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Internet-of-Things Devices, Intellectual Property, Venture Capital, China Manufacturing, and the Art of a Clean Deal: Who Owns What?

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**INTERNET-OF-THINGS DEVICES, INTELLECTUAL
PROPERTY, VENTURE CAPITAL, CHINA
MANUFACTURING, AND THE ART OF A CLEAN DEAL:
WHO OWNS WHAT?**

Chris Carr[†] & Dan Harris[‡]

Much of the value of an Internet-of-Things (“IoT”) startup resides in its intellectual property. Many IoT startups use China, mainly Shenzhen, to develop, manufacture, and ship their product.

Though this strategy provides many benefits, it also presents substantial challenges. IoT entrepreneurs often fail to ask the right initial questions of their Chinese manufacturer or take the basic legal steps needed to ensure they can track, retain and verify ownership of their own IP. This situation makes investors nervous and can greatly complicate the raising of initial or subsequent rounds of capital. At the micro-level, this article discusses the IP risks for foreign IoT startups that develop and manufacture their devices in China and offers strategic recommendations for how to manage that process to achieve a clean deal for investors and ultimately a meaningful liquidity event. At the macro-level, we highlight how intellectual property law and contract law can be leveraged to help drive the development of ecosystems in finance, entrepreneurship, and supply chain.

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INTRODUCTION

Investor and consumer interest in Internet-of-Things (“IoT”) startups and the size of their potential markets remains strong. From 2012 to 2016, venture capitalists poured over \$4 billion USD into these startups,¹ and that number is expected to grow well into the future.² Some analysts predict that 20 to 30 *billion* IoT devices will be connected to the Internet by 2020,³ with a potential impact on the global economy of up to \$6.2 trillion by 2025.⁴

China, Shenzhen in particular, is home to thousands of companies providing a wide range of services to foreign IoT startups, including the design and production of semiconductors, IoT modules, subsystems and finished devices. Shenzhen’s ecosystem includes suppliers of components, equipment, personnel, chemicals, wafers and product packaging—in short, pretty much everything one would need to build and ship an IoT product to any part of the world.⁵

Many foreign IoT startups are making the pilgrimage to Shenzhen to take advantage of this rich ecosystem.⁶ As China lawyers advising these companies, we regularly see IoT products that have reached the mass production stage and need to be produced quickly and in large quantities. Now that it has a commercial product, the startup seeks financing. The wise angel, venture capitalist, or private equity firm asks, “But who really owns the intellectual property in the product? Do you own it? Will or does the Chinese manufacturer/factory in Shenzhen own it? Or does some third party own all or part of it?”

Investors like clean deals, and intellectual property stability and predictability are important to them.⁷ IP-intensive industries have more

1. See Steve Myers, *As Connected Hardware Matures, Investors Pour More Funding Into Fewer Companies*, TECHCRUNCH (Jan. 6, 2017), http://bit.do/Myers_InvestorsPour.

2. See Christine Magee, *VCs Look to the Future as IoT Investments Soar*, TECHCRUNCH (Nov. 5, 2014), http://bit.do/Magee_VCs-look-future.

3. See Harald Bauer et al., *The Internet of Things: Sizing Up the Opportunity*, MCKINSEY & CO. (Dec. 2014), http://bit.do/Bauer_IoT; Chris Ip, McKinsey & Company, Address at the Hong Kong IoT Conference: IoT Opportunity – Are You Ready to Capture a Once-in-a-Lifetime Value Pool? (June 21, 2016), http://bit.do/IP_IoT-Opportunity; John Greenough, *How the 'Internet of Things' Will Impact Consumers, Businesses, and Governments in 2016 and Beyond*, BUS. INSIDER (July 18, 2016), http://bit.do/Greenough_IoT; VERIZON, STATE OF THE MARKET: INTERNET OF THINGS (2016), http://bit.do/Verizon_State-of-the-Market.

4. See Bauer et al., *supra* note 3; Ip, *supra* note 3.

5. See David Lam, *The Internet of Things Connects Silicon Valley to Shenzhen*, KNECT365 FIN. (Apr. 13, 2016), http://bit.do/Lam_IoT.

6. See Ryan Matthew Pierson, *Shenzhen Playing a Strong Hand in the Global IoT Game*, READWRITE (May 16, 2016), http://bit.do/Pierson_Shenzhen; Lam, *supra* note 5.

7. See Mary Juetten, *Do Venture Capitalists Care About Intellectual Property?*, FORBES (Aug. 11, 2015), http://bit.do/Juetten_Do-VCs-Care.

than doubled the sales and capital spending of non-IP-intensive industries, and wages are more than 50% higher in IP-intensive industries.⁸ Further, for early-stage companies, intangible assets can account for as much as 80% of their value.⁹

It is often awkward for the (usually) young entrepreneur to have to answer these important IP questions from investors. With the rise of IoT devices, these questions have become even more difficult to answer in a definitive way. The purpose of this article is to assist academic scholars in law and business, their students, legal practitioners, policymakers, entrepreneurs and investors to better understand the relevant history, issues, and risks related to making an IoT product in China and provide strategic recommendations to move forward.

I. SOURCING FROM CHINA: RELEVANT HISTORY

How did we get to this point? The process has worked its way through the following general stages.

A. *Stage One – The Gold Old Days (circa 1981 to 1995)*

Here, the landscape was pretty straightforward and simple, and there were two scenarios. In the first scenario, the Chinese manufacturer made standard consumer products. The U.S. buyer simply purchased that product and would ask the Chinese manufacturer to take the additional step of putting the trademark/logo of the U.S. buyer on the product or its packaging. In this case, intellectual property ownership was clear: the Chinese manufacturer owned the design of the product while the U.S. customer owned the trademark/logo. In the second scenario, the product was the U.S. buyer's already well-developed and established product. The buyer arrived at the doorstep of the Chinese manufacturer with its already completed product in hand, and then entered into a contract with the Chinese manufacturer to make a large number of copies. Here, ownership of the IP was also straightforward and clear: the Chinese manufacturer owned nothing, and the U.S. buyer owned all of the product's intellectual property.

The simplicity of this relationship helped give rise to the lazy practice of memorializing the entire manufacturing relationship

8. See Nam D. Pham, *The Impact of Innovation and the Role of Intellectual Property Rights on U.S. Productivity, Competitiveness, Jobs, Wages and Exports*, NDP CONSULTING (Apr. 2010), http://bit.do/Pham_Impact; Kristina Lybecker, *IP Protection is Key to U.S. Job Creation*, IP WATCHDOG (Mar. 23, 2015), http://bit.do/Lybecker_IP-Protection.

9. Mary Juetten, *Pay Attention to Innovation and Intangibles – They're More Than 80% Of Your Business' Value*, FORBES (Oct. 2, 2014), http://bit.do/Juetten_Pay-Attention.

through simple Purchase Orders (“POs”).¹⁰ More complex legal agreements such as an NNN Agreement, Product Development Agreement or OEM Agreement (more on each of these agreements below) were rarely used, since the ownership of the IP was clear and the PO took care of the price and delivery terms. In most cases this relaxed approach was sufficient.

B. Stage Two (circa 1995 to 2015)

During this stage a new iteration of the relationship evolved. U.S. buyers started to arrive in China with no completed product in hand, just the *idea* for the product. The U.S. buyer would then work to co-develop the idea or proposal into a product, alongside the Chinese manufacturer. Normally, the Chinese manufacturer would offer to perform all the development work at its own expense, with the understanding that it would later be selected and used by the U.S. buyer to exclusively mass produce the product.

This co-development process also often relied on the same relaxed “purchase order only” approach discussed in Stage One. This approach in turn gave rise to many of the issues we see today that make answering the “who owns what” question so difficult. For example, who owned the product design? What about the molds and tooling? Who owned the various manufacturing trade secrets? If the buyer chose to place the product with another factory other than the one who co-designed the product, what was owed to the initial manufacturer/factory that spent its own money to co-develop the product? To what extent did the initial manufacturer/factory need to satisfy the buyer’s price and quantity requirements? If the manufacturer ended its relationship with the buyer and then made the product under the its own trademark/logo, was that permissible?

Absent the right legal agreements, these were difficult questions to answer. However, in such vague situations, and as our prior research addressed and established, the Chinese factory would likely prevail in the event of a dispute between the parties over such issues.¹¹

10. We label this the “lazy approach” because, contrary to urban legend, the PO is not a contract in the traditional sense; it is only the placing of one order. Thus, IoT entrepreneurs should not rely on a PO to save them. See the more detailed discussion on POs in Part II *infra*.

11. See Chris Carr & Dan Harris, *Strategic Contracting in China for Foreign Firms*, 57 THUNDERBIRD INT’L BUS. REV. 241 (2015) [hereinafter *Strategic Contracting*]; Chris Carr & Dan Harris, *Contracting in China: A Contract Worth the Paper It’s Written On*, SUPPLY CHAIN MGMT. REV. 28-33 (2015) [hereinafter *Contracting in China*].

C. Stage Three (circa 2015 to Today)

Now we are at the beginning of the “boomtown” IoT era. Yet, in the design, development, and manufacturing of devices for the IoT market, the problem-filled relationships of the Stage Two era have only become more prevalent. Further, a whole new set of issues has arisen. During the Stage Two era, we could usually count on the simplicity of having only two entities that worked together to design and manufacture the product. In this third and current IoT era, the proverbial design and manufacturing kitchen has become even more crowded. For example, in many of the IoT startups we have seen the last two or three years, the design-development-manufacturing process has expanded to include the following:

- A product “concept” from the U.S. buyer.
- An international design firm handling the external design of the product.
- The internal design and function of the product being owned and handled by:
 - The U.S. buyer;
 - The Chinese manufacturer; and/or
 - The company who provided the components or sensors required to connect the IoT device to outside networks.
- The design of the IoT product “app” (usually for a smart phone). This can involve two separate sets of software: the communication sending software found on the IoT product and the communication receiving software which resides in possibly multiple forms. And as with internal design, these software components may be written by different parties: a third-party software design firm, the U.S. buyer and/or the Chinese manufacturer.¹²

So now consider: the product is ready, manufacturing needs to commence, and the startup pursues funding. The experienced funding source then asks, “Who owns this IoT product? Who owns its underlying IP?” We have found that when we ask the startup and its founder these questions, they often do not know. Further, their initial seed investors and/or companies they outsourced to do not know either.

As you can imagine, the “Good question. I’m not sure” response is not acceptable to seasoned and mature investors. When the startup

12. See ERRAN CARMEL & PAUL TJIA, *The Offshore Landscape*, in OFFSHORING INFORMATION TECHNOLOGY: SOURCING AND OUTSOURCING TO A GLOBAL WORKFORCE 3, 3-30 (2005).

and its founder are pressed to answer these questions, they usually have to admit it's not clear who owns what.

The overall message here is that as development and manufacturing of IoT devices becomes more diffuse and complex, it is even more important to turn to well-written legal agreements that can help answer such questions in advance. It is risky to devote time, energy, and money to build an IoT product that may in whole or in part be owned by someone else.

II. THE STANDARD SCENARIO

Today, the usual situation often plays out as follows. A foreign product designer-startup comes to China to select and then work with a Chinese manufacturer, probably in Shenzhen,¹³ to commercialize their IoT product. In this co-development setting, the foreign startup and its Chinese counterpart cooperate to build a prototype of the product that can be commercialized. But no written contract is used; the work is again (lazily) memorialized using a Purchase Order.

The parties' development cycle moves along, and the Chinese manufacturer eventually completes the needed prototype. It retains the prototype, and looks forward to beginning the manufacturing phase, where it can finally start to generate meaningful revenue. However, as the relationship evolves into the manufacturing phase, something will usually go wrong.

Two things often go wrong. First, the Chinese manufacturer/factory announces to the foreign IoT startup that the projected unit price for the product will need to substantially increase or it will be unable to meet delivery date or quantity requirements for the product. Or secondly, when the factory makes the product, substantial product defect and quality control issues appear.¹⁴

As these problems appear, the foreign startup confronts its Chinese counterpart and takes the position that it is going to take its prototype and have it manufactured by another factory, also probably located in or near Shenzhen. The Chinese manufacturer replies, in effect,

No way. You can't do that. We own the product's IP, and we agreed to manufacture the product for you exclusively so long as you were willing to order on our terms. You cannot now take the prototype to somebody else. We have the sole right to manufacture this product, and, if you don't make good on

13. Regarding the draw of Shenzhen, see discussion accompanying notes 1-6, *supra*.

14. See MIKE BELLAMY, THE ESSENTIAL REFERENCE GUIDE TO CHINA SOURCING: A COMPREHENSIVE GUIDE TO COMMON PITFALLS AND BEST PRACTICES (2014).

your promises of being able to make substantial sales, we will terminate our relationship and just make and market the product ourself.

In this situation, the problem is that in China, absent a written contract that expressly and clearly states the contrary, the Chinese party is probably correct in its legal position concerning the new product and its IP.¹⁵ Further, the Purchase Order is not a contract in the traditional sense; it is simply the placing of an order. So, unless a PO speaks to intellectual property (which is quite rare), it is not going to help the startup here. In fact, in China, some courts do not see POs as a contract at all and/or will not even consider a document that is not in Chinese.¹⁶

This sad ending for the foreign IoT startup—a scenario where it loses everything it has been focused on for months or even years—results from its failure to think through and properly document the co-development process.

III. MOVING FORWARD: LAW MEETS IP STRATEGY

There is still a lot of skepticism in business about China and the enforceability of contracts there. Several of our clients remain convinced that legal does not matter in China. But that is simply not true. As we have written and shown in prior research, it makes sense to have the right business contract in place for reasons of clarity, breach prevention, and enforceability.¹⁷ Further, and as we have also established in previous research, historical data and indicators suggest that, though China's still-emerging legal system is far from perfect, China has come a long way and is much more effective in handling *commercial contract disputes* than most people think.¹⁸ This positive development and shift are also consistent with the literature, which predicts that, as legal enforceability improves in a country, rational actors will shift away from relying on traditional mechanisms, such as trust and relationships (i.e., *guanxi*), and move towards explicit contracts to safeguard their exchanges from business and market risks.¹⁹

15. See Carr & Harris, *Strategic Contracting*, *supra* note 11; Carr & Harris, *Contracting in China*, *supra* note 11.

16. This is beyond the scope of this article, but in short, the ideal document is a bilingual Chinese language contract sealed and “chopped” by the Chinese company. *See id.*

17. *Id.* For Plaintiffs, *Some Courts in China Are Getting Better*, *ECONOMIST* (Sept. 30, 2017), http://bit.do/Economist_Plaintiffs-China.

18. *Id.* See Chris Carr & Dan Harris, *China Supply Chain Contracts: The Contract (Liquidated) Damages Provision*, *SUPPLY CHAIN MGMT. REV.* (Oct. 9, 2015), http://bit.do/Carr_China-Supply [hereinafter *China Supply Chain Contracts*].

19. See Kevin Zheng Zhou & Dean Xu, *How Foreign Firms Curtail Local Supplier*

What then, should a foreign IoT startup do to avoid losing its hardware/product in China? The short answer is, first, ask the right questions, and second, use the right bilingual legal documents and IP registrations to implement the answers to those questions.

A. *Threshold Questions to Get Started*

This is not an exhaustive list, but here are some initial important questions that the foreign IoT startup should ask itself and its Chinese manufacturer when getting started:

1. Who Does What, When?

Have you both *clearly agreed* on what will be done, who is responsible for what, and when each task should be done? This requires a detailed description and statement of the product to be designed and the work that needs to be performed. In China, too many product design projects fail because the parties do not know what is going on or they have not set expectations, and after a year or two of development, no progress is made on the prototype.

2. Costs, Allocation, Dates?

You both clearly agreed on the costs, the allocation of those costs and also the payment dates for those costs? What exactly will be provided by the Chinese manufacturer in return for your payments? This portion of the agreement and understanding should also typically address molds, tooling, software, design, the specifications for any working model, etc.

3. Return of IP?

If the project fails, have you both clearly agreed that all tangible and intangible materials and IP developed during the project need to be transferred over to you, the foreign IoT startup? These materials should not be retained by the Chinese manufacturer and designer under any circumstances. If your agreement is silent on the issue, chances are high that your Chinese counterpart gets to keep these items.

Opportunism in China: Detailed Contracts, Centralized Control, and Relational Governance, 43 J. INT'L BUS. STUD. 677 (2012); Kevin Zheng Zhou & Laura Poppo, *Exchange Hazards, Relational Reliability, and Contracts in China: The Contingent Role of Legal Enforceability*, 41 J. INT'L BUS. STUD. 861 (2010); Rekha Krishnan et al., *When Does Trust Matter to Alliance Performance?*, 49 ACAD. MGMT. J. 894 (2006); Mike W. Peng, *Institutional Transitions and Strategic Choices*, 28 ACAD. MGMT. REV. 275 (2003); Xueguang Zhou, Qiang Li, Wei Zhao, & He Cai, *Embeddedness and Contractual Relationships in China's Transitional Economy*, 68 AM. SOC. REV. 75 (2003).

4. Manufacturing Control?

If the project is successful and a prototype is developed, do you still have the right to manufacture the product anywhere you want, anywhere in the world, with any factory you want? This is critical. The foreign IoT startup must retain its right to determine what factory will manufacture its device. While the parties may hope and dream that the manufacturing will take place in the co-developer's factory, what if the manufacturer cannot provide an acceptable price, quantity, quality, or delivery date of the foreign IoT startup's product? What if the Chinese counterpart takes the position three months later that due to unforeseen changes in the prices of its materials and supplies, it needs to raise the price to you? To maintain control, you must protect the right to manufacture your product with a factory of your choice, regardless of the reason.

In short, the issue of the "right to manufacture" needs to be clearly understood and agreed upon by both sides before they focus on the more technical IP ownership details. The reason behind this is a practical one—we have found that every factory owner and every foreign IoT startup understands on a basic level manufacturing issues. If this is discussed and negotiated upfront, the IP landscape will shape and appear in a way both parties will also understand. Once the parties arrive at clarity on their manufacturing rights and obligations, the more mundane and technical IP issues and concerns become much easier and cleaner to address. If one waits to try and reach an understanding and agreement with one's China counterpart on manufacturing rights *after* the product co-development process begins, one will have lost all or most of one's leverage. In that situation, we have seen that the Chinese party can say no to one's desire to maintain manufacturing control and/or it can raise manufacturing prices with near impunity.

B. Legal Documents and Registrations to Implement Those Answers & IP Strategy

Here is the list of the basic contracts and intellectual property registrations that can be used to ensure that ownership and other rights will be protected against the Chinese manufacturer and the rest of the world. Some situations may require only a few of these items; others will require more.

1. Non-Compete, Non-Circumvention, Non-Disclosure (“NNN”) Agreements

NNN agreements are bilingual agreements that protect confidentiality and prevent a Chinese counterpart from competing with a startup or going around the startup by working directly with its customers.²⁰ This agreement makes sense *before* choosing the specific Chinese manufacturer, but many times this specific agreement may not be needed because it makes more sense to put the NNN’s substantive provisions into a well-drafted Product Manufacturing Agreement (see below). An NNN is a relatively simple agreement to draft but it must be done correctly to be effective. To be candid, the standard off-the-shelf American and European NDA Agreements we see people use are worthless for China.²¹

2. Mold/Tooling Ownership Agreements

This is another basic bilingual agreement that makes clear the tooling and molds being made for the project do, in fact, belong to startup.²² Without this agreement, when the startup wants to move to a new manufacturer for its product, its prior manufacturer may try to keep its tooling and molds. And without this agreement, there is a high probability the old manufacturer will use its molds/tooling to then make said product and compete with the startup. Like the NNN agreement, this agreement oftentimes is not needed because it makes more sense to put the substantive provisions from a Mold/Tooling Ownership Agreement into the Product Manufacturing Agreement (see below).

3. Product Ownership Agreement

This bilingual agreement makes clear that the product co-developed with the Chinese party belongs to the startup. Most importantly, the startup needs to have something in writing that is enforceable in both China *and* in other countries in which the startup sells or will sell its product.²³ If it does not have this agreement in place, its Chinese manufacturer can claim ownership of the product’s IP. Even more disturbing, it may be able to register a design or utility patent on the product in China *and* in the other countries in which the

20. Dan Harris, *Want To Protect Your IP From China? Use An NNN Agreement*, ABOVE THE LAW (Nov. 16, 2015, 11:02 AM), http://bit.do/Harris_Protect-IP.

21. See Carr & Harris, *Strategic Contracting*, *supra* note 11.

22. Dan Harris, *Product Molds and Tooling in China: Three Things You Must Do To Hang On To Yours*, CHINA L. BLOG (Sept. 19, 2015), http://bit.do/Harris_Product-Molds.

23. See Harris, *supra* note 20.

startup sells or might sell its product. Without this legal document signed by the Chinese manufacturer, it can accrue a variety of legal rights (in China and elsewhere) as to what the startup thought was its own product. Similar to the above, this agreement may not be needed if it makes more sense to move this content into a Product Development Agreement or Manufacturing Agreement (see below).

4. Product Development Agreements (PDAs)

These are often complicated agreements. PDAs define the boundaries of the product development relationship with the startup's Chinese manufacturer, including who owns what and who pays for what in order to arrive at the finished product stage.²⁴ These agreements make clear what the startup is paying for with respect to the product's development and lays out the important metrics the Chinese counterpart must satisfy to get paid. At a minimum, a good PDA includes bilingual provisions addressing the following:

- The product that will be developed,
- The technology that the foreign IoT startup and Chinese manufacturer will contribute,
- Who will provide the product specifications, and in what form, and
- Who owns the IP rights to the finished product.

5. China-Focused Manufacturing Agreements

These are often called "OEM Agreements." These agreements can also be complex. They are used to define the entire relationship between the startup and the Chinese manufacturer. It is rare not to require a good bilingual China-focused OEM Agreement. Among other things, these agreements usually address the following:

- Quality requirements,
- Time line and timeliness requirements,
- Product and intellectual property ownership,
- Mold/Tooling ownership,
- Non-compete, non-circumvention, non-disclosure (NNN) requirements,
- Sub-supplier expectations and requirements, and
- Penalties for breaching (for example, liquidated damages).

24. Steve Dickinson, Dan Harris, & Grace Yang, *China Product Development Agreements*, CHINA L. BLOG (Feb. 15, 2016), http://bit.do/Dickinson_China-Product.

6. China Trademark Registration

When the startup's IoT device is made in China and if its device or its packaging mentions the startup company, its brand name or logo, the startup simply *must* register the trademark in China. This is true even when the startup has no plans to sell the product in China. If the startup does not file its trademark for these items, someone else in China will likely do so. That someone else (for example, an unscrupulous competitor) may then have the power to stop the product from being made in China or from leaving China's ports.

7. China Invention and Design Patents

If the startup's IoT product is distinctive or innovative in either its design or function, the startup probably needs to pursue a Chinese patent. These patents protect its product from others who try to copy it in China. Further, they help prevent others from registering a patent on *the startup's* product in China, which can then give others leverage to try and stop it from manufacturing its product in China or having its product leave from China's ports.

CONCLUSION & IMPLICATIONS

The keys to IoT manufacturing in China are choosing the right legal agreements and the right IP registrations at the right time to maximize one's protections while minimizing one's costs. We mentioned earlier how U.S.- and European-style NDA Agreements simply do not work for China. Sadly, many other agreements we see drafted for China do not work either, for all sorts of reasons.²⁵ We appreciate that startups are often strapped for cash and loathe to spend money on legal expenditures. However, at the end of the day, IoT startups cannot have it both ways. If they decide to manufacture their device in Shenzhen to take advantage of that facet of the global startup ecosystem, they need to accept and manage the challenges that comes with that decision. If a startup has or will raise hundreds of thousands of dollars (or usually more) to mass produce and scale its device, it has no excuse for not spending a small portion of those funds implementing the legal recommendations we discussed above. Wise investors will want to know that these details have or will be addressed. Doing so will be money well spent and the return will be a faster, better, and cleaner liquidity event for all involved.

25. See Carr & Harris, *Strategic Contracting*, *supra* note 11; Carr & Harris, *Contracting in China*, *supra* note 11; Carr & Harris, *China Supply Chain Contracts*, *supra* note 18.