Can NVIDIA Take On Qualcomm in Automotive?

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NVIDIA believes it can take on and defeat a significant number of challengers when it comes to powering the future of the automotive industry. It bases this belief on the fact that autonomous vehicles will require a large amount of processing power centered on sensing and especially AI computing – a market that NVIDIA currently dominates. But is that enough for it to carve out a major share of the market, especially given the currently compelling position and long history Qualcomm has in selling into the automotive market?

The automotive and autonomous vehicle market (cars, trucks, and eventually even planes) is a huge emerging market, with vehicles essentially becoming data centers on wheels. This will dramatically increase the on-vehicle processing power beyond the 100-200 individual microcontrollers currently deployed per vehicle and obtained from a variety of manufacturers (e.g., TI, NXP, etc.). It will transition to high powered central control systems and decentralized, "edge" subsystems for the vast array of sensors needed on each vehicle, with the equivalent of 2-4 or more centralized "data centers" per vehicle, segmented and isolated for functions (e.g., infotainment, drive train, sensors) to eliminate a single point of failure and to help isolate and secure at the proper level high reliability components (drive train) from less mission critical components (e.g., entertainment). It will require compute-intensive capabilities and fast interconnect between the various subsystems, not to mention the need for connections to the cloud and other external data sources as well as vehicle to vehicle communications. 5G and next generation wireless tech will have a major role to play in this connectivity.

NVIDIA sees itself applying the key strength it has in the AI processors to tasks that will generally be needed for advanced features in cars. It also has assembled a number of subsystem SoCs (e.g., Orin, Thor) that are lower power more generalized processors for edge and sensor integration, as well as a number of software and development platform assets. At its recent GTC, NVIDIA highlighted Polestar, a new EV company supported by Volvo and Geely, and the work it has done using NVIDIA components as an example of a major win (of course Qualcomm is quick to point out it also has Polestar as a customer). For its part Qualcomm lists a number of car makers that have standardized on its platform, including GM, and boasts a $30B automotive order pipeline in its latest Automotive Day event.

Qualcomm has been producing capable but low-power-consumption controller and general purpose processing chips for car makers for some time, and

dominates the infotainment space. It also has an unparalleled product advantage in 5G and C2X wireless technologies that future vehicles must include. Wireless connectivity is an area in which NVIDIA has no internal product capability and its customers must rely on third party connectivity options, including potentially from Qualcomm.

To its credit, NVIDIA sees an opening in the ability to combine sensor data and analyze it, especially for the complex systems needed in autonomous vehicles. And it does have an advantage with its heavy emphasis on building AI capabilities and its work on ARM-based processors. Qualcomm too has emphasized its AI capabilities, but it has less powerful capabilities than NVIDIA in this space. But at this point it's unclear how much AI processing will be needed, and in any event there will likely be a range of such capabilities required, making Qualcomm's capabilities attractive.

There are also other companies, like Mobileye (currently a part of Intel but soon to go IPO) that want to be the major platform of autonomous vehicles and are building highly specialized processors to do so, although primarily for the ADAS/AD space. Other companies are also eying this space (e.g., AMD). The race is on as the electronic content of future cars may reach as much as $1K-$3K per vehicle depending on the options and features, with Digital Cockpit and ADAS leading the drive to greater complexity requiring enhanced compute.

At the moment, Qualcomm seems to have the advantage in the committed number of vendors as well as the depth of partnership. For example, Qualcomm's partnership with BMW is more than just about selling components. They are co-designing products that meet the needs of BMW performance and volumes, but then will make it available to Qualcomm to resell to others

Both companies are taking a platform approach that includes various chip components as well as software kits, development tools, predefined sensor processing components (e.g., video and audio processing) and third party add-in capabilities (e.g., Lidar). NVIDIA is labeling their platform as Drive while Qualcomm has adopted the Snapdragon label for its brand, along with component sub-brands: Cockpit, Ride, Connectivity and Car-to-Cloud.

Bottom Line: Qualcomm has a major advantage in the infotainment space as its chips have been powering the majority of cars for years. But it has less of a history in the sensor and powertrain areas. At the moment, Qualcomm seems to have a major advantage in committed vendors partnering with it, although it's not clear if those companies will be exclusively Qualcomm component users (actually this is unlikely), although nearly all will likely be using Qualcomm communications components. Our expectation is that NVIDIA will carve out a reasonable stake in the automotive market, particularly as it applies to autonomous vehicles. But Qualcomm will still represent the major supplier to the automotive market for the foreseeable future, and will capture a significant portion of the autonomous vehicle market as well as it pursues its own AI and more capable processor ambitions (e.g., Nuvia).

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