國防政策藍皮書第五號報告

Defense Policy Blue Paper No.5

二〇二五年中國對台軍事威脅評估

China's Military Threats against Taiwan in 2025

新境界文教基金會
國防政策諮詢小組

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國防政策

藍皮書

在彙整執政經驗與學者專家見解，以鼓勵對國防議題的理性深入討論，並作為民主進步黨政見與政策的參考。

序言

台灣的國防對穩定的兩岸關係扮演重要的角色。台灣自我防衛的決心與能力不僅在過去保障了兩岸人民和平共存的現狀；也是未來台灣在追求兩岸關係邁向良性發展時的基石。台灣的軍事力量是防衛性質的，無意與中國進行盲目的軍備競賽。然而，面對中國不斷擴充軍力，對台軍事準備未曾減緩，台灣必須要有更為堅強的國防力量來嚇阻中國以非和平的方式來解決兩岸的爭議，讓我們更有信心地拓展兩岸關係。

建立台灣自我防衛的決心不應只是口號一句，我們應當充分瞭解：台灣的自由與民主得來不易、守成維艱，只有勇於扛起國防的責任與負擔，我們與我們的子孫未來才能繼續享有自由與民主的幸福果實。面對未來十年台灣國防將要面對的險峻威脅，我們應當揚棄失敗主義的心態，時間永遠站在願意努力的一方，台灣有一流的人才與創新的科技研發能力，這些是台灣國防最根本的能力。政府應當儘快改善目前國防預算不足的現象，以吸引人才並發揮科技研發潛能。在此，本人重申：我國的國防預算應儘速恢復到 GDP 3%的水準。

建立台灣自我防衛的能力不應只是標語一堆，我們應當充分瞭解：中國對台軍事威脅不僅加大，而且也有性質上的轉變。台灣必須迅速調整國防戰略、軍事戰略與作戰構想，摒除軍種本位思考，有效運用國防資源，才能發展出因應的戰力，來降低中國對台的軍事威脅。台灣的國防必須以台灣為本體來思考，從島嶼的天候地理條件、政經社會發

展的條件、解放軍對台威脅的趨勢與台灣於維護區域安全上應盡的責任，找出「具台灣特色的國防建設」路徑。根據以上的綜合考量，本人認為：無論是「有效嚇阻」還是「防衛固守」，未來台灣應以建立完善下列三項戰力為首要：

（一）強化保障數位國土的能力：台灣是個高度資訊化的社會，數位國土攸關社會的生存與發展。面對來自中國不斷侵擾的資訊威脅，台灣必須強化現有國家整體資訊安全防護機制，推動關鍵基礎設施實體與資安防護的立法，扶植國內自主的資安產業，培育資安人才。國防之目的既在「協助災害防救，達成保衛國家與人民安全及維護世界和平。」國軍當有保障與防衛數位國土的責任，不能置身事外，現有資電作戰指揮部的位階應予提昇，以多元吸納資訊戰人才，發展資訊戰的不對稱戰法與戰具，以強化國防的前線。

國軍負有保障與防衛數位國土的責任，現有資電作戰指揮部的位階應予提高。

（二）加速潛艦國造：解放軍在導彈、制空與制海戰力的持續增強，台灣海疆安全在未來將面臨極為險峻的威脅。海防是台灣防衛的最後一道防線；海防若失，台灣防衛無險可守。面對解放軍水面、水下與海航戰力的全面領先，我國海軍必須重新檢視未來建軍的重點，除快速、匿蹤、打擊力強的飛彈快艇部隊外，潛艦是阻卻解放軍渡海犯台的重點戰具，而國造已

要更積極推動潛艦國造，「二階段潛艦國造」的構想，在保全海軍水下兵力的同時，啟動長期程的潛艦設計研發、裝備取得、測試運作、改良精進的發展循環。

是我國獲得潛艦的唯一選擇。潛艦國造應立即並更積極地推動。本人主張「二階段潛艦國造」的構想，一方面保全海軍水下兵力完整；同時，啟動長期程的潛艦構型設計研發、關鍵裝備取得、測試運作與改良精進的發展循環，維持潛艦研發動能，提昇潛艦自製裝備比例，累積潛艦製造人員與技術質量，強化海軍洋面拒止的戰力。

（三）轉型制空戰力：面對解放軍高密度、精準的導彈或戰轟機威脅，我國的制空戰力必須要轉向低度依賴基地跑道與後勤設施、低人員傷亡風險的多元戰具發展。除持續推動現有 F-16 與 IDF 機隊升級、積極對外籌獲先進戰鬥機外，先進長程無人攻擊載具應列為自主研製的重點，以爭取在解放軍奇襲下主戰機隊恢復戰力所需的時間縱深。並應同時啟動下代戰機與精進遠距打擊彈藥之中長期的研發計畫，以發展短場起降或垂直起降的先進戰鬥機，精進現有遠距打擊武器之精準度。

先進長程無人攻擊載具應列為自主研製的重點，並應同時啟動下代戰機與精進遠距打擊彈藥之中長期的研發計畫。

本人在《民進黨的國防議題》中已很明確地指出：「必須以經濟建構國防，以國防支援經濟。扶植民間產業投入國防武器裝備的研發與產製，鼓勵外商與國內業界合作，並置重點於下一代戰機與無人戰鬥載具的研製、潛艦國造、不對稱武器的研製與資訊攻防能量。」民主進步黨要成為國防產業帶動國防建設的支點。各國國防建設的實例告訴我們，如果沒有自主的國防產業支持，戰力是假的，沒有發展性的，與經濟發展是零和的。而未來推動「具台灣特色的國防建設」須務實地掌握未來中國對台軍事威脅的趨

勢，以國內各地的實驗室、工廠為起點。

未來的國防安全情勢縱然險峻，但民主進步黨將會更加努力地保護並維持台灣人民自由民主的生活方式，善盡推動國防建設的責任。貞昌個人相信、民主進步黨也相信、部隊裡的飛行員、艦長與指揮官們也相信、辦公室裡的專案管理人與分析師們也相信、廠房裡的經理人、工程師與技工們也都相信：我們能、台灣也能從最險峻的環境中找到出路、打開活路。

新境界文教基金會　董事長

摘要

中國在整體國力提昇後，加緊軍力擴張的腳步，建置遠距投射戰力，持續加強對台軍事準備，不戰而屈人之兵、以武促談、以武促統的策略未有改變，且隨著台海軍力失衡日益擴大，形成絕對軍力優勢，中國對以戰逼降的信心將大為增加。此一態勢無助於兩岸人民和平共存，也造成區域安全的緊張。

中國解放軍繼於 2007 年達成建置對台應急作戰能力、2010 年質量超越我國國軍之後，將持續邁向於 2020 年具備對台大規模作戰的決勝能力。中國軍事科技的研發，在北京的決心與人物力龐大資源的帶動下，已逐漸成熟，未來十年解放軍戰力的世代躍進將使得武器裝備性能大幅超越我國，對台灣的安全形成明顯且險峻的威脅，這些威脅包括：

（一）中國以網路戰對我數位國土的襲擾，將對台灣社會活動與政府運作形成威脅，可能對關鍵基礎設施造成實體性的破壞，造成生命財產的損失；

（二）中國對台導彈的數量成長雖會漸趨減緩，但在新型彈種的服役、精準度的強化與彈頭的多元化後，導彈戰力將不減反增，仍為解放軍遂行武力恫嚇或取得犯台速勝決勝的第一擊主力；

（三）解放軍長程防空飛彈射程已將台灣壓縮入其實質防空識別區內，2020 年代解放軍第五代戰機服役後，中國在制空戰力上明顯超越我國，國土制空將岌岌可危，將使我國軍事戰略中的有效嚇阻無法奏效、防衛固守難以持久；

（四）解放軍海軍已逐漸轉型為由現代化水面、水下與海航載具所組成的均衡艦隊，足以壓制台灣、對抗日本、挑戰美國，台灣的制海將難以維持。

民主進步黨向來主張台灣的強固國防為兩岸和平共存、保障台灣人民自由民主的生活方式所不可或缺。面對台灣國防未來十年險峻的情勢，尤應對解放軍對台軍事威脅有清楚的認識與持續的關注，並喚醒國民國防意識，積極推動國防建設。並根據中國對台軍事威脅的演變，調整建軍方向與防衛構想，積極強化國防科技與武器裝備的自主研製，以嚇阻中國的軍事冒進，持續朝向建立一個「軍人有信心、民眾能信賴、友邦可信任」的願景邁進。

壹、背景

中國一直不願放棄以武力犯台，且持續擴張軍備、加強對台軍事作戰之準備，嚴重威脅台灣的生存與發展。為維護台灣的國家安全，規劃適切的因應措施，民主進步黨對於中國對台的軍事威脅向來以審慎的態度持續保持關注，並不定期由中央黨部中國事務部提出相關的研析報告。自本黨中國事務部於 2004 年 1 月所提出的《中共軍力基本報告 2003》以來，十年間國際與兩岸關係局勢歷經曲折轉變，但不變的是：中國軍力持續擴張，對台威脅日增，兩岸軍力差距並在近幾年內急速拉大。作為對台灣國家安全負責任的政黨，並為日後重返執政先行準備，經蘇貞昌主席責成由黨部智庫（新境界文教基金會）國防政策諮詢小組針對中國對台軍事威脅進行相關的研析。基於國防建設非一時可及，實須長期程的威脅評估為先行基礎，故本次對於中國軍力之評估，一改往年以現時為評估基準，而著眼以十年為期，並聚焦預判 2025 年時中國對台軍事威脅，以用作為後續國防政策規劃所本。同時，遵《民進黨的國防議題》（國防政策藍皮書第一號報告，2013 年 6 月發佈）中所揭櫫的「多元參與」之國防治理原則，強調「只有跨軍文、跨部門、跨領域、跨國界的協調整合，才足以因應日趨複雜的國防議題」，民進黨打開大門，引進國內外各領域專家意見，在研析過程中，計有國內 17 位在軍事、資安、科技與歷史等不同領域軍文背景學者專家參與，3 位來自美國的專家提供他們寶貴的意見。

2013 年 11 月 23 日，中國宣布劃設「東海防空識別區」，嚴重衝擊我國國防安全，面對中國的強勢進逼與國民黨政府的虛弱反應，蘇主席復於 11 月 27 日本黨中常會中指示：基於中國軍事威脅力度日增，原規劃於 2014 年年中提出之《二〇二五年中國對台軍事威脅》（以下簡稱本報告）應加速於三個月內完成。本報告於 2014 年 2 月間完成初稿，並經國防政策諮詢小組會同中央黨部政策會、中國事務部與國際事務部審閱通過，分機敏與公開兩版本，後者對外公佈。

貳、中國對台「剿撫兼施」的軍事戰略構想

中國無視於我主權獨立之現實，持續建立跨海犯台的軍力。近年來，儘管兩岸關係表面上有所緩和，但中國並未放棄武力犯台，仍積

極進行針對性的軍事準備。我國防部在《2013 年國防報告書》再度重申：「中共對台『以武促統』思維與軍事準備，並未隨著兩岸關係改善而有所調整。」現階段中國對台軍事戰略與 17 世紀清朝康熙時期所採的「剿撫兼施」相似，對台軍事準備充分結合政治謀略與經濟吸納。一方面利用台灣政府過度傾中的政策，以「心理戰」、「法律戰」、「輿論戰」等三戰方法，營造兩岸關係和平發展的假象，模糊台灣軍民敵我意識，以瓦解台灣自我防衛之意志，逐步改變台海現狀，進而將台灣引入「一個中國框架」中，達成「不戰而屈人之兵」的效果。另一方面，則更積極從事軍事現代化，強化犯台戰力。一旦中國對台軍事準備完全就緒，對台形成軍事上絕對優勢，而台灣若再拒絕接受中國所提「易幟統一」的條件，則自「以武促談」、「以武促統」斷然採取「以戰逼降」。

中國整體國力提昇，意圖建構與美國平起平坐的大國關係，增加對亞太區域事務的影響力，進而與美國「共管」太平洋。為達成此一「中國夢」的想像，中國除持續「富國」的經濟發展，並加緊「強兵」的軍事建設。指標之一就是中國持續攀升的國防預算。據美

鄭氏政權的無條件投降

中國清朝採取剿撫兼施以攻略在台的鄭氏政權，自 1662 年起與鄭氏政權進行十次的政治性談判，清朝的主要堅持是台灣人必須「剃髮」以彰顯中國對台主權，至於鄭氏政權歸順後其他治權（如繼續治理、維持軍隊等）問題可以妥協；而鄭氏政權則堅持特殊的國與國關係，依朝鮮例，對中國稱臣納貢，但不剃髮，且清兵不登岸。

清朝初因軍事準備不足，只得與鄭氏政權持續周旋談判。但隨著政權穩定、經濟發展後，戰略焦點轉向台灣。除加大對鄭氏政權的經濟封鎖之外，破格任用降將，並由降將姚啟聖於福建設「修來館」，對鄭氏軍隊進行統戰，擴大吸收鄭軍官兵。1683 年，鄭氏政權內部長期惡鬥虛耗，而清軍跨海攻台之戰力就緒，由降將施琅率軍攻台。6 月，清、鄭海軍於澎湖水域決戰，鄭軍大敗。台灣軍民人心大亂、施琅發動以戰逼降，再起談判。鄭氏政權提出接受剃髮但保留部分治權的「留居台灣」，遭清朝拒絕。7 月，鄭氏政權只得同意無條件投降。

中國軍方自 1990 年代起，開始系統性地研究清朝康熙對台的攻略（任力所著《康熙統一台灣始末》為代表作之一），1996 年台灣總統大選期間，更配合對台軍事演習，對內部進行康熙剿撫兼施策略的政治宣導。規模之大，引起我方關注。1997 年，時任參謀總長羅本立上將命令軍事情報局進行相關歷史研究，以為反制。■

國國防部的《2013 年中華人民共和國軍事與安全發展》報告中指出，2012 年中國國防預算（官方數字）為 1,067 億美金，為同年度俄羅斯的 1.74 倍、日本的 1.84 倍、印度的 2.51 倍、南韓的 3.65 倍與我國的 9.88 倍；過去十年間（2004 至 2013 年）中國國防預算年增率平均為 14.3%。且由於中國的國防科技研發、武器採購與銷售與武警部隊經費等均未列入其官方的國防預算中，依我國國防部之評估，中國實際國防軍費應為官方數字的 2 至 3 倍。

中國國防預算的增加用以支撐其建立遠距投射的戰力、界定與保衛其核心利益與爭取大國的地位。以解放軍海軍發展遠距投射戰力的三步論規劃為例，即 2010 年起發展航空母艦及中遠程導彈能力，鞏固第一島鏈內水域的防禦、2020 年起將防禦範圍擴大至第一島鏈與第二島鏈間水域、2025 年以航空母艦為核心，與美國爭奪制海權。當中國的遠距投射戰力越為完備，其對外政策越趨強勢，越不惜以武力來展示其決心。2010 年起，中國在釣魚台列嶼與南海的領土爭議上，擺出劍拔弩張的態勢。更在 2013 年藉劃設東海防空識別區，宣示中國在第一島鏈內北區海空域的勢力範圍。

中國的軍力擴張遠遠超出其對台軍事作戰所需，非以對台為唯一目標。但中國要建立可信的遠距投射戰力、真正跨出第一島鏈的地理限制，而成為可與美國平起平坐的太平洋兩大強權，則非有台灣不可。地處第一島鏈樞紐的台灣，對於中國不僅具有「領土完整」、「民族統一」等意義外，中國更具有將台灣納為在太平洋的基地之戰略利益。中國人民解放軍少將（退役）彭光謙明白指出：「台灣……是我國跨越西太平洋第一島鏈走向太平洋的戰略突破點，是集攻防於一體的我國戰略要地與海防屏障。如果台灣從中國版圖分裂出去，不僅我海上固有的戰略防禦縱深頓失，……我將永遠被封閉在西太平洋第一島鏈以西。」因此，台灣是中國軍力擴張的首要與主要目標，且隨著中國國力越為發展，台灣對於中國的戰略重要性將越形提高，中國對台的野心與迫切感也將越趨明顯。基於此一考量，中國共產黨中央軍委會軍職成員中具有台海當面歷練之比例在 2007、2012 年均保持在 30%的高比例。

早在民進黨執政期間，國家安全會議發佈的《2006 年國家安全報

告：2008 年修訂版》中即針對中國對台軍事威脅提出具體警訊：自 2005 年中國制訂《反分裂國家法》後，據時任中國國家主席胡錦濤的對台軍事準備指導，解放軍「要確保 2007 年前形成應急作戰能力，……具警示性火力打擊的能力。未來更企圖於 2010 年達成『質量超越台軍』的目標，形成對台大規模聯合火力打擊與重點海空封鎖能力，並在 2020 年具備『大規模對台作戰的決勝能力』（我國防部於《2013 年國防報告書》稱此一能力為「對台全面性作戰能力」）。」2008 年後，中國對台軍事準備的步伐並未有所放慢，反而因為中國國防軍事科技的加速發展，許多主要武器裝備的發展獲得突破，應已達成在 2010 年「質量超越台軍」的目標。現任中國國家主席習近平承襲胡錦濤的對台軍事準備期程，於 2013 年指示解放軍加快推進國防和軍隊現代化，以達成「遠戰速勝、首戰決勝」的既定目標，顯示出解放軍邁向 2020 年達成「大規模對台作戰的決勝能力」的決心並未改變。

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中國的軍事戰略雖仍沿襲「積極防禦」的構想，強調戰略防禦，不輕易挑動戰端；但隨著遠距投射戰力的逐漸成形到位，此一構想在作戰層面有了新的詮釋：揚棄了過去誘敵深入的國土守勢作戰，而朝向建立外向作戰縱深，一旦決心動武，則採主動、積極、全面的戰術作為，以打贏「信息化條件下局部戰爭」為作戰目標，選擇於有利時機、利用軟硬殺戰具、於國境之外打擊敵軍野戰主力與指管後勤設施，以阻止敵軍主力突入其勢力範圍內，進而威脅到其本土。此一作戰概念，被稱之為「反介入與區域拒止」，本質上是攻勢性的空海作戰。一般認為中國遂行反介入與區域拒止所須的戰略縱深約當在國境以外 300 至 500 公里，而解放軍鷹派代表人物空軍上校（退役）戴旭則在最近更具野心地指出：為能直接打擊在關島的美國駐軍，中國需要 3000 公里遠的戰略縱深。

中國反介入與區域拒止戰力的建構有利於克服解放軍對台軍事行動的兩大障礙：台灣的自我防衛與美國基於「台灣關係法」馳援台灣。在平時，解放軍以主戰載台的作戰半徑與武器射程涵括台灣，使台灣戰機起飛與戰艦出港後即進入其監控與打擊範圍內，藉有效掌控

台灣周邊海空域，使台海內海化。解放軍在此區域內的海空偵巡將進一步地頻密化、常態化，以確立其專屬的勢力範圍，將台灣全境與其周邊區域壓縮為其實質上的「防空識別區」。一旦中國恫嚇或進犯台灣時，解放軍的反介入與區域拒止戰力將可大幅地增加美軍進入台海周邊區域的傷亡風險，造成美方決策的延宕與增加美軍馳援兵力抵達的難度，從而延展可專心對付台灣抗拒所須的時間，以爭取其恫嚇與進犯台灣的勝算。

參、中國軍事科技研發所帶動的戰力「世代躍進」

國防軍事科技是國家整體科技發展的一環，與國家科技水準與研發努力息息相關。隨著整體國力的成長，中國投入基礎與前瞻科技研究、軍事科技研發與武器裝備產製的人物力資源日增，同時，藉逆向工程、技術竊取、合作研製、軍民通用等多重方法，深化基礎與前瞻科技研究，以突破軍事科技研發瓶頸，加速先進武器裝備的自主開發與產製，以「探索一批、預研一批、建設一批、運行一批」的併進式發展，同時進行不同世代武器裝備的研究、測試、產製與後續改良升級，積極進行戰力的世代躍進。

解放軍以「探索一批、預研一批、建設一批、運行一批」的併進式發展，同時進行不同世代武器裝備的研究、測試、產製與後續改良升級，積極進行戰力的世代躍進。

中國在 1990 年代從俄羅斯引進基洛級柴電潛艦、現代級驅逐艦、SU-27 型戰鬥機、SU-30 型戰鬥機等現代化海空主戰載台後，戰力獲得大幅提升。在此基礎上，中國展開大規模的現代化武器裝備研製。雖然在關鍵技術與組件（如戰機、艦艇的發動機與雷達系統）上曾遭遇到相當的瓶頸。但中國除過渡性地藉持續向俄羅斯引進更為新式的武器裝備，以拉近與美軍先進武器裝備間的戰力差距外，更重要的是，加速推動軍事科技研發，試圖突破現有瓶頸，逐漸從外購、仿製邁向創新、自主。根據美國學者 Andrew Erickson 及 Gabe Collins 的推估，中國整體造艦能力可能在 2020 年達到俄羅斯 2013 年的技術水準，並在 2030 年達到美國 2013 年的技術水準。本報告認為：中國的整體軍事科技研發與武器產製在 2000 年代逐漸展現成果，預期在 2010 年代逐漸成熟，可能在 2020 年代拉近與美軍間的差距到 10 年左右。

中國的基礎與前瞻科技研究、軍事科技研發與武器裝備產製均有國家整體的規劃、動員與支持，並充分結合民間資源。由「國民經濟和社會發展五年規劃」指導中國基礎與前瞻科技研究，並帶動後續的軍事科技研發與武器裝備產製。中國第十一個國民經濟和社會發展五年規劃（簡稱「十一五規劃」，期程為 2006 至 2010 年）特別強調將科技研發成果轉為軍用，建立軍民用融合的國防產業發展策略。2006 年，中國國務院公佈了《國家中長期科學和技術發展規劃綱要（2006 至 2020 年）》，指出中國政府將積極參與並資助五項具有軍用潛能的基礎與前瞻科技研究領域（包括：材料設計及準備、在極端環境條件下的製造業、航空、航太機械與資訊技術研發）。胡錦濤並在 2007 年的中共第十七次全國代表大會報告中特別指出，中國必須建立和完善「軍民結合、寓軍於民的武器裝備科研生產體系」；並做出「調整改革國防科技工業體制和武器裝備採購體制，提高武器裝備研製的自主創新能力和品質效益」之決議。2008 年，中國進行軍事科技研發組織的改編。裁撤國防科學技術工業委員會，而由工業與信息化部下之國防科技工業局取而代之，意在吸引民間資金與技術參與軍事科技研發與武器裝備產製。同時，擴大與重整國營軍工集團，以增加其競爭力。在十一五規劃期間內，中國在航太系統、資訊系統、水下系統等軍事科技領域取得了相當的自製成果。

在十一五規劃（2006 至 2010 年）期間內，中國的天河一號超級電腦開始運作，北斗導航衛星已具區域導航功能，地面解析度 5 公尺的尖兵 5 號全天候偵察衛星、戰術通訊功能的烽火衛星、電子偵察功能的雷電衛星、具彈道飛彈預警與戰略通訊功能的神通衛星與通訊中繼衛星天鏈衛星相繼服役，大大改善其資電偵蒐能力。長劍 10 型陸基長程巡弋飛彈的服役增加了解放軍遠距對地精準打擊能力，而東風 31A 型洲際彈道飛彈與巨浪 2 型潛射彈道飛彈的相繼服役提高了中國的核子嚇阻的可信度。十一五規劃期間是解放軍海空載台發展的高峰期。在戰轟機與防空武器方面，主力的殲 8 型戰鬥機、剛服役的殲 10 型戰鬥機與殲 11 型戰鬥機（俄製 SU-27 型戰鬥機的授權自製）以及轟 6 型轟炸機（仿自俄製 TU-16 轟炸機）均進行火控系統、雷達系統、發動機或電戰系統的升級，空警 200 型與空警 2000 型預警機也相繼服役，解放軍空軍的制空戰力逐漸提昇並追及我國。紅旗 12 型

防空飛彈服役，現役中的紅旗 9 型陸基防空飛彈（仿自俄製 S-300 型防空飛彈）進行升級並發展出海紅旗 9 型艦載防空飛彈。解放軍海軍水面與水下戰力也全面性升級，剛服役的 052C（蘭州）級驅逐艦進行改良，051C（旅州）級驅逐艦、054A（江凱 II）級護衛艦、022 級匿蹤飛彈快艇與 071（玉昭）級船塢登陸艦相繼服役。039A（元）級柴電潛艦、093（商）級核動力攻擊潛艦與 094（晉）級核動力彈道飛彈潛艦也相繼服役。同時，此一期間內，解放軍持續進行反衛星導彈與東風 41 型洲際彈道飛彈的研發與測試，也進行了殲 15 型艦載戰鬥機（仿自俄製 SU-33 型戰鬥機）、殲 16 型戰鬥機（仿自俄製 SU-30 型戰鬥機）與翼龍無人攻擊機的測試。第一艘航空母艦進行改造，並進行 726（玉義）級中型登陸氣墊艇的測試。而殲 20 型戰鬥機與 095 級核動力攻擊潛艦的研發也在此一期間啟動。

受益於中國迅速擴大的經濟規模、科技發展的成果與國防科研的體制改革，中國的國防周邊產業在此一期程內也取得重大進展，例如：具解放軍色彩的華為技術有限公司，於 1987 年成立，在 2013 年的營業額即超越了百年老廠瑞典的易利信集團，成為世界第一大電信裝置製造商。華為公司也因其具有解放軍背景，被美國在內等多國認為具有國家安全顧慮，而限制其營運或銷售。同時，中國也已在科技研究上累積相當的人物力基礎，自 1998 年到 2012 年間，中國科研投資總額的成長將近三倍，在 2012 年，中國在科技研發上的投資僅次於美國。中國研究人員總人數（2012 年約有 926,000 位）也僅居美國之後，在 2010 年中國的工程學博士的數量已超過美國。許多跨國公司在中國建立了研究中心，藉由合作研發，引進先進科技，大大提昇中國整體科研水準。

2011 年至 2015 年是中國第十二個五年規劃（十二五規劃）的期程。除胡錦濤於 2012 年的中共第十八次全國代表大會報告再度重申「著力提高國防科技工業自主創新能力」外，中國國務院也於 2013 年發佈《國家重大科技基礎設施建設中長期規劃（2012-2030 年）》作為實踐十二五規劃的具體方案。在十二五規劃的十六項優先發展之基礎與前瞻科技研究中，不乏明顯具軍事科技研發與武器裝備產製潛能的項目，如：可用以改善反潛與水下戰具的海底長期科學觀測網、能強化資訊作戰能力的未來網路試驗設施與有助於突破大型軍用機研

發瓶頸的大型低速風洞等等。在十二五規劃期程內，預期中國可在航太系統、資訊系統、水下系統等軍事科技領域持續取得進展，並逐漸建立以下四項發展特色：（一）配合其軍事戰略發展遠距投射戰力，軍事科技研發既沿著空天向「高」擴展，也通過海洋向「遠」拓展，置重點於空天、水面與水下以及資電相關的武器裝備。（二）朝向大型化與匿蹤化的載台或無人載具、精準化的武器、數位化的指管系統等趨勢發展。（三）為了逐漸拉近美中之間的軍力差距，中國在軍事科技研發上，緊跟美國的步伐與方向，防止美國在關鍵性武器裝備研發取得明顯領先。（四）中國的軍事科技研發越為發展，其外購更先進武器裝備的阻力越小，俟獲得外購武器裝備後，經由逆向工程或合作研製，更加厚實中國軍事科技研發水準，也更加速戰力的世代躍進循環。在十二五規劃期間內，中國已或計畫自俄羅斯再度獲得或合作生產更為先進的武器裝備，包括 SU-35 型戰鬥機、LADA（拉達）級傳統潛艦、S-400 型防空飛彈等等，中國也力求歐盟國家解除對中的武器禁售，並與美國公司進行可用作軍用的大型機發動機之研發。

在十二五規劃期間（2010 至 2015 年）內，中國在現役主戰裝備的現代化已獲得鞏固之後，開始進行戰力躍向下個世代的準備。在資電偵蒐設備方面，更新的天河二號超級電腦已運作。全國性的衛星地面站的建成，各款軍用衛星的升級版相繼服役，地面解析度更精細的尖兵 10 號偵察衛星也將會服役。長劍 20 型（或稱空地 20 型，是長劍 10 型的空射型）長程巡弋飛彈將會服役，搭掛於轟 6 轟炸機上，構成遠距精準打擊戰力。東風 16 型與東風 15C 型短程彈道飛彈服役，前者射程遠並可能具有多彈頭，後者則強化彈頭性能可對我地下指管設施構成威脅。被稱為「航空母艦殺手」的東風 21D 型中程反艦彈道飛彈是中國反介入與區域拒止戰力的重要武器，儘管外界仍質疑此彈對於水上移動目標的精準打擊能力，解放軍採取先行服役部署並測試改進。各型戰機（殲 8 型戰鬥機、殲 10 型戰鬥機、殲 11 型戰鬥機、轟 6 型轟炸機）的升級或換裝完成、殲 16 型戰鬥機與翼龍無人攻擊機服役，已成功測試的殲 15 型艦載戰鬥機也將會隨著中國第一艘航空母艦遼寧號一起服役。056（江道）級護衛艦服役、現役的 039A（元）級柴電潛艦正進行船殼換裝，而 095（隋）級核動力攻擊潛艦可能在 2015 年前服役。此一期間，下一世代的海空主戰載台將紛紛進入測試階段，殲 20 型戰鬥機、殲 31 型戰鬥機、翔龍無人機、利劍無人隱形

攻擊系統與運 20 運輸機均相繼進行測試。052D（旅洋 III）級驅逐艦、中俄合作研製的拉達級柴電潛艦與 096（唐）級核動力彈道飛彈潛艦也正進行測評中。東風 12 型短程彈道飛彈與反衛星導彈的測試持續進行中。中國也啟動了可遂行全球打擊並突破防空系統的高超音速（10 馬赫）跨大氣層飛行器、戰鬥用機器人的研究。海軍方面也正進行第二與三艘航空母艦、055 級驅逐艦、054 B 級護衛艦、081 級兩棲攻擊艦與 097（秦）級核動力攻擊潛艦的設計與興建。

依解放軍戰力世代躍進的模式，在 2025 年（即十四五規劃期終），目前正在十二五規劃中進行測試階段的大部分項目與研究階段的部分項目應可進入產製階段，預判下列武器裝備將可服役：新一代超級電腦、已具全球導航功能且定位精度在 10 公尺內的北斗導航衛星系統、反衛星導彈、東風 41 型洲際彈道飛彈、東風 12 型短程彈道飛彈、殲 20 型戰鬥機、翔龍無人機、利劍無人隱形攻擊系統、運 20 運輸機、包括遼寧號在內的三艘航空母艦、081 級兩棲攻擊艦、052D 級、055 級兩款驅逐艦、054B 級護衛艦、拉達級傳統潛艦、096（唐）級核動力彈道飛彈潛艦、097（秦）級核動力攻擊潛艦等。殲 31 型戰鬥機則將可能量產輸出。

在 2025 年，當中國的自主武器裝備產製已接近美軍水準，輔以自外國持續獲得的先進武器裝備，將會大幅提昇解放軍在資通偵蒐、導彈打擊、爭取制空、爭取制海等四項犯台的關鍵性戰力，以達成具備在 2020 年大規模對台作戰的決勝能力之目標。

肆、解放軍在對台資通偵蒐戰力的強化

資訊與通訊為國家與軍隊的神經系統。在軍事層面，資通訊措施自古以來就是軍隊得以發揮團隊戰力所必須，常有決定戰局成敗的效果。在「網絡化戰爭型態」的時代，現代化軍隊的行動與武器裝備更是高度依賴資通訊系統，資通訊能力是軍事重要資產，掌握優勢可以形成戰力倍增效果，自然也是敵方優先打擊的目標。資通訊能力也可成為武器，藉由資通訊攻擊可以癱瘓、干擾、減效與混淆敵方資通效能，達成遲滯、分散、誤導與減耗敵方戰力的「軟殺」效果。在國家層次，資通訊設施攸關政府的運作，更是社會功能的重要媒介，為民

生活動所必須。在一個像台灣一般的高度資訊化國家中，資通訊互動所形成的網路空間如同「數位國土」，與政府機構、民間部門乃至每個人的日常活動息息相關，一旦受到襲擾，輕則將對個人權益、企業營運與政府服務造成影響，重則將會癱瘓金融、醫療、交通、電力等諸多關鍵基礎設施的正常運作，甚至引發實體性的破壞，造成財產甚至生命的損害。在資訊化時代，國家的生存與發展仰賴安全穩定的數位國土，政府各部會（包括軍隊）應共同擔負保障數位國土的責任。

解放軍對台的網路威脅

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中國在接下來十年對世界的影響可能比任何國家都要來得大，依據美國情報會議的評估，如果當前的趨勢持續保持下去，中國的經濟體在 2022 年將會成為全球第二大（以購買力平價為計算方式）。這個預測顯示了中國經濟的崛起與未來全球權力轉移，而依據台灣軍方的估計，中國可能在 2020 年就能具有以武力併吞台灣的能力。根據多方的估計，中國的年度軍事支出已達到 1850 億美元（以 2001 年美元匯率計），且將會在 2025 年超越美國的國防預算。為了在軍事和軍民通用的科技產業達於世界頂級水準，北京投注大量的資源在國防產業上，希望發展出更高科技的軍事能力來支持其核心任務。依據美國國防部東亞事務副助理部長何大維說法：「中國不但正在增強防護他們自己網路的技術，同時也在尋找以網路發動攻勢的途徑。」

隨著資訊科技和電腦計算能力的持續增進，網際網路已成為一個不斷改變和革新的領域。對網際網路的控制能力可以在軍事上強化對陸地、空中、海上、乃至太空的襲擾能力，而中國的政軍領導人正朝著整合軍文部門的關鍵網路能量來強化此一能力。解放軍目前投注相當龐大的資源在進行犯台與相關想定的計畫與演訓。由於無法在政治上取得共識，台灣在未來仍然會是解放軍主要的作戰目標和演訓重點。在這樣的情況下，網路領域將越來越有可能成為解放軍威懾台灣時的關鍵節點，隨著中國在資訊戰上投注越來越多的資源和訓練，此一威脅將有增無減。

對於未來威脅的預估多屬推測。但是，中國一直拒絕放棄對台動武並持續擴張軍備，北京也一直以武力來迫使台灣接受其統一的條件或以武力設定兩岸和解的底線。隨著解放軍軍事能力的增強與中國在國際上越加強勢的態度，北京顯然越來越會以軍事力量來進一步鞏固其領土和主權的主張，這意味著解放軍將會運用其不斷增強的網路襲擾能力對付台灣與其他國家。由於網際網路在各方面的運

用越來越廣泛，包括國際金融的安全交易、保障基礎設施運作乃至於主要軍事行動都須依靠網路，假設當前兩岸間既有的經濟、政治與安全情勢不變，兩岸軍力有利於中國的失衡現象將持續或甚至擴大，北京很可能挾網路戰的優勢來逼迫台灣在政治上做出妥協。到了 2025 年兩岸對於網路領域的爭奪將會愈趨白熱化，三項徵兆顯示解放軍的資訊戰能力到那時將會對台灣構成莫大的威脅。

首先是，中國許多國營的資通訊科技產業將會在研發和創新上成為全球的主要龍頭，這也會使解放軍在資通訊科技的產品供應鏈上有越來越廣泛的控制。隨著中國政府積極擴張其軍事和軍民兩用科技產業，這些與解放軍有密切關係的國營企業將會加速整合，以獲得越來越高的市場占有率。隨著這種趨勢發展，在中國營運的台灣資訊公司將會逐漸失去競爭優勢，並被中國國營企業排擠或併吞，最後落入中國政府的控制中。中國一直嘗試著擺脫網際網路現有的通用規範，持續投資研發以期能夠取代現有規範的架構，很可能在為來十年內能在這方面有所突破。中國在資安產業預估即將有龐大的擴張，估計將從 2011 年的 18 億美元成長到 2020 年的 50 億美元，達到 44.7%的年均複合增長率。透過網路法規對於科技產業的嚴密控制，中國政府也可以要求在中投資的台灣科技產業生產或出口符合其規範（如 WAPI）的零件，否則便阻撓他們在中國的生產營運。這會使得台灣與國際市場更容易受到來自中國網路戰的惡意攻擊和入侵。另外，中國的教育體制也會產出在數量上遠遠超越台灣的資訊科系專長人才（美國政府的一份研究預估到 2025 年中國每年會產出 8,500 名博士），這些科技人才都會成為解放軍資訊戰的主要人力來源。

其次，解放軍在眾多電腦網路科技領域上的進展將會加大其對台武力恫嚇威脅。中國在資訊戰上的發展已經引起世界各國的關切。未來解放軍可能擴張他們的攻擊目標，從電腦網路的入侵與直接攻擊都包含在內。此外，解放軍傳統上以敵國政府網路為主要目標，但近年來，解放軍也開始注重對於敵國民間智庫、通信業者、網路機房、交通基礎設施控制系統的攻擊。中國在量子電腦科技上的發展和其軍事用途會使得解放軍有突破敵方複雜加密系統的能力。舉例來說，目前中國正在進行的量子電腦加解密研究，有可能在未來十年內有重大突破，進而對台灣許多國安相關的加密系統構成威脅。未來的資訊戰威脅將是多領域的，中國可以同時運用諸多手段（例如社交工程網路、惡意內部員工、供應鏈控制等）構成多重層次的資訊戰能力，無論在涵蓋面、滲透程度、和機敏性上都可以取得更高的成效。解放軍可以攻擊敵方的基礎民生設施（如能源、水力供應、石油等）或基礎產業設施（金融業、運輸業、通信業）或其他的指揮、管制、情報、監視、偵察系統。解放軍也可以直接攻擊敵方的重要作戰系統，例如敵方的軍用電腦系統，以此癱瘓敵方空中、太空乃至網路的通信網路。另外，解放軍也可以在台灣的網路系統中散播長期的、難以發現的潛在弱點或威脅來源，在戰時才加以運用。

藉由網路的間諜戰、反向工程 Stuxnet 和 Flame 等惡意軟體獲得的技術，中國的駭客將能在政府的支持下有突破性的進展，甚至能夠開發出更具破壞力的惡意軟體來侵犯具有安全破綻的網路系統並偷取資料、破壞他國政府和軍方的電腦

系統及民間基礎設施。若是兩岸間網路戰的戰力差距持續擴大，解放軍對台構成的武力恫嚇威脅也會隨之增大。舉例來說，解放軍文獻提及以「資訊封鎖」對敵作戰的可能性，將這種作戰稱為「有系統的阻止敵方進行資訊的收集和交換」。解放軍文獻也提到在未來台灣發生戰爭時，如何對付美軍的後勤補給、指揮和管制、以及其他情報、監視、偵察設施，藉此強化中國整體反介入區域拒止的能力。

最後，在戰略層面上，要因應中國，台灣所將面臨的是越來越困難的權衡。對台灣而言，中國是頭號的軍事威脅來源，但中國同時也是世界上的科技產業關鍵點。因為中國既是台灣首要貿易伙伴，也聲稱對台擁有主權，兩岸戰略層次的互動，使得許多台灣在科技上可以用以反擊中國的手段派不上用場。當中國持續推動國家創新能力並將台灣吸納進去時，這種趨勢會持續到 2025 年。隨著中國逐漸從科技產業的加工出口國轉變為具有生產創新能力的國家，台灣在科技上領先中國的優勢也必然會逐漸減少。

解放軍若要對台灣發動大規模的傳統軍事入侵，過程中不可避免地會讓對方掌握到部分用以預警的情報和線索。然而，若是解放軍發動協調性的網路攻擊，這種攻勢將會是即時性的、非常難以預料的，而且也很難以反制。現代化產業、政府和軍方（包括其軍事行動）高度依賴資訊與電腦科技以遂行其主要功能，一次成功的、有系統性的、經過嚴密計畫的網路攻擊可在軍隊真正調動前，便改變了戰略與戰術態勢。也因為雙方都認知到了這點，台灣和中國都注意到資訊戰的研發以取得網路空間的優勢，但長期的趨勢顯然對於中國是有利的。建軍受制於有限的資源，也因此決策者必須在國防投資的優先順序上有所取捨。對台灣而言國家安全是無比重要的投資項目，但台灣的決策者是否能了解其重要性和急迫性則有待觀察。■（翻譯：黃柏彰）

（本文為個人觀點，不代表作者所屬機構的意見）

台灣國防的前線已不再是地理上的外島，而是網路空間所構成的數位國土。解放軍要達成遠戰速勝、首戰決勝的大規模對台作戰決勝能力，必先在軍事行動直前或同時取得資通訊優勢。解放軍的資電戰理論強調全面性打擊與超限戰性質，一旦決心恫嚇或進犯台灣，將先企圖迅速摧毀或癱瘓國軍資通訊戰力，也極可能會針對我政府、民生、經濟目標進行干擾或破壞，動搖民心士氣，減低台灣軍民抵抗意志與能力。中國資通訊戰力的整備由國家主席親自領導「國家信息安全工作領導小組」，整合軍、情、公安與資通訊產業，其中解放軍佔有極重要的角色。解放軍不僅主導超級電腦天河一號、天河二號的研發，大大提昇其資通訊作戰能力。解放軍也設立結合軍民人才的複合式「網軍」，由解放軍總參謀部擔任對敵方軍事與政治目標的資通訊

台灣國防的前線已不再是地理上的外島，而是網路空間所構成的數位國土

情蒐與攻防，各軍兵種、軍團級單位均設有網路作戰指揮機構，各重要軍區設有相關研究中心分工進行相關戰法的研究或資通訊作戰模擬對抗等任務，其中南京軍區的「信息戰情報研究中心」負責對台資通訊打擊目標的辨識與選定，並過濾研析所竊取之情報。國防動員委員會的信息動員辦公室則負責吸納與培訓民間人才、設立外圍組織並進行較為低階的全面性資通攻防。解放軍軍事院校則負責吸收資通訊高階人才，並與民間大學或研究機構共同開發資通訊硬體設備與核心技術。解放軍也會資助特定個別駭客進行敏感目標的資通訊攻擊。解放軍的資通訊攻擊能量，早已從低階的網頁置換，進階到社交工程攻擊、零時差攻擊等精準攻擊能力，並積極建構足以癱瘓敵方關鍵基礎設施運作、滲透嚴密保護網路系統與快速解密之能力。

資通訊攻擊具有隱匿、偽冒、難以追查辨識與不易究辦之特性，發動攻擊者多能逃脫責任，使得資通訊攻擊日益猖獗，對數位國土的威脅日趨嚴重。我國數位國土每天至少遭受到二十萬次的襲擾，以國安局對外網路為例，2010 到 2013 年三年間每天平均遭遇到 1 萬件侵擾事件，根據行政院資通安全辦公室統計，這三年間發生需要列管的國家資安事件的頻率是每天平均 0.9 件。

本報告諮詢陳如芬等 14 位（其中包括 5 位具軍方背景）資通訊安全專家的意見，他們評估：即便是國安單位，其加密保護資料仍有安全顧慮，機敏資料遭竊取的機率高（見表一）。資通訊攻擊對我國關鍵基礎設施的安全將有所影響，部份設施的主要功能有遭受到破壞的可能（見表二）。儘管國軍內部網路採取實體隔離的保護措施，專家仍認為國軍的資通訊系統脆弱性高，在敵資通訊攻擊下國軍作戰可能將被癱瘓，而且到了 2025 年威脅度將較 2013 年更為險峻（見表三）。

表一：我國國家安全部門（國安會、國安局、國防部、外交部、陸委會）的資料安全評估

	安全無虞，評分 0-0.9	略有安全顧慮，評分 1-2.9	有安全顧慮，評分 3-5.9	安全堪慮，評分 6-8.9	威脅嚴重，評分 9-10
2013 年現狀	[redacted]		5.45		
2025 年預估				5.85	

安全無虞＝資料遭竊取破壞之機率低
略有安全顧慮＝無加密或經保護之資料遭竊取破壞之機率高
有安全顧慮＝加密或經保護之資料遭竊取破壞之機率高，但我方足以及時偵知與修復
安全堪慮＝加密或經保護之資料遭竊取破壞之機率高，且我方無法及時偵知與修復
威脅嚴重＝加密或經保護之資料遭竊取破壞之機率高，且足以造成無法修復之損害

表二：針對我國非關軍事作戰與非國安部門列管的關鍵基礎設施之影響評估

	安全無虞，評分 0-0.9	略生影響，評分 1-2.9	有所影響，評分 3-5.9	影響甚大，評分 6-8.9	威脅嚴重，評分 9-10
2013 年現狀	[redacted]			5.83	
2025 年預估				5.72	

安全無虞＝關鍵基礎設施功能遭破壞之機率低
略生影響＝部分關鍵基礎設施部分功能遭破壞，但無損該設施之主要功能
有所影響＝部分關鍵基礎設施主要功能可能遭破壞，但仍能修復
影響甚大＝足以癱瘓大部分關鍵基礎設施之主要功能
威脅嚴重＝足以癱瘓大部分關鍵基礎設施之主要功能，並造成社會之生命財產重大損失

表三：對我國軍的軍事作戰之影響

	不生影響，評分 0-0.9	略生影響，評分 1-2.9	有所影響，評分 3-5.9	影響甚大，評分 6-8.9	威脅嚴重，評分 9-10
2013 年現狀	[redacted]			6.48	
2025 年預估					7.08
不生影響＝不致影響國軍的作戰與行政後勤支援 略生影響＝會對國軍行政後勤支援業務產生不便，但不足以影響軍事作戰 有所影響＝會對部分裝備之使用產生障礙，但我方足以及時修復 影響甚大＝會癱瘓國軍軍事作戰，且可能影響戰局 威脅嚴重＝會癱瘓國軍軍事作戰，且能迅速使國軍潰敗					

數位國土也是當前我國整體國家安全與軍事安全的火線。解放軍資通訊戰力發展置重點東南地區與南京軍區。中國以台灣為其資通訊攻擊的試驗場，測試與累積資通訊攻擊技術，再以攻擊台灣的經驗轉而對付其他西方國家。根據專家的評估：對我數位國土的襲擾多數來自中國（見表四）。即便資通訊攻擊難以追蹤確定其最終來源，在對國安局對外網路的侵擾事件中，可確定有至少 3%的比例來自中國。

表四：台灣的資安威脅來源的評估

無來自中國，評分 0-0.9	少數來自中國，評分 1-2.9	部份來自中國，評分 3-5.9	多數來自中國，評分 6-8.9	多數來自中國官方，評分 9-10
[redacted]				8.71
少數來自中國＝大部分來自非中國以外的國家 部份來自中國＝中國與其他國家均有，中國並無顯著多數 多數來自中國＝大部分來自中國，個人駭客與中國官方所支持的個人或機構均有，後者無顯著多數 多數來自中國官方＝大部分來自中國，並多數來自中國官方所支持的個人或機構				

中國的衛星除提供了解放軍更為先進的資通訊戰力外，也使解放軍遂行精準打擊與反介入區域拒止任務之戰力倍增。估計在 2025 年，以烽火與神通系列的通信衛星、尖兵與雷電系列的偵察衛星、北斗系列的導航衛星將可提供解放軍全天候掌控我國軍動態、更為精準的導彈打擊我政軍設施能力與尋殲我遠洋機動艦隊的能力。

除衛星外，解放軍在東南沿海加大陸基電子偵蒐與對抗設施的部署，針對台海的超視距雷達、偵察預警雷達的部署密度超過針對新設的東海防空識別區，將台灣全境納入實質防空識別區監偵範圍的態勢明顯。解放軍也在東海艦隊犯台路徑建置反潛水下聲納監聽系統，並頻密情報船、海測船在台灣周邊水域的活動，以掌握我國軍武器參數與台海戰場環境。

解放軍的指管通電情監偵戰力

Mark Stokes
（美國 2049 研究中心研究員）

中國人民解放軍現代化的優先項目之一，便是發展有效的、戰時可以存活的 C⁴ISR（指管通電情監偵）系統。C⁴ISR 系統可以減少被奇襲、增加預警時間、讓眾多經常各行其事的官僚體系得以更容易地分享情資、確保作業持續性並且可以讓決策者可依據更完整的資訊進行決策。雖然硬體設備在應急時相當重要，但武器系統若是沒有一套先進的 C⁴ISR 系統，所能發揮的功能將相當有限。解放軍在作戰上的成敗，很可能就取決於他們的指揮體系是否能取得足夠的資訊並將這些資訊充分利用。若是將視野從平面戰場放大到包括太空的立體空間，中國的分析文獻指出：中國軍力現代化的目標當然是干擾美國武力投射能力以支援盟友和履行台灣關係法支援台灣的行動。

（一）指揮和管制：為面對未來可能的衝突，解放軍正努力增強其指揮和管制的能力。在和平時期解放軍中央軍事委員下轄的指揮和管制體系包括了人民解放軍總參謀部，以及三個第一層級的參謀部門—總政治部、總後勤部、總裝備部，另外還包括七個軍區、解放軍海軍、解放軍空軍、和二砲部隊，這樣的指揮體系預期到 2025 年都不會有太大的更動。在危機爆發時，中央軍事委員很可能會將其指揮和管制體系轉變為聯合作戰體系，又稱為聯合戰區指揮部，至於此種聯戰體系的形式和構成則會取決於衝突的不同而改變。

可能的指揮態樣，是由其中一名中央軍事委員副主席、中央軍事委員委員、或一名資深的總參謀部或總政治部成員（副總參謀長或總政治部主任）擔任聯合

戰區指揮官和政治委員。在中央軍事委員的指導下，總參謀部可能會擔任起將平時期指揮組織迅速轉變為戰時架構的責任，而聯合戰區指揮部的所屬幕僚則可能選自與衝突區域最有關連的人員，並且由從總參謀部、三個一級參謀部門以及海軍、空軍、二炮人員中挑選各領域的幕僚人員。聯合戰區指揮部的主要任務會是進行聯合作戰的計劃和準備，管控解放軍在全國層級上可動員的資源，並指揮直接附屬在聯合戰區指揮下的集團軍層級單位。

在戰時，中央軍事委員預料會從衝突地區以外的軍區調動各種部隊和資源來支援聯合戰區指揮部，包括了解放軍軍團級海、空、二砲和地面部隊。透過中央軍事委員的直接管制和整合，可以使聯合戰區指揮部得到黨和國家機器資源的充分挹注，確保政軍戰略上的整合。預估聯合戰區指揮部將會有一個主要的指揮中所，附設預備和後方指揮所，也可能會視需求而設立一個前線指揮所。後方和前線指揮所將負責後勤業務並與主指揮所保持通聯，而預備指揮所則會在主指揮所失能時擔任起指揮責任。

解放軍的文獻也透露出聯合戰區指揮的主指揮所下轄：通信中心、火力協調中心、情報中心、資訊作戰／反電子戰指揮所以及一個負責管理氣象情報和其他任務的作戰支援中心。從海軍、空軍、二砲部隊來的聯絡官將會在聯合戰區指揮部裡進行作戰協調。

在聯合戰區指揮體系下，二砲、空軍、海軍將會透過火力協調中心協調進行長距離的精準打擊行動，而情報資訊中心則負責整合並發布相關的感測器數據、導航資訊、調查資料、地圖和天氣情報等。聯合資訊作戰／反電子戰指揮所則可能負責電偵作戰的資訊收集和分析，並進行反電子戰計畫和作戰上相互干擾的排除。

無論在和平時還是戰時，解放軍的核武部隊和傳統地面部隊的指揮和管制似乎都是分開的。在衝突發生時，中央軍事委員可能仍然會對核武器保有嚴密的控制，而不是將核武部隊託付給聯合戰區指揮部。

（二）通訊和電腦：在衝突時期，解放軍平時的通訊基礎設施會開始轉換進入戰時的狀態，以滿足聯合戰區指揮部的需求。為了支援可能距離中國本土越來越遠的作戰距離，解放軍目前正大量投資在先進的資訊和通訊技術上。很可能會由解放軍總參謀部的總參信息化部負責聯合戰區指揮部的通訊需求，並會依據需求調節軍用和民用通訊基礎設施，建立一個可以支援聯合戰區指揮架構的通訊網路。這個通信中心預料會包含來自總參謀部、海軍、空軍、二炮的幕僚，以及地方省級的通信官員。

總參謀部的信息化部將負責發展、建設、運作、並維持解放軍全軍層級的聯合作戰指揮和管制所使用的通訊系統。該部門的重要任務包括發展並佈署一套感測資料的整合管制平台，藉由此平台收集並管理感測器數據，並且向聯合作戰的單位和集團軍單位發送這些資料。地方集團軍層級單位上報的資料也可能進入此共通作戰圖像的資料庫。另外，海軍、空軍、和二砲部隊在平時保有的獨立通信系統，在衝突時可能都會與聯合戰區指揮體系進行整合，另外中央軍事委員也可

能保有一個獨立的通信網路用以進行對核武部隊的指揮和管制。

在戰術層級上，解放軍似乎正邁向網路中心戰的理論原則，希望以此來有效發送和管理越來越複雜的感測資訊架構，建構一個戰術性的通信網路可能可以在更低的成本下進行更分散而具彈性的作戰。而依據先進的戰術資料網路建設起的共通戰術圖像，則可能給解放軍帶來重要的變革，使其得以脫離傳統的各軍各自為戰的現狀。這樣的系統的效率則取決於高層對於個別戰術指揮官的政治控制，以及他們對於個別資訊操作者的信任度。

除了靜態的基礎設施如光纖網路、視距內微波通信和戰術無線電以外，解放軍也在軍用通信衛星的研製上進行了大量的投資。寬頻通信衛星使得大量的資料可以傳輸到越來越遠的距離與越來越多的使用者，範圍及於中國以外的地區。

（三）情報、監視、偵查：解放軍的 C^4ISR 系統包括了可以在陸地上、海上、和太空對目標進行情報、監視、偵查作戰的資源。解放軍對於移動性的目標的打擊距離取決於其長程監視的能力，為了擴展戰場的知覺，解放軍投注許多資源在各種基於太空、空中和平面的感測器上，讓他們得以監測在西太平洋、南中國海、印度洋等地的軍事活動。在衝突時期，從各種平台而來的感測資料可能會被整合或融合進一個單一的聯合戰區指揮的資訊作戰指揮所。理論上，這個指揮所可以直接調度衛星、空中和其他的平台用以進行資訊的收集和分析，並確保聯合戰區指揮部高層保有對戰場的知覺。

解放軍也在太空佈署越來越先進的光電衛星、合成孔徑雷達衛星以及電子偵察衛星。這些太空的系統增強了解放軍的戰場知覺，並且擴展他們向中國以外地區發動攻擊的能力。對於太空感測器的發展設計和資料收集，推測是由解放軍總參謀部所負責。這些太空的設備也使解放軍能夠監視中國周遭海域的海上活動，並追蹤進入該區域的空中軍力。一系列的小型合成孔徑雷達衛星和電子偵察衛星結合起來，將可以提供解放軍指揮官有關移動性目標的地點資訊。在衝突時期，中國也有可能以固體燃料的太空載具發射微衛星來加強其既有的太空資源。通信衛星也可以成為備用的通信系統，將各種感測器的資料提供給打擊系統，這也是解放軍軍力擴展出中國本土後會越來越依賴的能力。解放軍現有的和未來擴展的數據中繼衛星也會用來在衛星和指揮中心之間傳遞資訊。

空中的情報、監視、偵查系統則包括了發展越來越先進和多樣化的無人飛行載具，包括總參謀部、海軍、空軍、和二砲都有操作這些載具。而除了衛星和空中偵搜平台以外，解放軍似乎也在評估發展出將光電、合成孔徑雷達及電子偵察衛星上的感測器掛載在跨大氣層飛行器上的可行性，跨大氣層飛行器在地球大氣層的超高空飛行，其技術有可能會在接下來十年裡突破成為進行地區偵蒐能力的主要平台。

除了太空、空中、和近太空的感測器以外，解放軍空軍的各式雷達團也構成了一個大型的空中監視網路，並擁有至少一座具有超視距的天波雷達系統，可以監視長達 3000 公里的空中和海上活動。

總而言之，解放軍正在進行大規模的現代化改革，用以改善其作戰能力並增

強部隊在諸多方面的不足。發展 C⁴ISR 系統是解放軍現代化進程中不可或缺的一部分，最值得注意的地方便在於用以支援解放軍長程攻擊地面、海上和太空目標能力的 C⁴ISR 系統。■（翻譯：黃柏彰）

（本文為個人觀點，不代表作者所屬機構的意見）

伍、解放軍在對台導彈打擊戰力的質變

導彈打擊在本節中特指解放軍彈道或巡弋飛彈對我政軍設施的攻擊。中國的對台導彈打擊戰力正進行質變轉型的階段，過去解放軍強調導彈威懾，建軍以量取勝。未來，中國導彈的數量成長將會有所減緩，一方面以高精準度、高殺傷力彈頭的彈道飛彈彈種進行汰舊，一方面以巡弋飛彈取代彈道飛彈，導彈數量成長雖然減緩，但導彈打擊戰力仍將持續提高，除威懾外，解放軍的導彈打擊將越來越具打擊軍事目標取向，成為取得速勝、決勝所需的第一擊主力。

中國的對台導彈打擊戰力正進行質變轉型的階段，從強調威懾、以量取勝轉變具精準打擊軍事目標取向，成為取得速勝、決勝所需的第一擊主力。導彈數量成長雖有減緩，但導彈打擊戰力仍將持續提高。

彈道飛彈分為陸基與潛射，潛射彈道飛彈、洲際彈道飛彈（一般指射程在 10000 公里以上之彈道飛彈）與中長程彈道飛彈（一般指射程 3340 至 10000 公里之間之彈道飛彈）多搭載核彈頭，為戰略性武器。中程彈道飛彈（一般指射程在 1670 至 3340 公里之彈道飛彈）與短程彈道飛彈（一般指射程在 1670 公里以下之彈道飛彈）則可搭載核彈頭或傳統彈頭，中國部署在台海當面用以犯台的彈道飛彈，多為搭載傳統彈頭者的短程彈道飛彈（中程彈道飛彈主要為針對美軍基地與兵力）。解放軍的短程地對地彈道飛彈集中部署於南京軍區與廣東軍區東部，約佔所有導彈兵力的四成左右，針對性十足。

在 1995、1996 年飛彈危機之際，據估計中國所部署的常規地對地短程彈道飛彈約僅 40 枚。1999 年，我國防部表示有 120 枚彈道飛

彈對準台灣。到了 2000 年代，解放軍快速增加對台彈道飛彈的部署數量，我國與美國國防部相繼開始在各自的國防報告書或中國軍力報告中規律性地導彈數量有所評估（見表五）。依美國國防部的數據（僅計彈道飛彈數量），中國對台導彈的數量在 2009 年前估計都有 11%到 46%的成長，也曾有年增 150 枚的評估；2009 年後，導彈數量成長趨緩，並出現零成長的現象。我國國防部的評估數字也與美方大抵相同。此一現象並非中國決心不再對台增加導彈威脅，而是解放軍在導彈數量的威懾效果已近飽和後，開始進行飛彈的升級、換裝，讓現役導彈更具威力，並頻密在內陸進行試射，以研發或引進新一代的導彈。

表五：中國對台導彈數量估計

	我國國防部（或國安會）估計	美國國防部估計
1999 年	120	--
2000 年	200	--
2001 年	--	--
2002 年	--	350（年增率為 50 枚）
2003 年	--	450（年增率為 75 枚）
2004 年	610	500
2005 年	--	650-730（年增率為 100 枚）
2006 年	784	710-790
2007 年	--	900
2008 年	1300（國防部估計，數目包括巡弋飛彈） 1400（國安會估計，數目不包括巡弋飛彈）	990-1070（年增率 150 枚）
2009 年	1300（含巡弋飛彈）	1050-1150（年增率 100 枚）
2010 年	--	1050-1150
2011 年	1400（含巡弋飛彈）	1000-1200
2012 年	--	1000-1200
2013 年	1400	1100

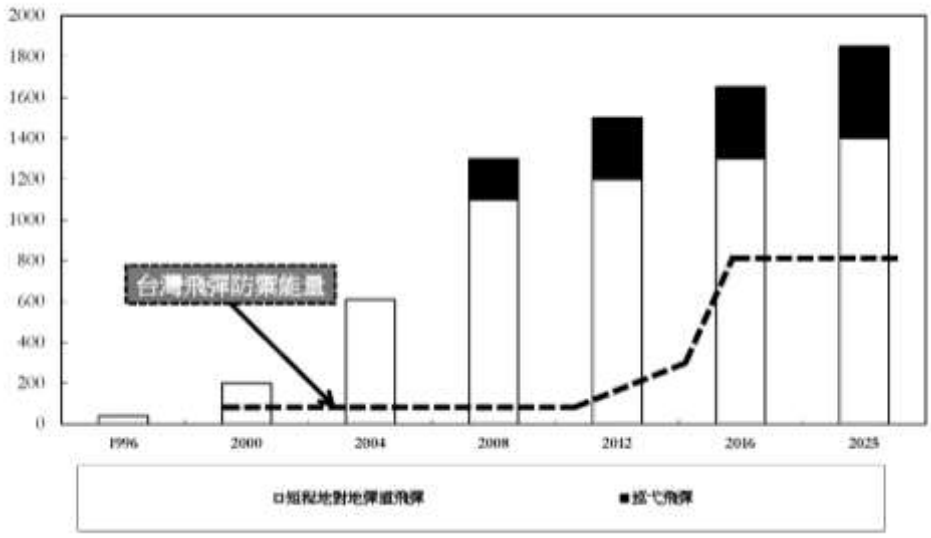
東風 11 型（射程 300 公里）與東風 15 型（射程 800 公里，台海飛彈危機試射的彈種）均是 1990 年代服役的短程彈道飛彈。兩原型彈均曾是解放軍對台導彈的主力，精準度（圓周誤差公算）不高，約在實際射程之 0.2%（分別為 600 與 1600 公尺）以上，只能針對非軍事目標與面的軍事目標，均應會因更進一步的升級版本與新彈種的服役而在 2025 年前逐漸被汰除。本報告評估在 2025 年時，中國對台彈道飛彈的數量可能在 1400 枚左右，約較 2013 年（以美國國防部數字

為基準）成長 300 枚。主力將為東風 16 型（射程在 800-900 公里間，可能具有多彈頭能力）、東風 15B 型（具衛星導航定位）、東風 11D 型（具衛星導航定位），都可能具有射程之 0.1%的準確度（約在 800、800 與 300 公尺左右）。少數部署的東風 15C 型（射程 600 公里）主要用來搭載特殊彈頭，以對付各種特殊目標，除了常規的高爆彈頭（對付建築物）、殺傷彈頭（對付人員）外，已有穿透彈頭（對付洞庫等強化工事目標）、延時子母彈頭（對付機場）、石墨碳纖彈頭（對付電力設施）、穿甲燃燒彈頭（對於集結之部隊與機艦）等等。具有末端制導能力的東風 12 型導彈（射程 300 公里）將用以突破我國愛國者飛彈防禦系統。解放軍新一代的短程彈道飛彈具有較高精準度，部分粗具反制飛彈防禦系統的功能，將可降低摧毀目標所需的彈數。

中國的短程彈道飛彈進入發射陣地，完成發射準備需時 40 分鐘，此一準備階段除非有綿密的人員情報與及時的科技情報，將難以事先察覺並加因應。短程彈道飛彈彈發射到打到台灣本島目標，約需 7 分鐘，我方預警反應時間約 5 至 6 分鐘。在飽和攻擊之下，一波導彈攻擊最大攻擊能量可能在 120 枚左右，即便在 2025 年，我愛國者飛彈防禦系統能量仍將難以全面攔截，部分來襲導彈將會突穿我飛彈防禦火網，成功擊中所欲目標。據估計，在適當的彈頭選擇下，中國要損壞我機場的一個跑道只需導彈 3 至 6 枚，我方的空軍基地雖普遍有跑道搶修設備相當防護，但 1 枚攜帶爆破彈頭之短程彈道飛彈，可造成面積 20 x 30 公尺、深度 12 公尺的彈坑，需 1 小時以上時間才能填補搶修完畢，而完成第一次發射的解放軍導彈單位，原地再裝填的時間約為 40 分鐘，足以在我軍搶修完畢前，再度發動攻擊。

長劍 10 型長程巡弋飛彈在 2008 年後開始部署，射程 1800 公里，精準度在 20 至 50 公尺，加上具有雷達截面積小、熱訊源小、低空飛行等不易被雷達或紅外線偵測之特點，為遠距精準打擊的利器，將會用以對付我高軍事價值的點目標，如指管設施或雷達站。空射型的長劍 20 型（或稱空地 20 型）將搭掛在轟 6 轟炸機上，將會用來對付台灣東岸目標。本報告估計在 2025 年時將會有 450 枚長劍系列的巡弋飛彈服役，約較 2013 年成長 250 枚。加上短程彈道飛彈數量的增長，評估中國在 2025 年時可用以對台的導彈數量將在 1850 枚上下，約較 2013 年（以我國國防部數字為基準）增加 450 枚（如圖一）。

圖一：中國對台導彈增長評估



陸、解放軍在對台制空戰力的超越

台灣的制空戰力對嚇阻中國犯台至為關鍵：當解放軍制空戰力開始明顯超越台灣，解放軍將越有自信對台採取軍事行動。若台灣的「有效嚇阻」無法奏效、「防衛固守」難以持久，失敗都將會是從喪失制空開始。美方專家 David A. Shlapak 就曾評估：如果解放軍迅速重創台灣空軍，並掌握制空，那將會嚴重打擊美軍馳援的意願，因為美軍得冒極大的風險來挽回很難挽回的局面。

若台灣的「有效嚇阻」無法奏效、「防衛固守」難以持久，失敗都將會是從喪失制空開始。

基本上中國一直具有制空戰力在數量上的優勢；而我國則以保持質上的領先來中和掉中國在量上的優勢，這是過去台灣維持制空的模式。1980 年代解放軍雖在帳面擁有 3900 架戰鬥機，但分配部署在台海當面的約在 500 架上下；而且即便是當時最先進的殲 7 型戰鬥機，性能遠不及我國空軍正積極換裝的 F-5E 型戰鬥機。除了戰機性能處於上風外，台灣的飛行員訓練時數高，戰技上也有明顯優勢。最後，再加上台灣防空飛彈的高密度部署，更構成解放軍空軍犯境的極大阻礙。1990 年代解放軍戰鬥機帳面上有 4000 餘架，但絕大多數依然是老舊的殲 5、殲 6 或殲 7（雖然經過若干改良與升級）等型戰鬥機，

只有極少數的殲 8 或 SU-27 型戰鬥機具有足能與我空軍戰鬥機一搏的性能。1996 年後，空軍戰鬥巡邏線固然從中國大陸海岸線退至海峽中線，但海峽中線以東的制空權仍足以牢牢掌握在台灣手中。解放軍空軍犯境的難度仍與 1980 年代相當。自 1996 年後，我國空軍進行二代兵力整建，除 IDF 自製戰鬥機外，引進幻象 2000 型與 F-16A/B 型戰機，也開始部署愛國者飛彈，使得台海制空戰力在亙 1990 年代至 2000 年代中葉前大抵均有利於台灣。然而，台灣空軍在二代兵力整建後，除了在 2003 年引進 AIM-120 中程空對空飛彈與 2009 年前後 IDF 型戰鬥機開始性能提昇外，制空戰力在 2000 年代並無進一步的提昇。

而解放軍在此一期間內，除擴充殲 8 與 SU-27 型戰鬥機機隊外，自行研製的殲 10 型與外購取得的 SU-30 型戰鬥機也陸續部署。SU-27、SU-30 與殲 10 等型戰鬥機除性能足以與我空軍 F-16A/B 型戰鬥機匹敵外，它們都具備深遠的作戰半徑，即便部署於南京軍區內陸二線基地仍足可迂迴對我本島東部進行攻擊，顛倒了國軍傳統之前線與後方的區別，可威脅到台灣東部基地。況且，解放軍空軍採取輪駐輪戰的制度，各軍區空軍機隊均有機會輪調至台海當面基地，以熟悉台海空域，戰時能立即前進部署支援。這使得解放軍犯台時，對台灣制空的威脅將不再僅限於台海當面的編制部隊（根據美國國防部 2012 年的估計，部署在台海當面的解放軍戰鬥機約有 310 架）。同時，中國對台導彈的質量俱增，對我指管系統、空軍基地與空防系統構成嚴重威脅，意在解除台灣空軍制空戰力於地。再加上：S-300 系列遠程防空飛彈開始部署於台海當面，空警系列預警機與反輻射無人攻擊載具的服役、飛行員訓練的強化等等，自 2000 年代中葉起，我軍在制空上的優勢逐漸被逆轉，概略估算台灣與中國在戰鬥機上的戰力比在 2004 年前台灣尚能保持優勢或平分秋色，2006 年時解放軍開始逆轉。

2010 年代將是中國與台灣戰鬥機「戰力代溝」擴大的年代，解放軍除升級並繼續擴大既有的殲 8、殲 10 與殲 11 等型戰鬥機機隊外，性能同等級的殲 15 型艦載戰鬥機與殲 16 型與俄製 SU-35 型戰鬥機將會成軍，老舊機款將逐漸汰除，並在四代戰機的數量上壓過台灣空軍。同時，轟 6 轟炸機所搭掛之長劍 20 型（或稱空地 20 型）空對地長程巡弋飛彈（射程在 1500 公里以上），可與彈道飛彈形成高低配合，攻擊我空軍基地。同時，長劍 10 號長程巡弋飛彈具打擊點目標能力，

對我指管節點與重要雷達觀通設施威脅鉅大。此外，解放軍除已部署300 具以上自以色列購入的哈比無人攻擊載具外，可追蹤攻擊我防空雷達與飛彈陣地，翼龍無人攻擊機也將會服役，以干擾我空防系統。

我國在 2011 年啟動的 F-16A/B 升級計畫，就算順利完成也要到2020 年代初期，性能也約與屬四代半的 SU-35 型戰鬥機相當。但到了2020 年代，台灣若無更新機種的引進，號稱具有「第五代戰機」匿蹤性能殲 20 型戰鬥機（屆時可能經過持續改善到略具美國 F-22 型戰鬥機七八成戰力的性能）將會開始服役，中國與台灣的空軍戰力將產生質變，殲 20 型戰機配合主力的殲 10、殲 11 型戰鬥機，屆時，中國在戰鬥機戰力上將明顯地超越台灣。

除了戰機發展外，值得注意的是中國在防空飛彈上的部署與在概念上的變化。防空飛彈是中國軍事科技研發的瓶頸之一，中國雖藉進口俄製防空飛彈加以仿製，但在性能與可靠度上仍離俄製系統有段距離。2000 年代，解放軍引進俄製射程 200 公里的 S-300 PMU2 型長程防空飛彈，並隨後部署於台海當面。S-300 PMU2 型飛彈的射程涵蓋範圍及於台灣本島桃園、新竹一代，台海空域成為其防空能力範圍，其強而有力的雷達更屢屢照射在台海偵巡的我軍戰鬥機，對我空軍飛行員形成壓力。解放軍將在 2010 年代積極引進更新的 S-400 型長程防空飛彈，配備有更強大的雷達功能與反干擾的能力，宣稱能有效偵測敵方的匿蹤戰機。該型彈具有 400 公里的射程，S-400 型防空飛彈一旦部署於台海當面，台灣全境將在其射程範圍內，針對性十足，並改變防空作戰的既有守勢概念，將台灣全境與周邊空域壓縮入中國不宣而實設的實質防空識別區內，成為軍事恫嚇與攻勢作戰的有利戰具。

中國的攻勢防空

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在過去十年中，中國人民解放軍藉由引進先進的俄羅斯防空系統並將其技術結合進國造系統裡，在地面和海上防空作戰的能力都已達到了大幅度的增進。從 2000 年代中旬開始解放軍佈署的長程地對空飛彈射程甚至可以跨越台灣海峽，

有效對台灣構成攻勢威脅。未來十年發展的防空飛彈系統將會有超越台灣的射程，並且具備「反飛彈」能力。若是台灣無法對此一趨勢做出有效回應，台灣在防空和反飛彈上的嚇阻戰力將會越來越薄弱。

直到 1990 年代初期，解放軍的主要防空飛彈系統仍然是沿襲俄羅蘇 S-75(SA-2)系統研發而來的紅旗-2，多種紅旗-2 系統加起來總共生產了約 10,000 枚飛彈、約 1,000 具發射載具。紅旗-2 飛彈在 1960 年代初期曾擊落數架台灣的偵察機，包括幾架由台灣空軍飛行員飛行的高空偵查機 U-2。隨著西方飛機上防空飛彈反制技術的進步，中國也試著升級其防空飛彈的雷達和導引系統，然而紅旗-2 最大的弱點仍在於其 35 公里的有效射程。到了 1990 年代俄羅斯開始重新向中國輸出武器技術後，獲得現代化的防空飛彈技術成為解放軍首要目標之一。

俄羅斯的新飛彈：美國空軍至今仍然沒有與任何具有 S-300 系列防空飛彈的國家打過仗，可以預見的，此飛彈系統對任何空軍都會構成重大的威脅。S-300 系列飛彈是由俄羅斯金剛石-安泰公司研發生產，該飛彈系統的設計使得敵方非常難以干擾其主動式相位陣列雷達，後期的更新還在飛彈本身安裝了主動導引雷達，這些都使得 S-300 系列防空飛彈非常的致命。解放軍目前已經獲得 55 套的 S-300 飛彈，亦即大約 220 具發射載台，每具發射載台都有 4 枚飛彈和至少可以重新裝填一次的備彈。換句話說，解放軍目前擁有至少 1,760 枚 S-300 飛彈。在這些飛彈中最新型的 S-300PMU-2 搭配了 48N62 飛彈體，可以達到 200 公里的射程，並且具備一定程度的反戰術彈道飛彈能力。

解放軍也非常積極希望獲得最新世代的 S-400 飛彈，S-400 飛彈具有約 400 公里的射程。不過，S-400 系統目前才剛開始進入俄羅斯部隊服役，俄羅斯也將該型飛彈的出售作為與中國交涉其他商業談判的籌碼。一般估計，中國可能會在 2010 年代後期獲得俄羅斯 S-400 飛彈的出口。

中國引進的俄羅斯防空飛彈技術：到目前為止，俄羅斯的金剛石-安泰公司一直得以用其防空飛彈的外銷來滿足中國對先進技術的需求，同時用外銷的獲利來資助進一步的科技研發，如此一來也避免了中國國產的防空飛彈在技術上得以與俄羅斯產生競爭。目前中國依據 S-300 系列自行研發了兩款國產的防空飛彈，首先是模仿 S-300PMU 技術製造的紅旗-9 飛彈，但該飛彈只有 125 至 150 公里射程，雖然有報導稱升級版的 HQ-9B 將具備 200 公里射程。紅旗-9 飛彈由解放軍空軍所使用，而解放軍地面部隊則以金剛石-安泰生產的另一款 Buk M-2 飛彈衍生的紅旗-16A(HQ-16A)作為主力防空飛彈。紅旗-16A 有 45 公里射程，並且至少被佈署在四個解放軍的集團軍裡。

海軍防空飛彈：從俄羅斯引進和仿製自俄羅斯技術的防空飛彈都讓解放軍海軍得以具有在亞洲海軍中相當傑出的防空能力。解放軍首先由俄羅斯購入四艘現代級驅逐艦，艦上配備的「牛虻」防空飛彈(SA-N-7)成為解放軍最先具有的區域防空飛彈，SA-N-7 是在 Buk 飛彈基礎上研發的，解放軍海軍並且在兩艘 052B 型驅逐艦上配備了海軍版的牛虻飛彈 SA-N-17。解放軍也在約 20 艘的 054A 型護衛艦上配備了從紅旗-16A 研發的海紅旗-16。另外，解放軍海軍購買了 S-300PMU

飛彈的 RIF-M 海軍版本，配備在兩艘 051C 型驅逐漸上，並且將根據紅旗-9 研發的海紅旗-9 配備在 6 艘 052C 型驅逐艦和建造中的 12 艘 052D 型驅逐艦上，這些軍艦全部投入服役後，解放軍海軍將擁有約 2,000 枚先進的區域防空飛彈。

反彈道飛彈和反衛星武器：在佈署越來越長程的防空飛彈的同時，中國也在努力研發戰略的反彈道飛彈系統以及可以攔截低軌道和中軌道衛星的反衛星武器。目前已證實中國在研發一款具有 400 公里射程的紅旗-19 長程飛彈，該款飛彈也極可能發展出海軍用的艦載版本。

中國的反彈道飛彈和反衛星計畫很可能在 1990 年代初期就已開始發展。美國早期的反衛星系統 SC-19 在 2007 年 1 月首次進行試射，並且在 2010 年和 2013 年又分別進行了飛彈攔截器的試射。中國則在 2013 年 5 月試射了一枚被美國官方研判為針對中地球軌道的反衛星飛彈系統，目標為用以攔截美國的導航衛星。一些來自中國的消息來源則指稱還有一款正在研發中的 東風-27 飛彈，將由解放軍二砲部隊作為反衛星、飛彈攔截器、和太空發射火箭等多用途載具。另外，解放軍總裝備部還有「快舟」系列太空火箭，根據東風-31B 洲際彈道飛彈研發而來，首先在 2013 年 9 月試射，可以用於進行彈道飛彈的攔截。

對台灣而言，解放軍目前的防空飛彈佈署對台灣都有可能成為戰時進行空域和海上封鎖的工具，同時也會使得台灣的空軍和飛彈部隊在對中國入侵進行反擊時更為困難，如此一來也抵銷了台灣在這些領域研發上領先的技術成果。隨著時間的發展，解防軍將會佈署更多更有效的反彈道和反衛星飛彈系統，藉此抵銷美國在戰略上的嚇阻能力，並且也會因此威脅到美國在戰時於亞洲尤其是台灣海峽的嚇阻能力。■（翻譯：黃柏彰）

（本文為個人觀點，不代表作者所屬機構的意見）

柒、解放軍在對台制海戰力的領先

台灣是個四面環海的島國，進出口高度依賴海上運輸，且運卸設施集中於台灣西部海岸，形成脆弱點。海上封鎖一直被認為是中國對台恫嚇的可能方案。若中國決意犯台，海防是台灣有組織性抵抗的最後防線，海防若喪失，解放軍將繼而奪取我台北、台中、左營、高雄、蘇澳、花蓮等要港，港口開放是登陸作戰之必要，港口所能提供的行政卸載能量才足能支持登陸部隊所迫需的輜重、給補與後援兵力，而一旦前述港口淪入解放軍手中，解放軍龐大的地面部隊將源源湧入台灣。制海戰力是解放軍戰力世代躍進的重點項目，解放軍海軍已從過

去的飛潛快的近岸海軍逐步轉型為由現代化水面、水下與海航載台所組成的均衡艦隊，是中國遠距投射戰力的指標，足以壓制台灣、對抗日本、挑戰美國。解放軍制海戰力的發展將使得我國海軍的遠洋機動、海上截擊等作戰概念難以執行，台灣海防將被限縮至僅能於近海遂行洋面拒止。

中國現代化、均衡的海軍艦隊足以壓制台灣、對抗日本、挑戰美國

解放軍在 2012 年曾進行艦隊組織的調整，將三大艦隊的各類水面作戰艦艇進行調動。目前下轄 6 個驅逐艦支隊、3 個護衛艦大隊與一個南海巡邏分隊，另外海軍水警區有數個獵雷艦、飛彈快艇、掃雷艇大隊。此一調整乃在因應海軍艦艇現代化，將老舊艦艇編配至護衛艦大隊，與各小型艦艇共同負責近岸的防禦。各款現代化水面艦則平均分配至 6 個驅逐艦支隊，擔負打擊任務。目前驅逐艦支隊基本上由 4 艘驅逐艦搭配 4 艘護衛艦組成。但從解放軍持續建造的 054A 護衛艦推斷，未來除了東海艦隊的第六驅逐艦支隊外，另外還會有兩個驅逐艦支隊強化為 4 艘驅逐艦、6 艘護衛艦的編組。

與中國的對台導彈數量增長趨勢相同，解放軍制海戰力也將放緩艦隻數量的成長，而致力於提昇現有戰力或汰舊換新。目前解放軍水面作戰艦艇的現代化比例僅達六成，依照中國的造艦速度，可在 2025 年完成 25 艘大型水面艦的提昇或汰換，在 2025 年時，解放軍在水面艦艇數量雖會維持 70 至 74 艘大型水面艦的規模，但各艦的戰力將會大幅提升，各艦之間與其他軍種間的聯合作戰效能也會有所進步。解放軍海軍驅逐艦支隊在 022 型飛彈快艇的支援下，主責打擊我國海軍水面與水下兵力，部分兵力將用以支援對美軍的反介入區域拒止作戰。

2025 年解放軍水面艦隊將完成全面性的現代化，各款艦隻的防空、反艦與指管通電情偵監系統都會獲得大幅度的性能提昇。具強大防空能力的 052 C 與 052 D 級驅逐艦是艦隊區域防空的主力，配備有自製的主動相位陣列雷達，每艘搭載 48 至 64 枚射程 120 公里以上的海紅旗 9 型防空飛彈。目前解放軍已有 8 艘這兩款號稱「中華神盾」的驅逐艦，將陸續建造這兩款艦以汰除老舊的 051 級驅逐艦，估計到

2025 年，解放軍將擁有 14 至 16 艘這兩款驅逐艦，其規模並足以替 2 至 4 個航空母艦戰鬥群提供艦隊防空。反艦飛彈是解放軍海軍的傳統強項。除鷹擊 83 型反艦飛彈已大量配裝外，仿自俄羅斯系統的鷹擊 62 與鷹擊 18 型艦載反艦飛彈與鷹擊 12 型空射反艦飛彈將會是解放軍反艦作戰的未來主要武器。解放軍水面艦新式的雷達與射控系統將可對付 200 公里（主動搜索）、450 公里（被動搜索）的目標，可同時接戰 10 個水面目標，並可建立支隊規模的資料鏈互連，也可藉由資料鏈傳輸，能提供其他助攻的小型艦艇（如 022 飛彈快艇）打擊目標的相關資訊。在 2025 年時，解放軍水面主戰艦將具有戰術資料鏈系統、衛星天線、高頻通訊天線等現代化指管通電情偵監系統，三大艦隊各艦隊中至少有 1 艘驅逐艦將會被改裝為艦隊指揮艦，裝備更完善的指管能力；三大艦隊與國家海洋局至少配屬 1 艘大型情報蒐集艦，與海航電偵機搭配，對台灣與美日等國的軍演進行電子參數蒐集。

解放軍水面艦的弱點是反潛能力，但對付只有 2 艘具作戰能力潛艦的我國海軍，來自水下的威脅對解放軍制海作戰的影響有限。解放軍雖致力於反潛能力的強化，但仍受制於基礎或前瞻科技研究的瓶頸。

中國現在擁有 1 艘俄製航空母艦改建的遼寧艦，未來可能再續建 2 艘航空母艦，艦載機將以殲 15 型戰鬥機為主力。依中國最近展示航空母艦編隊，除了航空母艦外，包括 3 艘驅逐艦、3 艘護衛艦、2 艘核攻擊潛艦與 1 艘綜合補給艦，顯示中國航空母艦戰力正逐漸成型。中國目前有 3 艘 071 級船塢登陸艦，可搭載 6 架直升機與 4 艘中型登陸氣墊艇。到 2025 年，新建的 081 級兩棲攻擊艦將可服役，可搭載 12 架直升機與 4 至 6 艘中型氣墊船，登陸作戰的能力將大為提昇。

解放軍海軍目前保有 6 支柴電潛艇支隊與 2 支核子潛艇支隊，現代化比例為 7 成左右，以東海艦隊的 2 支潛艇支隊現代化程度最高，全部部署新式的 039 G 級、039 A 級與俄製基洛級潛艇，數量有 18 艘。至 2025 年，老舊柴電潛艇將將由更新型的 039 A 級潛艇或是由中俄共同合作的拉達級潛艇取代，柴電潛艦的規模維持在 58 至 60 艘左右。目前解放軍仍維持 5 艘核動力攻擊潛艇的規模，由於 2025 年解放軍將具備 2 至 3 個航空母艦戰鬥群，至少需有 6 艘以上的核動力攻

擊潛艇，因此核動力攻擊潛艇的數量將會略微增加，而最新型的 093 G 級、095 級（或 097 級）核動力潛艦將會是主力。除先進魚雷外，解放軍水下兵力將普遍配備鷹擊 83 Q 型或俄製俱樂部系列潛射反艦飛彈；新型的 093 G 級核動力攻擊潛艇更可能配備垂直發射的鷹擊 63 型、18 型反艦飛彈或是對地打擊的長劍 10 型巡弋飛彈，解放軍潛艇具有多重的水面目標打擊能力與有限的對地攻擊能力。解放軍未來將積極克服其水下兵力運作噪音過大的弱點，這是中國與俄羅斯合作發展拉達級潛艇的理由之一。中國自製的絕氣推進系統已開始配置在 039 A 級柴電潛艦上，解放軍柴電潛艇能在海中停留更長的時間，伏擊能力大增。

解放軍海軍戰力的成長，採水面、水下與海航戰力同時升級，對我海軍構成全方位的威脅；重視遠距打擊能力，對我海軍構成大範圍的威脅；強調精準打擊能力，對我海軍高構成強度的威脅。可以預期在台海與東海艦隊南下或南海艦隊北上路徑範圍內，我海軍將面臨來自以數量優勢的解放軍飛彈快艇、護衛艦的飽和攻擊；我海軍遂行遠洋機動以求戰力保存或海上截擊，則易遭解放軍潛艦、驅逐艦與海航轟炸機的伏擊或圍殲。解放軍制海戰力的發展將迫使台灣轉向建置以以飛潛快為主戰戰具的洋面拒止戰力以為因應。

2025 年時，隨著中國軍力在質與量的快速增強，而台灣軍力發展相對緩慢，屆時，台海的軍力態勢將達到大幅失衡的懸殊狀態，中國以武促談、以武促統的手段將更為多元、更具威力，若台灣未有堅定的決心重振戰力，無法讓民眾對國防具有信心，中國的武力恫嚇的成功公算將會明顯增加。如果任由台海的軍力失衡持續擴大，無異鼓勵中國犯台，鼓勵中國鷹派人士以非和平的方式破壞台海和平共存的現狀，也鼓勵中國以強勢作為處理東海、南海領土爭議等區域安全問題，將使問題趨向零和，阻擾與複雜化台灣以和平的方式處置爭議。未來十年，台灣的國防安全將面臨極為明顯的險峻挑戰，為維持台海和平與台灣人民自由民主的生活方式，台灣無悲觀絕望的權利。謹提供中國對台軍事威脅之評估，便後續國防政策決策之參考。■

本頁空白

Forward

Taiwan's national defense has an important role in stabilizing cross-Strait relations. Taiwan's self-defense determination and capability have not only safeguarded the status quo of peaceful co-existence between people from both sides of the Strait, but will serve as the bedrock for Taiwan to pursue benign cross-Strait development. Taiwan's military power is defensive in nature with no intention of entering an irrational arms race with China. However, China's military continues to grow while its preparations for taking Taiwan by force never slow down. Taiwan must pursue stronger defense capabilities in order to deter China from solving cross-Strait disputes by efforts other than peaceful means, and to boost our confidence in developing cross-Strait relations.

Firming up our self-defense determination has to be more than just a slogan. One should fully understand that Taiwan's freedom and democracy are hard-won and difficult to maintain. Only by audaciously shouldering the responsibility and bearing the burden of national defense can all of us and our future generations continue to enjoy the fruits of freedom and democracy. As Taiwan's national defense faces dangerous threats in the upcoming decade, we must overcome a defeatism mentality because those who are willing to devote efforts will stand the test of time. Taiwan has the first-class talent and the capability for innovative research and development (R&D) in science and technology. These are the most fundamental capabilities for Taiwan's national defense. The government should improve the current situation of insufficient

defense budget allocations as soon as possible, so it could attract talent to contribute their R&D potential in science and technology. I hereby reiterate that our national defense budget should return to the level of 3% of GDP.

To establish Taiwan's self-defense capability requires a full understanding of the situation, instead of compiling a stream of watchwords. China's military threats against Taiwan have not only grown, but have changed in character. Taiwan must promptly adjust its national defense strategy, military strategy, and operational concepts. Only by yielding on a service parochialism and applying defense resources effectively can Taiwan diminish China's military threat. Taiwan's national defense must originate from the Formosan island itself: from the island's geographical conditions, socio-political-economic development, trends of China's military threats, to Taiwan's responsibility in maintaining regional security, we could find a path to establish "national defense development with Taiwanese characteristics." Based on the above-mentioned reasons, I believe that, be it "credible deterrence" or "resolute defense", Taiwan's defense priority should be to establish or refine these three critical capabilities:

(1) Strengthen the ability to protect the digital territory: Taiwan is a highly informationalized society. The digital territory is critical to the survival and development of our society. On account of China's constant cyber threats, Taiwan must strengthen its current national information security mechanism, endorse the legislations concerning critical infrastructure physical and information protection, support the indigenous information security

industry, and cultivate cyber security talent. Since the purpose of our national defense is "assisting disaster prevention and relief, safeguarding the security of country and people, and maintaining world peace," our armed forces cannot shy away from the responsibility of safeguarding the digital territory. The status of the Information and Electronic Warfare Command in the organization chart of the Ministry of National Defense should be raised in order to flexibly attract more information warfare personnel, to develop asymmetrical cyber operational concepts and equipment, and to strengthen the our defense frontlines.

The armed forces have the responsibility to safeguard and defend of our digital territory. The status of the Information and Electronic Warfare Command in the MND organization chart should be raised.

(2) Accelerate the indigenous production of submarines: With the continuous growth in the PLA's missile, air superiority, and sea control capabilities, Taiwan will confront an extremely serious threat in defending its maritime security in the future. Maritime security is Taiwan's last line of defense; if it fails Taiwan will lose any tenable defense position. In the face of the PLA's superiority in surface, underwater, and naval navigation, our navy must re-examine its development focus for the future: besides the rapid, stealth missile boats, submarines are the major platforms to deny the PLA's invasion fleet from crossing the Strait. Indigenous production has become the only choice for Taiwan to acquire submarines. Indigenous production of submarines should be initiated immediately and more proactively. I

propose a concept of "two-stage indigenous production of submarines," namely, conserving the integrity of the navy's current submarine forces on one hand while activating a long-term development cycle of ship design and R&D, critical equipment acquisition, testing and operation, and upgrade. We must maintain the submarine R&D momentum, increase the ratio of indigenous production, accumulate the quality of our shipbuilding workforces and technology, and strengthen the combat capabilities of naval sea denial.

Indigenous production of submarines should be initiated more proactively. The concept of "two-stage indigenous production of submarines," namely, conserving the integrity of the navy's current submarine forces on one hand while activating a long-term development cycle of ship design and R&D, critical equipment acquisition, testing and operation, and upgrade.

(3) Transform air capabilities: In the face of multiple threats posed by the high density and precision strikes of the PLA missiles, fighters and bombers, Taiwan's air capabilities must transform toward developing diversified platforms with reduced reliance on runway and logistics facilities and lowered risk of human casualties. Apart from continuing to support the upgrade of the current IDF and F-16 fleets and urgently seeking to procure advanced fighters from foreign sources, the indigenous production of advanced long-range unmanned combat air vehicles (UCAV) should be the priority, with the goal of extending temporal depth required for the recovery of operational capabilities of manned air fleets following PLA surprise strike. At the same time, we

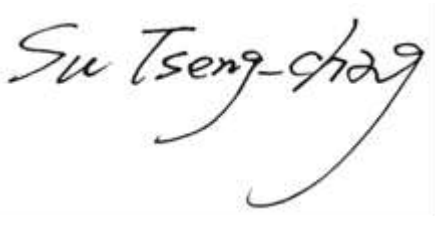
should initiate the medium- and long-term research programs for the indigenous production of next-generation fighters and the refinement of long-range precision strike munitions in order to develop advanced vertical/short takeoff and landing (V/STOL) fighters and to improve the accuracy of the existing long precision of existing long-range strike munitions.

Indigenous production of advanced long-range UCAV should be a priority. Medium- and long-term research programs for the indigenous production of next-generation fighters and the refinement of long-range precision strike munitions should be also initiated at the same time.

In the *DPP's National Defense Agenda* (published in June 2013), I clearly stated that we must "fully implement the combination of defense expenditure and economic development. The resource competition between defense expenditure and economic development must be changed conceptually and practically into a mutually reciprocal relationship. No economy, no defense: the economy and defense must be mutually reinforcing. We have to foster private industry investment in weapons R&D, encourage foreign partners to work together with local industries, and put the focus of future R&D on next-generation fighters, unmanned aerial vehicles, indigenous submarines, asymmetric weapons and cyber warfare." The DPP wants to be the catalyst in encouraging our indigenous defense industry to bolster our defense capabilities. Drawing on the examples of the defense establishments in other countries, we could say that military capabilities require the support of indigenous defense industries; otherwise, the combat

capability is a facade, lacking development potential, and in a zero-sum battle with economic development. In the future, the pursuit of "national defense development with Taiwanese characteristics," should be pragmatic about the trends of China's military threats against Taiwan and will be initiated from the laboratories and factories across the country.

Although the security environment is expected to be precarious in the future, the DPP will make the utmost effort to protect and to maintain freedom and democracy as a way of living for the people of Taiwan, and to shoulder responsibility for defending the nation. It is not only my personal belief, but also a shared belief among the DPP, the airmen, the skippers, the commanders, the project managers, the analysts, the factory managers, the engineers, and the technicians, that together we can find a way for Taiwan to thrive even in the face of the most dangerous environment.



President, the New Frontier Foundation

Summary

As China's comprehensive national power grows, the pace of its military buildup is accelerating. It is constructing long-range power projection capabilities, continuing its military preparations against Taiwan, hoping to vanquish Taiwan's people and forces without firing a shot. The policy of compelling negotiations and unification through use of force has not changed. As the military imbalance across the Strait grows wider by the day, hardening into a decisive military advantage, China's confidence about its ability to induce surrender using force increases accordingly. This state of affairs not only does not facilitate the peaceful coexistence of the two peoples across the Strait, but also creates tensions in the regional security dynamics.

The People's Liberation Army (PLA) attained the operational capabilities of responding to a Taiwan contingency in 2007, surpassed Taiwan's forces in quantity and quality in 2010, and continues working to secure decisive capabilities for a large-scale operation against Taiwan by 2020. Chinese research and development of military technology, driven by Beijing's determination and supported by massive investments of human and material resources, is gradually approaching maturity. The generational leap of the PLA's military capabilities will lead to the performance capacity of its weaponry greatly surpassing Taiwan in the next 10 years, posing an enormous and palpable threat to Taiwan's security. These threats include:

1. The incursions against Taiwan's digital territory by China's cyber warfare will endanger the functioning of Taiwan's society and the operations

of the government, and could cause tangible damage to critical infrastructure, leading to loss of life or property;

2. The growth in the number of Chinese missiles targeting Taiwan will gradually decelerate, but with the introduction of new types and models of missiles, the improvements to precision and diversification of warhead types will only increase, and will remain the first strike force that PLA forces will employ to coerce or to execute a swift and decisive victory to take over Taiwan;

3. The expansive range of the PLA's air defense missiles has already embraced Taiwan within a de facto air defense identification zone, and when the 5th generation fighters enter into service by 2020, the PRC will achieve clear airpower superiority over Taiwan, and control of the airspace over Taiwan's territory will become increasingly tenuous, as our national defense strategy of credible deterrence cannot be executed, and resolute defense will be challenging to sustain;

4. The PLA Navy is in the process of transforming itself into a modern, balanced fleet made up of surface, underwater, and carrier vessels, with the capacity to overpower Taiwan, confront Japan, and challenge the United States, such that Taiwan will find it difficult to assert sea control;

The Democratic Progressive Party has long held that a strong national defense is an indispensable element to preserving peaceful cross-Strait coexistence and safeguarding the free and democratic way of life of Taiwan's people. Overcoming the immense challenges that Taiwan's national security situation will face in the next ten years required a clear-eyed awareness and continuous monitoring of the threats posed by the PLA, as well as a wakeup

call to the self-defense determination of the people and an active promotion of defense buildup. In accordance with the evolution of the Chinese military threat toward Taiwan, we must adjust the direction of military development and operational concepts, seek a strengthening of military technology and self-reliance in the production of weaponry, and deter Chinese military aggression, to continue building toward the vision of "confidence by the servicemen, the people's trust in our defense, and assurance for our international friends."

1. Background

China has never been willing to give up taking Taiwan by force, and continues to expand its military capabilities against Taiwan. Taiwan's survival and development are at stake. In order to safeguard Taiwan's national security and plan for proper responsive measures, the Democratic Progressive Party (DPP) has been tracing China's military threat carefully, and the party's China Affairs Department published related analysis reports periodically. Since the department's *China's Military Capabilities Report, 2003* (released in January 2004), a lot of intricate changes have occurred in cross-Strait and international relations, but some remain unchanged: China's military capabilities continue to grow and increasingly threaten Taiwan. The cross-Strait military balance has shifted in China's favor and the gap has rapidly widened in recent years. To demonstrate that the DPP is a responsible political party which values national security and prepares to return to power, DPP Chairman Su Tseng-chang assigned the National Defense Policy Advisory Committee (Defense Committee in short) of the DPP think tank, the New Frontier Foundation, to conduct studies on China's military threat to Taiwan. In view of the need for a long-term threat assessment and extensive time for building up a defense capability, this report focuses on decennial evaluation of China's military growth in 2025, instead of using present time assessment as reference in the previous reports. This report also follows the guidelines of pluralistic participation in defense governance specified in the *DPP Defense Agenda,* the first DPP defense blue paper (released in June 2013), emphasizing "for dealing with increasingly complicated defense issues, the answers require coordination and integration across the traditional lines of civil-military, private-official, defense-diplomacy, and domestic-international." The DPP opened its door and learnt various opinions from different disciplines and countries. There were a total of 17 domestic participants and 3 American experts from military, information security, science and technology, and history fields offer their valuable insights in the process.

Our defense security was severely impacted by China's announcement of the Air Defense Identification Zone (ADIZ) over the East China Sea on November 23, 2013. On account of China's forceful advance and the KMT administration's weak response, DPP Chairman Su Tseng-chang instructed

at the Party's Central Standing Committee meeting on November 27, 2013, that concerning China's increasing military threat, the report of *China's Military Threats against Taiwan in 2025* (thereinafter *PLA 2025*) should be completed within 3 months, sooner than the planned release in mid-2014. The draft of *PLA 2025* was completed in February, 2014 and thereby reviewed by the Defense Committee as well as the Party's Policy Committee, the China Affairs Department, and the International Affairs Department. The unclassified version was released to the public.

2. China's Military Approach against Taiwan: "Dual Thrust of Suppression and Pacification (*Jiao Fu Jian Shi*)"

China remains unwilling to acknowledge the reality of Taiwan's independent sovereignty, and continues to amass its military capabilities against Taiwan. Despite an apparent thaw in cross-Strait relations in recent years, China still has not abandoned the option of taking over Taiwan by force and continues the military buildup for such a scenario. The *2013 National Defense Report* published by Taiwan's Ministry of Defense (MND) reaffirmed that "it is apparent that the PRC's thought on 'driving unification with military force' and military preparations against Taiwan were not adjusted as cross-Strait relations improved." In the present phase, Chinese military approach against Taiwan is comparable to the "dual thrust of suppression and pacification (*Jiao Fu Jian Shi*)" employed by the Qing Dynasty Kangxi Emperor in the 17th Century. On the one hand, it takes advantage of the current Taiwan government's excessively China-leaning policies to implement its "three warfares"-- psychological, legal, and public opinion warfares -- to construct a façade of peaceful development of cross-Strait relations that blurs the identity of the adversary for Taiwan's armed forces and dissolves Taiwan's will regarding self-defense, gradually altering the status quo in the Taiwan Strait to lure Taiwan into a "one China framework," and eventually succeeding in vanquishing the target without firing a shot. On the other hand, it continues to proactively pursue military modernization, strengthening its capabilities against Taiwan. Once the China's military preparations against Taiwan are complete, having achieved absolute superiority over Taiwan's forces, if Taiwan still refuses to accept unifications on China's proposed terms, then driving negotiation and unification with military force"

may be replaced by "compelling surrender after actual fighting".

Unconditional Surrender of Zheng's Regime

The Qing Dynasty adopted a dual thrust of suppression and pacification (*Jiao Fu Jian Shi*) to conquer Zheng' regime in Taiwan. Since 1662, The Qing had conducted 10 political negotiations with Zheng. The Qing's offer was as long as Zheng's regime agreed with hair braiding, a symbol indicating the acceptance of being China's sovereignty subject, other administrative matters such as Zheng's rule and its troops on Taiwan could be negotiable. On the other hand, Zheng's administration insisted on a special state-to-state relationship, a tributary protégé status similar to Korea: to concede and to pay tribute to China, but neither would accept hair braiding nor were Qing armies allowed to land on Taiwan's shore.

Due to insufficient military readiness, the Qing had no choice at first but to continue negotiating with Zheng's regime. However, as the Qing ruling power stabilized and the economy developed, the Qing government turned its strategic focus toward Taiwan. Not only had it broadened economic blockade on Zheng's regime, but, the Qing retained and exceptionally promoted Zheng's defected officers. A *Xiu-Lai* Office was established in Fujian, responsible by defected general Yao Qisheng, to induce turncoats, conduct "united front" propaganda and extensively absorb Zheng's troops. In 1683, Zheng's regime was weakened by political infighting, and the Qing military was ready to cross the Strait to attack Taiwan. Shi Lang, a defected admiral, led the conquest of Taiwan. In June, Zheng's navy was severely defeated decisive fleet battle around the Penghu islands and panic and chaos spread among the military and civilians in Taiwan. hi Lang conducted "compelling surrender after actual fighting" and resumed negotiations. The Zheng's regime accepted hair braiding but wished to maintain partial governance in Taiwan, but the Qing refused. In July, the Zheng had no choice but unconditional surrender.

In the 1990s, the People's Liberation Army (PLA) systematically studied the Qing Kangxi Empire's strategy against Taiwan (one of the classic examples is Ren Li's *The History of Kang Xi's Reunification of Taiwan*). During Taiwan's presidential elections in 1996, together with military intimidation against Taiwan, PLA launched extensive internal political propaganda about Kangxi's strategy. The scale of propaganda was so prominent that it caught Taiwan's attention. In 1997, former Chief of General Staff, MND, General Lo Pen-li ordered the Military Intelligence Bureau to conduct relevant historical studies to counter China's propaganda.

As China's overall national power grows, it seeks to build a major-power relationship with the U.S. as equals, expand its influence over regional affairs in the Asia Pacific, and enter into "co-management" of the

Pacific with the U.S. To achieve its China Dream, aside from its economic development, China is also intensifying its military buildup. One of the indications is the continued upward trend in China's defense spending. According to the U.S. Department of Defense (DoD) *Report to Congress on Military and Security Developments Involving the People's Republic of China 2013*, the China's officially published defense expenditures in 2012 were 106.7 billion US Dollars, equivalent to 1.74 times that of Russia in the same year, 1.84 times that of Japan, 2.51 times that of India, 3.65 times that of South Korea, and 9.88 times that of Taiwan. Over the past ten years (from 2004 to 2013), China's defense spending has increased at an average annual rate of 14.3%. If military research and technology development, weapon sales and procurement, and expenditures on the People's Armed Police, etc., were added to the published figures, the MND estimates that China's actual military spending is approximately two or three times the official published amount.

China's defense budget increase aims to support the construction of its long-range power projection capabilities, to define and protect its core interests, and to strive for great power status. For example, according to the three-stage scheme of the PLA Navy's power projection development, the first stage was to develop aircraft carriers and middle/long-range guided missile capabilities by 2010, in order to strengthen the defense of waters within the first island chain. The second stage is to expand control to the waters between the first and the second island chains by 2020. By 2025, the PLAN, center on aircraft carriers capabilities, would contest with the U.S. for sea command. The more complete China's long-range power projection capabilities become, the more forceful its foreign policy will be, and the more willing the military forces will be used to demonstrate its determination. Since 2010, China has started to flex its muscles in the territorial disputes over the Diaoyu islands and the South China Sea. In 2013, China further declared its sphere of influence in the air-sea area within the northern first island chain by announcing the ADIZ.

China's military buildup has far exceeded the need of operations over Taiwan. Taiwan is not the only target. However, Taiwan is absolutely needed for China to establish credible long-range power projection capabilities, to actually surpass the geographical restrictions of the first island chain, and to

become an equal power with the U.S. in the Pacific. At the hub of the first island chain, Taiwan not only means the "territorial integrity" and "national unification" for China, but is admittedly of strategic interest to turn the island as China's outpost base in the Pacific. As PLA Major General (retired) Peng Guangqian clearly stated: "Taiwan…is the strategic point for our country to break through the encirclement of the first island chain in the West Pacific to advance into the Pacific Ocean. The island is a strategic jumping point for offensive as well as the shield for maritime defense. If Taiwan splits from the map of China, we will not only suddenly lose our existing strategic defense depth of… but we will be forever trapped within the west side of the first island chain in the West Pacific." Therefore, Taiwan is the first and main goal of China's military buildup. As China's national power rises, Taiwan's strategic significance to China will increase and China's ambition and a sense of urgency toward Taiwan will be more evident. Respectively, the PLA officers who had Taiwan theater experience have maintained a high ratio of 30% within the Central Military Commission of the Communist Party of China (CCP) in 2007 and in 2012.

During the DPP administration, the *2006 National Security Report* issued by the National Security Council (revised in 2008) raised the following specific warnings regarding the China's military threat toward Taiwan: According to the guideline of military preparation against Taiwan issued after the legislation of the Anti-Secession Law in 2005 by Hu Jintao, then president of the People's Republic of China (PRC), the PLA "was required to attain the operational capabilities in responding Taiwan contingency, ...and to build warning strike capabilities by 2007. Longer-term aspirations included the goals of surpassing Taiwanese forces in quantity and quality, capable of large-scale joint strike and air/sea blockade against Taiwan by 2010, and, by 2020, of decisive capabilities in a large-scale operation against Taiwan (described in the MND *2013 National Defense Report* as 'comprehensive capabilities for using military force against Taiwan')." Since 2008, given the facts that China's military preparations against Taiwan have not slowed, the acceleration of the PLA military technology research and development (R&D), and some remarkable breakthroughs of the PLA major combat platforms, it should have already met its target of surpassing Taiwan's forces in quality and quantity by 2010. The current Chinese president Xi Jinping inherited

from his predecessor, Hu Jintao, the agenda of military preparations against Taiwan, and in 2013 directed the PLA to further accelerate its pursuit of military and force modernization to meet the objective of "swiftly winning long-distance battles and decisively prevailing in the first encounter," It is clear that the PLA's resolve to achieve decisive capabilities in a large-scale operation against Taiwan by 2020 has not changed.

The PLA's resolve to achieve decisive capabilities in a large-scale operation against Taiwan by 2020 has not changed.

Chinese military strategy remains based on the principle of "active defense," which emphasizes strategic defense and eschews provocative resort to force. However, as the development of is long-range power projection capabilities approaches maturity, this concept will acquire a new interpretation at the operational level: moving away from the previous, homeland defense-oriented postures geared toward luring the enemy inward, with increasing emphasis instead on pushing the strategic depth outwards. Once the decision of using forces is made, the PLA will seek to proactively seize the initiative, employing comprehensive tactics to win "a local war under conditions of informatization" as the objective. The PLA will choose the most advantageous timing, using both hard and soft kill weapons, to strike the enemy's field forces, command, control, and logistical support capabilities far from China's territorial borders, thereby blocking the opponent from entering China's zone of influence and thus from threatening China's territory. This concept has been generally described as "anti-access/area-denial" (A2/AD), and is in essence an offensive AirSea Battle. The conventional wisdom that China is carrying out its A2/AD requires strategic depth of 300 to 500 kilometers away from its borders. However, Dai Xu, a retired PLA Air Force (PLAAF) colonel and a military hawkish representative, recently hinted at even broader ambitions when he pointed out that in order to score a direct hit on U.S. forces stationed on Guam, China will need to have a strategic depth of 3,000 kilometers.

The Chinese buildup of A2/AD capabilities can help the PLA to overcome the two major obstacles that it would confront in the event of initiating military action against Taiwan: Taiwan's self-defense, and U.S. forces

coming to Taiwan aid, on the basis of the Taiwan Relations Act. Generally, the PLA uses the combat radius of its combat platforms and the range of its weapons to encompass Taiwan, such that Taiwan's fighters and naval vessels enter into its surveillance and strike zone upon take-off or leaving port, effectively gaining control of the sea and air space surrounding Taiwan and turning the Taiwan Strait into a China's territorial water. The PLA has regularized and intensified the frequency of air and sea patrols within this area. By creating a zone of influence, it constrains Taiwan's entire territory as well as the surrounding area into its "de facto ADIZ". Should China ever seek to threaten or attack Taiwan, the PLA's A2/AD capabilities would greatly increase the risk to American forces attempting to approach the Taiwan theater, which would lead to a significant delay in American decision making and increase the degree of difficulty for U.S. forces attempting to come to the rescue. This would prolong the span of time for the PLA to focus its efforts on breaking down Taiwan's resistance, to successfully coerce and invade Taiwan.

3. China's Military Technology R&D Has Driven the Generation Leap of the PLA Capabilities

Military technology R&D is part of the overall scientific and technological development of a country and closely related to a country's science level as well as its R&D efforts. With overall national power growing, China has increased the manpower and material resources available for its basic and advance scientific research, military technology R&D, and weapon development and production. Meanwhile, though multiple means of reverse engineering, technology theft, cooperative research and manufacture, and civilian-military dual use, China has deepened its basic and advanced scientific research, solves some bottlenecks in military technology

Through the approach of parallel development -- exploring a batch, pre-research a batch, building a batch and operating a batch -- China simultaneously conducts research, testing, manufacture and subsequent improvements and upgrade to weaponry of different generations and actively elevates its combat capability.

R&D, and accelerates indigenous weapon development and production. Through the approach of parallel development -- exploring a batch, pre-research a batch, building a batch and operating a batch -- China simultaneously conducts research, testing, manufacture and subsequent improvements and upgrade to weaponry of different generations and actively elevates its combat capability.

After China began importing KILO-class diesel-electric powered submarines (SSK), modern SOVREMENNY-class guided missile destroyers (DDG), SU-27 and SU-30 fighters from Russia in the 1990s, Chinese military's combat capacity greatly increased. On that basis, China embarked on a large scale research and production for its modern weaponry. Even though China encountered some bottlenecks of certain critical technologies and components, such as engine and radar systems for aircraft and ships, it continued to introduce newer weapon systems from Russia during the transition in order to narrow the gap of its combat capacity with that of the US's advanced weaponry. More importantly, the PLA accelerated its military technology R&D in an attempt to break though the current obstacle, and gradually moving from import and imitation to innovation and self-reliance in its weaponry. According to the evaluation of American scholar Andrew Erickson and Gabe Collins, China's overall ship-building capability in 2020 may reach the technical level that Russia had in 2013 and in 2030 achieve the American level in 2013. *PLA 2025* holds that China's overall military technology R&D as well as weapon development and production gradually demonstrated the achievements in the 2000s, are expected to become ripe in the 2010s. The PLA military technology level in 2025 may be within 10-year gap behind the U.S.

China's basic and advanced scientific research, military technology R&D and the indigenous weapon development and production that follow the guidance of the "Five-Year Plan for National Economic and Social Development" have had the country's overall planning, mobilization and support, as well as fully integrated private-sector resources. The eleventh Five-Year Plan for National Economic and Social Development (from 2006 to 2010, referred to as the 11th Five-Year Plan), in particular, emphasized transforming technological research results into military use and building up

a strategy that combines civilian-military dual use for the defense industry's development. In 2006, the PRC's State Council promulgated the "Outline for Mid/Long-term National Scientific and Technological Development Plan (2006-2020)", which pointed out that China government will actively engage in and fund five areas of basic and advanced scientific research which have potential for future military utility, namely material design and preparation, manufacturing under extreme environmental conditions, aviation and aerospace machinery and information technology R&D. In Hu Jintao's report at the CCP Seventeenth National Congress in 2007, he especially point ted out that China must establish and refine "the civilian/military fusion and spin-on oriented weaponry research and production systems" and resolve to aim at "adjusting and reforming the organizations of military technology R&D and weaponry procurement as well as strengthening innovation capability and quality of the indigenous weaponry." In 2008, China reshuffled the unit for military technology R&D by abolishing National Defense Science and Technology Industry Committee and replacing it with the Bureau of Defense Technology Industry, Ministry of Industry and Information Technology, which aimed at attracting private capital and technology to engage in military technology R&D and weaponry production, meanwhile, expanding and reforming state-owned military industrial groups in order to increase their competitiveness. During the Eleventh Five-Year Plan period, China made considerable achievements in the field of aerospace, information and underwater systems.

During the 11th Five-Year Plan (from 2006 to 2010), China's supercomputer, TIANHE-1 began its operation. With BEIDOU navigation satellite offering regional navigation service as well as the successive commissioning of Chinese JIANBING-5 (also referred to as YAOGAN-1) all-weather, 5-meter resolution reconnaissance satellite, FENGHUO-1 (CHINA SAT-22) tactical communications satellite, LEIDIAN electronic intelligence (ELINT) satellite, SHENTONG strategic early warning and communication satellite, and TIANLIAN communication relay satellite, the PLA greatly improved its command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) capability. CJ-10 (LONG SWORD-10) land-based cruise missiles (LACM) increased the PLA's long-range precision strike capability, while DF-31A intercontinental

ballistic missiles (ICBM) and JL-2 submarine-launched ballistic missile (SLBM) have served to improve China's nuclear deterrence credibility. The development of the PLA major aerial and naval platforms reached the peak during the period of 11th Five-Year Plan. As to warplanes and surface-to-air missiles (SAM), operational J-8, J-10, and J-11 (authorized replica of Russian SU-27) fighters as well as H-6 bombs (replica of Russian TU-16) were all under the fire control systems, radar systems, engineer, or electronic warfare (EW) systems upgrading programs. KJ-200 and KJ-2000 airborne early warning and control (AWACS) aircrafts entered service. The PLAAF's air-to-air capabilities gradually strengthened and caught up with Taiwan's Air Force. In addition, China's indigenous HQ-12 SAM commissioned and the naval version of operational HQ-9 (a Chinese license-produced version of the Russian S-300 SAM) was developed. The PLAN comprehensively upgraded its surface and underwater fleets, including upgrading the Type 052C (LANZHOU-class) DDG and commissioning Type 051C (LUZHOU-class) DDG, Type 054A (JIANGKAI II-class) guided missile frigate (FFG), 022 class stealth missile boat and Type 071 (YUZHAO-class) amphibious transport dock ships. In addition, PLAN commissioned the Type 039A (YUAN-class) SSK, Type 093 (SHANG-class) nuclear-powered attack submarine (SSN) and Type 094 (JIN-class) nuclear-powered ballistic missile submarine (SSBN). Meanwhile, the PLA not only continued developing and testing of anti-satellite missiles, DF-14 ICBM, carrier-borne J-15 fighters (a copy of Russian Su-33), J-16 fighters (a copy of Russian Su-30) and PTERODACTYL unmanned combat aerial vehicle (UCAV). Moreover, at the same time, the first aircraft carrier underwent reconstruction and Type 726 (YUYI-class) air-cushioned landing craft was tested. The research of J-20 fighter and Type 095 SSN was initiated.

During the 11th Five-Year Plan period, China's defense-related industry made significant progress, benefiting from China's rapid economic growth, the results of technology developments, and the reorganization of its military technology R&D and weaponry production structure. As an example, Huawei Technologies Co., Ltd., founded in 1987, is a networking and telecommunications equipment and services company with PLA background. In 2013, its turnover has surpassed Sweden's Ericsson, becoming the largest telecommunication equipment manufacturer in the world. Due to

its PLA background, Huawei has been a concern to the national security of many countries including the U.S., thus restricting its services and marketing. In the meantime, China has built up a strong foundation of manpower and resources in technology research. From 1998 to 2012, China tripled its total investment in technology research, making it the second only to the U.S. in technology research investment. China's total number of researchers (926,000 in 2012) also came in second, and its number of Doctors of Engineering surpassed the U.S. in 2010. Many international corporations have already established research centers in China, enhancing China's technology research levels by cooperative research and development, and importing advanced technology into the country.

2011 to 2015 is China's 12th Five-Year Plan period. Besides Hu Jintao's reassurance to "enhance defense technology industry's self-reliance, innovation capabilities" during the CCP Eighteen National Congress, the State Council has also issued "The Med/Long-Term Plan for Key National Technology Infrastructure Construction (2012-2030)" in 2013, as a concrete project to implement the 12th Five-Year Plan. The 16 priority research areas of basic and advanced scientific research include many items with apparent military technological potential and weaponry manufacturing implications. These items include long-term scientific sea floor observation networks that can be used to improve antisubmarine and underwater warfare capabilities, future Internet experimental facilities that can enhance information warfare abilities, and large low-speed wind tunnels that will provide a breakthrough in large military aircraft developments. *PLA 2025* anticipates that China will continue to make progress in various fields of military technology such as aerospace systems, information systems, and underwater systems. China will also establish four distinctive development characteristics: (1) developing long-range power projection capabilities corresponding to its military strategies, extending "altitude" (air), and "range" (sea), emphasizing aerial, naval, underwater, and informational weapon systems; (2) the development of larger-size, stealth platforms or unmanned aerial vehicles (UAV), precision weaponry, and digitalized commanding systems; (3) in order to bridge the gap between China and the U.S. military strength, China will closely follow the American progress and directions in military technology R&D to prevent the U.S. from gaining significant advantage in key fields of weapon de-

velopments; (4) while China's military technology R&D expands, the resistance for China to import advance weapons reduces, and by means of reversed-engineering or cooperative research or production, China solidifies its military technology R&D abilities, thus accelerating the generation-leap of its military power. During the 12th Five-Year Plan period, China has already or plans to obtain from or cooperate with Russia to develop more advanced weapon systems, including SU-35 fighters, LADA-class SSK, and S-400 SAM. China has also requested that European Union countries lift the arm-sales ban towards China, and also cooperates with American corporations to develop large engines that can be used for military purposes.

During the 12th Five-Year Plan period (2010-2015), after its operational weapon systems have been fully modernized, China has prepared for the next generation leap of enhancing its military power. In terms of C4ISR systems, the upgraded TIANHE-2 supercomputer has been fully operational. Nationwide satellite earth stations have been established; more military purpose satellites will enter service. JIANBING-10 reconnaissance satellite with enhanced ground resolutions will also be commissioned. CJ-20 (or KD-20, upgraded version of CJ-10 LACM) air launched cruise missiles (ALCM) will be commissioned and carried by H-6 bombers to further strengthen the PLA's long-range precision strike capabilities. The commission of DF-15C short-range ballistic missiles (SRBM) equipped with strengthened warheads poses a threat to Taiwan's underground command facilities. The DF-21D medium-range ballistic missiles (MRBM), also known as the "carrier killer", are China's primary weapon for its A2/AD operations. Although there are still questions about its accuracy on moving vessels, the PLA has deployed the missiles and will continue to test for improvements. The upgrades and renovations of various front-line aircrafts including J-8, J-10, J-11 fighters and H-6 bombers will be completed. J-16 fighters and PTERODACTYL UCAVs will enter service. The successfully tested J-15 fighters will be commissioned together with China's first aircraft carrier, the LIAONING. Type 056 (JIANGDAO-class) corvettes are commissioned. Type 039 (YUAN-class) SSK are undergoing hull replacement, and the Type 095 (SUI-class) SSN will possibly be commissioned by 2015. During this period, revolutionary next-generation aerial and navel weaponries such as J-20 fighters, J-31 fighters, XIANGLONG UAVs, and LIJIAN stealth UCAVs

have all been brought to testing. Type 052D (LUYANG III-class) DDG, LADA-class SSK (jointly developed by China and Russia), and Type 096 TANG-class SSBN are also under testing evaluations. The anti-satellite missile tests are also underway. China has also initiated the research of ultra-high speed space planes that have global striking capabilities and can penetrate air-defense systems, and the development of combat robotics. The PLA Navy has also initiated the design or constructions of its second and third aircraft carrier, Type 055 DDG, Type 054B FFG, Type 081 amphibious assault ship (LHD), and Type 097 (QIN-class) SSN.

With the generation leap pattern of China's military capabilities, some items that are currently under research stage, and most of the items that are undergoing testing will be on the production line by 2025 (the end of the 14th Five-Year Plan). These new weapon systems that will be likely commissioned include: a new generation of supercomputers, the BEIDOU navigation satellite system that has global positioning abilities with an accuracy of 10 meters, anti-satellite missiles, DF-41 ICBM, J-20 fighters, XIANGLONG UAVs, LIJIAN stealth UCAV, Y-20 transports, three aircraft carriers including the LIAONING, Type 081 LHD, Type 052D DDG, Type 055 DDG, Type 054B FFG, LADA-class SSK, Type 096 SSBN. J-31 fighters may be mass-produced and exported.

In 2025, when China's indigenous weapon systems will be close to the American standards, and with the assistance of imported advanced weaponry, the PLA's four critical capabilities in military actions against Taiwan, namely C4ISR, missile assault, air supremacy, and navel supremacy, will be significantly upgraded. The PLA's goal of building decisive capabilities in a large-scale operation against Taiwan by 2020 may be achieved.

4. Growth in the PLA's cyber, communication, surveillance and reconnaissance capabilities against Taiwan

Information and communications are the nerve systems of the nation and of the armed forces. In the military realm, information and communications measures have long been a prerequisite for the military to fully realize its organized combat capabilities, and can often become the decisive dif-

ference between victory and defeat. In the age of network-centric warfare, modern military operations and weapons systems are highly dependent on the information and communications systems, and these systems therefore constitute critical military assets. Assurance of information superiority can bring about force multiplier effects, and thus naturally become a high priority target for enemy forces. Information and communication systems can also become weapons applied toward "soft kill" tactics for delaying, dispersing, misleading, or weakening enemy forces. In the civilian realm, information and communications systems sustain the operations of the government, and is even more vital as a conduit for the functioning of the society and an essential necessity for the conduct of civil commercial activities. In such a highly informationalized country as Taiwan, the cyberspace forms by the interactions between multiple information and communication systems represents something akin to a "digital territory" that is intimately linked to the government structure, private sector entities, and the daily lives of each and every person. Any disruption to it would, at minimum, impact the rights and interests of individuals, business operations, and the provision of government services. A more extreme scenario would include paralysis of the financial, medical, transportation, electric, power, etc., systems, as well as the normal functions of critical infrastructure, even possible tangible damage potentially causing injury to or loss of property and life. In the information age, the survival and development of the nation relies on the existence of a secure and stable digit territory, and all government agencies including the military must jointly assume the responsibility for safeguarding the nation's digital territory.

PLA's Cyber Threat to Taiwan in 2025

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China is poised to have more impact on the world over the next decade than any other country. According to the U.S. National Intelligence Council, if current trends persist, modelling suggests that China will have the world's second largest economy (measured by purchasing power parity) by 2022. This measure is a telling indicator of the coming power shift in the global order; it also reflects the economic

strength of a pseudo-rising power that, according to the Taiwanese military, could have the ability to take Taiwan by force before the end of 2020. The range of estimates puts China's military spending at the equivalent of $185 billion (in 2001 dollars) to surpassing U.S. defense spending by 2025. In both cases, as a corollary to China's drive to become a world-class defense and dual-use technological and industrial power, Beijing has been making substantial investments in a military industrial complex to develop technologically-advanced capabilities to support its critical missions. According to Deputy Assistant Defense Secretary for East Asia David Helvey, "China is investing in not only capabilities to better defend their networks, but also, they're looking at ways to use cyber for offensive operations."

Cyberspace is persistently and rapidly evolving with contiguous advances in information technology, and high-speed, parallel computing. Cyber power can enhance disruptive capabilities across the land, air, sea, and space domains, and Chinese civilian and military leaders are moving toward integrating cyber capabilities across the spectrum of critical civilian-military functions and operations. A substantial portion of the Chinese People's Liberation Army (PLA) resources in planning and exercises are directed at Taiwan and contingencies related to it. Without a political resolution in sight, Taiwan is and will remain the primary driver of PLA operational strategy and training for the foreseeable future. In this context, the cyber domain will increasingly serve as a critical node in PLA's coercive strategy against Taiwan. As China's investments in developing capabilities and training in cyberspace grow over the next decade, this threat will also grow exponentially.

Predictions of a future threat are inherently a speculative endeavor. However, China's continued military build up and refusal to renounce the use of force against Taiwan, and Beijing's intent to use military force to compel unification on its terms, draw the line in cross-Strait rapprochement. Chinese assertiveness coupled with the PLA's increasing military capabilities reflects a willingness on Beijing's part to use military capabilities to further entrench its territorial and sovereignty claims. With the development of disruptive cyber capabilities and its broad applications to critical functions, this suggests the probability that the PLA will use its growing cyber-capabilities in a future Taiwan scenario and other scenarios as well. Moreover, assuming that present economic, political, and security trends in the Taiwan Strait continue at or above current pace. and the military balance continues to tilt towards China, the increasingly broad applications of cyberspace – from securing global financial transactions, to protecting critical infrastructures, and essential military operations – point to scenarios in which Beijing's leverage over Taiwan would enable it to coerce a resolution to cross-Strait disputes. In 2025, the cyber domain in the Taiwan Strait will increasingly be contested or denied. There are three trends that indicate that the PLA's cyber capabilities will be a significant threat against Taiwan by the year 2025.

China's state-led information and communication technology (ICT) industries will shift to becoming leaders in innovation and R&D capacity, and lead to greater PLA control over the ICT chain. Against the backdrop of China's drive to become a world-class defense and dual-use technological and industrial power, Chinese state-owned enterprises with links to the PLA have integrated aggressively within their own industries and related businesses across China and expanded operations

in the market. This trend could have the long-term effect of crowding out less competitive or non-compliant Taiwanese companies IT companies operating in mainland China, and make them more susceptible to PRC influences. China has been actively seeking to circumvent the constraints of existing networks and a breakthrough is likely within the next ten years with continued investment on research on wholesale alternatives to the existing Internet protocol. China's cyber security market will reportedly expand remarkably in the coming years, from a valuation of $1.8 billion in 2011 to $50 billion by 2020, representing a dramatic compound annual growth rate (CAGR) increase of 44.7%. The Chinese authorities could use Chinese market access as leverage to force the Taiwanese companies that build components and export them out of China to have to make them compatible with its IT protocols (i.e., WAPI). This would expose Taiwan and the international market to greater vulnerabilities to malicious hardware and software. Furthermore, the Chinese education system will likely produce a significant supply of domestic graduates in computer science (e.g., one U.S. government estimate puts China at 8,500 doctorates per year by 2025), which would supply the PLA's demand for cyber warriors.

Advancements in PLA capabilities across the spectrum of computer network operations would enhance China's coercive threat against Taiwan. The development of China's cyber warfare has captured worldwide attention. There will likely be an expansion of the target sets, for both computer network exploit and computer network attack activities. Additionally, while the traditional focus of Chinese cyber attacks has been on an adversary's government networks, the report stated that they have shifted their focus to civilian think tanks, telecommunications service providers, Internet node facilities and traffic signal control systems. China's development and military application of quantum computing technologies will allow the PLA to break sophisticated encryptions. For instance, current research projects that have been launched to develop quantum cryptology could come on-line within the next ten years and brake highly sensitive codes imperative for Taiwan's national security. Furthermore, future threats will likely arrive along multiple fronts. China can attack with a range of methods (e.g., social engineering, malicious insider, supply chain) against an array of interdependent layers with a diversity of effects on availability, integrity and confidentiality. The PLA can undermine critical infrastructure (e.g., energy, water, fuel), mission support services (e.g., banking, transportation, communications), and C2 and ISR systems. The PLA can directly attack mission systems — for example, via the computing capabilities embedded in air, space and cyberspace platforms. Finally, China can launch advanced, persistent threats, which can remain undetected in Taiwan's cyber systems for long periods of time.

Assisted by cyber espionage, the potential acquisition and reverse-engineering of known malware such as Stuxnet and Flame could enable Chinese hackers with government support to leap-frog development in even more destructive malware to exploit vulnerabilities in computer networks, exfiltrate information, and downgrade government and military computer systems and civilian infrastructure. Assuming a widening "cyber weapons gap" in the Taiwan Strait, this would enhance the PLA's coercive power over Taiwan. For instance, PLA analysts write about con-

ducting "information blockades" against opponents, which they refer to as "comprehensive countermeasures to block the enemy collection and exchange of information." Chinese military writing also pinpoints U.S. logistics, command and control, as well as C4ISR systems as centers of gravity to target in a future conflict over Taiwan, which would augment its overall anti-access/area-denial (A2/AD) capabilities.

Taiwan will increasingly face a very difficult trade-offs in being able to deal with China at the strategic level. China is the top state-based threat against Taiwan, but at the same time it is also the world's IT hub. Many of the tools that Taiwan has to push back against the Chinese are actually taken off the table because of the difficult trade-offs that come with strategically interacting with a country which whom is Taiwan's number one trading partner but also claims sovereignty over Taiwan. And the trend line out to 2025 is going to continue as China pursues its national innovation agenda and attempts to integrate Taiwan. For instance, China is moving from being an export processing zone of IT company to actually an innovation zone of IT components, and Taiwan's interdependence with them, in terms of the technologies that China imports from Taiwan and sells to the world, may gradually diminish.

While preparations by the PLA for a military invasion of Taiwan would be detectable with early warning signals and other cues, a coordinated cyber attack could be instantaneous, hard to predict, and thus preemptively counter. Given modern economies, governments' and militaries' increasing reliance on information technology and networked computing for critical functions—including military operations—a successful, targeted, and coordinated cyber attacks could alter the strategic calculus, and possibly determine the tactical landscape before a kinetic military operation. Taiwan and China have both invested a great deal in the development of disruptive cyber warfare techniques in order to gain an edge in cyber superiority, but the trend line appears to be in China's favor. Defense planning is increasingly being made under a resource constrained environment, and require careful prioritization and foresight by stewards of the defense relationship. Its import for national security appears to be a top priority in Taipei—but whether it is enough remains to be seen.

(Author's opinions expressed here do not represent the positions of his affiliated organization)

The frontline of Taiwan's national defense is no longer a geographic one made up by the outlying islands, but instead, the digital territory represented by cyberspace

The front line of Taiwan's national defense is no longer a geographic one made up by the outlying islands, but instead, the digital territory represented by cyberspace. For the PLA to attain the decisive capability in a large-scale operation against Taiwan by "swiftly winning long-distance battles and decisively prevailing in the first encounter," it will need to gain superiority in the information realm either immediately before or concurrently with initiating military action. The PLA's information warfare doctrine emphasizes comprehensive assault and unrestricted warfare. Once the decision is reached to coerce or take over Taiwan, it will first attempt to rapidly destroy or paralyze the information and communication capabilities of Taiwan's armed forces, as well as possibly inflicting disruption or damage to government, civilian, and economic or commercial targets in order to undermine public morale, thereby diminishing both the resolve and capacity for sustain military resistance. The readiness of China's information warfare capabilities is overseen by the National Leading Small Group for Information and Internet Security, led by the president himself, consolidating efforts of the military, intelligence, public security, and the information and communication industry sectors, and in which the PLA plays a central role. The PLA not only directed the R&D of the Tianhe-1 and Tianhe-2 supercomputers, greatly elevating its information warfare capabilities, it has also formed a "cyber army," made up of personnel from the military and civilian sectors combined. The General Staff Headquarters is responsible for offensive and defensive intelligence gathering efforts directed at information and communication systems of enemy forces and political targets. In addition, a command structure dedicated to cyber warfare is integrated in to each service branch and corps-level unit, and every military region includes a research center tasked with developing relevant operations or wargaming simulation related missions Among these is the Information Warfare Intelligence Research Center in the Nanjing Military Region, which is responsible for identifying and selecting Taiwanese targets of cyber-attacks, as well as filtering and intelligence analysis of the stolen data. The State Internet In-

formation Office of the National Defense Mobilization Commission is charged with recruiting and training civilian personnel, setting up auxiliary organizations, and conducting relatively lower-level comprehensive network attacks. The PLA Military Academy is in turn charged with recruiting higher-level information and communications technology talent, as well as collaborating with civilian universities or research organizations to jointly develop information technology hardware and core technologies. The PLA will also sponsor particular hacker attacks on the information networks of specific, sensitive targets. The PLA's capacity for cyber-attacks has long ago graduated from the low threshold of webpage replacement and advanced to social-engineer attacks, zero-day attacks, and other similar precision strike capabilities. It is also proactively developing capabilities to paralyze the operation of the opponent's critical infrastructure, penetrate highly secured network systems, and performing rapid decryption.

The instruments of information warfare are characterized by their ability to be hidden, counterfeiting, and difficult to identify, detect, or be dispatched. The initiator of the attack can thus evade responsibility, leading to rampant network attacks and the severity of the threat to the digital territory rising by the day. Taiwan's cyber networks withstand at minimum 200,000 incursions per day. Taking the external network of National Security Bureau as an example, in the three year period between 2010 and 2013, it was subjected to on average 10,000 instances of intrusion per day. According to data compiled by the Office of National Information and Communication Security of the Executive Yuan, the frequency of cyber security incidents requiring reporting and monitoring averaged 0.9 per day.

PLA 2025 incorporates the expertise of Ms. Chen Ru-fen and 14 other information security experts, including five with military backgrounds. Their overall assessment is that even in the national security sectors, the encryption-protected data is still under security threat, and the probability of network incursions targeting high sensitivity data remains high (See Table 1). The potential impact of cyber-attacks on the security of the critical infrastructure is such that the essential functions could be affected (See Table 2). The experts believe that the information and communication systems of the military are highly vulnerable and could be paralyzed if targeted by enemy

cyber-attacks. The projected level of the threat in 2025 will also be significantly more acute than the level in 2013 (see Table 3).

Table 1: Assessment Information Network Security of Taiwan's National Security Sector (NSC, NSB, MND, MOFA, and MAC)

	No Security Concern (Average score 0-0.9 points)	**Minor Security Concern** (Average score 1-2.9 points)	**Security Concern** (Average Score 3-5.9 points)	**Substantial Security Concern** (Average Score 6-8.9 points)	**Severe Security Concern** (Average Score 9-10 points)
2013 Status Quo	[redacted]			5.45	
2025 Projection				5.85	

No Security Concern = Low probability of data theft and/or destruction
Minor Security Concern = High probability of theft and/or destruction of unencrypted or unprotected data
Security Concern = High probability of theft and/or destruction of encrypted and protected data, but able to be rapidly detected and recovered
Substantial Security Concern = High probability of theft and/or destruction of encrypted and protected data, unable to be detected and recovered.
Severe Security Concern = High probability of theft and/or destruction of encrypted and protected data, sufficient to produce irreparable damage

Table 2: Assessment of Impact on Non-Military and Non-National Security Related Critical Infrastructure

	No Impact (Average score 0-0.9 points)	**Minor Impact** (Average score 1-2.9 points)	**Some Impact** (Average Score 3-5.9 points)	**Substantial Impact** (Average Score 6-8.9 points)	**Severe Impact:** (Average Score 9-10 points)
2013 Status Quo	[redacted]			**5.83**	
2025 Projection				5.72	

No Security Impact = Low probability of disruption to operations of critical infrastructure
Minor Impact = Partial disruption to operations of critical infrastructure, but no damage to major functions.
Some Impact = Partial destruction of major functions of critical infrastructure, but with ability to repair and recover.
Substantial Impact = Paralysis of main functions of critical infrastructure
Severe Impact = Paralysis of main functions of critical infrastructure, leading to significant loss of life and property

Table 3: Impact on Military Operations of the Armed Forces

	No Impact (Average score 0-0.9 points)	**Minor Impact** (Average score 1-2.9 points)	**Some Impact** (Average Score 3-5.9 points)	**Substantial Impact** (Average Score 6-8.9 points)	**Severe Impact:** (Average Score 9-10 points)
2013 Status Quo				6.48	
2025 Projection					7.08

No Security Impact = No impact on military combat operations, administration, or logistical support functions.

Minor Impact = Inconvenience to military administration or logistical support functions, but no impact on military combat operations.

Some Impact = Creates hindrance on ability to full utilize equipment, but not beyond the capability of repair and recovery.

Substantial Impact = Paralysis of military combat capabilities, with potential influence on outcome of conflict.

Severe Impact = Paralysis of military combat capabilities leading to swift defeat of armed forces.

The digital territory is also at the fire line of our national and military security. PLA information warfare activities are centered around the southeast region and the Nanjing military zone. The PRC utilizes Taiwan as a cyber-attack proving ground to test and accumulate information warfare techniques, using the experience gained from attacking Taiwan to then target other, western countries. Based on expert projections, a significant plurality of the attacks against Taiwan's digital territory originate from China (See Table 4). Though it is difficult to trace the precise source of a cyber-attack, the NSB was able to confirm that out of all of the incidents of cyber-attack against its external network, at least 3% emanate from the PRC.

Table 4: Sources of Threat to Taiwan's Information Security

Not Originating from PRC (Average Score 0-0.9 points)	**Minority Originating from PRC** (Average Score 1-2.9 points)	**Partially Originating from PRC** (Average Score 3-5.9 points)	**Majority Originating from PRC** (Average Score 6-8.9 points)	**Majority Originating from PRC Official Government Entities** (Average Score 9-10 points)
				8.71

Minority Originating from PRC = Majority originating from countries other than the PRC.
Partially Originating from PRC = Originating from PRC as well as other countries, with the PRC-based attacks not constituting a discernibly larger proportion.
Majority Originating from PRC = Majority originating from PRC-based private individual hackers as well as government-sponsored individuals or organizations, with the latter not constituting a discernibly larger proportion.
Majority Originating from PRC Official Government Entities = Majority of attacks originating from the PRC, with a plurality among those emanating from government-sponsored individual hackers or organizations.

Beyond providing the PLA with even more advanced information and communications capabilities, Chinese satellites also significantly enhance the PLA's precision-strike and A2/AD capabilities. It is estimated that by 2025, the combination of the FENGHUO- and SHENTONG-series communications satellites, the JIANBING- and LEIDIAN-series reconnaissance satellites, and the BEIDOU-series navigation satellites, will afford the PLA comprehensive, all-weather awareness over all activities and deployments of our forces, as well as the ability for guided missile strikes on our troops with ever greater precision, including seeking out and destroying our distant maneuver fleets.

In addition to satellites, the PLA is also expanding the deployments of land-based electronic surveillance and countermeasure facilities on its southeast coast. The density of over-the-horizon and early warning radar installations situated opposite the Taiwan Strait exceeds those trained on the newly-declared East China Sea ADIZ, clearly signaling intent to subsume Taiwan's entire territory within a de facto ADIZ. The PLA Navy has also set up anti-submarine underwater sonar monitoring systems in the East Sea Fleet's lane of attack toward Taiwan, and reconnaissance boats and marine surveillance ships now operate frequently in the surrounding waters, gaining familiarity with the operational environment in the Taiwan Strait and col-

lecting electronic data of Taiwan's weapon systems.

PLA Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C^4ISR)

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Development of a survivable and responsive C^4ISR system is a central People's Liberation Army (PLA) force modernization priority. C^4ISR systems reduce surprise, increase warning time, facilitate the sharing of information within an often stove-piped bureaucracy, ensure continuity of operations, and allow senior decision makers to make better-informed decisions. Although hardware is important in times of emergency, weapon systems are of limited utility without an advanced C^4ISR system. Success or failure in PLA use of force is likely contingent upon the quality of information available to commanders and the manner in which it is used. Looking horizontally beyond its immediate periphery and vertically into space, Chinese analysts view disruption of the U.S. ability to project conventional power to support alliance obligations and legal requirements under the Taiwan Relations Act (TRA) as a legitimate force modernization goal.

Command and Control: **The PLA is enhancing its ability to command and control forces that could be brought to bear in a future contingency. The CMC's peacetime conventional command and control system is centered today upon the General Staff Department (GSD), three other first level general departments -- General Political Department (GPD), General Logistics Department (GLD), and General Armaments Department (GAD – seven military regions, PLA Navy, PLA Air Force (PLAAF), and Second Artillery Force. This structure is not expected to change significantly between now and 2025. In a crisis situation, the CMC's peacetime command and control of conventional forces likely would transition to a joint task force structure, referred to as a Joint Theater Command (JTC). The form and substance of a contingency JTC appears to be flexible and scenario dependent.**

In a notional scenario, a CMC vice chairman, CMC member, and/or senior GSD and GPD authorities (eg, Deputy Chief of the General Staff and GPD deputy director) could serve as JTC commander and political commissar. Under CMC guidance, GSD likely would the principle organization responsible for overseeing the transition from peace to wartime command and control. A JTC staff could be centered upon the most relevant military region(s), with additional elements drawn from GSD, the other three general departments, and representatives from the Air Force, Navy, and Second Artillery. The primary mission of the JTC would be to plan and prepare for joint operations and exercise authority over national level PLA assets and corps-level components assigned to the JTC.

The CMC likely would likely augment forces within a military region through

apportionment of selected assets from throughout the PLA to the JTC and corps-level Navy, Air Force, and conventional Second Artillery component commands. Direct CMC oversight of and integration with the JTC ensures an orchestrated political-military strategy with access to party and state resources. JTC employment of national assets likely would be carried out via a primary JTC command center. The primary command center would be supported by reserve and rear command posts, and if necessary, a forward command post. The forward command post and the rear command post, which is responsible for logistics support, reports to the primary command center. The reserve post would assume duties as the primary command center if the latter is neutralized.

PLA writings indicate that the JTC's primary command and control center would be comprised of a subordinate communications center, firepower coordination center, intelligence information center, an information operations (IO) or electronic countermeasures (ECM) command center, and an operations support center responsible for meteorological and other functions. Representatives from the Navy, Air Force, and conventional Second Artillery component command likely would maintain coordination cells within the JTC command center.

Second Artillery, Air Force, and Navy component commands under the JTC would coordinate long range precision strike operations through the firepower coordination center. An intelligence information center theoretically would integrate and distribute sensor data, navigation, survey, mapping, and weather information. Joint IO/ECM center responsibilities may include oversight of collection and analysis of electronic reconnaissance, ECM planning, and operational deconfliction.

Nuclear and conventional command and control systems appear to be managed separately in both peacetime and wartime. The CMC likely would retain strict control over nuclear weapons in a crisis situation, rather than apportioning to JTC authority.

***Communications and Computers:* In a crisis situation, the PLA's peacetime telecommunications infrastructure would transition to meet JTF requirements. To support operations at increasing distances from Chinese shores, the PLA is investing heavily into advanced information and communications technology. JTC communications authorities, most likely overseen by the GSD Informatization Department, would leverage military and national civilian telecommunications infrastructure as needed to establish a joint operational command communications network to support the command structure. JTC communications centers likely would include representatives from the general departments, Navy, Air Force, and Second Artillery and as well as provincial telecommunications offices.**

The GSD Informatization Department is responsible for developing, constructing, operating, and maintaining a PLA-wide interoperable joint command and control communications system. Priorities include development and fielding of an Integrated Command Platform that correlates sensor data produced by GSD assets and distributes to joint and corps-level component commanders. Sensor data produced by corps-level component units likely would contribute to a common operational picture. In addition, Navy, Air Force, and conventional Second Artillery units maintain independent communication systems in peacetime that likely would be interoperable with a JTF in a crisis situation. The CMC likely maintains a separate

communications network reserved for nuclear command and control.

At the tactical level, the PLA appears to be applying principles of network centric warfare to communicate and correlate data from increasingly sophisticated sensor architecture. A tactical network may allow for dispersed and flexible operations at lower cost. The introduction of a common tactical picture, based on an advanced tactical data link program, could be a paradigm shift that could gradually break down the PLA's traditionally stovepiped approach to defense. The effectiveness of such a system may depend upon the level of political control imposed on tactical commanders and trust in individual operators.

In addition to static infrastructure of fiber optic cables, line of sight microwave and tactical radios, the PLA has been investing in the development and production of dedicated military communications satellites. Broadband satellite communications enable transmission of high volumes of data from sensors to a wide variety of users at increasingly extended ranges from China's periphery.

Intelligence, Surveillance, and Reconnaissance: **The PLA's C^4ISR system also includes ISR assets that would support operations against targets operating in the land, maritime, and space domains. The PLA's ability to strike mobile targets is likely bounded by the range of its persistent surveillance. To expand its battlespace awareness, the PLA is investing in space-based, airborne, and surface-based sensors that could enable monitoring of military activities in the Western Pacific, South China Sea, and Indian Ocean. In a contingency situation, sensor data from a range of platforms likely would be correlated or fused within a JTC intelligence information center. Theoretically, the center could task satellites and airborne platforms and other collection assets, analyze information, and ensure a JTC leadership maintains situational awareness.**

The PLA is fielding increasingly sophisticated space-based electro-optical (EO), synthetic aperture radar (SAR), and electronic reconnaissance (ELINT) satellites. Space-based systems expand the PLA's battlespace awareness and support strike operations further from Chinese shores. GSD most likely drives requirements and leverages the data produced by space-based sensors. Space assets enable the monitoring of naval activities in surrounding waters and the tracking of air force deployments into the region. A constellation of small SAR and ELINT satellites could provide commanders with geolocation data on mobile targets. In a crisis situation, China may have the option of augmenting existing space-based assets with microsatellites launched on solid-fueled launch vehicles. Satellite communications also offer a survivable means of linking sensors to strike systems, and will become particularly relevant as PLA interests expand further from Chinese shores. Existing and future data relay satellites could transmit targeting data to and from command centers.

Airborne ISR assets include increasingly advanced and diverse range of unmanned aerial vehicles (UAVs) operated by GSD, Navy, Air Force, and Second Artillery. The Air Force and Navy also operate manned peacetime aerial reconnaissance aircraft. Beyond satellites and airborne ISR platforms, the PLA appears to be assessing the feasibility of "near space" flight vehicles equipped with EO, SAR, and ELINT sensors. Near space flight vehicles, operating at the upper extremes of the atmosphere, may emerge as a dominant platform for a persistent regional wide

surveillance capability over the next decade.

In addition to space-based, near space, and airborne sensors, PLAAF radar brigades comprise a large air surveillance network, including at least one over the horizon (OTH) "skywave" radar system that monitors air and maritime activity out to 3000 kilometers.

In summary, the PLA is engaged in a comprehensive modernization campaign that seeks to improve war fighting capabilities and overcome military deficiencies across the force. The development of C4ISR systems is an integral part of the PLA's modernization program. Areas of particular emphasis include the development of C4ISR capabilities supporting the PLA's family of long range precision strike assets for operations against targets operating in the land, maritime, and space domains

(Author's opinions expressed here do not represent the positions of his affiliated organization)

5. Qualitative changes in PLA's missile strike capabilities against Taiwan

In this section, missile strike is defined as the PLA's attacks on our political and military facilities with ballistic or cruise missiles. China's missile strike capabilities against Taiwan have undergone a period of qualitative changes. In the past, the PLA focused on missiles coercion with an emphasis on quantity. In the future, the growth in the quantity of missiles will decline, but the strike capabilities will continue to rise due to the upgrade of ballistic missiles with high-precision and high-lethal warheads, and the replacement of ballistic missiles by cruise missiles. In addition to coercion, the PLA missile strikes will be more counterforce-oriented, and become the first-strike capability needed to achieve swift and decisive victory.

The PLA's missile forces against Taiwan have undergone a qualitative change, from coercion implication and emphasis on quantity to a counterforce-oriented, and precise guided first-strike capability. In the future, the growth in the number of missiles will decline, but the strike capabilities will continue to rise.

There are land based and submarine launched ballistic missiles. The SLBM, ICBM (often with a minimum range of more than 10,000 kilome-

ters), and IRBM (with a range of 3,340 to 10,000 kilometers) are primarily designed to deliver nuclear warheads and are considered as strategic weaponry. MRBM (with a range of 1,670 to 3,340 kilometers) and SRBM (with a range of 1,670 kilometers or less) could carry either nuclear or conventional warheads. The ballistic missiles that China would use to attack Taiwan are mostly conventional SRBM (MRBM are mainly targeting the US bases and forces). The SRBM arsenal is mainly deployed to the military region in Nanjing and the east side of the military region in Guangdong, and consists of 40% of all missile forces. The intended target of these deployments is plainly evident.

During the Taiwan Strait missile crisis in 1995-1996, there were around an estimated 40 conventional SRBM that China deployed. In 1999, according to the MND, there were 120 SRBM aimed at Taiwan. Until 2000, the PLA rapidly increased the missiles deployment against Taiwan. The MND and the U.S. DoD began providing regular estimate the numbers of missiles in their national defense reports or the annual reports on military power of the PRC (See Table 5). According to the DoD, counting only the numbers of SRBM, the numbers of SRBM that China aimed at Taiwan before 2009 has steadily increased from 11% to 46%. There was also an estimated annual increase of 150 missiles. After 2009, the growth of missile numbers has slowed down or shown zero growth. The numbers that our MND estimated were overall identical with the DoD's estimation. It does not suggest that China no longer determined to increase its missile threat to Taiwan. It means that the PLA has moved on because the quantity effect of coercion has reached saturation. The PLA has begun upgrading and replacing the missiles in service to make the arsenal more powerful overall. There was also intensive inland test-firing to develop or to introduce a new generation of missiles.

The DF-11 (300 kilometers range) and the DF-15 (800 kilometers range, used in test-firing during the missile crisis) are both SRBMs commissioned in the 1990s. Both were once the main force of the PLA's missiles deployment against Taiwan. The level of precision (CEP) was as low as 0.2% of the practical range (600 and 1,600 meters, respectively), and they could only aim at soft (civilian) and area military targets. By 2025, they will

be gradually decommissioned when further upgraded versions and new types of missiles are commissioned. *PLA 2025* estimates that around 1,400 SRBMs will be deployed against Taiwan by 2025, with an increase of 300 than in 2013 (based on the DoD's figures). The main force will be DF-16 (with a range of 800 to 900 kilometers and possibly multiple warheads), DF-15B (with a Global Positioning Satellite system), and DF-11D (with a Global Positioning Satellite system). They will all potentially have the accuracy of 0.1% of the practical range (approximately 800, 800, and 300 meters). A few deployed DF-15Cs (with a range of 600 kilometers) were mainly used to deliver special warheads in order to deal with various specific targets. Besides the conventional high-explosive warhead (designed to damage building structures) and the fragmentation warhead (designed to have lethal impact on personnel), there have also been the penetrating warhead (designed to penetrate hardened targets such as bunkers), the delayed submunition warhead (designed to target the airbases), the graphite carbon fiber-resin (designed to scramble electric facilities), and the continuous rod warhead (designed to devastate assembled troops, aircrafts, and ships), etc. The DF-2 (with a range of 300 kilometers) has terminal maneuverability and would be used to break through Taiwan's Patriot missile defense system. The PLA's new generation SRBMs have a higher level of precision, and some even have primary functions in countering missile defense systems, will be able reduce the missile number needed to destroy the targets.

For the PLA, it takes 40 minutes to be ready to launch SRBMs after arriving the launching site. This preparatory phase will be hard to be detected in advance unless intensive human intelligence and real-time technical intelligence are in operation. It takes approximately 7 minutes for the fired missiles to reach the targets in Taiwan, and our warning and reaction time is about 5-6 minutes. Under saturation strike, the maximum number in one wave of missile attack may exceed 120. Even by 2025, our Patriot missile defense systems will still not be able to have the capacity to fully intercept them. Some of the attacking missiles will penetrate our missile defense and successfully hit the desired targets. According to estimates, it may take the PLA 3 to 6 missiles, with appropriate choices of warheads, a runway. Although our air force bases generally have adequate protection and equipment for rapid runway repair, one short-range ballistic missile with an explosive

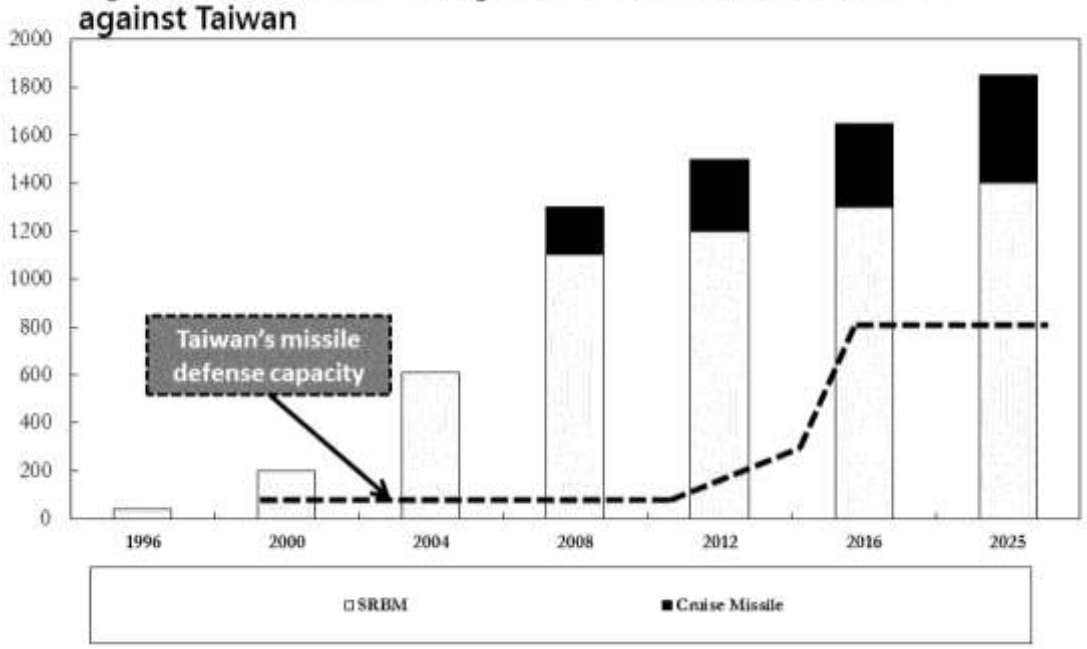
warhead can cause a hole of 20 meters by 30 meters in area and 12 meters in depth, and will take more than 1 hour to fill up and finish the repair. After the first launch, it takes about 40 minutes to load another missile at the same site, so the PLA has enough time to strike again before our troops can finish the runway repair.

Table 5: Estimations of PLA Missile Forces against Taiwan

	MND (or NSC) estimations	DoD estimations
1999	120	--
2000	200	--
2001	--	--
2002	--	350 (annual growth: 50)
2003	--	450 (annual growth: 75)
2004	610	500
2005	--	650-730 (annual growth: 100)
2006	784	710-790
2007	--	900
2008	1300 (MND, including cruise missile) 1400 (NSC, excluding cruise missile)	990-1070 (annual growth: 150)
2009	1300 (including cruise missile)	1050-1150 (annual growth: 100)
2010	--	1050-1150
2011	1400 (including cruise missile)	1000-1200
2012	--	1000-1200
2013	1400 (including cruise missile)	1100

The CJ-10 long-range LACMs started to be deployed since 2008. The operation range is 1,800 kilometers with the accuracy between 20 to 50 meters. As a great tool for long-range precision strike, the traits of the CJ-10, such as its small radar cross section (RCS), low heat emission, and low altitude flying, enable it to escape radar or infrared detection. It will be used to aim at our high-value military assets, such as command and control facilities and the radar stations. The surface-to-air CJ-20 (or KD-20) will be carried by the H-6 bomber to attack the targets on the east coast of Taiwan. *PLA 2025* estimates that there will be 450 CJ-10-series cruise missiles in service by 2025, 250 more in 2013. With the increasing numbers of the SRBM added on, China is estimated to have about 1,850 missiles against Taiwan by 2050, 450 more in 2013 (based on the MND's figures (See Figure 1).

Figure 1: Estimation of the growth of the PLA missile force against Taiwan



6. The PLA overtakes Taiwan in air superiority

Taiwan's air superiority capabilities is vital to maintaining deterrence against Chinese invasion: when the PLA's capacity for control of the airspace clearly begin to surpass that of Taiwan, the PLA will gain more confidence to take military actions against Taiwan. If Taiwan's "credible deterrence" fails and "resolute defense" cannot be sustained, the failure will be a direct consequence of the loss of air superiority. U.S. defense expert David Shlapak once assessed that if the PLA conducts a rapid strike against Taiwan's Air Force and seizes air superiority, it will greatly undermine the US's will to intervene as U.S. forces would have incur great risk to salvage a situation that is almost irretrievable.

If Taiwan's "credible deterrence" fails and "resolute defense" cannot be sustained, the failure will be a direct consequence of the loss of air superiority.

Fundamentally, the PLAAF has always possessed quantitative superiority over our air force, while we sought to preserve qualitative superiority to

neutralize the PLAAF's numerical advantage; this was the model Taiwan used to maintain air superiority in the past. In the 1980s, although the PLA had 3,900 fighters, about 500 were deployed within the range of strike Taiwan, and even the then-latest J-7 fighter's performances were far inferior to the F-5E, which the Taiwan's Air Force actively worked to improve. Beyond the better performances of the aircraft, the Taiwanese pilots' had more training hours and better combat skills. Moreover, the high density of Taiwan's SAM deployment constituted an even bigger obstacle to the PLAAF invasion. Throughout the 1990s the PLA possessed roughly 4,000 fighters, but most of them were the aged J-5, J-6 or J-7 types, even if they were refined or upgraded, and only a few J-8 or SU-27 fighters' performances could compete with the fighters fielded by our air force. After 1996, although the combat air patrol (CAP) line shifted back from China's coastline to the centerline of the Taiwan Strait, control of the airspace from the centerline eastward remained firmly in Taiwan's hands, and the challenges to a PLAAF's invasion was the same as in the 1980s. After 1996, the Taiwan's Air Force underwent the program of the Second Generation Forces Reconstruction. In addition to the domestically-made indigenous defense fighters (IDF) as well as the introduction of MIRAGE-2000 and F-16A/B fighters, we also began to field Patriot missiles, the balance of airpower in the Strait to continue in Taiwan's favor from the 1990s to the mid-2000s. However, since the Second Generation Forces Reconstruction, Taiwan's air capabilities have not been further elevated apart from the introduction of AIM-120 advanced medium-range air-to-air missile (AMRAAM) in 2003 and the upgrade of the IDF around 2009.

During this period, the PLA not only expanded its J-8 and SU-27 fighter fleets, but also later introduced the domestically developed and produced J-10 as well as the foreign-procured SU-30. The SU-27, SU-30 and J-10 fighters are functionally comparable to the F-16 A/B fighters flown by Taiwan's Air Force. The SU-27, SU-30 and J-10 all have extensive combat radiuses. That is, even if these aircraft are stationed in the inland rear airbase of the Nanjing Military Region, they are still able to launch attacks on the eastern part of Taiwan, overturning distinction between the frontline and rear area that Taiwan's military has traditionally believed. In addition, the PLAAF adapts a force rotation system, giving air fleets from every PLA mil-

itary region the chance to be stationed in the base facing the Taiwan Strait in order to familiarize themselves with the Taiwan Strait airspace and to be able to offer assistance in the case of wartime deployment. This ensures that, in event of a Taiwan contingency, PLA's air dominance will not be limited to the air fleets stationed opposite Taiwan (according to DoD's 2012 estimates, there were roughly 310 fighters deployed by the PLA in the area). Meanwhile, the quantity and quality of the PLA's missiles against Taiwan have improved with time, representing an acute threat against our command and control systems, air bases, and air defense systems that intends to neutralize the air superiority capabilities of Taiwan's Air Force on the ground. On top of that, the deployment of the S-300 series long-range SAM stationed opposite Taiwan, the entering into service of the KJ-series AWACS aircraft and anti-radiation UCAV, and improvements in pilot training, etc., have all contributed to the deterioration and reversal of the previous air superiority held by Taiwan's Air Force. A broad assessment estimates that the balance of capabilities between Taiwan and China's fighters was still in Taiwan's favor in 2004, but that the situation had begun to reverse by 2006.

The 2010s will be the era in which the "fighter gap" between China and Taiwan looms. In addition to continuing upgrades and expansion of the existing J-8, J-10 and J-11 fighter fleets, the J-15 carrier-based fighters, which has equivalent performance specifications, and J-16 and SU-35 fighters will soon enter into service. Older aircraft will also gradually be retired, while the quantity of 4th-generation fighters will surpass that of Taiwan's Air Force. Simultaneously, the H-6 bomber equipped with the CJ-20 (KD-20) ALCM (with a range of over 1500 kilometers) can be worked with ballistic missiles to form complementary high/low combined strikes against Taiwan's air bases. At the same time, the point-target strike capability of the CJ-10 LACM represents a major threat to our command nodes and critical radar and communication stations. Moreover, with the more than 300 Harpy UCAV purchased from Israel already in operation, the PLA can now trace and strike Taiwan's air defense radars and missile sites. The Pterodactyl UCAV will also soon be entering into service, and can be utilized to interfere with our air defense systems.

In 2011 Taiwan embarked on a program to upgrade the F-16A/B

fighters, but even if it proceeds smoothly, the earliest possible completion date will not be until the mid-2020s, and the upgraded functions will be comparable to the 4.5-generation SU-35 fighters. But by the 2020s, if Taiwan has yet to introduce newer aircraft, the J-20, which is purportedly a 5th-generation fighter with stealth capabilities (with continuous minor improvements approximating 70%-80% of the performance the U.S. F-22 fighter) will then be in service, leading to a qualitative shift in the balance between China and Taiwan's air capabilities. Once the J-20 is operating in conjunction with the main force J-10 and J-11, the combat capabilities of China's fighters will unquestionably surpass those that of Taiwan's.

Other than the advancements in fighters, another phenomenon worth noting is the shift in the deployment of and the concept around the China's SAM. SAM has been one of the bottlenecks of China's military technology R&D. In spite of copying missiles imported from Russia, the performance and reliability of the resulting product lagged far behind the Russian systems. During the 2000s, the PLA introduced the Russian S-300 PMU2 long-range SAM with the range of 200 kilometers and deployed them opposite Taiwan. The S-300 PMU2 can reach as far as Taoyuan and Hsinchu areas in Taiwan, meaning that the scope of PLA's air defense capability overlaps with Taiwan's airspace. Not only that, but its powerful radar tracks Taiwan's fighters carrying out CAP missions in the Strait, exerting pressure on our pilots. Within the next several years, the PLA will introduce the newer S-400 SAM, which has probably 400 kilometers range with a more powerful radar system and electronic-counter-countermeasure (ECCM) capability, and claims to be able to effectively detect the enemy's stealth fighters. Once the 400-kilometer-range variant of the S-400 is deployed, Taiwan's entire territory will be encompassed within its operational range, with full targeting intent. This will alter the current defense-oriented concept of air defense operations by compressing Taiwan's surrounding sea and airspace into an undeclared, de facto ADIZ. The S-400 will thus become an extremely effective instrument of military intimidation and offensive operation.

China's "Offensive" Air Defense

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Over the last decade China's People's Liberation Army (PLA) has revolutionized its ability to conduct anti-aircraft operations by importing advanced Russians systems and absorbing Russian technology into indigenous systems—for both ground and naval applications. By the middle of the last decade this gave the PLA an "offensive" advantage over Taiwan inasmuch as new surface-to-air missiles (SAMs) could reach across the Taiwan Strait. New SAM systems expected by the end of this decade will be able to reach far beyond Taiwan and have far better "anti-missile" capabilities. Absent a response, Taiwan's air defenses and missile deterrent will face far greater stress.

Until the early 1990s the PLA's primary SAM was the HQ-2, a copy of the Russian S-75 (SA-2), developed in multiple versions with about 10,000 reportedly produced with about 1,000 launchers. These downed several Taiwanese reconnaissance aircraft in the early 1960s, including five very high altitude U-2s flown by Taiwanese pilots. While China has sought to update its radar and guidance systems undermined by modern Western countermeasures, it remained limited by its 35km range. When Russian weapons became available in the early 1990s acquiring new SAM technology became a top PLA priority.

Russian Triple Digits: There is a good reason why the United States Air Force has not fought against a country armed with modern SAMs from the Russian Almaz-Antey S-300 family: the losses would be prohibitive. It is the manner in which these missiles employ almost impossible to jam active phased array radar, plus the later addition of active-guiding radar in the missiles themselves, which makes this generation of SAMs so deadly. So far the PLA has acquired at least 55 "batteries" of S-300s, meaning about 220 launchers, with four SAMs each and at least one reload, could mean at least 1,760 missiles. The latest S-300PMU-2 with the 48N62 missile can reach out to 200km and has a limited anti-tactical ballistic missile capability.

The PLA has also placed a very high priority on acquiring the next-generation S-400 SAM, which has a 400km range. However, this SAM is just starting to enter Russian units and its sale to China is tied up with much larger Russian commercial goals, though its sale to China is expected before the end of the decade.

Russian enabled Chinese SAMs: Almaz-Antey has so far managed to satisfy Chinese demands for SAM technology while committing sales funds to advanced technology development—so Chinese SAMs do not soon compete with Russia's. This has allowed China to develop two new SAMs. The HQ-9 is based on S-300PMU technology but its missile only has a 125 to 150km range, with reports that an upgraded 200km range HQ-9B may emerge. The HQ-9 is deployed by PLA Air Force units, while the HQ-16A is subordinate to PLA Army air defense units. Largely based

on the Almaz-Antey Buk M-2, the HQ-16A has a 45km range and is deployed to at least four Group Armies.

Naval SAMs: Both Russian and Russian-enabled SAMs have given the PLA Navy one of the most formidable air-defense capabilities among Asian navies. Starting with the acquisition of the four *Sovremenniy* class destroyers the PLA Navy gained its first medium-range SAM in the *Uragan* (SA-N-7) naval version of the Buk and the more advanced *Shtil* (SA-N-17) on the two Type 052B destroyers. The HHQ-16, a naval variant of the HQ-16A derivative of the *Shtil* is used on 20 or so Type 054A frigates. The PLA Navy purchased the *RIF-M* naval version of the S-300PMU for its two Type 051C destroyers and uses the HHQ-9 naval version of the HQ-9 on its six Type 052C and estimated 12 Type 052D destroyers. When the later are deployed, the PLA Navy will be able to deploy about 2,000 modern SAMs.

BMD and ASATs: In programs to build much longer range SAMs, China is also working toward building a robust national ballistic missile defense (BMD) system as it works to develop Low and Medium Earth Orbit anti-satellite (ASAT) systems. There is at least one 400km range SAM program underway, sometimes called HQ-19. It will likely also have a naval variant.

China's ASAT and BMD programs likely extend back to the early 1990s. While the early ASAT, called SC-19 by the U.S. was tested successfully in January 2007, a missile interceptor version of this system was tested in 2010 and in 2013. In May 2013 China tested what some U.S. officials regard as a Medium Earth Orbit ASAT system intended to intercept U.S. navigation satellites. Some Chinese sources also mention a future "DF-27," a potential Second Artillery controlled ASAT/missile interceptor/space launch vehicle. And then there is the General Armaments Department-controlled *Kaizhou* space launch vehicle, first tested in September 2013, based on the DF-31 ICBM and which could also perform interception missions.

For Taiwan the PLA current SAM forces will not only help enforce an air and sea blockade but will also prevent Taiwan's air and missile forces from conduction retaliatory strikes, thereby diminishing the investments Taiwan is making in these capabilities. Over the longer term, as the PLA develops more effective anti-satellite and strategic ballistic missile defenses, it will undermine the strategic deterrent capabilities of the United States, and with it, the U.S. ability to deter conflict in Asia, especially on the Taiwan Strait.

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7. PLA's sea control capabilities surpasses Taiwan

Taiwan is an island nation surrounded by ocean on all sides. Its trade activities are heavily dependent on sea-based transportation, and its primary loading facilities are concentrated on the west coast, making this a vulnerability. Sea blockade has always been projected as potential scenario of Chi-

nese intimidation against Taiwan. In the event that China invades Taiwan, maritime defense will be Taiwan's last organized defensive line; if neutralized, the PLA will be able to capture main harbors such as Taipei, Taichung, Zuoying, Kaohsiung, Suao, and Hualien. Harbors are crucial to landing operations, since only its loading capacities are sufficient to sustain landing forces' impediment, supplies and reinforcements. If the above-mentioned harbors are captured, the PLA's large number of ground forces will flood into Taiwan from those access points. Sea control is therefore a key agenda in the generation leap of the PLA's military capabilities. The PLAN has gradually transformed from its previous green-water navy (aircraft, submarine, and fast attack craft) to a more balanced fleet that includes modernized surface vessels, submarines, and sea transport vessels. These are the indicators of China's power projection, which is enough to overpower Taiwan, confront Japan, and challenge the U.S. The PLAN's development in sea control capabilities will neutralize our navy's maneuver operation on the high seas and naval interception operation, and will limit Taiwan's naval defenses to littoral sea denial.

China has developed a modernized, balanced naval force which is enough to overpower Taiwan, confront Japan, and challenge the U.S.

The PLAN restructured and made adjustments to the surface vessels in three of its fleets in 2012. The PLAN is made up of six destroyer divisions, three frigate groups, and one South China Sea patrol squadron. In addition, China's coast garrison division includes several mine-hunter, missile boat, and minesweeper groups. These adjustments were made to accommodate the modernization of naval vessels, assigning old vessels to corvette groups and focusing on offshore defenses with smaller vessels. Modernized vessels were evenly assigned to the six destroyer divisions, the main function of which will be to conduct strike missions. The current destroyer divisions are basically combined with four DDG and four FFG. However, judging from China's continuing construction of type 054A FFG, there will be two destroyer divisions that will be expanded to a combination of four DDG and six FFG, besides the current sixth destroyer division of the East Sea Fleet.

Parallel to the trends in Chinese missile deployment toward Taiwan, the PLAN is also decelerating its growth in numbers of vessels, focusing on raising capabilities from the current levels and replacing old vessels with new ones. Only 60% of the PLAN's forces have been fully modernized. With the rate at which China is producing new vessels, it will be able to complete upgrades or replacements of 25 large-sized vessels by 2025. Although the number of the PLAN's surface vessels in 2025 will remain between 70 and 74, their capabilities will improve significantly, as well as their ability to conduct combined operations with other vessels and services. With the support from the type 022 missile boats, the PLAN's destroyer division will focus on attacking our surface and underwater forces, and a portion of its forces will be used to support its A2/AD operation against the U.S.

The PLAN's surface vessels will achieve complete modernization by 2025. Anti-air, anti-ship, and C4ISR capabilities among these vessels will improve significantly. The 052C DDG and 052D DDG, equipped with domestically-produced active phased array radars and 48 to 64 HHQ-9 SAM with range of more than 120 kilometers, will be the fleet's primary air defense force. The PLA currently possesses eight of these so-called "Chinese Aegis" destroyers. These two classes of destroyers will continue to be produced to replace the old type 051 DDG. The PLAN is projected to possess 14 to 16 of these vessels by 2025, which will be sufficient to provide air defense to two to four carrier battle groups. Anti-ship missiles have always been the PLAN's advantage. Besides the widely deployed YJ-83 anti-ship missile, the YJ-62 and YJ-18 ship-to-ship missile, and YJ-12 air-launched anti-ship missile will become the PLA's primary anti-ship weapon. The new radar and fire control system on PLAN vessels can fire on targets from 200 kilometers (active search), and 450 kilometers (passive search), and can engage ten surface targets simultaneously. It can also create a squadron-scaled data interlink, and can provide target information to smaller supporting vessels (e.g. type 022 missile boat) by means of data transmission. By 2025 the PLAN's primary surface vessels will have modernized C4ISR systems such as tactical data link systems, satellite antennas, and high frequency communication antenna. At least one destroyer in the three fleets will be renovated to be the command flagship, equipped with better command capabilities. The three fleets and the State Oceanic Administration have at least

one reconnaissance boats or surveillance ship, coordinating with electronic surveillance aircrafts to collect electronic data regarding military exercises of Taiwan, Japan, and the U.S.

The weak spot of PLAN's vessels is its antisubmarine ability. However, the underwater threat towards the PLAN's sea control that comes from our navy will be extremely limited with only two submarines with combat ability. Although the PLA is devoted to strengthening its antisubmarine ability, it is still limited due to the bottleneck of both its basic and advanced technology research.

China currently possesses one Russian-made aircraft carrier, the LIAONING, and will possibly produce two more carriers in the future. The J-15 fighters will be the primary forces serving on these carriers. According to China's recent display of its carrier group, there will be three DDG, three FFG, two SSN, and one replenishment ship besides the carrier itself. This shows that China's aircraft carrier forces are gradually being developed. China has three 071 amphibious transport dock ships that can hold six helicopters and four medium-sized LCAC. By 2025, the newly constructed type 081 LHA that can hold twelve helicopters and four to six medium-size LCACs will be commissioned, significantly improving China's landing operation abilities.

The PLAN has six SSK squadrons and two SSN squadrons. Approximately 70% of its force is modernized, with the two squadrons in the East Sea Fleet being the most modernized, deployed with the latest 039G, 039A, and KILO SSK, reaching a total of 18 submarines. By 2025, older SSK will be replaced with the newer type 039A and LADA-class SSK jointly produced by China and Russia. The number of SSK will be between 58 and 60. The PLA currently maintains a scale of five SSN, but because China will have two to three carrier battle groups by 2025, which will require at least six SSN, so this number is expected to increase slightly. The newest 093G and 095 (or 097) SSN will be the main force. Besides advanced torpedoes, the PLAN submarine forces will be equipped with YJ-83 Q-class missiles or Russian-made anti-ship missiles. The new type 093G SSN may even be equipped with the vertical-launched YJ-63 anti-ship missiles, YJ-18 anti-ship

missiles, or the sub-version CJ-10 cruise missiles. The PLAN submarines will have multiple surface target striking abilities and limited land attack abilities. The PLAN will try to find a solution to the underwater noise problems of its submarine forces produce during operations, which is the main reason why China and Russia developed the LADA-class SSK. China's self-produced AIP is already being deployed on type 039A SSK, extending the length of time that the diesel submarine can remain submerged, which will greatly enhance its ability to launch surprise attacks.

The PLAN modernizes the surface, underwater, and naval aviation capabilities comprehensively and simultaneously to create a multi-directional threat to our naval forces. The emphasis on its long-range striking ability poses a long distance threat to our naval forces, and the emphasis on precision striking ability poses high-intensive threats to our surface vessels. Our naval forces in the Strait will encounter full-scale missile attacks from superior numbers of PLAN missile boats and FFG. Our navy's high sea maneuver or naval interception forces will be ambushed, surprised, and neutralized by the PLAN's submarines, destroyers, and bombers. PLAN's development in its sea control capabilities will force Taiwan's Navy to transform to a sea denial force and utilizes UCAV, submarines, and missile boats as its primary combat platforms.

Given the rapid growth in both the quality and quantity of the Chinese military capabilities, against Taiwan's relatively more sluggish military development, the gross imbalance of military power across the Taiwan Strait will reach great disparity by 2025. The PRC will then possess diverse and powerful means to coerce Taiwan into negotiation and unification by force. If Taiwan does not demonstrate its firm determination to revitalize its military capabilities, the public will not be able to maintain faith in their national defense, and China's expectation of successful intimidation by force will sharply increase. If we allow the cross-Strait military imbalance to continue to widen, it would be tantamount to openly inviting Chinese invasion, encouraging those hawkish in China to break the current status quo of peaceful co-existence via non-peaceful means, and emboldening the PRC's forceful conduct with regard to regional security issues such as the territorial dis-

putes in the East and South China Seas, driving the situation toward a zero-sum dynamic that will hinder and complicate Taiwan's efforts to resolve these disputes peacefully. Over the course of the coming decade, Taiwan's national security will clearly confront immense challenges. There is no moment to waste on pessimism and despair if Taiwan is to maintain peace across the Strait and sustain a free and democratic way of life for its people. The Defense Committee presents this assessment of the China's military threat against Taiwan in 2025 in order to serve as reference for DPP future defense policy decisions.

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國防政策藍皮書
Defense Policy Blue Paper

第一號報告	民進黨的國防議題
DEF-PUB 01	DDP’s National Defense Agenda
第二號報告	中科院轉型與厚實自主國防核心研製能量
DEF-PUB 02	Transforming the CSIST: Strengthening Indigenous Defense Research and Development
第三號報告	建立權責相符的國家安全會議
DEF-PUB 03	An Accountable National Security Council
第四號報告	開啟臺美國防夥伴關係的新章節
DEF-PUB 04	New Chapter for Taiwan-U.S. Defense Partnership
第五號報告	二〇二五年中國對台軍事威脅評估
DEF-PUB 05	China’s Military Threats against Taiwan in 2025

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