SEALED BY ORDER OF THE COURT

CR-15 00106 - EJD

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

Filed
APR 01 2015
RICHARD W. WIEKING
CLERK, U.S. DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN JOSE

SAN JOSE DIVISION

THE UNITED STATES OF AMERICA

vs.

WEI PANG, HAO ZHANG, HUISUI ZHANG, JINPING CHEN, ZHAO GANG, and CHONG ZHOU

SUPERSEDING INDICTMENT

Count One:	18 U.S.C. § 1831(a)(5)-Conspiracy to Commit Economic Espionage
Count Two:	18 U.S.C. § 1832(a)(5)-Conspiracy to Commit Theft of Trade Secrets
Counts Three-Seventeen:	18 U.S.C. §§ 1831(a)(1),(2), (3), & 2-Economic Espionage; Aiding and Abetting
Counts Eighteen-Thirty Two:	18 U.S.C. §§ 1832(a)(1),(2), (3), & 2-Theft of Trade Secrets; Aiding and Abetting

A true bill.

Foreperson

Filed in open court this 1st *day of* April *A.D. 2015*

United States Magistrate Judge

Bail. $ NO bail arrest warrants as to all defendants

MELINDA HAAG (CABN 132612)
United States Attorney

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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN JOSE DIVISION

UNITED STATES OF AMERICA, v. WEI PANG, HAO ZHANG, HUISUI ZHANG, JINPING CHEN, ZHAO GANG, and CHONG ZHOU, Defendants.	CASE NO. CR-15-00106 EJD VIOLATIONS: 18 U.S.C. § 1831(a)(5) – Conspiracy to Commit Economic Espionage; 18 U.S.C. § 1832(a)(5) – Conspiracy to Commit Theft of Trade Secrets; 18 U.S.C. § 1831(a) – Economic Espionage; 18 U.S.C. § 1832(a) – Theft of Trade Secrets; 18 U.S.C. § 2 – Aid & Abet;18 U.S.C. §§ 1834 and 2323 –Criminal Forfeiture **FILED UNDER SEAL** SAN JOSE VENUE

SUPERSEDING INDICTMENT

The Grand Jury charges:

Introductory Allegations

At all times relevant to this Indictment, unless otherwise indicated (and with all dates and date ranges being both approximate and inclusive):

The Victim Companies

1. Avago Technologies ("Avago") was a leading designer, developer and global supplier of a broad range of analog, digital, mixed signal and optoelectronics components and subsystems with a focus in semiconductor design and processing. Avago was headquartered in San Jose, California, and

Singapore, and had facilities around the United States and the world. The facilities operated by Avago included fabrication plants, one of which was located in Fort Collins, Colorado.

2. Skyworks Solutions, Inc. ("Skyworks") was an innovator of high performance analog semiconductors. Skyworks was headquartered in Woburn, Massachusetts, and had facilities around the United States and the world. The facilities operated by Skyworks included fabrication plants, one of which was located in Woburn.

The Technology

3. Surface Acoustic Wave ("SAW") and Bulk Acoustic Wave ("BAW") filters are used in wireless devices to eliminate interference and improve other aspects of device performance. FBARs are one type of BAW filter.

4. Film Bulk Acoustic Resonators ("FBAR") are tunable acoustical resonators comprising top and bottom electrodes that sandwich piezoelectric material, and which are supported from the ends such that they are suspended over a substrate. FBARs are often referred to as "filters" because they filter incoming and outgoing wireless signals for wireless devices. FBARs are tuned to adjust their resonance frequency to suit various applications. Avago is the leading company in the United States that manufactures and sells FBARs.

5. The most common and most profitable application of FBAR technology is as a radio frequency ("RF") filter for mobile phones and other wireless devices. Filtering unwanted incoming and outgoing wireless signals has become technologically more difficult with the ever-expanding use of wireless signals in modern communications. Technological advances in FBARs have played a substantial role in creating smaller, more efficient wireless devices for both consumer and military applications.

Entities Used by the Defendants

6. Tianjin University ("TJU") was a State University and part of the People's Republic of China ("PRC") Ministry of Education. TJU includes the College of Precision Instrument and Opto-Electronic Engineering ("College of Precision Instrument"). The College of Precision Instrument contained three pertinent research facilities: the State Key Laboratory for Precision Testing Techniques

and Instrument, the Engineering Research Center of the Ministry of Education / Micro-Nano Manufacturing and Measuring Technology, and the Municipal Engineering Center / Micro-Nano Manufacturing Technology. WEI PANG, HAO ZHANG, and JINPING CHEN held the positions of TJU Professors in the College of Precision Instrument.

7. TJU was a member institution of PRC 985 Project. The 985 Project was a PRC funding program administered by the Ministry of Education and instituted for the purpose of enabling the PRC to develop world class universities. The PRC Ministry of Education also stated that PRC state universities have a role in bolstering the PRC economy and that this role was more readily fulfilled by utilizing 985 Project funds.

8. Novana, Inc. ("Novana"), was a shell corporation formed in the Cayman Islands by WEI PANG, HAO ZHANG, and others, at the direction of TJU. Novana was created in part to appear to be the legitimate source of the trade secrets stolen from Avago and Skyworks. TJU dictated this arrangement, including the ownership structure of Novana.

9. Tianjin Micro Nano Manufacturing Tech ("MNMT") was located in the PRC's Tianjin Economic Development Area ("TEDA"), a PRC-sponsored high tech development zone, and served as the investment arm of TJU, which was MNMT's sole owner.

10. ROFS Microsystems ("ROFS") was an entity created by the joint venture between MNMT and PANG, ZHANG, and others on September 11, 2011. WEI PANG, HAO ZHANG, JINPING CHEN, ZHAO GANG, CHONG ZHOU, and others held positions at ROFS.

Other Individuals

11. J.Y. was the Academician of the Chinese Academy of Sciences responsible for the TJU College of Precision Instrument and Opto-Electronic Engineering. J.Y. had substantial connections to the PRC government and was a chairman or committee member of numerous PRC political committees, including the National Committee of Chinese People's Political Consultative Conference ("CPPCC"), CPPCC of Tianjin City, China Association for Promoting Democracy ("CAPD"), and Tianjin CAPD.

The Defendants

12. WEI PANG came to the United States from the PRC as a graduate student at University

of Southern California ("USC") on August 10, 2001. After obtaining his PhD in Electrical Engineering ("EE") from USC in 2006, he worked for Avago in Fort Collins, Colorado, until the end of June 2009. PANG was a USC classmate of HAO ZHANG and HUISUI ZHANG.

13. HAO ZHANG came to the United States from the PRC as a graduate student at USC on May 19, 2003. After obtaining his PhD in EE from USC in 2006, he worked for Skyworks in Massachusetts until May 2009.

14. HUISUI ZHANG came to the United States from the PRC after receiving his Bachelor of Science degree from Peking University in 2002. After obtaining his Master of Science degree in EE from USC in 2006, HUISUI ZHANG worked for Micrel Semiconductor in San Jose, California. HUISUI ZHANG, WEI PANG, and HAO ZHANG were classmates at USC.

15. JINPING CHEN was Assistant Dean at TJU, the Deputy General Manager/Vice President of Tianjin Micro Nano Manufacturing Tech ("MNMT"), and a member of the Board of Directors of ROFS. CHEN coordinated Micro-Electronic Mechanical Systems ("MEMS") fabrication equipment lists and led the formation of ROFS as a PRC-based joint venture between WEI PANG and HAO ZHANG's team and TJU/MNMT.

16. ZHAO GANG was the general manager of ROFS, was educated at TJU, and had prior TJU-affiliated employment. In 2005, GANG helped TJU and JINPING CHEN form MNMT, which originated as a micro/nano engineering fabrication facility built with PRC government funding.

17. CHONG ZHOU was a TJU graduate student working for WEI PANG and HAO ZHANG's TJU design team. CHONG ZHOU worked with Cadence design kit and made source code adjustments, contributed to papers and patent applications on FBAR, edited layouts for FBAR, and altered documents containing Avago's trade secrets.

Avago Trade Secrets

18. Avago's FBAR technology contained trade secrets, as defined in Title 18, United States Code, Section 1839(3), that were included in products sold worldwide. Avago and its predecessor companies have spent approximately 20 years and $50,000,000 researching and developing its FBAR technology. Avago's FBAR technology included, but was not limited to, the following trade secrets:

a. **P-cells**: Avago used Cadence, a publicly-available computer automated drafting ("CAD") software platform for engineers to design FBARs. Avago employed software engineers to develop parameterized cells, which Avago called "P-cells," for use within Cadence. The "Call Back" features of P-cells automatically adjusted remaining dimensions when one or more dimensions were changed by an engineer using the program to design FBARs. The Call Back files were typically saved by noting a "CB" at the end of the file name. These automatic adjustments allowed Avago's FBAR designers to create and test new FBAR designs quickly. When an Avago P-cell was opened, the window revealed the source code and a banner at the top stating that the file was Avago's intellectual property. The source code also showed the name of the Avago employee who made every revision to the file, including the date the revision was made. The P-cells in Avago's Design Kit took many software engineers years to develop.

b. **Design Kits**: Avago grouped all of the P-cells it created into a bulk "Design Kit" that was stored on restricted servers. The P-cells in Avago's Design Kit were critical to Avago's ability to design high performance FBARs and were not disseminated outside of the company.

c. **Air Bridge Design Feature**: Avago's "Air Bridge" connected the top electrode on an FBAR to the electrical pad. Avago's Air Bridge contained unique features, such as allowing kinks to remain and machining the air bridge to match the contours of the sloped layers beneath it. Avago's Air Bridge enhanced the performance of its FBARs by improving the amount of energy an FBAR reflected back.

d. **Wings and "Undercut" Design Features**: Avago's "Wings" feature derived its name from the wing shape of one layer. Avago developed Wings simultaneously with its Air Bridge. Wings had a specific feature called an "undercut." Avago perfected a wet-etching process to create the undercut and specifically designed its FBARs to have a slight undercut.

e. **Silicon Carbide Layers**: Avago's Silicon Carbide Project combined two passivation layers, or coatings, of silicon carbide in a particular manner proprietary to Avago.

f. **Temperature Compensation Layer**: Avago placed a temperature compensation layer between two electrodes as part of its FBAR design, and found that a smoother and more gradual

slope avoided cracking and enhanced performance.

g. **Coupled Resonator Frequencies (CRF) Project**: Avago's CRF Project was a method for manufacturing an acoustically-coupled device for FBARs. The particular manner in which Avago manufactured the device enhanced the performance of its FBARs.

h. **Ion Mill Etching Process and Trimming Code**: Avago's ion mill etching process was a unique FBAR fabrication process. Avago maintained a machine-specific trimming code, or source code, that enabled a specific type of machine (a Roth and Rawl brand) to perform the ion mill etching process. The trimming code and the specific type of machine were both essential components to Avago's ion mill etching process.

i. **Microcap, Automatic Parameter Testing (APT), and Wafer Bonding Process**: Avago developed a low-cost packaging technique called "Microcap" that aligned notches and cavities to "sandwich" a lid wafer onto a base wafer (also referred to as "wafer bonding") before cutting the wafer into individual pieces. Avago intentionally placed bumps, treads, and "vias" (that is, passageways through the wafer layers) on and through the backs of wafers, then used gold to fill the aligned cavities between the lid and the base wafers for conductivity. Sandwiching multiple wafers allowed Avago to simultaneously package multiple FBARs before cutting, saving time and money. Avago also developed source code to conduct APT during the wafer bonding process. APT simulated the shape of a base wafer for bonding and automatically generated a matching wafer that can be bonded to the base. Additionally, APT automatically adjusted all parts of both wafers for any modifications to either wafer.

j. **Chemical Mechanical Polish (CMP) Process**: CMP was one of the FBAR fabrication process steps performed by technicians at Avago.

k **FBAR Design Layouts**: Avago's FBAR design layouts contained critical parameters that affect FBAR performance.

l. **Applications for Avago's FBAR Technology**: Avago conducted market and feasibility analyses for potential applications of FBAR technology and protected the results as trade secrets.

m. **Aluminum Nitride (AlN) Deposition Details**: AlN was the piezoelectric

material that Avago used in its FBARs. Although various methods of depositing AlN on the bottom electrode were available, Avago determined that "sputtering" was the preferred method. Precise sputtering of AlN was critical to the tuning and performance of Avago's FBARs.

n. ***High Tone Bulk Acoustic Resonators***: In addition to work on FBAR, Avago also performed Research and Development ("R&D") on other types of BAW devices, including high tone bulk acoustic resonators ("HBAR").

Avago Confidentiality Protections

19. Avago took reasonable measures to keep its trade secrets, including those referred to in paragraph 18 above, secret, including the following:

a. Avago employees were required to sign a Non-Disclosure Agreement (NDA) as part of accepting employment.

b. Avago employees attended annual training on confidential information and on business standards of conduct.

c. Avago employees were required to wear access badges to enter Avago facilities.

d. Avago maintained security cameras both inside and outside Avago facilities. Security Guards monitored these cameras 24/7.

e. Access to Avago's computer system required an assigned log-in and password. Avago computer monitors also displayed a Security Banner/Warning.

f. Access to Avago's "T" Drive required a separate, assigned log-in and password, and required the user to view and accept a confidentiality warning and agreement before logging on. Further access inside the "T" drive was limited to folders relevant to each particular user. Initial access was granted by a system administrator, who limited an employee's access to the areas for which he or she had a legitimate need.

g. Access to Avago's computer system required an assigned log-in and password, and was only given to employees with a need for access.

h. Publication of any Avago FBAR information required prior approval from Dr. Richard Ruby.

i. Avago physically marked relevant items "Confidential."

j. When disclosing approved information to other companies, Avago used Confidential Disclosure Agreements (CDA) that ranged from three to five years, or, in the rare instance in which the disclosure contained source code, ten years.

k. Avago required employees to dispose of confidential information in designated bins with slots, the contents of which were subsequently shredded.

l. Avago used code names for projects.

m. Avago marked relevant emails: "Confidential - Do Not Forward."

n. Avago required employees to disclose inventions deriving from work at Avago.

o. Avago placed strict limitations on information that could be included in academic papers or presentations.

Skyworks Trade Secrets

20. Skyworks developed BAW filter technology that it intended to include in products that were to be sold worldwide. Skyworks exited the BAW/FBAR business in early 2009, sold some of its patents and patent applications to Avago, and retained some of the information as trade secrets, as defined in Title 18, United States Code, Section 1839(3), including the following:

a. **Recipes and Process for Deposition of AlN**: The key step in manufacturing Skyworks' filters was the deposition of AlN by sputtering. Skyworks developed uniform and precise deposition recipes and processes for AlN sputtering that directly affected the quality of BAW filters.

b. **fxP Tool Equipment Specifications**: Skyworks also developed precise specifications and customizations for the fxP tool Skyworks used to deposit AlN.

c. **Omega AlN Etching Tool Equipment Specifications**: Skyworks used an Omega etching tool to etch the AlN after it had been deposited, and spent considerable time developing its etching process, including precise specifications and customizations.

d. **Equipment Specifications Stored on Shared Drives**: Skyworks compartmentalized and stored its intellectual property ("IP") in controlled-access, shared drives. These shared drives contained numerous trade secrets, such as recipes, equipment specifications, facility setup

information, pricing information, project plans, and testing reports.

e. **Wafer Chemical Quantity Calculation Recipes**: Skyworks developed and maintained recipes that listed the optimal, precise chemical quantities for making BAW wafers.

f. **Mask Layouts**: Skyworks' mask layouts were layouts for Skyworks' integrated circuits ("ICs"). Skyworks developed masks that allowed etching and application of other process steps to certain areas of a filter.

g. **Module Performance Data**: Power Amplifier Modules ("PAMs") and Front End Modules ("FEMs") were combinations of several parts. Skyworks sold PAMs and FEMs and protected data regarding their performance in testing as trade secrets.

h. **Skyworks' Internal Power Point Presentations**: Skyworks engineers often used PowerPoint presentations containing trade secrets during internal department/team meetings to explain and illustrate Skyworks' processes and test results.

i. **BAW Project Plans**: PowerPoints and other files outlined BAW future performance goals, R&D techniques, and technology applications.

Skyworks Confidentiality Protections

21. Skyworks took reasonable measures to keep its trade secrets, including those referred to in paragraph 20 above, secret, including the following:

a. Skyworks required keycard/badge access to BAW facilities.

b. Skyworks required employees to establish a username and password in order to access Skyworks' IT network.

c. Skyworks restricted employee access to directories containing proprietary information and trade secrets. Employee access to restricted shared drives required approval from the employee's manager. There were several layers of access that required approval, including site access, group and user folder access, and application access. Once the manager approved the appropriate layers of access, the employee was provided a username and login password based upon the requirements of the position. For access to closed directories for projects and other items outside the control of the employee's manager, approval of access from the owner of the project directory structure was required.

d. Skyworks restricted the availability of Virtual Private Network access only to those who had a demonstrated need, and required group manager approval prior to sending a username and password to those employees.

e. Skyworks had procedures in place to handle departing employees, including a checklist entitled "Employee Clearance Process." Skyworks conducted exit interviews for departing employees, including having the employee complete and sign a form entitled "Confidential Exit Interview." Skyworks also required departing employees to sign forms entitled "Information for Terminating Employees Regarding Inventions and Proprietary/Confidential Information," and "Standards of Business Conduct."

f. Skyworks used IP banner warnings as a default in Cadence software designs and as standard practice on most documents and templates.

g. Skyworks required employees to obtain specific permission before they could publish material related to the BAW department.

h. Skyworks' BAW department undertook specific IP protection training and other related training.

i. Skyworks employees were required to sign employment agreements that specified NDAs as conditions of employment. These agreements also stated that inventions and technology belonged to Skyworks and that employees could not disclose information pertaining to Skyworks' inventions or technology.

COUNT ONE: (18 U.S.C. § 1831(a)(5) -- Conspiracy to Commit Economic Espionage)

22. The factual allegations contained in Paragraphs 1 through 21 are realleged and incorporated as if fully set forth here.

23. Beginning in 2006 and continuing to the present, in the Northern District of California and elsewhere, the defendants,

WEI PANG,
HAO ZHANG,
HUISUI ZHANG,
JINPING CHEN,
ZHAO GANG, and
CHONG ZHOU,

together with others known and unknown to the Grand Jury, knowing and intending that the offenses would benefit a foreign government, namely the PRC, and foreign instrumentalities, namely TJU, MNMT, TEDA and ROFS, conspired:

a. knowingly to steal, and without authorization appropriate, take, carry away, conceal, and by fraud, artifice, and deception obtain trade secrets belonging to Avago and Skyworks;

b. knowingly and without authorization to copy, duplicate, sketch, draw, download, upload, alter, photocopy, replicate, transmit, deliver, send, communicate, and convey trade secrets belonging to Avago and Skyworks; and

c. knowingly and without authorization to receive, buy, and possess trade secrets belonging to Avago and Skyworks, knowing the same to have been stolen and appropriated, obtained, and converted without authorization.

Manner and Means of the Conspiracy

24. The object of the conspiracy was to steal trade secrets from Avago and Skyworks and use them to set up an FBAR/BAW fabrication facility in the PRC. In effect, and in the words of one of the defendants, the objective was "moving Avago to China."

25. To accomplish this transfer, WEI PANG, HAO ZHANG, HUISUI ZHANG, and others, communicated with JINPING CHEN, ZHOU GANG, CHONG ZHOU, J.Y., and others in the PRC to develop a scheme by which the sources and origins of the trade secrets stolen from Avago and Skyworks would be disguised and the technology contained within those trade secrets be used by entities in the PRC to develop products for civilian and military use.

26. TJU authorized WEI PANG, HAO ZHANG, and others to incorporate Novana in the Cayman Islands in 2009. TJU guided PANG in establishing Novana and approved its ownership structure. Although PANG, ZHANG, and two unindicted co-conspirators each contributed seed money to Novana, PRC entities paid for the equipment purchases and fabrication facility in Tianjin.

27. To achieve their goal of creating a fabrication facility in the PRC, WEI PANG, and HAO ZHANG needed to justify their hiring as full professors at TJU by having patent applications in their names in both the United States and the PRC. Those two defendants applied for patents in both

countries using technology and trade secrets stolen from Avago and Skyworks. To conceal the sources of the technology that formed the basis of their patent applications and to prevent Avago from discovering the theft, WEI PANG and HAO ZHANG applied for U.S. patents based on the Avago technology under ZHANG's name only, keeping former Avago employee PANG's name out of those patent applications. At approximately the same time, the defendants applied for patents in the PRC for some of the same stolen Avago technology, but did so under both WEI PANG and HAO ZHANG's names. This subterfuge allowed both defendants to use the PRC patent applications to enhance their credentials in applying for full professorships with TJU, while hiding their actions from Avago by using only ZHANG's name in the applications filed in the United States. By filing for the patents, PANG and ZHANG also disguised the fact that they had stolen the technology from their respective employers, which enabled them to present themselves to potential investors and suppliers as the developers and owners of that stolen intellectual property.

28. During the same period, acting through its wholly-owned investment arm, MNMT, and in a further effort to disguise and obfuscate the source of the stolen trade secrets and the manner by which TJU would come to possess them, TJU entered into a joint venture with WEI PANG, HAO ZHANG, and others. The entity created by this joint venture, ROFS, served as the vehicle to "launder" the trade secrets for later use by TJU in setting up its fabrication facility.

29. In October 2008, while they were still employed by the victim companies, PANG and ZHANG provided and coordinated the information necessary to complete applications for PRC government funding, including applications to Tianjin Science and Technology Development Zone; State Key Laboratory (National Laboratory) & Introduction of Overseas High Level Talent; 985 Project Application; 211 Project Application; and MEMS Engineering Research Center of Ministry of Education. Each of these applications required the defendants to supply detailed information about their plans and personnel. The applications often emphasized the benefit of MEMS technology to the PRC, particularly the military benefits, as well as to make the PRC the leading country in the commercial RF industry.

Overt Acts

30. On or about the following dates, in furtherance of the conspiracy and to effect its objects, the defendants committed the following overt acts, among others, in the Northern District of California and elsewhere:

a. On October 29, 2006, HUISUI ZHANG emailed WEI PANG and HAO ZHANG his notes from a planning meeting for creating an FBAR fabrication facility in the PRC. One subsection of the notes was entitled: "Cost saving by moving Avago to China."

b. On October 30, 2006, WEI PANG emailed a warning to maintain secrecy to HAO ZHANG and HUISUI ZHANG:

> Please try not to check personal email accounts in company. It could be tracked as long as in company's network. It is very important. Even in Avago, I have seen several law cases, where the previous employee's emails has been investigated, we are faced with two law cases relating
>
> with FBAR right now.

c. On November 6, 2006, HUISUI ZHANG emailed WEI PANG and HAO ZHANG regarding their need for intellectual property, stating that "IP is our biggest problem." [Translation from Chinese.]

d. On November 9, 2006, WEI PANG emailed HAO ZHANG and HUISUI ZHANG discussing potential conflicts for their PRC company concerning Avago's and Skyworks' IP:

> IP is almost impossible if we are still engaged with current company, but sample demonstration will be good enough for VC according to a veteran in a high-tech start up company. The prototype doesn't need to be perfect in the very beginning. But.... how can we build filter outside of Avago and Skyworks?

e. On November 13, 2006, WEI PANG sent an email to a PRC national and former colleague at USC to help set up a business plan to sell FBARs in the PRC:

> We (Hao, Huisui, and I) have made decision to form a company and establish a factory in China to produce FBAR filters mainly for cell phone manufacturers (such as Nokia, Motorola, Samsung, LG, etc.) by leveraging our technology and experience accumulated in both of academics and industry through the past five years. The filter market for cell-phone alone is estimated to be more than $1 Billion in 2006. We are confident with our technology and business model (i.e., cost advantages

over competitors) and are preparing for business plan to attract venture capitals.

f. On November 13, 2006, WEI PANG sent a follow-up email stating, "Since we (Hao and I) are still working in FBAR company, please keep it as secret."

g. On December 10, 2006, WEI PANG emailed his notes of a meeting that took place on December 9, 2006, to HAO ZHANG and HUISUI ZHANG stating, "My work is to make every possible effort to find out about the *process's* every possible detail and *copy* directly to China." [Translation from Chinese, italicized words in English in original.]

h. On January 25, 2007, WEI PANG emailed HAO ZHANG and HUISUI ZHANG agreeing that they could beat out competitors because they would not need to conduct research and development:

> However, in the company point of view, another significant cost is R&D and management (such as labor cost) fee (>25%) in any typical western company, we save that money a lot, and . . . no filter (FBAR or SAW) company can compete with us.

i. On May 25, 2007, WEI PANG emailed HAO ZHANG and HUISUI ZHANG suggesting a name for their company in the PRC, "I want to call the company 'clifbaw'. How about your names?" When HUISUI ZHANG responded by asking PANG to "explain the inside meaning," PANG replied: "China lift BAW technology ~ Clifbaw. haha."

j. On June 14, 2007, HUISUI ZHANG emailed WEI PANG and HAO ZHANG about his meeting with a venture capital ("VC") firm representative that same day. HUISUI ZHANG summarized the VC's concerns, in part, as follows (bullets not in original text):

- The main points he concerns are two: IP and detail investigations on costumers [*sic*].
- Also he mentioned if the potential members are working at a BAW company, it will be a conflict.
- The detail investigation is to know what exactly costumer [*sic*] needs and the detail requirement they will buy. We actually know these but I cannot tell VC because the information is from currently BAW providers which are your employers.

k. On June 20, 2007, HUISUI ZHANG emailed WEI PANG and HAO ZHANG explaining that he had met with patent agents in the PRC to discuss when and where to file patent applications. HUISUI ZHANG recommended they file patent applications in both the United States and

the PRC. HUISUI ZHANG continued that, "if they got caught, the best situation they can hope for will be that the U.S. BAW patent holder has not applied for BAW patent in China." [Translation from Chinese.]

l. On June 29, 2007, WEI PANG emailed HAO ZHANG and HUISUI ZHANG that he had already provided applications for FBAR oscillators for cell phones and microphones, including detailed market and feasibility analyses, to HAO ZHANG.

m. Beginning in July 2007 and continuing to at least January 2008, WEI PANG solicited a number of universities and institutes in the PRC regarding the proposed FBAR fabrication company.

n. On January 21, 2008, WEI PANG traveled to the PRC to present a lecture at an FBAR symposium for a number of PRC government institutes at TJU College of Precision Instrument. J.Y. attended that lecture and met with PANG.

o. On February 20, 2008, J.Y. emailed WEI PANG requesting information for his job application at TJU.

p. On February 20, 2008, WEI PANG emailed J.Y. unpublished Avago draft United States patent applications as well as other documents relating to his employment at TJU. [Translation from Chinese.]

q. On June 2, 2008, WEI PANG traveled to the PRC to visit MNMT at TEDA and have meetings with TJU's Dean and Vice President.

r. On July 16, 2008, WEI PANG forwarded to HAO ZHANG and others an email and attached letter from a TJU Vice-President ("VP") welcoming PANG to TJU, requesting information on other personnel, and asking for further confirmation regarding "[p]otential intellectual property dispute with the work you will be doing in China vs. patent application/company trade secret in the U.S." [Translation from Chinese.] The letter also contained details about a visit to the United States by the Dean of the College of Precision Instrument and the Vice President of TJU to meet with WEI PANG, HAO ZHANG, and other co-conspirators.

s. On July 20, 2008, WEI PANG emailed HAO ZHANG and others to say that

officials from TJU would be coming to the United States to meet with them the week of August 30, 2008.

t. On August 31 and September 1, 2008 the TJU VP and the Dean of the College of Precision Instrument met with WEI PANG, HAO ZHANG, and others at a residence in San Jose, California.

u. On September 8, 2008, a TJU VP emailed WEI PANG, HAO ZHANG, and others to say that TJU would give PANG's team full support by actively obtaining the funding, equipment, and space required to conduct the work. TJU asked PANG to provide details for the plan including equipment requirements, staffing requirements, development plans, and to note specifically any information that needed to be kept confidential. [Translation from Chinese.]

v. On September 11, 2008, WEI PANG emailed HAO ZHANG the file "WCDMA_TX_070803.gds" containing Avago trade secrets.

w. Between October 12 and October 26, 2008, WEI PANG and HAO ZHANG coordinated with TJU officials to apply for PRC government funding, including applications to the Tianjin Science and Technology Development Zone; the State Key Laboratory (National Laboratory) & Introduction of Overseas High Level Talent program; the 985 Project; the 211 Project; and the MEMS Engineering Research Center of Ministry of Education.

x. Between October 25 and November 22, 2008, HAO ZHANG emailed his co-conspirators the specifications and pricing for the Aviza AlN sputter deposition tool, the Omega AlN etching tool, and the Sigma deposition tool, all containing Skyworks trade secrets, in order to prepare to build an FBAR fabrication facility at TJU.

y. Between November 2 and November 6, 2008, WEI PANG traveled to the PRC to meet with TJU and MNMT officials, as well as with equipment vendors.

z. On November 10, 2008, WEI PANG sent an email to an unindicted co-conspirator (H.I.) that included a PowerPoint slide containing Avago's deep silicon via etching technique.

aa. On November 10, 2008, an unindicted co-conspirator (H.I.) sent an email to an

equipment vendor used by Avago stating, "I am working for China Tianjin University now to help them set up a MEMS pilot line for student training purposes (This is the 985 project, $ comes from education funding.)" H.I. then forwarded this email to WEI PANG.

bb. On November 11, 2008, WEI PANG sent an email containing the subject line, "equipment details," and an attached spreadsheet of tools and the specifications at which the tools would need to operate. Specifically, the list contained Avago's "AlN etch recipe."

cc. On December 9, 2008, HAO ZHANG emailed to WEI PANG an unredacted slide from Avago's Confidential Process Flow PowerPoint.

dd. On December 11, 2008, WEI PANG sent an email to HAO ZHANG containing photos of the Avago device packaging process which allowed two silicon wafers to be sandwiched together, called the "microcap process."

ee. Between January 31 and February 1, 2009, WEI PANG and HAO ZHANG traveled to San Jose, California, for a team meeting and to meet with equipment vendors.

ff. On February 12, 2009, HAO ZHANG emailed a TJU official proposing that because he did not previously have access to the Skyworks technology to which he had recently been assigned, he should stay at Skyworks long enough to "master the technology," and then join TJU at the beginning of May 2009. [Translation from Chinese.]

gg. On February 19, 2009, WEI PANG emailed HAO ZHANG Avago P-cells and Design Kits (v.5 and v.6).

hh. On February 19, 2009, HAO ZHANG emailed WEI PANG a PowerPoint for Skyworks AlN and Molybdenum ("Mo") deposition that contained over 25 slides with computer screen snapshots of detailed process specifications.

ii. On March 25, 2009, HAO ZHANG emailed WEI PANG, while PANG was in the PRC, a PowerPoint entitled, "Planarization Rate at FBAR CMP," that included detailed photographs, screenshots, and specifications of Avago's CMP process. ZHANG also emailed PANG a screenshot entitled "BAW process flow snapshot," containing Skyworks' process flow.

jj. On April 5, 2009, WEI PANG emailed several of his co-conspirators informing

them that he had communicated with TJU officials and that the plan was to set up a company in the Cayman Islands and then form a joint venture in Tianjin with MNMT, which was "a Tianjin University 100% controlled company."

kk. On April 12, 2009, HAO ZHANG emailed WEI PANG, while PANG was in the PRC, a PowerPoint containing Avago's "Parametric Summary of Air Bridge and Wing Structure."

ll. On May 20, 2009, HAO ZHANG emailed WEI PANG Skyworks' BAW PowerPoint and 2D recipe.

mm. On June 9, 2009, HAO ZHANG left Skyworks and relocated to the PRC, where he began full-time employment as a professor at TJU.

nn. On June 29, 2009, WEI PANG left Avago and relocated to the PRC, where he began full-time employment as a professor at TJU.

oo. On July 27, 2009, WEI PANG emailed JINPING CHEN a proposal for funding a TJU MEMS lab to the Tianjin Science and Technology Commission. [Translation from Chinese.]

pp. On September 10, 2009, WEI PANG registered Novana in the Cayman Islands.

qq. On October 12, 2009, HAO ZHANG filed a United States patent application based on stolen Avago Air Bridge technology, listing himself as the sole inventor. On the same date, ZHANG's oath form was filed with the United States Patent and Trademark Office (PTO), acknowledging the requirement for providing truthful information to the PTO about the inventor and invention status, as well as the penalties for violating Title 18, United States Code, Section 1001 (making a false statement).

rr. On October 15, 2009, WEI PANG emailed HAO ZHANG and others Avago's ion milling process specifications.

ss. On October 15, 2009, HUISUI ZHANG emailed WEI PANG and HAO ZHANG to set up a conference call to discuss potential collaboration regarding FBAR/BAW and the smart grid.

tt. On October 20, 2009, HUISUI ZHANG followed up by circulating a short agenda for the conference call described in the preceding subparagraph.

uu. On November 3, 2009, WEI PANG forwarded an email to HUISUI ZHANG

about funding from the PRC Ministry of Education and said: "As you can see, we are suggested to work on smart grid project from University. There is money there, do you have any ppt slide?" HUISUI ZHANG responded the same day, saying that he did not have a slide but could come up with something. [Quoted portion in English; referenced email in Chinese.]

vv. On December 9, 2009, HAO ZHANG emailed CHONG ZHOU and others a layout marked "Skyworks Solutions Inc, 20 Sylvan Road, Woburn, MA 01801 / Proprietary Information No Dissemination Or Use Allowed Without Prior Written Permission," that also contained the names of Skyworks employees and the dates of revisions to the layout made by the named Skyworks employees.

ww. On December 18, 2009, HAO ZHANG filed a United States patent application based on stolen Avago Wings technology, listing himself as the sole inventor. On the same date, ZHANG's oath form was filed with the U.S. Patent and Trademark Office (PTO), acknowledging the requirement for providing truthful information to the PTO about the inventor and invention status, as well as the penalties for violating 18 U.S.C. § 1001.

xx. On March 16, 2010, HAO ZHANG filed a United States patent application based on stolen Avago Temperature Compensation ("Tempco") project technology, listing himself as the sole inventor. On the same date, ZHANG's oath form was filed with the U.S PTO, acknowledging the requirement for providing truthful information to the PTO about the inventor and invention status as well as the penalties for violating 18 U.S.C. § 1001.

yy. On May 11, 2010, HAO ZHANG filed a United States patent application based on stolen Avago Coupled Resonator Filters ("CRF") technology, listing himself as the sole inventor. On the same date, ZHANG's oath form was filed with the U.S. PTO, acknowledging the requirement for providing truthful information to the PTO about the inventor and invention status as well as the penalties for violating 18 U.S.C. § 1001.

zz. On June 10, 2010, HAO ZHANG filed a United States patent application based on stolen Avago Silicon Carbide technology, listing himself as the sole inventor. On the same date, ZHANG's oath form was filed with the U.S. PTO, acknowledging the requirement for providing truthful information to the PTO about the inventor and invention status as well as the penalties for violating 18

U.S.C. § 1001.

aaa. On June 23, 2010, CHONG ZHOU emailed to HAO ZHANG an altered, stolen Avago design kit FBAR Resonator P-cell generator file, "resonator12b.il."

bbb. On August 15, 2010, CHONG ZHOU emailed to HAO ZHANG an altered, stolen Avago design kit FBAR Resonator P-cell generator file, "resonator13b.il."

ccc. On August 20, 2010, WEI PANG and HAO ZHANG filed a PRC patent application based on stolen Avago Wings technology, listing themselves as the co-inventors.

ddd. On August 24, 2010, CHONG ZHOU emailed a file, "Band I and Band II Parameters for Layout" files containing stolen Avago Design Kits and P-cells to HAO ZHANG

eee. On August 28, 2010, HAO ZHANG emailed CHONG ZHOU a PowerPoint presentation entitled "Temperature Compensated BAW Resonator with Embedded Silicon Dioxide Layer Underneath Piezoelectric Layer," marked "Skyworks Solutions Confidential and Proprietary."

fff. On August 31, 2010, WEI PANG and HAO ZHANG filed a PRC patent application based on stolen Avago Air Bridge technology, listing themselves as the co-inventors.

ggg. On September 7, 2010, WEI PANG and HAO ZHANG filed a United States patent application based on stolen Skyworks Composite Bulk Acoustic Wave Resonator technology, listing themselves as the co-inventors. On the same date, PANG's and ZHANG's oath forms were filed with the U.S. PTO, acknowledging the requirement for providing truthful information to the PTO about the inventor and invention status as well as the penalties for violating 18 U.S.C. § 1001.

hhh. On September 27, 2010, WEI PANG and HAO ZHANG filed a PRC patent application based on stolen Avago Tempco project technology, listing themselves as the co-inventors.

iii. On October 21, 2010, defendants WEI PANG and HAO ZHANG filed a PRC patent application based on stolen Avago Silicon Carbide project technology, listing PANG and ZHANG as the inventors.

jjj. On November 5, 2010, WEI PANG and HAO ZHANG filed a PRC patent application based on stolen Avago CRF technology, listing PANG and ZHANG as the inventors.

kkk. On December 7, 2010, CHONG ZHOU emailed a PowerPoint entitled "Mask

FE901 Design and Layout Review," marked, "MEMS Group, Tianjin University," and containing FBAR layout views, among other slides, to HAO ZHANG.

lll. On December 12, 2010, JINPING CHEN emailed co-conspirators and officials from TJU a copy of a contract between TJU and MNMT. The contract committed TJU to give 26 million RMB to MNMT to purchase MEMS fab equipment. TJU was also supposed to provide tax free forms for all of the purchases and pay any relevant fees. [Translation from Chinese.]

mmm. On December 20, 2010, CHONG ZHOU altered a stolen Avago design kit FBAR Resonator P-cell generator file, "resonator 13b.il," and emailed it to HAO ZHANG. The source code text matched that of the "resonator13b.il" file sent on August 15, 2010.

nnn. On January 23, 2011, HAO ZHANG emailed a representative of ZTE (the PRC's largest listed telecoms equipment company) a PowerPoint entitled, "Bulk Acoustic Wave (BAW) RF Filters For Wireless Communications," that displayed his work at both Novana and TJU on the cover slide. In addition to discussing the importance and performance of Novana's BAW products, the presentation contained specific Avago product information to illustrate Novana's products, and performance charts that referenced Skyworks product performance.

ooo. On August 16, 2011, GANG ZHAO emailed WEI PANG, HAO ZHANG, and JINPING CHEN regarding business dealings with UMC (a wafer fabrication company in the PRC). ZHAO stated, "[t]he material which you sent UMC last time shows very clearly the word AVAGO," and concluded "...[I] suggest the necessary revisions be made just to avoid any unnecessary problems for us later." [Translation from Chinese; "Avago" in English.]

ppp. On September 22, 2011, JINPING CHEN emailed officials at TEDA to verify the agreement between TEDA and the ROFS MEMS project. The agreement clarified that WEI PANG, HAO ZHANG, JINPING CHEN, ZHAO GANG, and others held positions at ROFS. [Translation from Chinese.]

qqq. On October 16, 2011, HAO ZHANG emailed CHONG ZHOU and others a PowerPoint presentation entitled "Single to Balanced Circuits" on a template entitled "Skyworks Template."

rrr. Avago became aware of WEI PANG's thefts after it saw HAO ZHANG's United States patent applications covering Avago trade secrets in the fall of 2011. In late 2011, WEI PANG's former boss at Avago, Dr. Rich Ruby, traveled to the PRC to attend a conference in Shenzen. While he was in the PRC, Dr. Ruby visited TJU to see PANG and ZHANG's new MEMS lab. When he toured the facility, Dr. Ruby recognized that it was using stolen Avago technology. Dr. Ruby confronted JINPING CHEN and WEI PANG about stealing and using Avago trade secrets. PANG falsely denied having an FBAR company or any company.

sss. On December 9, 2011, Dr. Ruby memorialized the verbal confrontation with WEI PANG and JINPING CHEN in an email. CHEN forwarded Ruby's email to WEI PANG, HAO ZHANG, and ZHAO GANG on the same day.

ttt. On December 14, 2011, JINPING CHEN emailed Dr. Ruby that, "[b]ased on our inspection, we can make sure that Tianjin University is not the assignee of any patent you have mentioned, neither US ones nor Chinese ones. On the same day, CHEN forwarded this response to WEI PANG, HAO ZHANG, and ZHAO GANG.

uuu. On November 11, 2012, WEI PANG emailed CHONG ZHOU and HAO ZHANG warning ZHOU never to include unpublished figures or materials from Avago or any other company in ZHOU's Master's degree thesis. [Translation from Chinese; "Avago" in English.]

vvv. On July 5, 2012, CHONG ZHOU received and email notification about the status of the backup of ROFS's layout server that listed files contained in the directories of individual ROFS design team members that referenced specific Avago employees, internal Avago project names, design kits, and P-cells.

www. On March 3, 2013, CHONG ZHOU emailed a stolen Avago design kit FBAR Resonator P-cell generator file, "resonator13c.il," in an email with a subject line that simply read, "code." This revision was the same as the "resonator13b.il" file sent on August 15 and December 20, 2010, except that it also contained an additional revision attributed to CHONG ZHOU, dated November 29, 2011.

All in violation of Title 18, United States Code, Section 1831(a)(5).

d. Skyworks restricted the availability of Virtual Private Network access only to those who had a demonstrated need, and required group manager approval prior to sending a username and password to those employees.

e. Skyworks had procedures in place to handle departing employees, including a checklist entitled "Employee Clearance Process." Skyworks conducted exit interviews for departing employees, including having the employee complete and sign a form entitled "Confidential Exit Interview." Skyworks also required departing employees to sign forms entitled "Information for Terminating Employees Regarding Inventions and Proprietary/Confidential Information," and "Standards of Business Conduct."

f. Skyworks used IP banner warnings as a default in Cadence software designs and as standard practice on most documents and templates.

g. Skyworks required employees to obtain specific permission before they could publish material related to the BAW department.

h. Skyworks' BAW department undertook specific IP protection training and other related training.

i. Skyworks employees were required to sign employment agreements that specified NDAs as conditions of employment. These agreements also stated that inventions and technology belonged to Skyworks and that employees could not disclose information pertaining to Skyworks' inventions or technology.

COUNT ONE: (18 U.S.C. § 1831(a)(5) – Conspiracy to Commit Economic Espionage)

22. The factual allegations contained in Paragraphs 1 through 21 are realleged and incorporated as if fully set forth here.

23. Beginning in 2006 and continuing to the present, in the Northern District of California and elsewhere, the defendants,

WEI PANG,
HAO ZHANG,
HUISUI ZHANG,
JINPING CHEN,
ZHAO GANG, and
CHONG ZHOU,

COUNT TWO: (18 U.S.C. § 1832(a)(5) – Conspiracy to Commit Theft of Trade Secrets)

31. The factual allegations contained in Paragraphs 1 through 30 are realleged and incorporated as if fully set forth here.

32. Beginning in 2006 and continuing to the present, in the Northern District of California and elsewhere, the defendants,

WEI PANG,
HAO ZHANG,
HUISUI ZHANG,
JINPING CHEN,
ZHAO GANG, and
CHONG ZHOU,

together with others known and unknown to the Grand Jury, intending to convert a trade secret, that was related to a product and service used in and intended for use in interstate and foreign commerce, to the economic benefit of anyone other than the owner of that trade secret, and knowing and intending that the offense would injure the owner of that trade secret, conspired:

a. knowingly to steal, and without authorization appropriate, take, carry away, conceal, and by fraud, artifice, and deception obtain trade secrets belonging to Avago and Skyworks;

b. knowingly and without authorization to copy, duplicate, sketch, draw, download, upload, alter, photocopy, replicate, transmit, deliver, send, communicate, and convey trade secrets belonging to Avago and Skyworks; and

c. knowingly and without authorization to receive, buy, and possess trade secrets belonging to Avago and Skyworks, knowing the same to have been stolen and appropriated, obtained, and converted without authorization.

Manner and Means of the Conspiracy

33. The objects of the conspiracy were carried out, in part, as alleged in Paragraphs 24 through 29 above.

Overt Acts

34. In furtherance of the conspiracy and to effect its objects, in the Northern District of

California and elsewhere, the defendants committed, among others, each of the overt acts alleged in Paragraph 30, including its subparagraphs.

All in violation of Title 18, United States Code, Section 1832(a)(5).

COUNTS THREE THROUGH SEVENTEEN: (18 U.S.C. §§ 1831(a)(1),(2),(3), & 2 -- Economic Espionage; Aiding and Abetting)

35. The factual allegations contained in Paragraphs 1 through 30 are realleged and incorporated as if fully set forth here.

36. On the dates set forth below, in the Northern District of California and elsewhere, the defendants listed in the separate counts below, together with others known and unknown to the Grand Jury, knowing and intending that the offenses would benefit a foreign government, namely the PRC, and foreign instrumentalities, namely TJU, MNMT, TEDA and ROFS, as specifically alleged in each of the Counts 3 through 17 below:

a. knowingly stole, and without authorization appropriated, took, carried away, concealed, and by fraud, artifice, and deception obtained trade secrets belonging to Avago and Skyworks;

b. knowingly and without authorization copied, duplicated, sketched, drew, downloaded, uploaded, altered, photocopied, replicated, transmitted, delivered, sent, communicated, and conveyed trade secrets belonging to Avago and Skyworks; and

c. knowingly and without authorization received, bought, and possessed trade secrets belonging to Avago and Skyworks, knowing the same to have been stolen and appropriated, obtained, and converted without authorization:

COUNT	DATE	DEFENDANT(S)	ACTION	TRADE SECRET
3	March 16, 2010	HAO ZHANG	U.S. patent application	Avago Temperature Compensation ("Tempco") project technology
4	May 11, 2010	HAO ZHANG	U.S. patent application	Avago Coupled Resonator Filters ("CRF") technology
5	June 10, 2010	HAO ZHANG	U.S. patent application	Avago Silicon Carbide technology

6	June 10, 2010	WEI PANG and HAO ZHANG	U.S. patent application	Skyworks Composite Bulk Acoustic Wave Resonator technology
7	June 23, 2010	CHONG ZHOU and HAO ZHANG	email	Avago design kit FBAR Resonator P-cell generator, "resonator12b.il" file
8	August 15, 2010	CHONG ZHOU and HAO ZHANG	email	Avago design kit FBAR Resonator P-cell generator, "resonator13b.il" file
9	August 20, 2010	WEI PANG and HAO ZHANG	PRC patent application	Avago Wings technology
10	August 24, 2010	CHONG ZHOU and HAO ZHANG	email	"Band I and Band II Parameters for Layout" files containing Avago Design Kits and P-cells to HAO ZHANG
11	August 28, 2010	CHONG ZHOU and HAO ZHANG	email	Skyworks PowerPoint presentation entitled "Temperature Compensated BAW Resonator with Embedded Silicon Dioxide Layer underneath Piezoelectric Layer," marked "Skyworks Solutions Confidential and Proprietary."
12	August 31, 2010	WEI PANG and HAO ZHANG	PRC patent application	Avago Air Bridge technology
13	September 27, 2010	WEI PANG and HAO ZHANG	PRC patent application	Avago Temperature Compensation ("Tempco") project technology

14	December 7, 2010	CHONG ZHOU and HAO ZHANG	email	Avago FBAR layout views, Mask FE901 Design and Layout Review
15	December 20, 2010	CHONG ZHOU and HAO ZHANG	email	Avago design kit FBAR Resonator P-cell generator, "resonator13b.il" file
16	October 16, 2011	CHONG ZHOU and HAO ZHANG	email	Skyworks PowerPoint presentation entitled "Single to Balanced Circuits" and prepared on a PowerPoint template titled "Skyworks Template."
17	March 3, 2013	CHONG ZHOU	email	Avago design kit FBAR Resonator P-cell generator, "resonator13c.il" file in an email with the subject line entitled "code"

All in violation of Title 18, United States Code, Sections 1831(a)(1), (2), (3), & 2.

COUNTS EIGHTEEN through THIRTY-TWO: (18 U.S.C. §§ 1832(a)(1),(2),(3), & 2 – Theft of Trade Secrets; Aiding and Abetting)

37. The factual allegations contained in Paragraphs 1 through 30 are realleged and incorporated as if fully set forth here.

38. On the dates set forth below, in the Northern District of California and elsewhere, the defendants listed in the separate counts below, together with others known and unknown to the Grand Jury, intending to convert a trade secret, that was related to a product and service used in and intended for use in interstate and foreign commerce, to the economic benefit of anyone other than the owner of that trade secret, and knowing and intending that the offense would injure the owner of that trade secret, as specifically alleged in each of the Counts 18 through 32 below:

a. knowingly stole, and without authorization appropriated, took, carried away, concealed, and by fraud, artifice, and deception obtained trade secrets belonging to Avago and Skyworks;

b. knowingly and without authorization copied, duplicated, sketched, drew, downloaded, uploaded, altered, photocopied, replicated, transmitted, delivered, sent, communicated, and conveyed trade secrets belonging to Avago and Skyworks; and

c. knowingly and without authorization received, bought, and possessed trade secrets belonging to Avago and Skyworks, knowing the same to have been stolen and appropriated, obtained, and converted without authorization:

COUNT	DATE	DEFENDANT(S)	ACTION	TRADE SECRET
18	March 16, 2010	HAO ZHANG	U.S. patent application	Avago Temperature Compensation ("Tempco") project technology
19	May 11, 2010	HAO ZHANG	U.S. patent application	Avago Coupled Resonator Filters ("CRF") technology
20	June 10, 2010	HAO ZHANG	U.S. patent application	Avago Silicon Carbide technology
21	June 10, 2010	WEI PANG and HAO ZHANG	U.S. patent application	Skyworks Composite Bulk Acoustic Wave Resonator technology
22	June 23, 2010	CHONG ZHOU and HAO ZHANG	email	Avago design kit FBAR Resonator P-cell generator, "resonator12b.il" file
23	August 15, 2010	CHONG ZHOU and HAO ZHANG	email	Avago design kit FBAR Resonator P-cell generator, "resonator13b.il" file
24	August 20, 2010	WEI PANG and HAO ZHANG	PRC patent application	Avago Wings technology

25	August 24, 2010	CHONG ZHOU and HAO ZHANG	email	"Band I and Band II Parameters for Layout" files containing Avago Design Kits and P-cells to HAO ZHANG
26	August 28, 2010	CHONG ZHOU and HAO ZHANG	email	Skyworks PowerPoint presentation entitled "Temperature Compensated BAW Resonator with Embedded Silicon Dioxide Layer Underneath Piezoelectric Layer," marked "Skyworks Solutions Confidential and Proprietary."
27	August 31, 2010	WEI PANG and HAO ZHANG	PRC patent application	Avago Air Bridge technology
28	September 27, 2010	WEI PANG and HAO ZHANG	PRC patent application	Avago Temperature Compensation ("Tempco") project technology
29	December 7, 2010	CHONG ZHOU and HAO ZHANG	email	Avago FBAR layout views, Mask FE901 Design and Layout Review
30	December 20, 2010	CHONG ZHOU and HAO ZHANG	email	Avago design kit FBAR Resonator P-cell generator, "resonator13b.il" file
31	October 16, 2011	CHONG ZHOU and HAO ZHANG	email	Skyworks PowerPoint presentation entitled "Single to Balanced Circuits" and prepared on a PowerPoint template entitled "Skyworks Template."

32	March 3, 2013	CHONG ZHOU	email	Avago design kit FBAR Resonator P-cell generator, "resonator13c.il" file.

All in violation of Title 18 United States Code, Sections 1832(a)(1), (2), (3), and 2.

FORFEITURE ALLEGATION: (18 U.S.C. §§ 1834 and 2323 – Proceeds and Property Involved in Economic Espionage and Theft of Trade Secrets)

39. The allegations contained in Counts 1 through 32 of this Indictment are hereby realleged and incorporated as if fully set forth here. Upon conviction of any of those offenses, the defendants,

WEI PANG,
HAO ZHANG,
HUISUI ZHANG,
JINPING CHEN,
ZHAO GANG, and
CHONG ZHOU,

shall forfeit to the United States of America, pursuant to Title 18, United States Code, Sections 1834 and 2323, any property used, or intended to be used, in any manner or part to commit or facilitate the commission of the offenses, and any property constituting or derived from any proceeds obtained directly or indirectly as a result of the commission of the offenses.

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40. If any of the property described above, as a result of any act or omission of the defendants:

a. cannot be located upon the exercise of due diligence;

b. has been transferred or sold to, or deposited with, a third party;

c. has been placed beyond the jurisdiction of the court;

d. has been substantially diminished in value; or

e. has been commingled with other property which cannot be divided without difficulty,

the United States of America shall be entitled to forfeiture of substitute property pursuant to Title 21, United States Code, Section 853(p), as incorporated by Title 18, United States Code, Section 2323(b).

All pursuant to Title 18, United States Code, Sections 1834 and 2323.

DATED: 4/1/15

[redacted]
FOREPERSON

MELINDA HAAG
United States Attorney

MATTHEW A. PARRELLA
Chief, Computer Hacking/Intellectual Property Unit

(Approved as to form: _____)
AUSAs Parrella/Callaway