

Alcatel-Shanghai Bell: Impossible Plus 60%? Not a Problem with XtremePCB

Alcatel-Shanghai Bell gave their design team seven weeks to complete a project estimated to require thirteen. The solution: the concurrent design capabilities of Mentor's Xtreme PCB.

When a customer's name contains the word "Bell", it goes without saying that they are an important customer and that their design is likely pushing technology boundaries. When that "Bell" is Alcatel Shanghai Bell (ASB), a joint venture of Alcatel-Lucent and the China State Asset Supervision and Administration Commission (SASAC), the design will push technology boundaries and be highly visible.

Company Background

In addition to the joint venture, ASB is the first foreign-invested telecommunications company in China limited by shares, with Alcatel-Lucent holding 50% plus one share, and Chinese shareholders holding the remainder. The multi-billion-dollar telecom technology leader delivers end-to-end telecommunications solutions. It also has a key international R&D center with full access to Alcatel-Lucent's global technology pool, developing original technology for use in China and export to Alcatel's customers worldwide.

ASB comprises several Product Business Divisions. Rather than duplicate PCB design capabilities at each division, ASB maintains a

Common Competence Center (CCC), the common Research and Development organization for PCB, FPGA, Mechanical, and EMC/EMI design. All PCBs are designed in the CCC. In addition, the CCC provides support for all EDA tools used by the divisions.

Designing a Leading-edge Product

It's certainly no surprise that the product design being embarked upon by ASB was not only complex, leading-edge electronics technology coupled with state-of-the-art manufacturing, but was proposed to be completed in virtually the blink of an eye. So, it's also no surprise that ASB turned to Mentor Graphics to help

"Xtreme Technology grows our competence. I truly regard this as a natural result of the close cooperation between Mentor Graphics and Alcatel Shanghai Bell,"



*Genbao Feng, Director,
Alcatel-Shanghai Bell
Common Competence Center.*

make the impossible possible.

The design teams were tackling a new Media Gateway. This Media Gateway provides functionality for the Next Generation Network (NGN) and IP Multimedia Subsystem (IMS). In particular, the PCB team was charged to design the Package Interface Module (PIM) board.



Alcatel-Shanghai Bell's PCB design team (Left to Right): Ming Jiang, Hui Wang, Wenfeng Shui, Aihua Zhao, Wei Li, and Lifan Sun.

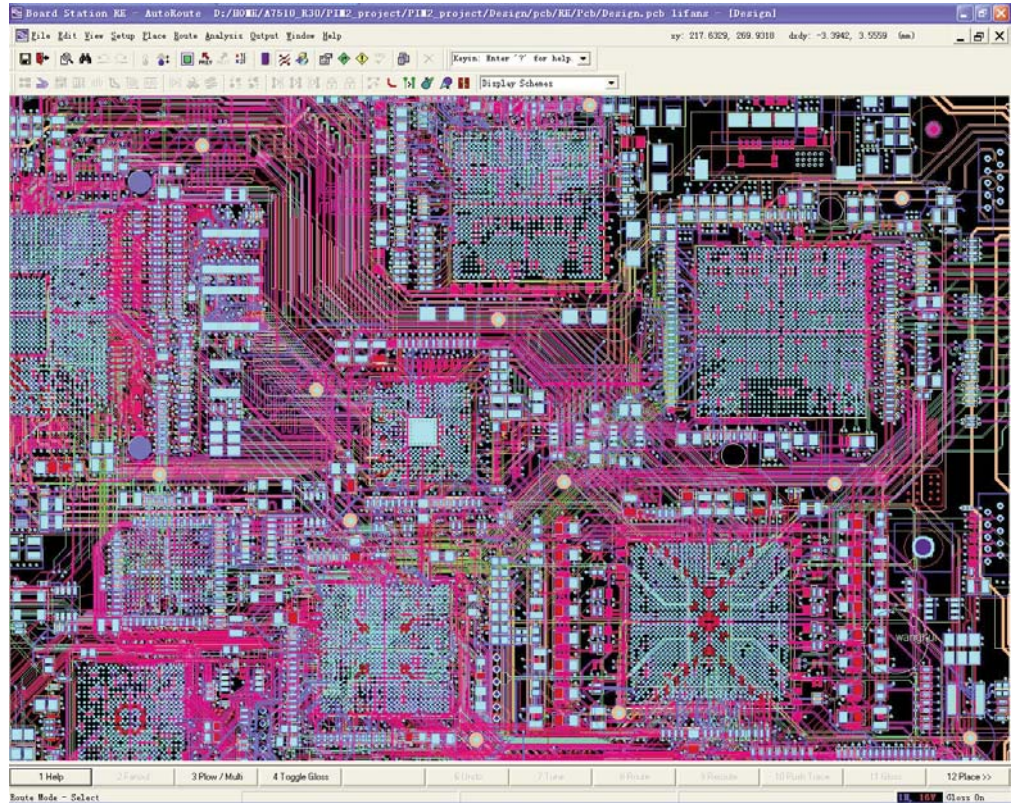
The high-capacity Media Gateway provides any-to-any media switch-ing and interchange net-works for IP ports for voice, fax and data.

The PIM itself was no less complex than the overall product itself. The PIM comprises 16 board layers, 3823 nets, and 67,023 individual traces on a 310mm x 330mm board. That board is home to 5533 separate components having a total of 20,206 pins. If that's not enough of a challenge, consider that more than 70% of the nets have specified high-speed constraints, and 15% of the nets use differential pairs.

This project required talented designers, extraordinary PCB design tools, and ample time. Unfortunately, one of those wasn't available.

Wei Li, PCB Design Manager, knew that it would take new technology to design this board, and it would have to accommodate concurrent designers on the same project to meet what she knew would be a tight schedule. She chose XtremePCB to enable concurrent, team design on this important project.

"Xtreme technology gives us more flexibility on resource assignment and management, it is a perfect platform for team work," said Li. "With Xtreme technology, we are more confident facing the more complex designs with tighter schedule."



The final PIM layout, seen in this screen shot from Mentor Graphics' XtremePCB tool. The extremely complex PCB design was completed in 60% less time than originally estimated.

Having never used Xtreme before, she called upon her experience and calculated that at the very least, her two designers would require 13 weeks for the design. She met with the team from the Product Business Division and submitted her plan. Unfortunately, there was a very tight market window that had to be met, and that would mean shaving just a bit off of that 13 weeks in order to deliver the product on time.

"I left the meeting with 7 weeks to complete the design," said Li. Perhaps an impossible task?

Utilizing the Power of XtremePCB

With one of the three needed entities — time — at a premium, Li turned her attention to the remaining two over which she still had control.

Her original plan called for two designers to work concurrently using XtremePCB.

Now, she would take advantage of the four licenses and assign other engineers to join the principal team to keep the four seats "hot" as much as possible. Vanishing time could be combated with parallel design.

Li assigned layout engineers Hui Wang and Lifan Sun as the principal designers. Added to the team were Aihua Zhao, Ming Jiang, Ming Cao and Wenfeng Shui.

In partnership with ASB from the project's inception was Mentor Global Account AE Chao Jiang. Jiang made Li and her staff comfortable with Xtreme and demonstrated a number of the unique features. Li's

team quickly learned how to best utilize the features in XtremePCB and were soon proficient.

Project Scheduling

Six talented designers working on the same project could cause some problems; scheduling conflicts for the available four seats; task assignment; lead roles; a touch of creative ego.

Principal designers Wang and Sun acted as lead designers and coordinated the design. They coordinated the rules and assigned block to each designer to work on.

Becoming quickly competent on XtremePCB to allow the team to approach this important project with confidence was also not a problem.

“With past Board Station RE experience, Xtreme is easy to adopt,” recalled Lifan Sun. “There is no difference in the GUI or the operations. It truly took me only a half hour to feel perfectly confident to design a difficult PCB like this.”

In addition to assigning specific portions of the project to the available designers, Wang and Sun also took advantage of members’ specialties. For example, Wang focused on DDR related parts and Sun concentrated on the six BGAs with PCI, HT and SPI.

The Design Process

XtremePCB was configured. The engineers were assigned and trained. The deadline was in place. Now, it was time for the design to begin.

The two principal designers kept their two seats active, designing and coordinating the project. As the other engineers had time or as a seat opened, they rotated in and out. By assigning technology-specialists to their areas of special expertise, completion of designs began occurring ahead of schedule.

As the project moved forward, the team began taking on a more and more optimistic attitude. XtremePCB

“Without XtremePCB, we couldn’t have completed such a complex PCB design in five weeks...even if we had worked day and night.”

HUI WANG
PRICIPAL DESIGNER

was allowing them to work quickly but creatively. Tasks were flowing with more ease than they had imagined. Thirteen weeks looked extreme now, and beating the seven week deadline was beginning to become a real possibility. Clearly productivity was way up.

Li and her team had some previous experience with early concurrent design tools. “In the past, we found adding an engineer to a project gave us about 30% ‘engineering resource’

increase in productivity. Using XtremePCB, we found adding an engineer contributes 70% of an ‘engineering resource’. That’s more than twice as efficient as our previous experience!” explained Li.

As the design went forward, it became clearer that no one had expected that they could begin using a new tool so quickly nor that they would be so efficient with it. Days began dropping from the expected completion date.

Soon...very soon...the design was complete. The design team had indeed done the impossible with XtremePCB. Even more impressive: the final PCB layout passed all tests on the first attempt!

What in the beginning had been expected to be a 13 week intense design had been cut to seven. In fact, Wei Li and her team had delivered the completed design in just five weeks. That’s cutting an incredible 60% off the original estimate for design time.

Management Notices

When this type of productivity increase occurs, it gets noticed. Mr. Genbao Feng, the Director of the CCC has enjoyed a close relationship with Mentor Graphics for many years. But even Mr. Feng was unexpectedly surprised by this level of performance. He credits close working relationship with Mentor for helping get the right product for the task onsite and working quickly.

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