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TESTIMONY

Joint Anti-Access Operations

China's "System-of-Systems" Approach

CORTEZ A. COOPER

CT-356

January 2011

Testimony presented before the U.S. China Economic and Security Review
Commission on January 27, 2011

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The RAND Corporation

Joint Anti-Access Operations
China's "System-of-Systems" Approach²

Before the U.S. China Economic and Security Review Commission

January 27, 2010

Let me begin by expressing my appreciation to the Co-Chairmen and the other distinguished members of the US-China Economic and Security Review Commission. It is an honor and a pleasure to have the opportunity to testify here today.

My testimony will briefly examine four areas of concern regarding US security and freedom of access and maneuver in the Asia-Pacific region:

- China's perceived strategic imperative and objectives for developing anti-access or counter-intervention capabilities in maritime, air, space, and electro-magnetic domains
- The People's Liberation Army's approach to developing doctrine to achieve anti-access objectives
- The design of technical and organizational frameworks to marry military capabilities to these objectives
- US responses to China's anti-access strategy, concepts, and capabilities

The Commission's stated goal for this session is to examine the implications for regional security arising from the People's Liberation Army's growing capability to integrate military operations across all domains of war in the Western Pacific. I agree with the underlying assumption that the PLA has realized to some extent such capability advances, and hope that my testimony will provide some insight into the nature of these capabilities and the capacity of the PLA to bring them to bear in a way that might threaten US forces responding to a contingency in Asia.

¹ The opinions and conclusions expressed in this testimony are the author's alone and should not be interpreted as representing those of RAND or any of the sponsors of its research. This product is part of the RAND Corporation testimony series. RAND testimonies record testimony presented by RAND associates to federal, state, or local legislative committees; government-appointed commissions and panels; and private review and oversight bodies. The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

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China's Perceived "Counter-Intervention" Imperative

China's rise as a pillar of the world economy is reflected in maritime, aerospace, and information technology environments, forcing shifts in existing global power alignments. As a continental power with a number of border stability challenges, the People's Republic is faced with an extremely complicated peripheral security environment—both on the continent and in immediate seas. At the same time, its global presence and interests are growing in scope and importance, with Communist Party legitimacy underpinned by high-percentage annual economic growth linked to global trade. This reality paradoxically acts as a strategic brake on development of military capabilities focused on the distant abroad, while reinforcing the need to develop viable force projection capacity to secure interests in and beyond Asia.

Chinese military strategists and security experts from at least the 1991 Gulf War forward have stressed the development of capabilities to adapt to this post-Cold War threat environment. China's primarily coastal economy and growing engagement in the global market feed a sense of vulnerability in the maritime domain.³ PRC leaders viewed the US response to coercive posturing toward Taiwan in the mid-1990s through this prism of inadequacy, finding evidence that China's military had little ability to manage a cross-Strait conflict that might involve a vastly superior US military. Most of China's civil-military leaders apparently believe that this places them at strategic loggerheads with the US, engendering a fundamental mistrust regarding Washington's position toward China's re-emergence as a great power.

China's most recent Defense White Paper, *China's National Defense in 2008*, is the first of six to date to assert that the US exerts a negative influence on Asia-Pacific security, over-looking a half-century of evidence to the contrary.⁴ Regardless of the level of cooperation or competition on any single issue of mutual concern, there is acrimony in the Sino-US relationship fed by a perception among many of China's elite that Washington's motives for engagement are thin cover for a containment strategy. This is seen most clearly in the military sphere, where increased Chinese military confidence and aggressive posturing threaten to undermine a Sino-US relationship that leaders on both sides know to be of crucial importance.

³ For a comprehensive overview of the constraints and imperatives of China's maritime power ambitions, set in geo-political and historical context, see Robert S. Ross, "China's Naval Nationalism: Sources, Prospects, and the U.S. Response," *International Security*, Vol. 34, No. 2 (Fall 2009), Pp. 46-81.

⁴ *China's National Defense in 2008*, Information Office of the State Council of the People's Republic of China, Beijing, January, 2009.

“Counter-Intervention” Doctrine

A major tenet of China’s security strategy is to build anti-access capabilities to protect broader interests that it perceives threatened by a technologically dominant maritime power. For Chinese strategists, this is known as a “counter-intervention” strategy. Under Jiang Zemin’s leadership, Party guidelines for the PLA departed from traditional focus on large-scale land-centric combat and set in motion force-wide programs to fit the PLA for joint campaigns on multi-dimensional battlefields. Jiang’s military guidance, first promulgated publicly in 1993, spurred both a major doctrinal shift toward joint operations and a prioritization of information warfare and long-range precision strike capabilities. Jiang’s “Military Guidelines for the New Period,” prioritized active defense operations to deter or delay US intervention in a Taiwan conflict.

A later extension of these guidelines required the PLA to prepare to win a “local war under informatized conditions,” understanding a change in the nature of warfare due to advances in command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), and network electronic warfare. In 1999, Jiang signed “The New Generation Operations Regulations,” a seminal series of documents setting the path for the conduct of joint campaigns on battlefields that encompass air, sea, space, land, and electro-magnetic domains.⁵

In the transition from Jiang’s administration to that of Hu Jintao, emphasis on developing anti-access concepts and capabilities did not wane. Although Hu’s much-scrutinized guidance to the PLA in 2004, the “Historic Missions of the Armed Forces in the New Period in the New Century,” provides impetus for the PLA to develop capabilities for non-combat military operations, the operational advances that appear to have benefited from the highest priority of effort are those pertaining to anti-access capabilities. This applies both to the development of joint campaign doctrine to support anti-access objectives, and the fielding of precision strike and information warfare systems.

The PLA’s most authoritative modern work on military strategy, *The Science of Military Strategy*, states that in the current threat environment preparing for a local war against a technologically superior adversary is “the center of gravity of strategy.”⁶ The same text later describes key concepts of operation behind this strategy as “organizing all the services and arms to conduct active counterattacks... against the enemy’s command, intelligence and communications

⁵ James Mulvenon and David Finkelstein, *China’s Revolution in Doctrinal Affairs: Emerging Trends in the Operational Art of The Chinese People’s Army*, The CNA Corporation, Alexandria Virginia, 2005.

⁶ Peng Guangqian and Yao Youzhi, ed. *The Science of Military Strategy*, Military Science Publishing House, Academy of Military Science of the People’s Liberation Army, Beijing, 2005, P. 250.

systems, and his airports and the launch sites of strategic assault weapons, and disrupt his strategic air raid plan, and wear down and contain his air raid forces to win the victory..."⁷ While this is couched in defensive terms, other texts clearly stress the active nature of seizing the initiative in a fight designed to "counter" intervening forces.⁸ Chinese strategists also assess that political and economic conditions constrain the scope of modern war, and this provides an opportunity for the combatant who dominates the information battlefield in the opening of a conflict to control its outcome.

For the PLA, strategic concepts are translated to doctrine through the development of campaign guidelines, and these guidelines drive capabilities development. Missions pertaining to anti-access operations are found across various campaigns, but the Joint Anti-Air Raid Campaign and the Joint Firepower Campaign provide the essential concepts for counter-intervention operations.⁹ The Joint Anti-Air Raid Campaign centers on the fielding and operation of an integrated air defense covering the mainland; attacks on adversary airbases and aircraft carriers; and extension of air defenses beyond China's borders through employment of fighters, anti-aircraft systems, ship-borne surface-to-air missiles (SAM), and airborne early warning and command assets. The Joint Firepower Campaign describes the concepts for integration of air and missile precision strikes required to support anti-air raid operations and other campaigns. It includes coordinating and synchronizing anti-ship ballistic and cruise missiles, land-attack cruise missiles, air strikes with precision-guided munitions, and counter-C4ISR strikes with specialized weapons.

In the first decade of developing high-tech local war capabilities, submarines were the focus of China's anti-access approach, but this is no longer the case. Submarines remain a key component, but land-based ballistic and air- and surface-launched cruise missiles with a variety of ranges and payloads are also part of the new mix. The extension of all these capabilities from peripheral waters out to as much as 1000 nm from China's coast is becoming a reality as a new over-the-horizon targeting network begins to take shape. The key concepts and capabilities behind China's current counter-intervention strategy include:

- An organizational structure to "operationalize" Joint Firepower Strike and Anti-air Raid Campaign doctrine
- A fully integrated, automated joint C4ISR and electronic warfare network

⁷ Ibid, P. 300.

⁸ See Gao Shijin and Zhang Peizhong, *On Multiple Military Missions*, Beijing: Chanzheng Chubanshe, 2009, P. 65.

⁹ The definitive work on Chinese campaign doctrine is Wang Houqing and Zhang Xingye, eds., *Zhanyixue*, Beijing: Natinal Defense University Press, May, 2000.

- Long-range ballistic and cruise missiles; with anti-ship, anti-radiation, runway-cratering, and other specialized warheads
- Offensive and defensive computer network operations capabilities
- Counter-space weapons capable of both destructive and non-destructive effects
- Advanced naval air defense
- Deep-water mines and advanced torpedoes
- Trans-regional mobility of forces

A “System-of-Systems” Approach: Marrying Objectives to Capabilities

In modern warfare a weapon and its wielder are inextricably tied to information, decision, and fire control networks—a “system-of-systems” as both western and Chinese strategists point out. In 2005, Hu Jintao first highlighted for the PLA the goal of system-of-systems operations, and subsequent writings indicate that the PLA is still wrestling with its ultimate shape and content.¹⁰ But the crux is integration and fusion of a joint command organization with an integrated command network to allow for rapid combat decision and execution.

The system-of-systems approach to PLA capabilities development appears to be focused on two key tenets: develop and employ an integrated platform or network for rapid joint war zone information collection, fusion, dissemination, and command decision; and develop task-based organizations to conduct integrated joint operations enabled by this platform. The PLA heavily prioritized the first of these two objectives in the recently completed five-year program, and accounts of recent training indicate that they have achieved progress.¹¹ Progress on the second objective is less evident. Although Chinese doctrine and exercise activity points to improved capability to conduct coordinated joint operations at the operational, or theater level of war, Chinese military media indicates that debate continues within the PLA as to the desired end-state for integrated joint organization across the force.

¹⁰ See for example the Academy of Military Science’s influential journal *Zhongguo Junshi Kexue*, Vol.4, Oct. 2010.

¹¹ In an 11 January, 2006 PLA Daily Online article, “PLA Sets to Push Forward Informationalization Drive from Three Aspects,” Shen Yongjun and Su Ruozhou wrote that the 11th Five-Year program tasked the PLA Informationalization Work office to move the PLA toward a “perfect universal transmission... and processing

An Integrated Command Platform

The integrated platform to which the PLA aspires, and has reportedly begun to operate, is more than just a compatible cross-service communications network. It seeks to provide advanced software and hardware to fuse a suite of battlefield operating systems pertaining to command and control communications, electronic warfare, a common operating picture of friendly and enemy forces, targeting data, and logistics—providing commanders at all levels with an informational tool kit to make rapid decisions. The overall goal is rapid, stable application of command decisions by the PLA, while an adversary struggles to regain access to information and avenues for disseminating commands.¹²

It is difficult to identify from available sources the components of this integrated command platform, and to determine the extent to which each of the various battlefield operating systems is integrated into a compatible network. The Chinese have obviously built on US concepts of “net-centric warfare,” but appear to aim at an even more ambitious goal in terms of the comprehensive nature of the platform. Media reports and doctrinal writings portray something akin to the combined capabilities of the US Global Command and Control and Joint Surveillance and Target Attack Radar Systems. The basis for this might be found in descriptions of the *Qu Dian* battle management system reportedly being developed since the late 1990s to provide joint C4ISR and target acquisition capabilities, but recent articles do not specifically mention this when referring to an integrated platform.¹³

PRC media claims that recent major exercises, particularly the much-publicized *Mission Action-2010* multi-region exercise, illustrate the viability of an integrated command platform and have tested it against electronic attack from opposing force units. The Central Military Commission and PLA general staff also were reportedly involved in the exercise, showing the priority given to developing system-of-systems operations.¹⁴

platform.”For further information on this aspect of informationization, see *China: Connecting the Dots*, 2007: National Air and Space Intelligence Center, Pp.15-18.

¹² Zheng Zhidong, “Thoughts on Improving Preparations for People’s War Under Informatized Conditions,” *Guofang*, April 2005, P.19.

¹³ For information on the *Qu Dian* system, see Larry M. Wortzel, “PLA Command, Control and Targeting,,” in Roy Kamphausen and Andrew Scobell, ed., *Right-Sizing the People’s Liberation Army: Exploring the Contours of China’s Military*, Carlisle PA: Strategic Studies Institute, September 2007, Pp. 212-220.

¹⁴ _____, 2 November, 2010, “PLA GSD Officer on Training Transformation in ‘11.5,’ Looks After ‘12.5,” *Jiefangjun Bao Online*, Beijing (www.chinamil.com.cn).

Recent reports focus particularly on “skip-echelon” command that allows for a central, high-level decision to bypass layers of command bureaucracy to tactical units and weapons systems in a joint environment.¹⁵ Some analysts believe that this is the ultimate goal of integrated joint operations, bringing to bear capabilities across the services at the tactical level and reducing time latency of joint action. Effective micro-management of tactical forces absent the task-organization and training to operate in such an environment, however, is extremely difficult.

Organizing an “Informationalized” Force

Even with an advanced C4ISR and targeting network, joint operations will collapse without officers, NCOs, and units organized for such operations. A review of Chinese military newspapers and other sources indicates that the PLA has not ultimately decided how to define and conduct integrated joint operations as part of an overarching system-of-systems approach. These sources, however, generally provide five characteristics for integrated joint operations: unified command, unified planning, integrated operations, integrated C4ISR, and joint logistics. The PLA seeks to resolve issues in two areas related to these objectives: bridging the gap between the peacetime Military Region command system and a joint wartime command structure; and defining the level at which the PLA will be jointly task-organized. These issues involve more than simply operational considerations—decisions will impinge on the culture and rank-structure of the PLA, and potentially threaten traditional power centers within the PLA and the Communist Party.

China’s peacetime Military Region structure does not reflect the command and control requirements for anti-access mission sets described in joint firepower and anti-air raid doctrine. These regional commands could, however, transition to a joint theater or war zone headquarters in wartime; but augmentation of air force, navy and Second Artillery missile forces with these ground force-centric structures during a crisis poses significant command and coordination challenges.¹⁶ Service-specific and perhaps even joint formations at the operational level (a Corps, fleet or numbered air force in US parlance) might operate under coordinated joint command fashioned from the augmented Military Region construct, or might operate under direct control of senior officers in Beijing. There is some resemblance between this concept and the US formation of joint task forces, although the primary formations below joint task force level in US doctrine are service-specific in nature and have significant experience executing operations under

¹⁵ _____, 27 October, 2010, “Chengdu MR Air Force Participates in ‘Mission Action-2010’ Joint Command,” *Jiefangjun Bao Online*, Beijing (www.chinamil.com.cn).

¹⁶ For an excellent overview of war zone organization, see Kim Nodskov, *The Long March to Power: The New Historic Mission of the People’s Liberation Army*, Copenhagen: Royal Danish Defence College Publishing House, 2009, Pp. 212-213

joint plans and command. Chinese writings indicate a potential desire to build joint organizations below the operational, war zone level, and to tie these organizations to specific joint missions to gain at least temporary information, air and sea superiority in a regional fight. There is little evidence that the PLA has formed and exercised such formations.

Some media reports imply that the PLA will have joint units at both the operational and tactical levels, but these reports are vague and indicate that the PLA has not fully decided how to organize joint combat formations from service-specific units. An article regarding the recent *Mission Action 2010* exercise mentions both “Joint Campaign Large Formations” and “Joint Tactical Formations,” but does not elaborate on specific unit composition.¹⁷ China’s military command and control is overwhelmingly centralized, and initiative at lower levels of command is not a PLA trademark. Investing joint capabilities in a commander at the tactical level will require either a shift in traditional mind-set, or confidence that the integrated command platform will allow for central control over multiple joint units at the tactical level. PLA culture is also heavily Service-oriented, and resolution of joint organizational structure and lines of command will be an arduous, time-consuming process.

Training an “Informationalized” Force

Annual General Staff Department training guidance directives are intended to translate Party strategic guidance into operational objectives understood throughout the PLA. Since 2004 the annual guidance has stressed the joint and “informationalized” concepts that underpin an anti-access strategy against a superior opponent. A January 2006 PLA media editorial served as a defining call-to-action, stating that PLA capabilities were “incompatible” with the “demands of...winning informatized war.”¹⁸ In July of 2008, the Central Military Commission’s daily newspaper announced the release of a revised version of the official Outline for Military Training and Evaluation (OMTE). This document is the authoritative long-term plan for Chinese military training, and the 2008 revision reportedly served as a “new starting point” for the PLA to “adapt to the requirements of integrated joint operations.”¹⁹

¹⁷ _____, 21 October, 2010, “Beijing MR Sums Up ‘Mission Action 2010,’” New China News Agency Wire Service.

¹⁸ _____, 6 February 2008, “Strategic Guidance Establishes Basis for Expanding PLA Activity,” *Jiefangjun Bao*, Beijing.

¹⁹ _____, 25 July 2008, “PLA General Staff Department Approves Release of Newly Amended ‘Military Training, Examination Outline,’” *Jiefangjun Bao*, Beijing.

In 2009, the General Staff Department followed the OMTE release by reportedly identifying a set of major missions for military training that included mission-specific research and practice in campaign planning and joint command, joint training, “the development of joint operations command talent,” and training involving “complex electro-magnetic environments.”²⁰ For 2010, a GSD official stated that joint training on an advanced information system was a major goal for the year and for the five-year period to follow. This same source indicated that the next five years will see an adjustment in the PLA’s approach to training, which will set the stage for system-of-systems training across the force after 2015.²¹ These media reports and the documents they reference map out a still nascent but high priority effort to test, through training and exercises, hypotheses regarding joint command and operations, and to adapt best practices pursuant to lessons learned. Based on previous information regarding the system-of-systems approach, this would require the PLA to exercise both joint command structures and the integrated command platform that enables joint operations.

The PLA appears to be on the way to employing a joint, automated battlefield management network, and has fielded a suite of weapons systems capable of accomplishing the missions required by joint anti-air raid and firepower campaign doctrine. The PLA is less advanced in determining the joint force structure and lines of command to employ these capabilities, but has established training goals for the next 10 years that indicate a concerted drive to test and determine the best organizational approach. GSD-directed advances in integrated C4ISR and targeting, joint organization, and joint training may well give the PLA by 2020 the capabilities needed to execute a comprehensive anti-access campaign against US forces operating in Asia.

Implications for the United States

The freedom of maneuver and dominant presence of US maritime and air forces in the Pacific has secured lines of communication and reinforced stability in Asia for decades. Allowing even the perception that this bedrock has been undermined could call into question US commitment to regional stability. Responses over the past year to Beijing’s stance regarding South China Sea economic and sovereignty claims clearly illustrate the importance of American leadership to assuage regional fears of an unconstrained China; and Beijing took note of the potential for further damage to its standing in the neighborhood. US and allied counters to anti-access

²⁰ Wu Dilun and Liu Feng’an, 6 January 2009, “General Staff Department Lays Out Plan for Military Training Throughout the Armed Forces in the New Year,” *Jiefangjun Bao*, Beijing.

²¹ _____, 2 November, 2010, “PLA GSD Officer on Training Transformation in ‘11.5,’ Looks After ‘12.5,’” *Joefangjun Bao Online*, Beijing (www.chinamil.com.cn).

strategies are important indicators of resolve regarding crisis response and escalation control in the western Pacific and contiguous seas.

China's civil-military leaders derive a need for anti-access capabilities from a perceived strategic vulnerability, and develop operational doctrine and campaign concepts to address this weakness. The campaign guidelines then provide the tactical mission sets that drive PLA force structure, systems development, and training. It follows that US responses to the threat posed by PLA anti-access concepts and capabilities must likewise comprise strategic, operational and tactical measures; and I believe that at each of these levels, a mix of cooperative and competitive approaches provide the best formula for preventing a costly arms escalation and increased potential for dangerous miscalculation.

Flexible access options for US forces, regular presence through joint training and exercise activity, and joint initiatives in regional security forums are all important aspects of anti-access mitigation and threat reduction for our treaty allies. Conventional, long-range strike threats to US bases and maritime formations, and counter-C4ISR threats that degrade US response time and decision space, would be significantly exacerbated in a scenario in which US forces were denied a flexible range of basing and access options. New agreements for access, logistic support, and joint training both within and beyond the alliance structure are promising. Vietnam, the Philippines, and Indonesia are geographically critical in terms of maritime lines of communication, and seek US assurances that should be accompanied by willingness to engage in cooperative security initiatives.

Given Beijing's fundamental mistrust of US objectives, Beijing will view most, if not all, US regional security initiatives through a "containment" lens. I believe that there is little that US policy makers can do to change this in the short term. Over time, however, welcoming increased Chinese involvement in, and capabilities for, non-combat humanitarian, disaster relief, and peace-keeping operations both in and beyond Asia will provide a means for building mutual confidence. Arms control discussions are another potential tool in this regard. Although there are few readily appropriate frameworks for dealing with conventional arms control issues, the US should not be allergic to considering a review of existing and potential regimes to control conventional weapons with strategic effects. China's ballistic and cruise missile inventory, with a diverse range of warhead characteristics and effects, as well as developmental directed energy weapons and other counter-space capabilities, fall into this category. Track 1.5 or 2 forums, under the general rubric of the official Strategic and Economic Dialogue mechanism, could provide a start-point for discussions in this area.

At the nexus of the strategic and operational levels, infrastructure hardening and force dispersal initiatives for regional bases should be a resource priority. Given the complicated peripheral security environment facing Beijing, and the increasing need for China to develop cooperative means to protect global economic assets, it is not in China's interest to hyper-escalate in an area of vital US interest. Defensive measures that accompany flexible force deployment options are a cost-effective means of proving resolve and calling China's anti-access investments into question.

The Sino-US military-to-military relationship has a role to play in addressing China's anti-access aspirations. PLA leadership is increasingly vocal and aggressive in questioning US motives and presence in Asia, possibly serving as a brake on meaningful progress in the relationship. At the strategic level, US civilian leadership should stress that within the defined areas of cooperation, we have an expectation that contact will become more routine and less subject to cancellation or political manipulation. Regular contact with US officers and NCOs will provide for China both a verification of US resolve to maintain unimpeded access throughout the region, and a reinforcement of America's policy of welcoming China's peaceful emergence as a global stakeholder.

Operationally, China's anti-access strategy is heavily reliant on winning the information battle at the outset of a campaign. Showing Beijing that the US will in no way concede this fight requires maintaining the technological edge in space, and working with allies and partners in the region to build compatible, redundant C4ISR networks. Along these same lines, I noted earlier that the PLA is struggling with the organizational and command issues inherent in conducting complex joint strike and counter-C4ISR operations beyond China's borders. US security analysts should closely scrutinize Chinese developments in this area and assess in concert with operators and systems developers the implications of PLA approaches to joint operations.

At the tactical level, US technical and tactical mitigation should be comprehensive and system-specific. US and Japanese submarine forces hold at risk the PLA surface and, to lesser extent, sub-surface assets that form an important pillar of the PLA's anti-access strategy in seas to the east and south of China. The US needs to augment this with an anti-submarine warfare architecture comprised of distributed sensors, unmanned vehicles, and surface, sub-surface, and aerial detection, targeting, and weapons systems. Maintaining a larger number of our own nuclear attack submarines in the Pacific, particularly SSGN missile boats, also increases the risk to China of relying on an anti-access strategy.

Dealing with land-based ballistic and land- and air-launched cruise missiles is an extremely complex problem, particularly as missile seeker and warhead technology advances. Integrated air

and missile defenses that network the complete range of joint US systems and leverage allied capabilities are an essential investment. China's greatly improved detection, tracking, targeting, and long-range missile systems will soon pose a very real threat to US carrier groups operating to the west of Guam, and Guam itself may soon be held at risk of conventional strike given Chinese ballistic missile advances. No single mitigation technique will ensure US capacity to achieve air superiority over potential trouble spots in the East and South China Seas. US forces need a combination of hardened and dispersed forces, integrated air and missile defenses, rapid missile counter-strike capabilities, and redundant C4ISR in order to maintain this key component of US crisis response capability in Asia.