

SMART GOALS FOR A SMARTPHONE CHIPSET DESIGN TEAM



In Qualcomm's Smartphone Chipset Design Team, the five letters "PPATS" play a critical role in product development.

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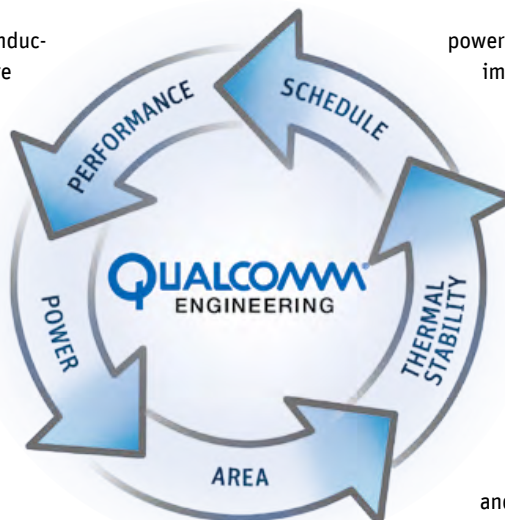
The conventional wisdom in industry is that engineering teams should focus on innovation — while also honoring the three goals of consistently improving product quality, decreasing time to market and maximizing cost efficiency.

While there's no arguing that these goals are critical, as guiding principles they fall short because they are too vague. They fail to recognize the real differences among engineering teams, which serve a diversity of customers with specific needs. To secure and maintain market leadership, every product development team must define its own set of priorities — based on what is truly valued by the customers who buy its products as well as the end consumers who use them every day.

Qualcomm has built a 30-year history of success by understanding, addressing and often anticipating the changing needs of the global market for wireless telecommunications products and services. Billions, maybe trillions, of times a day, consumers around the world touch something made better by Qualcomm — from the smartphones in their pockets and the tablets on their coffee tables to wireless modems in their briefcases or navigation systems in their cars.

In designing the company's core semiconductor products, Qualcomm's engineers are guided by a SMART (specific, measurable, attainable, realistic, timely) goal that summarizes the concerns of consumer electronics manufacturers, automakers and other customers that incorporate Qualcomm's technologies into their products. PPATS stands for power, performance, area, thermal stability and schedule. Each of these tenets plays a central role in making Qualcomm the world leader in semiconductor technology.

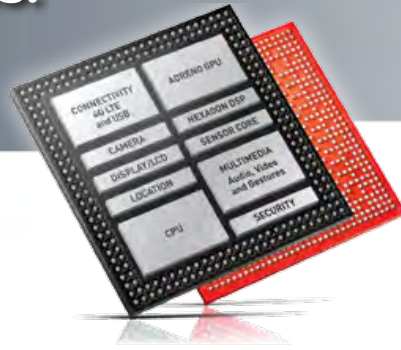
- **Power.** Anyone who owns a mobile phone knows the frustration of seeing a low-battery warning. Chips from Qualcomm support the development of next-generation power systems that decrease energy consumption demands and answer end-consumer needs. Qualcomm employs physics-based simulation to design energy-efficient integrated circuits (ICs) that meet stringent customer requirements for



power and reliability. Because power improvement is a priority for customers, all of Qualcomm's engineering efforts consider and address power consumption.

- **Performance.** As cell phones, tablets and other devices become the hub for multiple activities — from social media and shopping to gaming and video streaming — consumers require faster, more reliable performance. Qualcomm's chips must be designed for maximum robustness and uninterrupted connectivity to keep pace with growing user needs. Qualcomm's Snapdragon processors, for example, deliver industry-leading performance in many smartphones. Qualcomm's chips deliver uninterrupted connectivity via the latest communication standards, such as 4G LTE. To deliver this, Qualcomm engineers perform rigorous simulations.

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- **Area.** Consumers demand more and more functionality, but in a smaller product package. Qualcomm's chips need to be precisely engineered to squeeze as much functionality onto the available area without adding weight or materials. Engineering simulation enables Qualcomm engineers to optimize the silicon chips to deliver maximum performance with the fewest transistors and lowest power consumption levels. This is a challenge that guides Qualcomm engineers every day.
- **Thermal stability.** With so much electronic activity occurring inside today's consumer products, heat buildup is an ongoing concern that not only affects product performance but represents a safety issue. When electronic circuits run hot, their performance degrades. For this reason, Qualcomm utilizes sophisticated physics-based simulation to ensure that device temperatures are managed appropriately. Simulation helps Qualcomm engineers to identify areas of concern early in the product development process, long before products are released to manufacturers and consumers.
- **Schedule.** Qualcomm operates in unarguably the fastest-moving industry in the world today. As manufacturers of mobile phones and other devices compete to launch the latest and

greatest product, Qualcomm is often under pressure to supply innovative chip technologies very rapidly. However, the engineering team can't just focus blindly on speed; it also has to ensure the high reliability needed to earn customer trust. Qualcomm's product development team has created a system of warnings and triggers to ensure that aggressive milestones are achieved dependably, every single time.

PPATS reminds Qualcomm engineers that in today's complex global markets, it's not enough to focus on the traditional, vague tenets of quality/speed/cost. Engineers have to go deeper, asking questions such as, How do my customers define quality? What features really matter in the marketplace right now? How quickly are my products actually needed? What is my customer's real cost threshold?

Because Qualcomm operates in the high-profile consumer electronics marketplace, it's relatively easy for the company's engineers to recognize their priorities. After all, the daily headlines are filled with successful launches of mobile phones and other consumer electronic products as well as market studies and surveys showing end-user needs for longer battery life, enhanced connectivity and other product characteristics.

As a best practice, every engineering team should step back from the detailed requirements of individual customers that guide its everyday work and distill these needs into a few core tenets. 



Venugopal Puvvada has been vice president, Engineering, Qualcomm Bangalore Design Center, for the past eight years. Currently, he is responsible for the Customer Enablement and Technology Group. Puvvada has more than two decades of experience. He worked at Texas Instruments Bangalore for 13 years prior to joining Qualcomm.