Competing in wireless LAN: Q&A with Ralink EVP Rick Jeng

Chris Hall, DigiTimes.com, Taipei [Thursday 23 February 2006]

When wireless LAN (802.11) first began to see significant market take-up, any number of IC companies tried to compete, only to discover that it was tough going. Many of the original contenders in wireless LAN dropped out, but a handful have managed to keep going, among them Ralink Technology. Headquartered in Taiwan's Hsinchu Science Park (HSP), Ralink is a small and lean operation, but one that is managing to compete with the likes of Atheros and Marvel. In 2005, Ralink moved some 14 million 802.11 chipsets, for a 12% global market share.

DigiTimes.com talked with Ralink EVP Rick Jeng, at the company's offices in Hsinchu, about the company's positioning, its manufacturing process and its technology offerings.

Q: According to recent press reports, Ralink Technology expected to ship some 14 million WLAN chipsets in 2005, securing over 12% of the international market in WLAN chipsets. Are these reports accurate? Is the figure of 14 million accurate?

A: The figure of 14 million chipsets is accurate, and that represents slightly over 12% of the global market in WLAN chipsets. In 2004, we shipped 5.5 million chipsets, so you can see that growth has been very significant. We are a profitable company, and the wireless LAN market is still growing, by at least 40% a year.

Q: Who are your nearest competitors in terms of technology, size and market presence? Has Intel, with its integrated mobile solutions for notebooks been a significant factor in the 802.11 market over the past year?

A: I think that everybody knows that Intel sells the most WLAN chipsets, although their technology is not the most cost-effective. However, Intel has a major advantage, in that it is able to bundle wireless LAN chipsets with some of its logic chipsets, as a complete solution.

After Intel, Broadcom probably ships the most chipsets, followed by Atheros and Marvel. Ralink's market position is very close to that of Atheros and Marvel, although we supply different market segments. We have different customers. Marvel tends to focus more on low-power embedded applications.

Q: Your company headquarters is in the US or Taiwan?

A: Our headquarters is in Hsinchu, and we have 100 employees here. We also have an R&D team in Cupertino, California, with 20 employees.

Q: Are you implementing MIMO? I assume that that is now a very significant technology.

A: Yes, it is, and everyone will be using it at the 802.11n standard.

Q: And will you be offering MIMO at other standards also?

A: Currently we have a pre-802.11n product that utilizes MIMO technology. That chip is shipping now, but of course pre-11n is not a true 11n spec. We are also adopting MIMO technology to enhance 802.11a and 802.11g throughput and coverage.

Q: Are there any features that distinguish your MIMO from MIMO as implemented by other companies? Is there anything that makes your implementation of MIMO technology superior to that of other 802.11 chip-design companies?

A: Our current maximum-ratio-combining (MRC) MIMO solution puts the emphasis on highly sustained throughput to mitigate indoor multi-path cost-effectively, although it remains compatible with legacy devices. Our competitors tended to go for spatial-domain-multiplexing (SDM) MIMO, only to discover that the difference in performance is insignificant, even though it incurs a much higher cost. The reality is that anything MIMO would surpass the performance of standard 802.11 products from other companies.

Q: And in addition to the algorithms, you are implementing very high levels of on-chip integration?

A: Yes, our chip for 802.11n is probably our most complex one. That chip integrates multiple channels on a single die. It integrates two transmit and three receive channels. Other companies offer two transmit and two receive channels, so we are managing a very high level of RF integration on-chip.

As I mentioned, with this pre-802.11n chipset we have applied MIMO technology, and that enhances the coverage, which is now six times wider than that of legacy 802.11a/b/g implementations, for the same throughput. For example, with legacy 802.11 devices at a distance of 100 feet, the throughput would be in the region of 20Mbps. Beyond that distance, there would be a significant drop in throughput. With MIMO, the throughput would remain at the same level of 20Mbps, if, say, the distance covered is extended from 100 to 250 feet.

Q: Do you think, then, that 802.11n could provide a suitable solution for streaming multimedia in the home, providing a wireless connection between some type of media hub or entertainment center and other rooms in the home?

A: Yes, 802.11n will be suitable for that kind of application in the home because the data rate can be increased to at least 150Mbps. That means throughput is increased by at least some six times, compared with throughput under 802.11a/b/g. That makes 802.11n a good technology for delivering multimedia content. Also, MIMO is a robust technology, and that also means it is suitable for streamed multimedia content. MIMO resolves the multipath problem, where RF signals might otherwise be impeded by reflections, and so on. For video applications, you need sustained throughput; the video must be available at any time, anywhere, and 802.11n with MIMO technology can achieve that.

Q: If you're supplying a pre-802.11n product, what are your expectations for a final standard? Do you think you are staying very close to a final standard? When do you think we'll see the standard ratified and 802.11n products in the market?

A: For some time, discussion of the standard made little or no progress. Then in the first quarter of last year, Intel initiated a group within the industry, the Enhanced Wireless Consortium (EWC), whose aim was to dispense with a subset of the proposed 802.11n standard. Intel's proposal made the standard more executable, more bootable, and a number of companies went along with that.

With that initiative from Intel, I am expecting to see a basic 802.11n standard be agreed upon in the first or second quarter of this year. Although that won't be the final standard, it should be very close to a final standard and very close to what is being proposed by the EWC. It should provide a basis on which companies can develop 802.11n products.

Q: Who fabs your chips?

A: Our chips are fabbed by TSMC and UMC.

Q: For your manufacturing process, are you using RF CMOS or some form of compound-semiconductor approach?

A: Currently we are using a compound process, silicon germanium (SiGe). At the same time, we are also developing the transceiver in RF CMOS.

Q: Would you say that design in RF CMOS is more difficult than in a compound process?

A: Several years ago, designing for RF CMOS was considered quite difficult, but now it's regarded as conventional.

Q: Is using RF CMOS process cheaper than a compound process such as SiGe?

A: Manufacturing in RF CMOS is similar to SiGe after taking into account the die size, wafer cost and yield. Moreover, SiGe offers better geometry and performance. For low-power, embedded applications, however, RF CMOS is probably a good approach for achieving a higher level of integration.

Q: Can you obtain higher yields by manufacturing in RF CMOS, as opposed to SiGe?

A: No. You obtain better yields when you manufacture in SiGe because the RFIC still is an analog device overall.

Q: What are you implementing for security?

A: Basically, we are following the requirements of the 802.11i standard and following them quite strictly. If we and other companies do not follow the standard closely, there would be no interoperability between products. Following 802.11i, we start with a WEP implementation, and then add enhancements, such as enhanced authentication and an enhanced encryption engine.

Q: Are you offering channel bonding as a feature or do you plan to offer it?

A: We don't have any plan to offer channel bonding in our 802.11b/g/a chipsets because it does not follow an industry standard. We want to be a good citizen within the networking world and adhere to the standards. One problem with channel bonding is that it uses two channels, and that means the second channel is not available for use.

One feature that does differentiate us in the market is enhanced throughput by the MAC layer controller. Our design is aimed to improve control of the MAC layer, and this enables us to have higher throughput via the MAC layer controller.

Q: Are you active in 802.11s, wireless mesh?

A: We are implementing a mesh protocol in our AP software core, although this is a basic implementation. A final 802.11s standard still has to be agreed. We think that it will take some time for wireless mesh to become popular. There are a number of technical issues that need to be resolved, and in the meantime, wireless mesh would be competing with WiMAX. Intel is pushing WiMAX, and Intel is very influential.

Q: Are you likely to be involved with any other RF technologies, such as WiMAX or Wireless USB?

A: Currently we are focused only on Wireless LAN only. We are staying focused on wireless LAN only, and we think that is our core competence.

Q: How is Ralink differentiated from other companies in the wireless LAN market, including local companies in Taiwan?

A: Five years ago, when Ralink first started, there were more than 60 wireless LAN chipset companies in the market. Now, most of those have disappeared. There are several reasons for that. One is technology. You have to be able to deliver technology that combines high performance with a cost-effective and robust design. Most of those companies failed because they could not deliver a quality product. You have to be able to deliver a high quality transceiver, and a number of other items in addition, such as baseband algorithms and the driver. All of these have to be extremely well designed, and most companies that originally entered the wireless LAN market were not competitive.

A second aspect is service. Wireless LAN is in very high demand, and vendors need to be able to ship products quickly. That means we have to be able to supply service efficiently, on a twenty-four-hour basis. We are able to do that because we are headquartered in Taiwan, and we are able to respond to our customers immediately, send our crew over and get problems resolved very quickly. We run very efficiently compared with other companies.

We are also very close to the foundries and the packaging and testing houses, and that helps with maintaining efficient management.

Q: The wireless LAN market seems to be enjoying rapid growth. Is that growth reflected in Ralink's performance?

A: In 2004, we shipped 5.5 million chipsets, and in 2005 we shipped around 14 million chipsets. So you can see that growth has been very significant. We are a profitable company, and the wireless LAN market is still growing, by at least 40% a year.

Q: Do you think that wireless LAN phones will be a major market driver for 802.11?

A: Wireless LAN phones are a booming market, and they will be particularly successful if we see widespread adoption of the UMA standard, which allows conventional mobile (cellular) phones to work over wireless LAN. In other words, UMA provides a protocol that allows a wireless LAN phone to talk to a traditional cell phone in a licensed band. Under UMA, the user of a GSM phone, for example, wouldn't notice any switching between a wireless LAN band, which would be unlicensed, and a cellular licensed band. The transition would be seamless.

Because wireless LAN uses unlicensed bands, the cost of calls will be much cheaper than traditional cellular service over licensed bands, where spectrum will normally have been purchased, at high cost, from a government.

Q: So you are confident that wireless LAN phones, or WiFi phones as I suspect they'll be called, have a bright future? There will be strong market demand?

A: We think so. If you in the vicinity of a wireless LAN hotspot, in a restaurant for example where people are normally connecting their notebook PCs to a wireless LAN, you'll be able to use a UMA-enabled phone over the wireless LAN connection.

Q: And that could also allow connection to the Internet?

A: Yes, so you could check email, and so on. You could also roam internationally if you had a fixed IP address, or even an IP address dynamically assigned by a service provider.

Rick Jeng, EVP, Ralink Technology
Photo: Company

Ralink’ s RT2800 is a pre-802.11n (EWC) chipset.
Photo: Company