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China's Defense Electronics and Information Technology Industry

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Summary

The future of the Chinese defense electronics and information technology (IT) industry rests on the ability of the industry to leverage existing foreign and commercial off-the-shelf technologies and to grow competitive domestic research and design (R&D) and production capabilities. The Chinese leadership is moving the defense electronics and IT industry toward this end goal chiefly by accelerating civil-military integration (CMI) to connect the commercial electronics and IT industry with China's national defense requirements; increasing civilian commercial participation—and competition—in the military procurement market through regulatory reform, funding, and encouragement of commercial R&D in dual-use technologies; and supporting innovation strategies in the civilian companies that are the backbone of the defense industry.

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The strategies to build indigenous innovation capabilities published in state policy documents and adopted by key players in the defense industry—China Electronics Corporation (CEC), China Electronics Technology Group Corporation (CETC), Huawei, and ZTE—share a common focus on increased R&D expenditures, collaboration with outside research partners, and technology transfer through foreign collaboration.

China is continuing to shift from merely producing advanced defense electronics based on established foreign technology toward building design and development capabilities that would allow for independent innovation. The commercial electronics industry and academic partners play a crucial role in these efforts and have been increasingly targeted for economic investment and further integration with the military.

GOVERNMENT PRIORITIES FOR THE INDUSTRY

China's Twelfth Five-Year Plan (2011–2015) targets the electronics and IT industry, calling for increased R&D and design capabilities. It lays out an industry-wide restructuring aimed at achieving these broad goals and emphasizes the role of technology clusters in innovation. The Ministry of Industry and Information Technology's (MIIT) Electronics and Information Technology Industry Development Plan for the Twelfth Five-Year Plan (电子信息制造业“十二五”发展规划) sets industry-wide targets for maintaining a roughly 10 percent increase in average annual growth and reaching RMB 10 trillion in annual revenue by 2015. The development envisions the industry as having five to eight large-scale backbone enterprises, each of which will produce over RMB 1 billion in annual revenue. For large enterprises, the target is to produce a collective RMB 500 billion. Revenue growth for electronic and IT manufacturing's strategic emerging [technologies] areas is expected to reach 25 percent annually. Further, the government is expected to invest RMB 500 billion (USD \$77 billion) in the electronic components sector alone.

Part of China's strategy to increase the independent innovation and design capabilities of the electronics and IT industry is to drive domestic

enterprises to increase R&D activity and acquire design capabilities and intellectual property rights from foreign partnerships. A number of key government policies supporting R&D and foreign technology transfer include:

- State Council, 2008 Document No. 128 (国办发(2008)128号), entitled “A Number of Policies for Promoting the Industrialization of Independent Innovation Achievements” (于促进自主创新成果产业化若干政策的通知). Article 3 of the document calls for additional deductions in taxable income for a firm's costs associated with R&D for new technologies, products, and processes.
- State Council, 2011 Document No. 4 (often referred to as “New Document 18”), entitled “A Number of Policies to Further Promote the Development of the Software and IC Industry” (进一步鼓励软件产业和集成电路产业发展若干政策 or “国发(2011)4号”). This follows the old Document No. 18 passed in 2001 to continue preferential tax policies for the software industry and states that the government will strengthen its support for investment, financing, and R&D for integrated circuits.
- China State Taxation Administration (国家税务总局) and the Ministry of Finance (财政部) Document No. 100 (财税(2011)号100), entitled “VAT Policies for Software Products.” This document provides for a VAT tax refund to Chinese enterprises that redesign imported software or develop their own, with specific provisions for embedded software. It also contains a VAT tax incentive for Chinese enterprises to directly own or co-own the intellectual property rights underlying their software products.

CIVIL-MILITARY INTEGRATION TRENDS IN THE INDUSTRY

Current S&T policy documents illustrate China's desire to increase CMI in the electronics and IT industry. MIIT's current Electronics and Information Technology Industry Development Plan also includes support for increased progress in civil-military integration—both inside and out-

side of the market—as well as for interoperability between civilian and military goods. MIIT’s Development Guidelines for the Software Industry Under the Twelfth Five-Year Plan also specifically call for increased CMI. Both sets of guidelines show a noteworthy shift, as the previous guidelines under the Eleventh Five-Year Plan do not mention CMI. Still, the shift itself should come as no surprise: the Chinese military often leverages commercial technology and the relative strength of civilian enterprises in electronic information trades.

The four leading defense electronics and IT enterprises all appear to have embraced CMI even before Hu Jintao increased the push for it, and evidence of it can be found in corporate press releases, interviews, and sales of defense products and services. In 2005, CETC released the “3-3-3 Transform and Ascend Strategy” (三三三转型升级战略), calling for a proactive approach to the development of its three core markets simultaneously: military, civilian, and foreign. CEC, which jointly organizes the annual China International Defense Electronics Exhibition with the General Armament Department of the People’s Liberation Army, also has a corporate strategy targeting the military. In 2008, CEC announced that software and systems integration of military electronics products was specifically highlighted as one of CEC’s four primary business areas going forward.

Another way CMI is seen in the industry is through industry partnerships with academic researchers for military R&D projects. Using Project 985 funding, Xidian University appears to have partnered with three of the biggest players in the Chinese electronics industry—CETC, ZTE, and Huawei—to establish the “Advanced Military Integrated Electronic Information Systems Innovation Platform” (先进军事综合电子信息系统优势学科创新平台), a joint pooling of capabilities aimed at developing cutting-edge electronics technologies for military use. This platform is of fairly recent vintage, having been authorized in 2006, begun as a pilot project in 2008, and become fully operational as of 2011.

Chinese defense S&T leaders have repeatedly stressed the importance of deepening CMI by giving smaller firms greater access to defense

procurement programs. In 2010, the State Council and the CMC jointly issued Document No. 37, “A Number of Opinions with Regard to Building and Perfecting Civil-Military Integration in the Weapons Research and Manufacturing System” (关于建立和完善军民结合寓军于民武器装备科研生产体系的若干意见 [37号]). This document emphasizes the importance of greater civilian enterprise participation in military and defense markets for increasing competition, enhancing the technological sophistication of products in those markets and also improving the health of civilian electronics firms in the aggregate via increased demand for their products.

Although the opaque nature of the defense electronics market makes drawing definitive conclusions about the extent and importance of recent efforts toward these ends difficult, there are some signs that integration is beginning to have a noticeable impact. For example, China Zhenhua Electronics Group, a publicly-traded subsidiary of the mega-conglomerate CEC, focused on development of key components for defense electronics, noted in its 2011 annual shareholder report that the rising number of small firms entering the defense electronics market in the preceding year had spurred increased competition and led to downward pressure on prices, creating “adverse market conditions” for larger, long-standing defense procurement suppliers.

INNOVATION STRATEGIES

In 2006 the Ministry of Science and Technology and the Ministry of Commerce published a number of ideas on the “go out” strategy (走出去), which was first introduced by Deng Xiaoping and which Hu Jintao is credited with accelerating in 2003. Key parts of the “go out” strategy are to encourage S&T enterprises to set up R&D institutions overseas and joint R&D activities with universities or outside research institutions, and to provide organizational support for these ventures.

CEC, CETC, Huawei, and ZTE share the common strategies of R&D investment and outside collaboration for innovation. Of course, what these companies term ‘innovation’ is in no small part a process of absorbing outside technologies and techniques for incorporation into their own

R&D programs. In recent years, each has stressed the importance of innovation for their businesses and has increased R&D spending as one method of achieving this.

CETC and CEC, the two largest state-owned enterprises in the defense electronics and IT industry, both adhere to the “go out” strategy. Both claim to seek innovation capabilities through outside collaboration with foreign companies and domestic academic partners. In particular, CETC International (CETCI) announced that its “go out” strategy includes setting up a number of overseas headquarters, setting up offices at a number of overseas companies, and recruiting domestic and international talent. Huawei and ZTE, the leading private Chinese enterprises in telecommunications and software, have strategies to seek innovation through international collaboration such as the establishment of foreign R&D centers and partnerships with foreign high-tech companies.

THE “DIGITAL DIAMOND” MODEL

The “digital triangle” concept that was used to analyze Chinese defense electronics and IT industry over the past decade may not provide enough emphasis on the growing role of legal and regulatory policymakers outside of R&D programs and their respective governing bodies. For instance, Documents No. 37 and No. 100 have shifted the dynamics of the industry, and their effects will continue to be seen in coming years. However, the digital triangle model groups these and similar actors under state R&D funding programs, but it may be better to distinguish them in a fourth category.

We put forward the idea of a “digital diamond” paradigm to replace the digital triangle model. The vertices presented are 1) the commercial electronics and information technology industry; 2) state R&D funding; 3) legal and regulatory support;

and 4) the military. In testing this model, we have found it helpful for analyzing major elements of the industry. The digital diamond succeeds in drawing attention to the recently changing dynamics of the defense industry, ranging from accelerating civil-military coordination activities, increased research funding priorities for relevant organizations, and the introduction of favorable regulatory policies in support both civilian companies as well their entrance to defense procurement markets.

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