



Altair and Cadence

The Company

Altair is a fabless chip company that specializes in developing and selling high-performance and low-power 4G Long-Term Evolution (LTE) semiconductor solutions. The company's main market today is consumer-centric; millions of its chips go into devices including tablets, netbooks, chromebooks, mobile hotspots, cameras, routers, and gateways.

Altair is expanding into the growing Internet of Things (IoT) market and recently announced a portfolio of LTE chipsets making a huge impact in the marketplace with their power, size, and cost. The company is spearheading the repositioning of LTE from a very high-throughput, expensive technology to one that could fit into demanding IoT and machine-to-machine (M2M) applications such as smart meters, vehicle telematics, and wearable devices.

As LTE gains momentum as the world's most rapidly deployed cellular technology, providing mobile wireless broadband services to millions of users, Altair is highly focused on capturing market share. More than 347 carriers in 104 countries, including the United States, Japan, Korea and China, have adopted LTE and are making it the fastest-adopted wireless technology in history. LTE has the potential to become a unified global standard for mobile by converging different 3G and 4G networks into a common 4G platform. According to Infonetics Research:

- In 2015, wireless carriers will pocket nearly \$170 billion from commercial LTE service revenues. The figure is expected to grow more than 30% over the next five years.
- By 2020, nearly 60% of all LTE subscriptions will be on LTE-Advanced networks.
- LTE infrastructure spending is expected to account for nearly \$33 billion by the end of 2020. This includes spending on LTE macrocells, small cells, and mobile core solutions.

Challenges

- High levels of signal processing and careful design to minimize power consumption and maximize performance for advanced LTE technologies
- High costs related to IP licensing of different SoC components, tapeouts in advanced process geometries, carrier certifications and software investments
- Aggressive time to market and price targets for chipsets

Cadence Solutions

- Complete suite of analog IP
- Analog design and integration expertise
- Controller and PHY IP for LPDDR2, USB 2.0, and M-PCIe™ interfaces

Lessons Learned

- Designing with Cadence® silicon-proven analog IP is the best solution to reduce cost, accelerate time to market
- Always work upfront with the IP vendor on AFE definition

Results

- Ability to compete in the rapidly growing LTE market space
- Up to eight months faster time to market
- Leading-edge products at a lower cost in terms of time, engineering, and tapeout

“The efficiency and productivity we gain from using Cadence analog IP solutions in our chip design flow, together with the world-class support we get during critical phases of our projects, make all the difference. Cadence IP reduces our time to market and provides a higher return on our investment. It enables us to target markets we’d otherwise be unable to target.”

Eran Eshed
Co-Founder and Vice President of Marketing and Business Development, Altair

Key Challenges

Next-generation LTE technologies are challenging designers to create highly power-efficient mobile devices. LTE was specified to include advanced signal-processing techniques that increase its spectral efficiency of the transmission channel. Techniques such as OFDMA and SC-OFDM modulations, advanced forward error correction (FEC), various MIMO techniques (multi-antenna systems), and re-transmission schemes like ARQ and H-ARQ enable the system to robustly and efficiently use the limited available spectrum.

These advanced technologies demand high levels of signal processing and careful design to minimize power consumption (battery life) and maximize performance, including high throughput and reliable signal reception.

Compounding these design challenges is the continuous trend towards consolidation in the semiconductor industry. It’s no simple task to be a successful semiconductor company. In Altair’s everyday development and budgeting decisions, it faces high costs related to intellectual property (IP) licensing of different system-on-a-chip (SoC) components, tapeouts in advanced process geometries, carrier certifications, and huge software investments. The company must sell millions of chipsets to achieve profitable returns on these investments.

Altair segments its chipset portfolio into these two main categories:

- 1. Supercharged LTE:** These chipsets deliver between 150-450Mbps and are used in applications including computing devices, cars, and stationary broadband access
- 2. LTE for IoT:** These chipsets deliver up to 10Mbps and feature very low power consumption and affordable price points. This category is used for “classical” M2M/IoT applications, such as electric/gas meters and street lamps, as well as in the consumer wearable segment, for smart-home gateways and in various other vertical M2M markets.

Each of these products sets a different challenge for Altair designers—whether it’s to squeeze out more performance or eliminate several mW from a product.

The Solution and Results

In this fast-paced, competitive environment, any tool or process that can help make Altair’s investment more contained, predictable, and scalable is invaluable. This is what Cadence analog IP provides to Altair’s VLSI (very-large-scale integration) and product engineering teams.

Cadence analog IP solutions enable Altair to develop leading-edge, low-power analog product designs. Cadence helps the company dramatically reduce development cycle without compromising performance.

“The efficiency and productivity we gain from using Cadence analog IP solutions in our chip design flow, together with the world-class support we get during critical phases of our projects, make all the difference,” says Eran Eshed, co-founder and vice president of Marketing and Business Development. “Cadence IP reduces our time to market and provides a higher return on our investment. It enables us to target markets we’d otherwise be unable to target.”

Altair values the Cadence analog IP team’s experience and solid, fast customer support. Eshed recalls extensive discussions around key specifications, mostly around I/F requirements, and how Cadence performed co-simulation with Altair’s RF circuit to confirm there were no issues. Tapeout was successful and the design worked the first time on the test chip.

“Cadence has a history of developing leading-edge analog IP, and the company’s ability to develop optimized analog front end (AFE) makes it a perfect partner for us,” Eshed says. “Cadence optimized its standard AFE to increase the number of IQADCs, IQDACs, and PLLs to match our system needs. We don’t have to worry about missing elements or performance degradation because they give us the complete solution.”

Because Cadence offers a single source of IP for USB, memory, peripherals, and analog, Altair can more easily integrate blocks and optimize layouts to fit the chip floor plan.

“Cadence solutions enable us to accelerate our development time, which means faster time to market,” Eshed says. “We have a superior chip because all the different Cadence IP work together.”

Lessons Learned

Altair recognizes the challenging nature of analog, and that designing without an IP vendor would increase the company’s risk, impact time to market, and compromise the ability to even compete in some areas. Eshed also shares the following key lessons learned:

- Always work together with the IP vendor to define an AFE, to ensure that it can meet key I/F areas and converter specifications
- Only work with an experienced analog IP vendor who understands that some areas can’t be easily defined upfront and is willing to confirm specifications before a contract is signed

Summary

Altair is under relentless pressure to quickly deliver high-performance, low-cost chipsets to the marketplace. The company’s key challenges include complex LTE design requirements and high licensing, tapeout and software-investment costs. With Cadence analog IP, Altair is able to develop low-power analog designs in shorter timeframes without compromising performance.

“We operate under very aggressive price targets for the chipsets and, of course, we always want to be on time and first to market,” Eshed says. “We chose Cadence IP for our complete portfolio of chipsets because it provides us with the fastest, most reliable path to meeting our stringent objectives.”



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