THE NATIONAL COMPUTER QUALITY SUPERVISING CENTER (NCTC)

A Core Chinese Dual Use Technology Capability

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THE NATIONAL COMPUTER QUALITY SUPERVISING CENTER (NCTC: A CORE CHINESE DUAL USE TECHNOLOGY CAPABILITY

by Dr. Xin Song, Leonard Zuga, and Professor Michael Pecht

In early October of 2012, the US House of Representatives Permanent Select Committee on Intelligence published its Investigative Report on the U.S. National Security Issues Posed by Chinese Telecommunications Companies Huawei and ZTE.

The report caused a brief political flap that included coverage by CBS's 60 Minutes.

One of the risk factors noted in the report was that Huawei's corporate history suggests ties to the Chinese military and that Huawei failed to provide detailed answers to questions about those connections. This accusation is neither new nor surprising.

The basic accusation of Huawei's ties to the People's Liberation Army dates back more than a decade, as gleaned from open-source documents and repeated over and over again by both government and private contract analysts within the nation's intelligence community.

Although this latest incident caused a two- or three-day political firestorm, the embers rapidly cooled, and once again the differences and similarities between the dual-use industrial base that has emerged in China and that of the US have not been part of the discussion and remain misunderstood.

The Huawei issue is important but could be the entry point to understand the Chinese overall approach, rather than simply a periodic warning shot. We need a sustained policy response to Chinese policy, not one off flares in the night.

This article, through a discussion of China's National Computer Quality Supervising Center (NCTC) and its roots, evolution, and intimate ties to China's dual-use industrial base, will illustrate that China's government policy–driven infrastructure for IT equipment design and testing fosters an industry capable of developing and fielding highly reliable products, as opposed to simply manufacturing electronic gadgets for some multinational company.

The NCTC is the key to assuring that China captures increasing shares of the global telecommunications and IT equipment markets, such as in the case Huawei, now the largest telecommunications equipment maker in the world, and ZTE, the world's fourth-largest mobile phone manufacturer.

http://www.nctc.org.cn/english/about%20us.htm

As the authors noted in their book, *China's Electronics Industry, 2009 Edition*, "China has marshaled the political will and resources, and applied government direction to ensure the progress of science and technology as the cornerstone of its economy with a primary objective of support-

ing the development of a modern 'well-off' society and the development of a strong dual-use industrial base."

http://www.cityu.edu.hk/phmc/pdf/China_Book_order_form.pdf

Political will is a key phrase.

In the discussion that follows we will illustrate how the NCTC, established in 1987, is ensuring a strong dual-use industrial base.

In its endeavor to develop science and technology in selected fields every 5 years, the Chinese Communist Party (CCP) develops and announces its five-year plan to lay out the blue print for the key fields that China will focus on. Following the development of the plan, funds pour into the identified fields. The plans are relatively easy to implement since they are controlled by China's central government.

In the long run, designed and developed under government supported and funded programs, innovative Chinese IT products will likely eclipse those of Western companies.

The structure of the General Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ) and the National Computer Quality Supervising Test Center (NCTC) will ensure product competitiveness and increasing market shares.

But unless Western policy makers and business executives understand the evolution, structure, and objectives of these organizations, another future alarmist Congressional report is likely to again result in political controversy without conclusive guidance to purchasers of US government IT equipment based on fact, as opposed to conjecture.

Unless Western governments understand the need for and develop government policies and institutions to compete with the rising Chinese electronics industry, Western companies will also continue to lose market shares to Chinese competitors, thereby ceding the soft economic power to China — market share and prestige — attributable to the critical IT equipment industrial sector, which is now responsible for an estimated three percent of the global GDP.

To understand the role of the NCTC in China's plans and its ability to field globally competitive consumer and dual-use information technology (IT) products, two key aspects of China's approach to industrial policy are worth examining.

First, unlike the messy partisan processes of Western democracies, China's government facilitates the establishment of coordinated national industrial and economic policy. In China's quest for balanced increases of both hard military power and soft economic power, the Chinese Communist Party is adept at developing and mandating sustained government policies through the development of a robust dual-use industrial base.

As illustrated in China's Electronics Industry, 2009 Edition, the authors noted "benefitting from government policies and strategic investments and incentives, China's electronics industry has come to supply more than a third of the world's consumer electronics components."

The soft power implications of this fact are certainly not lost on China's leaders today.

Second, China is consistent in publishing far in advance to the rest of the world what those policies and objectives are and how China intends to achieve those objectives.

As an example of China's advanced notice of its dual-use industrial policy, in China's Electronics Industry, 2009 Edition, the authors also noted that guidelines for establishing national medium- and long-term programs for science and technology development (2006–2020) included two early indicators of an emerging government-sponsored dual-use industrial base.

First, the current scientific and technological management system will combine and coordinate the military and civilian research organizations.

Second, China's military organizations will continue to be encouraged to shoulder the tasks of scientific research for civilian use. At the same time, civilian research institutes and enterprises are also allowed to take part in national defense research projects.

Another example of China's advance notice of its dual-use policy, published by Second Line of Defense in May of 2011 states that "China, through its five-year plans and a host of other political vehicles, telegraphs its intentions to the world far in advance of their ability to achieve them. What we westerners fail to realize, given our own habit of announcing then failing to achieve, is that China will indeed deliver on its published intentions."

http://www.sldforum.com/2011/05/china-and-rare-earths/

That article also observed that in 1999, the Cox Report alerted us to China's increasing need for rare earths for the technologies being fostered under its High-Tech Research and Development Program 863.

Additionally, in 2002, the USGS stated, "In 1999 and 2000, nearly all (more than 90%) of the separated REE [rare earth elements] used in the United States was imported either directly from China or from countries that imported their plant feed materials from China."

Thus, as a result of long-term planning and industrial policy establishment, in just a few decades China's electronics industry has gone from being entirely dependent on foreign capital and technologies to becoming a self-sustaining indigenous industrial base.

China's "authoritarian capitalism" approach to science and technology progress is working quite well.

China has the luxury of having governing bodies willing to stimulate national consumption, to dictate the development of a dual-use industrial base, and to develop and coordinate the necessary institutions in support of its dual-use industrial base.

The success of these policies has resulted in a forecast from the Organization for Economic Cooperation and Development (OECD) that China's economy will be larger than the combined

economies of the Eurozone countries by the end of this year, and will overtake the US by the end of 2016.

In its report, *Looking to 2060: Long-term Global Growth Prospects*, the OECD has also forecast that China's economic activity, which represents 17% of the global GDP in 2012, as opposed to the US's 23%, will grow to 28% of the global GDP by 2030, while the US share of the global GDP will shrink to just 18%.

The key enablers of China's forecast growth are China's increasingly better educated and more productive domestic work force.

Given the relationship between economic performance and military spending and with China's forecasted growth rates and America's economic mandate to cut defense spending in the coming years, the influential British publication *The Economist*, in its April 7, 2012, article The dragon's New Teeth, noted that if both countries remain on their present trends, China's defense spending could overtake America's after 2035.

From these and many other examples then, it is clear that in piecing together the puzzle of China's announced economic and dual-use industrial base policies, along with its often confusing organizational infrastructure, there are strong indications that China will bring the aforementioned forecasts of The Economist and the OECD to fruition.

The following discussion of the history, development, goals, and responsibilities of the NCTC are but one clear piece of that emerging puzzle's picture.

Piecing together the puzzle also illustrates the close relationships between China's military, its evolving dual-use industrial base, and the certainty of PLA ties to China's leading IT companies.

National Computer Quality Supervising Test Center and China's Dual-Use Industrial Base

The National Computer Quality Supervising Test Center (NCTC) was established under the authorization of the General Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ)[1] and the Ministry of Industry and Information Technology (MIIT)[2] in the People's Republic of China.

Under the authorization of AQSIQ, MIIT, and the National Gold Card Office, the objective of NCTC is to promote national industrial scientific and technological development.

The NCTC provides national-level test services on products such as computers, computer peripherals, computer network equipment, fiscal cash registers, second generation identity card reading (verification) equipment, computer room equipment and engineering, printed circuit boards, electronic components, integrated network cabling, software, integrated circuit (IC) cards and equipment, radio frequency identification (RFID) and equipment, and energy-saving computers.

To keep up with developments in the nation's information industry, NCTC founded a series of test centers, including the Machinery Electronics Industry Computer Room Device Quality Supervising Test Center, MIIT IC Card Quality Supervising Test Center, and National Radio Frequency Identification (RFID) Product Quality Supervising Test Center.

The major test types provided by NCTC include Entrusted Inspection, Arbitration Inspection, Quality State Monitor Selective Testing, Production License Validation Testing, China Compulsory Product Certification (CCC or 3C) Authentication, and Certification for Energy-Saving.

The corporate entity of NCTC is Beijing Zunguan Science Technology Ltd. (Beijing Zunguan).

Beijing Zunguan was approved by the China National Accreditation Board for Laboratories (CNAL) and authorized by the AQSIQ and MIIT to carry out national-level inspection and assessment of electronic product quality as a third party.

The China Electronics Technology Group Corporation's (CETC) 15th Institute and the China Information Industry Trade Association (CIITA)[3] hold shares in NCTC of 80% and 20%, respectively.

In the following discussion of the CETC's 15th Institute, we see the historical development of a close relationship between the defense and commercial electronics sectors.

The CETC's 15th Institute

The 15th Institute of the China Electronics Technology Group Corporation (CETC) provides technical and personnel support to the NCTC, thereby serving as the technical base for the NCTC. The 15th Institute is not only the leader in the design and construction of China's national information systems, but it is also one of the largest system integrators in China.

The 15th Institute provides computer systems for national defense and economic development.

The 15th Institute was founded in 1958. In addition to the 15th Institute, CETC today consists of 50 other institutes, each of which is an individual entity. Overall, the CETC has responsibilities in specialized areas of product development (including providing technology solutions), technology research, graduate student education, and manufacturing. Product development used to be the main income source for the CETC's 51 institutes.

However, many of them have started to provide testing services, which have become one of the major revenue sources. Additionally, many CETC institutes have also entered the civilian product market by founding new spinoff companies.

The objective of the 15th Institute itself is to provide the defense industry with computing technology and products.

It developed China's first computer in 1959 and China's first large general-purpose computer in the 1970s. It has been active in many critical projects, such as the launch of China's first satellite in 1970, the launch of an inter-continental missile into the South Pacific Ocean in 1980, and the launch of the first Shenzhou space shuttle in 1999.

In 1987, the 15th Institute entered the civilian computer product market with the registration of a company named Taiji Computer Corporation Limited. With the establishment of the NCTC, the 15th Institute has been carrying out national-level computer product supervision.

Historical Evolution of the NCTC

There have been three stages in the development of the NCTC: establishment, expansion, and registration.

Stage One

The first stage, establishment, began in the early 1980s, when industrial products in China suffered a drop in quality. Beginning in 1985, the State Council of China decided to carry out national quality supervision inspection for industrial products and authorized the China State Bureau of Technology Supervision (CSBTS) to organize the establishment of national-level product quality supervision centers.

As the first step, in 1986, the Ministry of the Electronics Industry (the forerunner of the Ministry of the Information Industry, currently MIIT) authorized the 15th Institute to establish the Quality Test Center for Electronic Industry Computer Products and Printed Circuit Boards, which was the forerunner of the NCTC. In 1987, the CSBTS decided to establish a national-level computer quality supervision and test center in the 15th Institute, and the National Commodity Inspection Bureau also decided to establish a national-level computer product inspection lab in the 15th Institute.

NCTC was founded to meet these demands, and it was authorized as a national-level supervision and test center in 1993. At this stage, its business focus was inspection and testing for computers, computer peripheral equipment, integrated circuit cards, and integrated circuit card machines.

Stage Two

In the second expansion stage, NCTC proposed to register a series of test centers to expand its services in a variety of electronic products at different locations around the country. The proposal was approved, and various supervision and test centers were registered in the 1990s.

These centers share the same staff. At this time, NCTC's business responsibilities were expanded to include information security. NCTC consists of the following major test centers:

National-level centers[4]:

- National Electronic Tag Product Quality Supervising Test Center

- Information Industry Computer Product Quality Supervising Test Center
- Information Industry Computer Room Engineering and Equipment Quality Supervising Test Center
- Information Industry Information Security Test Center

Ministry-level centers:

- Information Industry Printed Circuit Board Quality Supervising Test Center
- Information Industry IC Card Quality Supervising Test Center

In China, national-level centers are authorized by national-level bureaus, such as AQSIQ, which report directly to the State of Council. Ministry-level centers are authorized by ministry-level bureaus, such as the bureaus reporting to the Ministry of the Electronics Industry.

A product certified by a national-level center usually can be accepted universally by any customer in China. A product which is only certified by a ministry-level center might not be acceptable to customers who require that products be certified by higher level certification (i.e., national-level certification).

Stage Three

In the late 1990s, the State Quality Supervision Bureau determined that the third-party inspection agency should be an independent legal entity. Therefore, NCTC entered into a third stage of development, registration, where it became a company with a separate legal entity: Beijing Zunguan Information Technology Products Quality Inspection Authentication Ltd. in 2001, and then Beijing Zunguan Science Technology Company Ltd. in 2003.

This company was established as a joint venture between the 15th Institute and the China Information Industry Trade Association, although the NCTC still belongs to the 15th Institute administratively. During this time, NCTC further expanded its business areas into finance and social security.

Organization of the NCTC

As previously mentioned, the NCTC is a subsidiary unit of the 15th Institute, which is one of 51 institutes under the China Electronics Technology Group Corporation (CETC), a government-controlled company.

The CETC reports to AQSIQ and MIIT directly, as shown in the organizational chart in Figure 1. Even though the NCTC is registered as an independent legal entity, it has strong ties with the Chinese government.

Its parent unit (the 15th Institute) is responsible for significant government projects and the majority of the government projects taken by the NCTC. The key NCTC personnel, along with their areas of authority, are summarized Figure 1 and in the following paragraph.

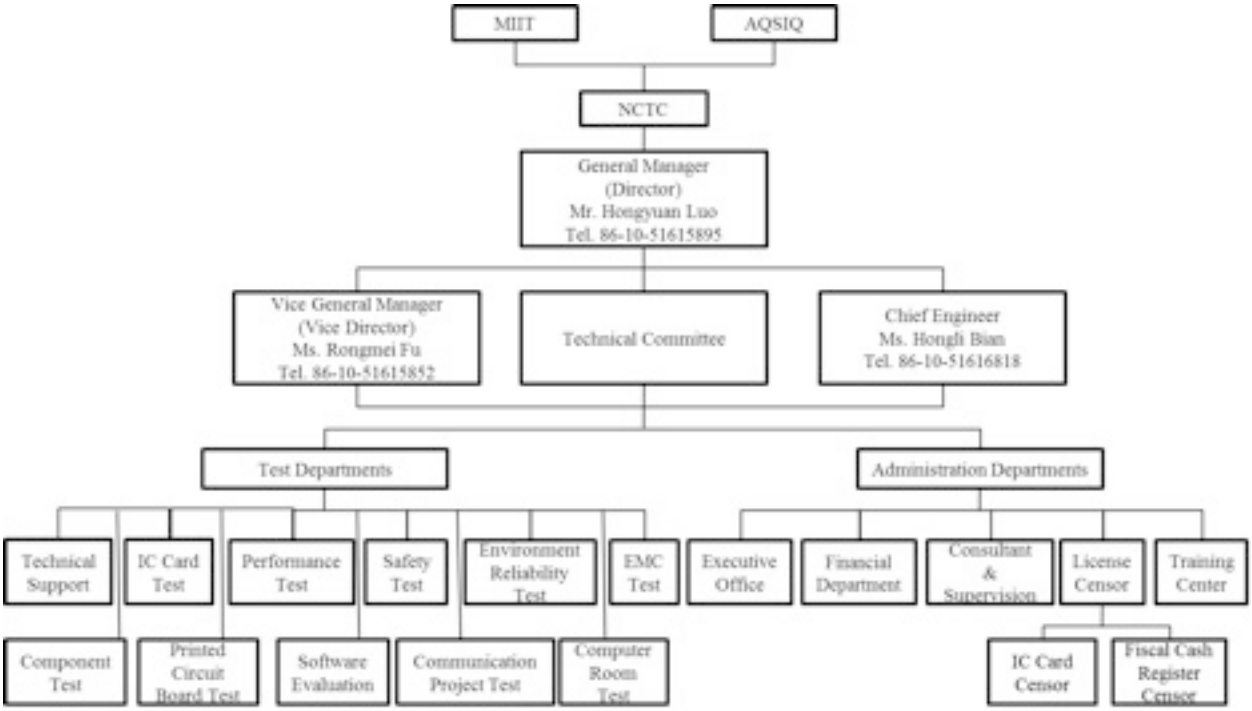

Figure 1. NCTC organizational chart.[5]

Hongyuan Luo (罗洪元), Director and General Manager of NCTC. Mr. Luo graduated from the department of mathematics standards. Hongyuan Luo is a standing council member of the China Computer Industry Association, vice chairman of the Council of China RFID Alliance, vice leader of the RFID Working Group Application Team of the Electronic Label Ministry of Industry and Information Technology, and vice director of the National Technical Committee on Digital Techniques of Intelligent Building and Residence Community of the Standardization Administration of China

Rongmei Fu (符荣梅), Vice Director and General Manager of NCTC. Ms. Fu has been working in the area of electromagnetic compatibility (EMC), safety, and reliability for computers. She has published several research papers in EMC testing. Ms. Fu has responsibility and authority over performance, safety, environment, EMC, reliability of IT equipment and systems, IC cards and IC card read and write devices, RFID products, digital television systems, fiscal cash registers; testing of computer rooms, cabling systems, and software products

Hongli Bian (边红丽), Chief Engineer of NCTC. Ms. Bian oversees all areas of testing and promotes those areas that are emphasized by the government to better serve clients of the NCTC.

[1] The AQSIQ is a ministerial-level administrative department directly under the State Council of the People's Republic of China and is in charge of national quality, metrology, entry-exit commodity inspection, entry-exit health quarantine, entry-exit animal and plant quarantine,

import-export food safety, certification and accreditation, and standardization, as well as administrative law-enforcement. AQSIQ was formed by merging the CSBTS and the former State Bureau of Import & Export Inspection and Quarantine in 2001; at the same time, the Standardization Administration of the People's Republic of China (SAC) and Certification and Accreditation Administration of the People's Republic of China (CNCA) were established under AQSIQ.

[2] The MIIT, formerly the Ministry of Information Industry, was established by the State Council in March 2008 to incorporate the functions of several previous ministries and offices, including the ministry-level Commission of Science, Technology, and Industry for National Defense (COSTIND), the State Council Information Office, the State Tobacco Monopoly Bureau, and the National Development and Reform Commission (NDRC). The MIIT also includes the subordinate State Bureau for Science, Technology, and Industry for National Defense, which is responsible for the management of defense, shipbuilding, and aerospace industries—previous functions of COSTIND. MIIT is responsible for the regulation and development of the postal service, internet, wireless, broadcasting, communications, production of electronic and information goods, software industry, and promotion of the national economy.

[3] The China Information Industry Trade Association (CIITA) is a national non-profit organization associated with the information industry in China. Under the guidance and supervision of the MIIT, CIITA was founded in May 1990 to develop information resources and expand the information market, as well as to develop electronic information in China.

[4] There is no official translation for the names of these centers, which suggests that there is no intent to market to foreigners.

[5] There are two units mentioned in this discussion that are not shown in Figure 1: The 15th institute and CETC. NTC, as portrayed in Figure 1, is an independent legal entity that reports directly to AQSIQ and MIIT. This is the organizational chart within NCTC.

Basic Competencies and Services of the NCTC

General Lab Services of the NCTC

The NCTC provides various lab services, including electromagnetic compatibility (EMC) testing, safety testing, environmental reliability testing, server room / data center inspection, IC card testing, RFID testing, quality and performance testing, semiconductor component (SC) and printed circuit board (PCB) testing, software evaluation (SE) testing, consulting, and training. There is significant overlap with this organization and the 5th Institute (CEPREI Calibration and Test Center), headquartered in Guangzhou.

The following sections describe the general lab services of the NCTC.

Electromagnetic Compatibility Testing

The Electromagnetic Compatibility (EMC) lab was founded in 1989. Since 1999, the NCTC has invested about RMB10 million in test facilities, including one anechoic chamber and more than

100 other types of advanced EMC equipment imported from RS in Germany, Schaffner and EM Test in Sweden, Agilent in the US, and Noiseken in Japan. All the operators and technicians in the lab are well-trained and experienced, having passed the required qualification tests.

The EMC lab in NCTC is capable of conducting the CCC certificate test, the production license confirmatory test, the European Conformity (CE) certificate and test, product quality inspection, and government, industry, and customer-entrusted spot checks.

The EMC lab also provides technical diagnostics and improvement advice and plans. The major products under inspection include computers, computer peripherals, computer network equipment, IC card applications, domestic appliances, fiscal cash registers, finance and tax control machines, RFID readers, and financial terminals. Customers of the EMC lab include TPV, Founder, Lenovo, BOE, Hisense, Thunis, Daewoo, Siemens, and China Great Wall Computer Shenzhen Co., Ltd.

The primary services of the EMC lab include inspection of product quality for hardware, software, and systems; spot testing of product quality authorized by the government; product permit inspection of IC card and IC card readers, tax cash registers, fiscal cash registers, and satellite TV receivers; product quality certification testing, such as CCC and CE certification; and technical diagnostics and improvement advice and plans for computers, computer peripherals, computer network equipment, IC card applications, domestic appliances, fiscal cash registers, finance and tax control machines, RFID readers, and financial terminals.

Safety Testing

The electrical safety testing lab contains nearly 100 pieces of testing instrumentation and equipment used to perform compulsory inspections of IT equipment, China Quality Certification Center (CQC) voluntary certification tests, CE certificate tests, entrusted tests, and diagnostic tests. Products subject to safety testing include IT equipment, audio and video equipment, communications and telecommunications equipment, measurement and control equipment, laboratory electrical equipment, household consumer appliances, automatic controllers, IC card readers, and electronic tag reading and writing equipment.

Environmental Reliability Testing

The environmental lab is 300 square meters (m2) in size and has one operator with a master's degree and two with bachelor's degrees. The lab works on more than 500 test projects with more than 10 publications annually. It provides technical support for product design, component screening, intermediate testing, and acceptance testing.

There is a wide range of customers from industries such as electronics, telecommunications, and mechanical manufacturing, and companies such as Siemens, Ericsson, Tsinghua Thunis, Tsinghua Granville, Lenovo Group, Founder Technology, and the Chinese military. An environmental reliability test chamber can be used to run temperature cycling tests, temperature shock tests, constant or alternating temperature and humidity tests, salt spray tests, vibration (sinusoidal, random) tests, shock tests, bump tests, drop tests, and noise tests.

Server Room and Data Center Inspection

Currently, server room acceptance in China is conducted through a consensus of customer, supervisor, and construction units. Because of their different perspectives and insufficient knowledge, the Chinese government has invited third parties, such as the NCTC, to carry out project acceptance.

The result is that the NCTC will provide a consultant prior to construction to provide advice on topics such as site selection, determining whether the physical environment conforms to regulations, and safety supervision of the design, construction, and support of facilities in order to minimize the construction risk for the client.

The inspection standards include the following: 1) GB/T 2887, "General specification of the computer site"; 2) GB 50174, "Computer room design specification"; 3) GB 9361, "Computer site safety requirements"; 4) SJ/T 30003, "Construction and acceptance of computer room"; 5) GB 50303, "Construction quality acceptance of electrical engineering"; 6) GB 50343, "Lightning protection of the buildings of electrical and electronic systems"; 7) GB 50243, "Quality acceptance of the ventilation and air conditioning engineering construction"; 8) SJ 20455, "General specification for military computer rooms"; and 9) GB 8702, "Electromagnetic radiation protection." It is clear from these key specifications that there is a dual-use component to the consulting and analysis conducted by NCTC.

IC Card Testing

Since 1998, the NCTC has been entrusted by the government, industry, and enterprise to supervise the inspection and quality testing of IC cards (contact and contactless). The testing checks the physical characteristics, including card size, warping, stability of dimension and warpage under temperature and humidity conditions, contact surface profile, contact position, bending toughness, dynamic bending stress, dynamic distortion stress, contact resistance, static magnetic fields, opacity, static electricity, peeling strength, alternating electric fields, alternating magnetic fields, mechanical strength, block adhesion, reliability under environmental testing, read and write distance, field strength, chemical resistance, coating thickness, card plug life, printing speed, and flame resistance.

The NCTC also conducts tests on IC card systems, such as tax control cards and Sinopec fuel cards. Furthermore, the NCTC consults and trains on areas related to the standards, testing methods, and testing plans.

RFID Test Center

The RFID Test Center was built in 2006, under the permission of the Certification and Accreditation Administration of the People's Republic of China, to be a professional third-party testing organization related to advanced RFID technical applications and the protection of the Chinese RFID industry.

The RFID Test Center provides technical support and consultation for the following: typical applications and product acceptance of RFID techniques; tender documents; standards for the im-

plementation and application of RFID products and equipment; inspection, simulation, and verification of RFID techniques; specifications of RFID products and equipment; and testing for procumbent acceptance, spot checking for process quality, and routine testing commissioned by enterprises.

Past projects of the RFID Test Center include the following:

1) research-phase inspection and system validation of the highway traffic identification system in Henan Province;

2) product procurement and system testing for the declaration of electronic guidance systems, authorized by land border ports of the AQSIQ, Shenzhen Bureau;

3) project evaluation of the road and bridge toll systems in Wuhan, Hangzhou, and Harbin;

4) evaluation of the feasibility of vehicle plate management in the Shanghai Expo as an RFID application model;

5) system testing for the "branch know" smart card;

and 6) quality inspection of animal ear tag products, electronic customs locks, logistic labels, INLAY products, RFID tickets, and RFID readers and writers. The tests conform to ISO standards, such as ISO/IEC15693, ISO/IEC 14443, ISO/IEC 18000, ISO/IEC 11784, ISO/IEC11785, ISO/IEC10536, and ISO/IEC 18047.

Product Quality and Performance Testing

Commissioned by the Department of Justice, the Department of Technical Quality Supervision, and insurance companies, the NCTC has carried out product quality arbitration inspection, covering well-known servers and network devices, desktop/laptop computers, computer peripherals, IC card equipment, and other information technology products, with a total product value of RMB 50 million. The following paragraphs describe examples of typical quality inspection cases that were made public.

In one case, a batch of computer servers was exposed to rain during transportation, so the buyer refused to accept the products. Entrusted by one of the local courts of Xiamen, diagnostics of these off-line but powered servers was conducted. Performance failures were found in 10 out of 12 server machines. The cause of failure was determined based on the appearance, integrity, humidity conditions, and performance.

In another quality inspection case, a customer reported a non-functioning Toshiba Duo laptop. Authorized by a police station in the Haidian district, Beijing, the NCTC found that this was a counterfeit and was actually a used PC manufactured in 2000 in Japan. The configuration was a Mobile Intel Celeron CPU, 500 MHz, 64MB RAM, and a 2.1G hard disk. The "XP, ATI, and Core" marks on the PC did not match the actual configuration. The XP screen display and the record of the hard drive capacity, CPU speed, and memory capacity were modified manually. Several similar cases were found in IBM ThinkPad laptops sold in Beijing.

The NCTC has also helped solve disputes between laptop users and sellers by diagnosing causes of failures.

For example, in one case, a battery could not provide power to a laptop, although the laptop worked when plugged in. The laptop customer service found that the charge and discharge performance of the battery was normal, and therefore assumed the failure was due to mis-operation by the customer. However, it was determined by the NCTC that there was a fault in the power supply parts on the motherboard and that it was not user error.

Semiconductor Component and PCB Testing

The NCTC claims to be a pioneer in ICs, and, in particular, very large scale integration (VLSI) test technology with applications in both consumer and military electronics. They also have more than 120 pieces of test equipment and many experts.

The semiconductor component (SC) and PCB test units conduct tests on the environmental reliability and electrical, physical, mechanical, and metallographic properties of different varieties of components and circuit boards.

The testing products include the following: liquid crystal thermography circuits, including resistors, capacitors, inductors, and other resistive, inductive, and capacitive devices; devices such as diodes, transistors, MOSFETs, thyristors, and IGBT rectifier bridges; analog integrated circuits, including positive and negative pressure fixed/adjustable voltage regulators, operational amplifiers, voltage comparators, sampling holders, voltage followers, precision voltage references (PVRs), time base circuits, and optical coupling; digital integrated circuits, including 74/54, 74/54LS, 74/54F, 74/54ABT, 74/54HC, 74/54HCT, CD4000, H000, interface circuit 8000, communications interface circuits, and memory and single-chip VLSIs; mixed analog–digital integrated circuits, including AD/DA, integrated circuits, and audio circuits; other electronic components, including relays and power supply modules; and multilayer printed circuit boards and copper-based and copper-clad laminates.

Software Evaluation Testing

Software testing evaluates information application systems and software. Major tests include evaluating product functionality, performance, reliability, safety, adaptability, and feasibility.

Specialized Test Services

China Compulsory Product Certification

All electrical equipment manufactured in China or imported to China must comply with the regulations for China Compulsory Product Certification, abbreviated as CCC or 3C, which were issued by AQSIQ in December 2001. The supervision and management of the electronics market by CCC were implemented on August 1, 2003, when the establishment of CCC was announced by AQSIQ and the Certification and Accreditation Administration of China. CCC is the statutory compulsory safety certification system, serving as the basic approach to safeguard consumers'

rights and interests and protect personal property safety. The NCTC says that it has been adopted by international organizations as well.

The items subject to CCC include 135 products, which can be divided into 20 categories, such as household appliances, motor vehicles, motorcycles, safety glasses, medical devices, lighting apparatuses, cables, and wires. The CQC is appointed to undertake the work of compulsory product certification for 17 categories within the CCC catalogue. NCTC has a contract with CQC to carry out CCC tests in the following areas:

- CNCA-01C-021:2001 Electronics equipment for finance and trade
- CNCA-01C-020:2001 Servers
- CNCA-01C-020:2001 Portable computers
- CNCA-01C-020:2001 Display equipment
- CNCA-01C-020:2001 Embedded power supplies
- CNCA-01C-020:2001 Printers

European Conformity Certification

The European Conformity (CE) marking (formerly EC mark), is an obligatory product mark for the European market that applies to products regulated by certain European health, safety, and environmental protection regulations. CE marking indicates compliance certification according to the requirements formulated in the 22 European CE marking directives and subsequent European standards.

Therefore, the CE marking is important for manufacturers and importers placing products in the European market. CE markings on electronic products demonstrate that the products have been subjected to the appropriate conformity assessment procedure(s), indicating their eligibility to be placed in the European market.

In 2001, the China Operating Departments of CCQS (a UK-based company established in 2001 and accredited by the European Union Committee and United Kingdom Government as a Notified Body, which offers certification and consultancy services related to compliance with European Union CE marking for product safety) was set up in Beijing. However, it is the NCTC that provides examinations and technical document reviews of CE certification and consultancy services for Chinese manufacturers.

Energy Conservation Product Certification

The China Energy Conservation Program (CECP) was officially founded in October 1998 with approval from AQSIQ and the Certification Accreditation Administration of China (CNCA). It is one of the organizations with the responsibility to fulfill the requirements of the "Energy Conservation Law" of the People's Republic of China. CECP is a non-profit organization with independent legal status that is in charge of the organization, management, and implementation of the certification for energy-conserving products, water-saving products, and environmentally friendly products.

In 1998, CECP began the energy conservation certification program with residential refrigerators, and then expanded it to more than 90 product categories, such as home appliances, lighting, electronics, office equipment, industrial products, water-saving products, and environmentally friendly products. Together with the Central United (Beijing) Certification Center Co., Ltd., and the China Quality Certification Center, NCTC performs energy-saving certification and inspection of environmental labeling products for computers, monitors, printers, fax machines, digital multi-function office equipment, switching power supplies, and power adapters. In 2007, with the China Standardization Institute, the NCTC helped to collect standard efficiency data for PC monitors and copy machines.

Certification for China's Home Appliance Subsidy Program for Rural Areas

The NCTC plays a significant role in the Chinese government program "China's Home Appliance Subsidy Program for Rural Areas," which allows people from rural areas to buy home appliances with direct incentives from the government. These home appliances include products such as washers, color TVs, refrigerators, freezers, mobile phones, electromagnetic cookers, microwaves, air conditioners, computers, and heaters.

The NCTC, selected by the Ministry of Finance Economic Development Department, is one of the main test labs for certifying these home appliances that will eventually be sold to rural areas. For computer products, the incentive from the government is 13% of the product price, but not more than RMB 455. The China National Electronics Import Export Corp. (CEIEC)—representing the Ministry of Finance Economic Development Department, the Ministry of Commerce Comprehensive Department, and MIIT—has been sending out bids for computer products.

Consulting Supervision Division of the NCTC

The NCTC Consulting Supervision Division provides recommendations and management on the construction of information systems, including design in the planning phase, supervision and testing in the implementation phase, project evaluation in the operation and maintenance phases, and building an integrated business module with all project steps.

The division's accomplishments include construction consultation on the digital library of national defense for the science and technology industry, network security of defense technology information, high-definition digital television systems for a defense technology base, a network expansion project for the Beijing dance academy, evaluation of the disaster recovery room and the data center of Sichuan Telecom, and evaluation of the engine room of Beijing Telecom.

Inspection Equipment

The NCTC has developed test equipment and test platforms, including card socket life testers (for contact cards), mechanical strength testers (for contact cards), hot wire ignition testers, vertical flame testers, AC/DC load testers, plug test assemblies for the operating system of a smart IC card, COS test assemblies for a fiscal card, function assemblies for a fiscal cash register, testing fixtures for IC card development, testing fixtures for Sinopec gas cards, testing fixtures for RFIDs, testing fixtures for public health service cards, testing fixtures for China Mobile SIM cards, testing fixtures for Unicom SIM cards, testing fixtures for the 2ed ID card, testing assem-

blies for the 2ed ID card reader, testing assemblies for contactless readers, and testing assemblies for digital televisions.

Major Customers

The NCTC provides inspection and quality assessment for the government, certificate organizations, and businesses. The major customers from government include AQSIQ, National Certification and Accreditation Administration Committee (NCAAC), and MIIT.

The major clients of NCTC in the certificate organizations include CQC, Chinese Energy Efficiency Labeling Management Center, China Environmental Labeling Certification Center, and CE Certification. Additionally, NCTC serves various testings for more than 30 major private enterprises, such as Lenovo (Beijing) Co., Ltd., Founder Technology Group Corporation, Tong Fang Co., Ltd., China Great Wall Computer Shenzhen Co., Ltd., and Langchao Electronic Information Industry Co., Ltd. Beijing Zunguan currently provides approximately 2000 electronic product test reports per year for these customers.

Many of the customers play dual roles in the NCTC: on one hand, the NCTC offers certification testing services for these customers; on the other hand, these customers provide guidelines and specifications on how these certification tests should be conducted. For example, Lenovo uses the NCTC to test their products and provides the NCTC with test criteria and specifications, some of which have apparently come from IBM.

Conclusion

China's NCTC has been established and organized to promote national industrial electronic information scientific and technical development. The NCTC, through its own public documentation, is explicitly set up as a dual-use information technology industry support organization.

In accordance with the rules and regulations developed by the National Committee for Supervising Certification and Accreditation, the NCTC operates product quality certification and safety and EMC tests to provide both buyers and sellers with evidence for impartial assessment and assist the government in regulating marketing practice so as to promote trade and protect consumers' legitimate rights and interests.

The NCTC provides national professional test services for products such as computers, computer peripherals, computer network equipment, fiscal cash registers, second generation identity card reading (verification) equipment, computer room equipment and engineering, printed circuit boards, electronic components, integrated network cabling, software, IC card and equipment, RFID and equipment, and computer energy savings.[1] No overarching organization comparable to the NCTC is known to exist in the US or in any other major Western IT industrial state.

The NCTC is an integral component of the Chinese government policy-driven infrastructure for IT equipment design and testing, which has resulted in an increasingly innovative industry that has expanded China's share of the global telecommunications and IT equipment market.

This expansion can be seen in the cases of Huawei, now the largest telecommunications equipment maker in the world, and ZTE, the world' s fourth largest mobile phone manufacturer.

Through the oversight and assistance of the NCTC, Chinese-developed IT products will likely soon eclipse those of Western companies.

The dual-use structure of the AQSIQ and the NCTC will help to ensure that China's IT engineers develop increasingly competitive and capable IT components for government, military, and consumer applications, thereby expanding China's hard and soft power around the globe through advancing weapons systems and market dominance.

Unless Western policy makers and business executives understand the evolution, structure, and objectives of these organizations and establish domestic policy and infrastructure to compete effectively in the market place, as well as on IT applications, a future alarmist Congressional report may result in simply more political rhetoric while the western IT industry continues to cede market share and fall behind in soft and hard power.

The recently announced Defense Advanced Research Projects (DARPA) "Vetting Commodity IT Software and Firmware" (VET) program (DARPA-SN-13-07: VET - Vetting Commodity IT Software and Firmware) is a step in the right direction

(see https://www.fbo.gov/?s=opportunity&mode=form&id=55b80a80971c739699e410584819e767&tab=core&_cview=0).

DARPA plans to find "innovative, large-scale approaches to verifying the security and functionality of commodity IT devices." The VET program will seek to demonstrate that it is technically feasible for the Department of Defense (DoD) to determine that the software and firmware shipped on commodity Information Technology (IT) devices is free of broad classes of backdoors and other hidden malicious functionality.

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About the Authors:

Dr. Xin Song, the primary Chinese linguist for this research, is a hydrogeologist and environmental engineer. Dr. Song graduated holds a Master degree in Environmental Science from

Tsinghua University, Beijing and a PhD in Civil and Environmental Engineering from University of Maryland, College Park.

Leonard Zuga is an analyst of emerging technologies, technology transfer, and industrial base development in the context of the global political economy.

Professor Michael Pecht is the founder and Director of CALCE (Center for Advanced Life Cycle Engineering) at the University of Maryland, which is funded by over 150 of the world's leading electronics companies at more than US$6M/year. The CALCE Center received the NSF Innovation Award in 2009.

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