

Market trends in GaAs RF ICs

Strategy Analytics summarizes how the gallium arsenide radio-frequency IC market will see \$3.7bn of power amplifiers being consumed by 1.7 billion handsets in 2014 as multi-band, multi-mode smartphones drive demand.

After global events put a damper on the economy for the start of 2009, the gallium arsenide (GaAs) device market is in the midst of a strong recovery. After a slow start, the market surged toward the latter part of 2009 and revenues finished essentially flat with 2008 levels. The growth that began in the latter part of 2009 continued throughout 2010.

To gain a better perspective of the trends that will drive the GaAs market in the future, it is instructive to look at what has happened to the market over the past decade. As the global economic crisis deepened, it was easy to draw parallels to the 'telecom bubble' of the early 2000s.

Figure 1 shows our analysis of the yearly growth rate for GaAs devices over the last decade. Following the dramatic growth at the end of the 1990s, the chart clearly shows an equally spectacular contraction that drove the GaAs market lower by nearly 35% over the next two years. During the growth period at the end of the 1990s, the drivers were Internet connectivity and 2G wireless networks. Companies responded by building high-capacity networks and enormous quantities of handsets for demand that never materialized. It subsequently took the GaAs industry several years to work through this excess inventory.

The difference now is the seemingly insatiable consumer demand for data services across both fixed and mobile platforms. Figure 2 shows results and estimates from Cisco's Virtual Networking Index initiative. This report categorizes the amount and type of internet protocol (IP) data that consumers and businesses are using. By their estimate, users transmitted nearly 14,700 petabytes (10^{15} bytes) of IP traffic per month in 2009. They believe this number will increase by slightly more than a factor of four to 63,900 PB by 2014. To put this into context, they claim that it will take more than two years to watch the amount of video that will cross global IP networks every second in 2014. While it represents the smallest segment of this estimate, they expect mobile data to have the fastest growth, increasing by a factor of 39 between 2009 and 2014.

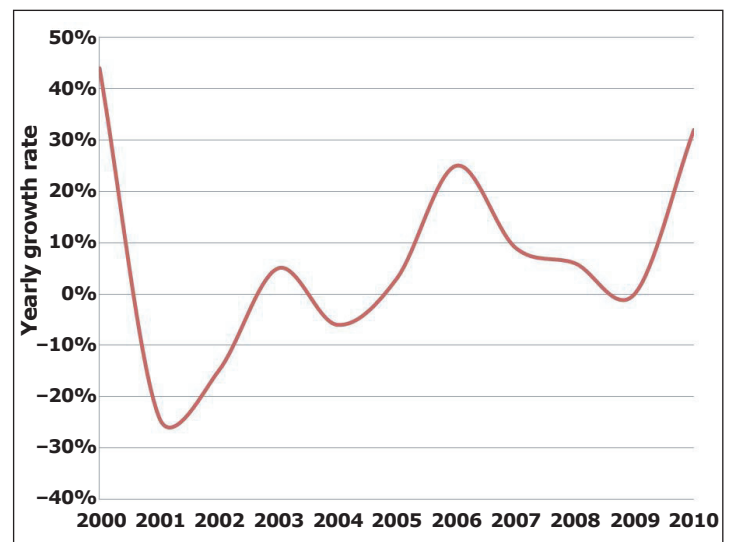


Figure 1: Yearly GaAs device market growth.

The biggest enabler of the mobile data increase and the most important driver of the GaAs RF IC market is the handset segment. The number of handsets sold each year dwarfs devices sold in other market segments. As the use of feature-laden smartphones increases, mobile data consumption will continue to rise quickly. To meet these growing data needs, next-generation networks like LTE, HSPA+ and WiMAX make use of newly available spectrum, wider channel bandwidths and more sophisticated modulation schemes to increase data transmission rates and capacity. Figure 3 shows our estimate of the total number of handsets sold and the growth of smartphones.

Much of the content of a handset is silicon-based, but power amplifiers (PAs) and switches in the front-end of the phone use GaAs devices. We believe that the additional frequency ranges and the desire of operators to supply a 'world-phone' covering many standards and geographical areas will increase the number and complexity of multi-band, multi-mode GaAs PAs and the switching networks used to select the proper amplifiers. In addition, newer handsets also include Bluetooth, GPS and Wi-Fi radios that also increase the use of GaAs components. We estimate that 1.7 billion hand-

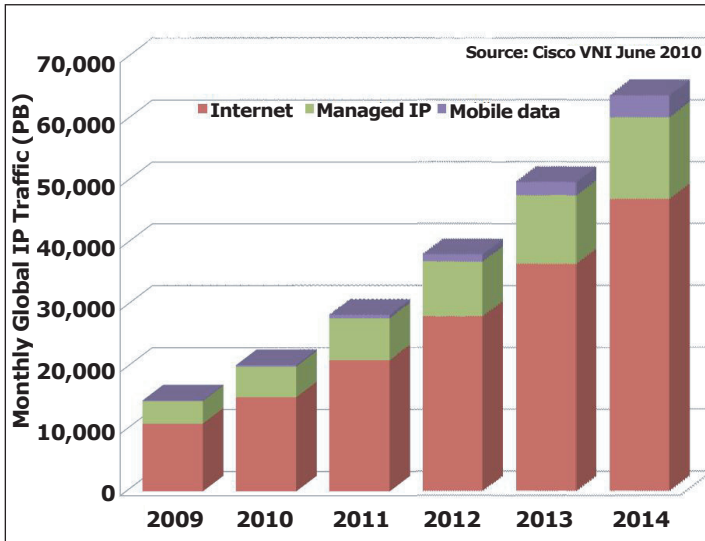


Figure 2: Monthly IP data traffic in Petabytes.

sets will ship in 2014, with GaAs PAs accounting for nearly \$3.7bn in revenue. This will represent 60% of all the GaAs device revenue for the year.

The rapidly expanding demand for data influences developments in many of the other GaAs RF IC markets.

We have become a mobile society transmitting much of our data wirelessly. This means that the entire 'ecosystem' of wireless infrastructure, backhaul, consumer devices and even satellite-based networks will grow and become more sophisticated as a result of the data explosion. These applications will result in amplifier, control and signal generation demand for GaAs RF ICs.

Looking more closely at the profile of the data traffic, video is the predominant source. The Cisco VNI report states "video will continue to exceed 91% of global consumer traffic by 2014". With rapid adoption of faster broadband, video on demand (VOD) and high-definition television (HDTV) by consumers and 3D television gaining traction, bandwidth requirements for wireline broadband networks are also increasing.

As data usage increases, the optical networks that aggregate and transport traffic from metro areas are running at higher capacities with more sophisticated modulation schemes. Portions of several networks currently have 100Gbps capabilities, and higher data rates are moving deeper into the entire network. Several service providers are taking advantage of the inherent high capacity of fiber-optic cables by running them directly to the customer premises to supply internet and video services. Even the operators who do not have all-fiber networks are using fiber deeper into their hybrid fiber coax (HFC) transmission networks. In conjunction with this 'fiber-deep' architecture, they

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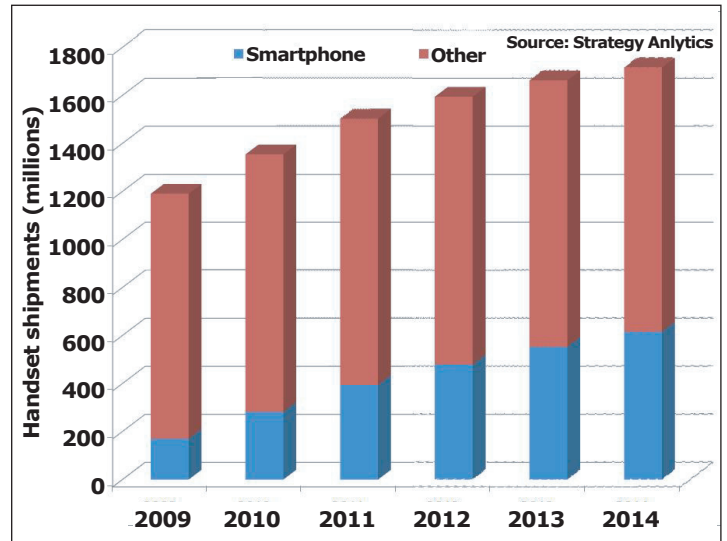


Figure 3: Handset sales and segmentation.

are increasing frequency bands and implementing variants of standards such as DOCSIS to boost data rates and capacity on the portions of the broadband CATV network that remain coaxial.

Both types of networks have opportunities for GaAs devices. In the fiber networks, some signal conditioning occurs in the electrical domain. Transimpedance amplifiers (TIA), laser drivers and various control components use GaAs and other compound semiconductors in these optical-electrical-optical (OEO) transitions. In the coaxial portions of the HFC network, the higher transmission loss requires multiple stages of amplification as the signal travels to the customer premises, where there are also opportunities in the modem and set-top box.

In summary, seemingly insatiable consumer demand for data applications, whether it is text messaging or high-definition video, will be at the root of future growth for GaAs RF IC devices. While market segments like backhaul, fiber transport, CATV and broadband will see good growth, the handset segment drives the overall market value for GaAs devices. Increasing

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number of bands and complexity should allow GaAs devices to remain firmly entrenched in future market applications.

Strategy Analytics is finalizing our analysis, but preliminary results indicate

that the GaAs market recorded revenue growth of 32% in 2010 to reach slightly more than \$5.4bn. We anticipate that this growth will taper somewhat but still remain strong, and that the GaAs device market will close 2011 with growth in the 15–20% range. ■

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