



## CADENCE AND VIA TELECOM, INC.

VIA Telecom Leverages Cadence Encounter Conformal Equivalence Checker to Perform Full-chip Verification

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*Alon Sa’ado, Senior Design Engineer, VIA Telecom, Inc.*

### CORPORATE PROFILE

- VIA Telecom, Inc. is a leading innovator and developer of CDMA chipsets for 3G voice, data, and GPS-enabled devices

### DESIGN CHALLENGE

- Adopt an equivalency checking solution to enable them to run RTL to netlist comparisons at the chip level
- Find a solution that includes the ability to check clock domain crossings

### CADENCE SOLUTION

- Deployed Encounter® Conformal® Equivalence Checker (EC) to address both the verification and clock domain checking challenges

### CADENCE PRODUCTS AND SERVICES

- Encounter RTL Compiler synthesis solution

## POWERFUL CHIPSETS FOR THE WIRELESS WORLD

Headquartered in San Diego, California, VIA Telecom, Inc. is one of the world’s leading innovators and developers of CDMA chipsets. Their single-chip CBP4.0 CDMA baseband processor integrates mixed-signal, analog, and digital functionality with an interface to multiple RF components, enabling faster design cycles and reducing overall mobile station cost. VIA Telecom technologies are used in 3G voice, data, and GPS-enabled devices.

The VIA Telecom design team decided that they needed to find a new solution to perform equivalence checking and clock domain checking on their designs. “We determined that it was time to adopt a formal process for both equivalence checking and clock domain checking, and our goal was to find a single solution that could handle both,” said Alon Sa’ado, senior design engineer at VIA Telecom. “We have a lot of clock domains in our designs,

which makes them particularly difficult to control. To deal with this, one of our top priorities was to find a tool that could check for synchronization. If we don’t realize that there is a synchronization missing, we’ll most likely experience unexpected behavior in the design. For example, it can cause the flip flop to be in an unknown state, or for some logic to have unexpected polarity. Properly synchronizing the domains would help to ensure that the design will behave as we expect it to.”

## ENCOUNTER CONFORMAL EC ADDRESSES BOTH EQUIVALENCE CHECKING AND CLOCK DOMAIN CHECKING CHALLENGES

The VIA Telecom team evaluated the Cadence Encounter Conformal EC versus their existing solution. “We had used other tools for these tasks, but were not happy with the results we were achieving,” continued Sa’ado. “We found

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*Alon Sa'ado, Senior Design Engineer, VIA Telecom, Inc.*

that the Cadence solution was able to address all of our key concerns for both equivalence checking and clock domain checking, so we made the switch."

One issue that was important to the VIA Telecom team was having the ability to read and compare the whole chip. "We used to have to work at the module level for everything," said Sa'ado. "Using the Encounter Conformal EC has enabled us to work at the chip level. This capability saves a tremendous amount of time versus our old process of addressing dozens of modules one by one. Now, we can read everything one time and let the tool work."

In addition to providing the ability to work at the chip level, the VIA Telecom team found that Encounter Conformal EC helped them with module-level issues that they had not been able to solve. "We had some challenges with very hard modules that we could not verify using our existing process," said Sa'ado. "The data path and multiplier were both causing problems. Encounter Conformal EC was able to handle the issues and deliver results."

Clock-domain checking, another critical issue for the VIA Telecom team, is also done at the module level. Since the team's designs have a lot of clock domains, checking for proper crossing has

traditionally posed quite a challenge. "This was a big issue for us, and we were pleased to find that Encounter Conformal EC was able to handle this challenge without requiring another tool," said Sa'ado. "We simply used the tool's -verify option to check the clock domain crossing in our design. In some modules we discovered the synchronization was missing and added it."

## ADVANCED FEATURES IN ENCOUNTER CONFORMAL EC SPEED DEBUG PROCESS

Using Encounter Conformal EC, the VIA Telecom team was able to automatically diagnose functional differences in their design using the hierarchical comparison functionality. The tool narrows down possible locations for differences in the design, allowing them to be identified much more quickly. "Even if you feed Encounter Conformal EC the whole chip, it can compare modules and sub-modules, which really helps in debugging," said Sa'ado. "If it finds an issue, it automatically provides a smaller cone of logic, narrowing down the location of the problem and speeding our debugging process."

"With our previous tools, if we had mismatches, we were really in the dark," continued Sa'ado. "It was very difficult for

us to understand what we were dealing with and why we had a mismatch. The advanced debugging features in Encounter Conformal EC make it relatively easy to find any problems, and the graphical user interface is very helpful for fixing the bugs."

Encounter Conformal EC works by comparing the design from the bottom up. It starts at the bottom and compares sub-modules. If the modules match, the tool black boxes them and moves up. If something does not match, the tool flags the issue. The tool can work in two ways, either flat or hierarchical. "There are a lot of benefits to hierarchical compare, particularly for debugging," said Sa'ado. "We work in hierarchical mode for RTL to netlist comparisons. It allows you to always be thinking ahead. When we compare gate to gate, we use flat mode because it's not as difficult to manage."

## VIA TELECOM CONTINUES TO IMPROVE EFFICIENCY USING ENCOUNTER CONFORMAL EC

VIA Telecom has made Encounter Conformal EC a permanent part of their design flow, for both verification and clock domain checking. "We found the Encounter Conformal EC easy to use right from the start," said Sa'ado. "We were up and running and had the tool integrated into our existing flow quickly. This was largely due to the on-site support that we received from Cadence. They took us through set up and accelerated our learning with great tips and tricks. We look forward to continuing to improve our efficiency by leveraging the features and our partnership with Cadence."

**cadence™**

Cadence Design Systems, Inc.

### CORPORATE HEADQUARTERS

2655 Seely Avenue  
San Jose, CA 95134  
P: +1.800.746.6223 (within US)  
+1.408.943.1234 (outside US)  
F: +1.408.943.5001  
www.cadence.com

For more information about  
this and other products contact:

[info@cadence.com](mailto:info@cadence.com)

or log on to:

[www.cadence.com](http://www.cadence.com)