4 In What Countries Should I Patent, Anyway?

This Patent Stuff and My Semiconductor Business – Part 4

Welcome to this post about patents and chips. Not a lot has been written about this combination, but there is a lot to know, especially for the innovators and entrepreneurs themselves. In this three-weekly series, I talk about various aspects, from my dual points of view of a patent agent and a semiconductor entrepreneur. If you like the article and read it on LinkedIn, give it a thumbs up, and/or click on Follow. If you like to work with us for your next patent, "contact us" info is on www.icswpatent.com. You can also subscribe/unsubscribe for short email alerts when the next post is available.

There are many countries and jurisdictions. A patent allows you to stop others from producing, selling, or using your invention, which is a key to where you should patent—you want to have the biggest bang for your buck. Of course, it depends on your product and business. If your chip goes inside a cell phone, then you may have customers mainly in China, Korea, US, Japan, and Brazil. That would be 5 countries to patent. But if that chip can only be produced in a foundry process of 28nm or smaller, and your invention makes no sense in, say, a 90nm process, then you could consider that there are only four countries with capable foundry companies: Taiwan, Korea, US, and China. There would be no need to patent in Japan or Brazil. Japan has fabs down to 65nm. Brazil does not produce ICs.

In Figure 6, the left column shows the product or technology your company sells or licenses to its customers, and in which you have invented something new. Perhaps you make a small computer board that you sell to washing machine manufacturers. In this context, your computer board is a system-level product. If your invention is how to use a flux capacitor in the computer system that is able to recover tomorrow's laundry data, then your innovation is at the board level, and you should, again, consider the first row of Figure 6. If the innovation is inside a field-programmable gate array (FPGA) that might be used on your board, then you should look at the second row.

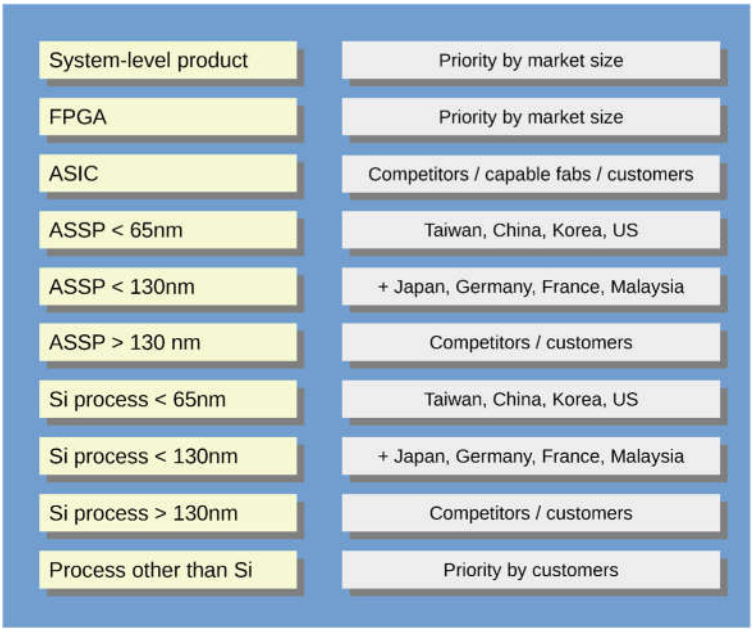

Figure 6 - Determining where to seek patents

However, if the board contains an application-specific IC (ASIC), and your innovation is inside the ASIC, then you should look at the third row of Figure 6. Et cetera.

Since there are too many countries where you could patent an innovation, you need to prioritize to find where you should seek protection of a patent, based on the locations of:

(1) who can produce (i.e., capable foundries or factories)
(2) who sells (i.e., your competitors or their sales channels)
(3) who buys (the potential customers)
(4) who uses (the end customer, or end user of the product or method that you have invented)

In the case of system-level products, production can be done in just about any country. Your competitors and their sales channels could be anywhere. So what remains is the countries where your potential customers are, and the countries where the end customers are. Your prioritization should be based on either the market size of your potential direct customers, or the market size of the end users. So if your innovation is in a dongle that can be attached to a cell phone, then you can cover 2.5 billion end customers just by patenting in China and India. But if 80% of the potential sales dollars for the dongle is just in the US and Japan, then you will prioritize the US and Japan. You should look ahead, too. If in 10 years from now China has 30% and the US and Japan together also 30%, then you should patent in China, the US, and Japan.

CAPABLE FABS

Silicon fabs can be found in Taiwan, Korea, the US, China, Germany, Japan, France, and Malaysia. **So what are capable fabs**? It strongly depends on the silicon process node—Malaysia and France manufacture down to 90nm; Japan goes down to 65nm; Germany and China currently go down to about 22nm; the US 12nm; Korea and Taiwan work on the most advanced processes, currently in the order of 4nm. China and the US are likely to follow, maybe four years behind Taiwan and Korea. For non-silicon processes such as GaAs, SiGe, GaN, SiC, and InP, the list of countries may be different. If your invention only makes sense in silicon processes of 10nm and smaller, then you could just patent in Taiwan, Korea, the US, and China. If your invention makes sense in any process node, silicon or something else, then there are too many countries with capable fabs and you should prioritize on competitors' or customers' locations.

Your innovation might relate to an FPGA – for example how an FPGA itself is made, or a circuit that could best be implemented in an FPGA. You could look at who can produce the FPGA and decide that it would be TSMC (Taiwan), Samsung (Korea), Intel (US), UMC (Taiwan), GlobalFoundries (US), or SMIC (China), or you could look at who sells them, and decide that it would be Xilinx (US), Intel (US), Lattice (US), MicroSemi (US), QuickLogic (US), MicroChip (US), Achronix (US), and S2C (US). You would decide that all of them are either in the US, Taiwan, Korea, or China. Although you are not sure if Korea or China currently produces an FPGA, you may guess that in ten years from now there is a very real chance that they will. China might, additionally, cover a significant part of the end customers, and you might decide that no Korea manufacturer would produce if they couldn't sell their product in China. So, your prioritization might end up looking like Taiwan, US, China, and last Korea. If you're short of money, you might drop Korea, but you should think twice before also dropping China.

If you are making an ASIC for your own system, or for your customer's system, then the design would have only one customer. But you know that your competitors (other system companies or other chip design houses) might be quite interested in copying your invention into their ASICs, or into their ASSPs. They could get hold of your chip once it is in production, and reverse engineer your invention. If you don't patent it, you essentially give it away. Again, you should consider capable fabs, your competitors, the direct customers and the end customers. For capable fabs, see the sidebar above. For competitors, well, you know who you are talking about. For direct customers, consult your sales team, and for end customers, dig up your business plan. In your considerations, you may weigh customers (direct or indirect) by their count, or by the dollar amount they represent.

If your innovation sits in a circuit in an ASSP, or in a silicon foundry process, you may first consider the capable fabs. In many cases this means that you look at the process node first. Is the invention applicable or relevant only for advanced foundry processes of 65nm and better, or also older processes of 130nm and better, or for any foundry process? You're down to just four countries (Taiwan, US, China, Korea) or even two if it is for advanced processes only. You could add four countries (Japan, Germany, France, and Malaysia) if you don't care about processes older than 130nm, but eight countries to file a patent might be straining your budget. There might be fewer countries if you just look at your current competitors, or the largest markets (direct or indirect). Determine the priority order in terms of dollar coverage of your patent, then look at your budget, and decide which countries to take. Be somewhat flexible, and keep an eye on why you are patenting in the first place. If it is to attract venture capital in the US, or to build the company's value in case of an acquisition, you may need to include US patents even though their priority in terms of dollar coverage protection is not as high as Taiwan and maybe China or Korea.

Lastly, if your foundry process is not silicon, then you need to follow the same line of thinking, but determine your capable fabs first. It could be that there is only a single capable fab, for instance because it has patented a unique feature on which your invention depends. In that case, you need to determine when their patent expires, and if its term is acceptable for you. If so, you only need to patent in the country of your one capable fab, which protects you against all their other customers. It could also be that there are many capable fabs, since non-silicon fabs are usually much less expensive than silicon fabs. Investigate whether patenting by priority of capable fabs is an option. If not, look at your competitors, then look at the direct and indirect customers.

The cost in each country is also an issue. Many countries require translation, but some don't, or require only partial translation. The cost of applying for the patent varies, and, once you have it, maintenance fees—yearly or otherwise regular fess to keep the patent alive—may also add up. Europe, with its smorgasbord of countries, may seem like a challenge. But a European Patent may bring outcome. You need to go through the approval process only once, and after that you can validate your patent at very reasonable cost in quite a few countries, including several that are not part of the European Union.

Upcoming:

5 Choosing the Right Patent Person for Your Inventions

6 How is a Chip or Firmware Patent Different than Other Patents? What About a Software Patent?

7 Woohoo! I Invented a Huge Improvement over My Competitor's Invention!

8 I'll Be A Billionaire Soon Enough. But Now I'll Just Buy This Book on Patent Writing on thriftbooks.com.

9 My CTO Can't Explain His Invention to Me. But He Is the Smartest Guy in the World.

Published so far (find them on www.icswpatent.com or #ThisPatentStuff):

1 So You Got This Great Idea That Will Wipe Out Competition. Now What?

2 Developing an IP Protection Strategy for Your Semiconductor Company – PART I

3 Developing an IP Protection Strategy for Your Semiconductor Company – PART II

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