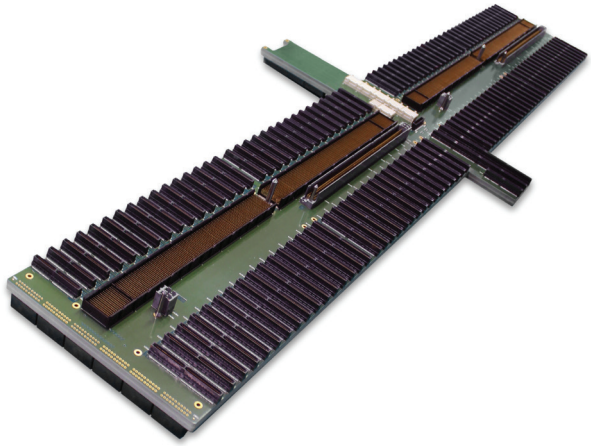
HARTING also is one of the few North American custom backplane manufacturers with the RoBAT test system. The RoBAT unit subjects each backplane to a battery of continuity and isolation tests to ensure all connections are correct, there are no shorts or opens on the board, all components are placed and oriented correctly, all connector pins are straight and all resistors have the correct value.

The development phase successfully completed, the first boards manufactured to its liking, Imagine Communications has qualified **HARTING** to produce backplanes for all its Platinum IP3 and legacy routers.

“Imagine Communications had stringent requirements for the electrical design, and that really pushed us to the limit,” said Bradford Taras, product manager for **HARTING**’s backplane business in North America.

“This board is a beast. We’re very proud we were able to accomplish what they wanted, and make that the springboard for a broader relationship.”

The RoBAT unit at work



This 52-layer manufacturing prototype (left) of a custom backplane has been used by Harting in the development of large boards like the Modular Interface for Harris Broadcast’s Platinum IP3 router.