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Unexpected Consequences From Knock-On Effects: A Different Standard for Computer Network Operations?

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UNEXPECTED CONSEQUENCES FROM KNOCK-ON EFFECTS: A DIFFERENT STANDARD FOR COMPUTER NETWORK OPERATIONS?

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INTRODUCTION

During the Kosovo campaign the press reported an alleged plan for a computer-based strike on [Serbian President] Milosevic's personal bank accounts. Later stories indicated that legal concerns were one reason the cyberassault was aborted. If such a plan existed, the legal issues might include the fact that absent a showing, for example, that the monies are being used to directly support a military effort, the Law of Armed Conflict ("LOAC") would not permit raiding Milosevic's personal accounts.1

The law of war would preclude an action that targeted the financial accounts of an enemy's leader, unless the accounts directly supported the war effort. Presumably, this is because personal bank accounts are traditionally civilian property and not the subject of military action.2 Further, under traditional methods and means of warfare, the military assets of the opposing nation could not reach these types of accounts. This is no longer true in today's armed conflict.3 The evolution of computer network operations ("CNO"),

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3. This paper will only discuss the application of computer network operations against targets once armed conflict has begun, otherwise known as jus in bello. See Richard W. Aldrich, How Do You Know You Are at War in the Information Age?, 22 HOUS. J. INT'L L 223 (2000) (discussing potential employment of computer network operations prior to armed conflict, or jus ad bellum). See generally Eric Talbot Jensen, Computer Attacks on Critical National
and computer network attacks ("CNA") in particular, has vastly expanded the capabilities of today’s commander and has

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Infrastructure: A Use of Force Invoking the Right to Self-Defense, 38 STAN. J. INT’L L. 207 (2002) (positing that attacks on critical national infrastructure should be considered armed attacks under the United Nations Charter); Todd A. Morth, Note, Considering Our Position: Viewing Information Warfare as a Use of Force Prohibited by Article 2(4) of the U.N. Charter, 30 CASE W. RES. J. INT’L L. 567 (1998) (comparing Information Warfare capabilities to those of nuclear, chemical and biological attacks in destructive capability but contrasting them by the ease with which they can be attained); Michael J. Robbat, Note, Resolving the Legal Issues Concerning the Use of Information Warfare in the International Forum: The Reach of the Existing Legal Framework, and the Creation of a New Paradigm, 6 B.U. J. SCI. & TECH. L. 10, Part IV (2000) (proposing an international convention with the intent to proclaim CNA and other forms of information warfare as an “armed use of force” and provide for universal cooperation and extradition); Michael N. Schmitt, Computer Network Attack and the Use of Force in International Law: Thoughts on a Normative Framework, 37 COLUM. J. TRANSNAT’L L 885 (arguing that determinations of use of force for a computer network attack should be based on the consequences of the attack, not the method); WALTER GARY SHARP, SR., CYBERSPACE AND THE USE OF FORCE 101 (1999) (asserting that an attack across cyberspace resulting in no physical damage should be considered a use of force).

4. See THE JOINT CHIEFS OF STAFF, JOINT PUB 3-13, JOINT DOCTRINE FOR INFORMATION OPERATIONS I-9 (Oct. 9, 1998) (defining computer network attack as “[o]perations to disrupt, deny, degrade, or destroy information resident in computers and computer networks, or the computers and networks themselves”), available at http://www.dtic.mil/doctrine/jel/new_pubs/jp3_13.pdf (last visited Mar. 19, 2003). Computer Network Operations include such things as CNA and computer network defense. See generally DOROTHY E. DENNING, INFORMATION WARFARE AND SECURITY (2000). A detailed description of these techniques is beyond the scope of this paper. However, a brief introduction to some standard hacker tools is valuable as a baseline for the discussion that follows. A Trojan horse is a “program that, when activated, performs some undesirable action not anticipated by the person running it. It could delete files, reformat a disk, or leak sensitive data back to its author.” Id. at 259. A logic bomb, or time bomb, is a Trojan horse that is “triggered by some event.” Id.

A virus is a fragment of code that attaches itself to other computer instructions, including software application code . . . performs some function and then turns control over to its host . . . The resident copy watches for uninfected hosts . . . [and] inserts a copy of itself in the host. The virus may then execute a ‘payload,’ which can do anything from displaying an amusing or political message to wiping out files on the hard drive . . . A worm is a program that propagates from one computer to another over a computer network by breaking into the computers in much the way that a hacker would break into them. Unlike viruses, they do not get any help from unwitting users. They must find a computer they can penetrate, carry out an attack, and transfer a replica of their code to the target host for execution. In effect, a
subsequently expanded the targets he can now attack.\textsuperscript{5} As the battlefield has changed from a linear front to a three-dimensional battlespace, the potential targets have also changed.\textsuperscript{6} This change is reflected not only in the quantity of targets available based on extended ranges, but in the nature of the targets, as reflected by the example of an attack on Milosevic’s private bank accounts.\textsuperscript{7} This expansion of the commander’s potential target list has caused some to cast doubt on the ability of the commander to adequately apply the traditional principles of the law of war such as distinction, military necessity and humanity, as well as proportionality, when using CNO.

In response to this expanded lethal reach, particularly in the case of CNA, some have proposed new international agreements\textsuperscript{8} or a

\begin{quote}
\begin{itemize}
  \item worm completely automates the steps taken by a computer intruder who hops from one system to the next. 
  \begin{itemize}
  \item Id. at 269-70, 280.
  \end{itemize}
  \end{itemize}
\end{quote}

Denial of service attacks deny legitimate users access to information sources by destroying data or disrupting operations. \textit{Id.} at 231 Code Breaking means “acquiring access to the plaintext of encrypted data by some means other than the normal decryption process used by the intended recipient(s) of the data. Code breaking is achieved either by obtaining the decryption key through a special key recovery service or by finding the key through cryptanalysis.” \textit{Id.} at 408; \textit{see also} Dr. Ivan K. Goldberg, \textit{Glossary of Information Warfare Terms} (providing a full glossary of cyber war terms), \textit{available at} http://www.psycom.net/iwar.2.html (last visited Mar. 25, 2003); William B. Scott, \textit{Goal for “Cyber Warrior” Training: Sharper Hacker Tactic Knowledge}, \textit{157 AVIATION WEEK & SPACE TECH.}, No. 10, Sept. 2, 2002, at 60 (outlining the two-day “Cyber Warrior” course and providing estimated numbers of cyber attacks).

\textit{5.} \textit{See} David A. Fulgham, \textit{Infowar to Invade Air Defense Networks}, \textit{157 AVIATION WEEK & SPACE TECH.}, No. 19, Nov. 4, 2002, at 30 (quoting General John Jumper, Air Force Chief of Staff as saying, “I’ve talked often about the fact that we’re rapidly approaching the time when you can tell an SA-10’s [surface to air missile system] radar that it’s a Maytag washer and put it in the rinse cycle instead of the firing cycle”).

\textit{6.} \textit{See} Schmitt, \textit{supra} note 2, at 162 (noting that civilians become targets in the new battlefield).


\textit{8.} \textit{See} Mark R. Shulman, \textit{Discrimination in the Laws of Information Warfare}, \textit{37 COLUM. J. TRANSNAT’L L.} 939, 964-65 (1999) (proposing a model protocol to codify the application of standard humanitarian principles to information operations); \textit{see also} William J. Bayles, \textit{The Ethics of Computer Network Attack},
shift in the standard focus of analysis to accommodate the unique aspects of CNA, including the potential for second and third tier effects known as "knock-on" effects. These changes are unnecessary. Commanders need only apply the traditional analysis (including the principle of distinction), the balance between military necessity and humanity, and the principle of proportionality to ensure that they correctly apply this new technology during armed conflict. This is even true in the case of objects that serve both a military and civilian purpose, or dual-use objects.

Further, as commanders consider the expanded target list offered by CNA capabilities, particularly the potential secondary, tertiary, or "knock-on" effects, there is concern about possible violations of the principle of distinction and the rule of proportionality. While the potential for these unexpected consequences does exist and may have some unique aspects in CNO, they do not present irresolvable legal issues. Rather, the commander can look to the same law and principles that apply to all military operations. He may use CNA if, in good faith, he believes that the damage to civilian objects and injury to civilians that is expected from the attack, including potential "knock-on" effects, given the circumstances as known to


9. See Schmitt, supra note 3, at 886 (addressing the various methodologies that may be used to address CNA attacks).

10. See Schmitt, supra note 7, at 392-94 (defining "knock-on effects" and providing an often cited example of these effects).


The main issue is: can you be very precise and do exactly what you say you can do and not have any other problems – no unintended consequences? ... We spend a huge amount of time concentrating on CNA ... making sure you don’t do something you are not intending to do.

We are going down this road carefully.

Id.
him at the time after taking all feasible measures to ascertain those circumstances, is not excessive to the concrete and direct military advantage anticipated.

Part I of this paper will analyze whether the traditional rules of the law of war, formed during the long-established linear battle era, give sufficient guidance to a commander contemplating a CNA. The paper will contend that though the laws of war were formed during an era that did not contemplate instantaneous lethality through electronic transmission from a computer thousands of miles from the potential target, they can still be applied with accuracy and pertinence today. Part II closely examines the legal constraints to the offensive use of CNA and its potential problem of "knock-on" effects leading to unexpected consequences. If properly analyzed, this paper will then demonstrate that the legal standard when considering potential unexpected consequences is no different in CNO than in normal kinetic operations and presents no significant addition to the standard targeting analysis.

I. TRADITIONAL RULES OF WAR AND THE CNA

Once two nations are in armed conflict with each other, the law of war applies. The two nations are still bound by peacetime

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13. See Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field, art. 2 opened for signature Aug. 12, 1949, 6 U.S.T. 3114, 75 U.N.T.S. 31, reprinted in SCHINDLER & TOMAN, THE LAWS OF ARMED CONFLICTS 305 (1st ed. 1981) (stating that the "trigger" for the law of war to apply is international armed conflict or conflict "between two or more of the High Contracting Parties [to the Geneva Conventions], even if the state of war is not recognized between them"); see also Convention (II) for the Amelioration of the Condition of Wounded, Sick, and Shipwrecked Members of Armed Forces at Sea, art. 2, opened for signature Aug. 12, 1949, 6 U.S.T. 3217, 75 U.N.T.S. 85, reprinted in SCHINDLER & TOMAN, supra, at 333; Convention (III) Relative to the Treatment of Prisoners of War, art. 2, opened for signature Aug. 12, 1949, 6 U.S.T. 3316, 75 U.N.T.S. 135, reprinted in SCHINDLER & TOMAN, supra, at 355; Convention (IV) Relative to the Protection of Civilian Persons in Time of War, art. 2, opened for signature Aug. 12, 1949, 6 U.S.T. 3516, 75 U.N.T.S 287, reprinted in SCHINDLER & TOMAN, supra, at 427. This statement, known as common Article 2 because it is common to all four Geneva Conventions, is in contrast to "armed conflict not of an international character occurring in the territory of one of the High Contracting Parties" which is found in Article 3 of all four Geneva Conventions and is known as common Article 3. Id. The full body of the law of war applies to common Article 2 conflicts, whereas a much smaller and less
agreements to the extent that they are not obviously superseded by hostilities\textsuperscript{14} or suspended between the warring states.\textsuperscript{15} They continue to be bound by customary international law,\textsuperscript{16} but they are also bound by the unique body of customary and conventional law\textsuperscript{17} that applies “to all cases of declared war or of any other armed conflict which may arise between two or more of the High Contracting Parties [to the Geneva Conventions], even if the state of war is not recognized between them.”\textsuperscript{18}

Within this body of law, also known as the law of armed conflict, three fundamental principles guide a commander in determining what targets he can attack: 1) Distinction, 2) Balancing Military Necessity with Humanity, and 3) Proportionality.\textsuperscript{19} These principles have developed over centuries of warfare and have been codified in conventional law that requires a commander to consider them appropriately as he conducts military operations in international


16. See Custom, 1 Hackworth Dig. § 3, at 15-17 (outlining basic tenets of customary international law).


18. See supra note 13 (discussing when the law of war correctly applies to a conflict).

19. See U.S. Dep’t of the Navy, NWP 1-14M, Commander’s Handbook on the Law of Naval Operations (Oct. 1995) (defining these three principles further as: “1) The right of belligerents to adopt means of injuring the enemy is not unlimited, 2) It is prohibited to launch attacks against the civilian population as such, and 3) Distinctions must be made between combatants and noncombatants, to the effect that noncombatants be spared as much as possible”).
armed conflict. The initial question for this paper is whether these principles are still valid and whether their application is effective in light of new technologies.

A. DISTINCTION

One of the fundamental principles of the law of war is the requirement for a commander to distinguish between military and civilian objects, including populations, when selecting targets to engage. As stated in the preamble to the 1868 St. Petersburg Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight, "[t]he only legitimate object, which States should endeavor to accomplish during war, is to weaken the military forces of the enemy." The underlying assumption is that civilian populations, as well as civilian objects, should not be the object of attack unless they "participate directly in hostilities" or somehow become part of the military forces. This principle is confirmed in the Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflict ("GPI"). The general rule regarding distinction during an armed conflict is found in Article 48, which states "[i]n order to ensure respect for and protection of the civilian population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military

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22. See GPI, supra note 21, art. 43, 1125 U.N.T.S. 22 (dictating when citizens become part of the armed forces).
objectives.” Several articles that follow this provision expand on these terms and the application of this protection.

GPI Article 51 pronounces rules intended to protect civilians from the dangers arising from military operations. Not only does it

23. *Id.* art. 48, 1125 U.N.T.S. 25. The United States accepts Article 48 as customary international law. See Matheson, *supra* note 21, at 426 (supporting the idea that customary international law encompasses much of Part IV and believing it necessary to distinguish between armed forces and civilians).

24. See GPI, *supra* note 21, art. 51, 1125 U.N.T.S. at 26. GPI Article 51 states:

Article 51—Protection of the civilian population

1. The civilian population and individual civilians shall enjoy general protection against dangers arising from military operations. To give effect to this protection, the following rules, which are additional to other applicable rules of international law, shall be observed in all circumstances.

2. The civilian population as such, as well as individual civilians, shall not be the object of attack. Acts or threats of violence the primary purpose of which is to spread terror among the civilian population are prohibited.

3. Civilians shall enjoy the protection afforded by this Section, unless and for such time as they take a direct part in hostilities.

4. Indiscriminate attacks are prohibited. Indiscriminate attacks are:
   (a) those which are not directed at a specific military objective;
   (b) those which employ a method or means of combat which cannot be directed at a specific military objective; or
   (c) those, which employ a method or means of combat the effects of which cannot be limited as required by this Protocol; and consequently, in each such case, are of a nature to strike military objectives and civilians or civilian objects without distinction.

5. Among others, the following types of attacks are to be considered as indiscriminate:
   (a) an attack by bombardment by any methods or means which treats as a single military objective a number of clearly separated and distinct military objectives located in a city, town, village or other area containing a similar concentration of civilians or civilian objects; and
   (b) an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.

6. Attacks against the civilian population or civilians by way of reprisals are prohibited.

7. The presence or movements of the civilian population or individual civilians shall not be used to render certain points or areas immune from military operations, in particular in attempts to shield military objectives from attacks or to shield, favour or impede military operations. The Parties to the conflict shall not direct the movement of the civilian population or individual civilians in order to attempt to shield military objectives from attacks or to shield military operations.
preclude making civilians the "object of attack"\textsuperscript{25} unless they take a "direct part"\textsuperscript{26} in hostilities, but it also precludes attacks that are unable to discriminate or focus on a particular military object.\textsuperscript{27} This means the commander is required not only to use weapons that can distinguish by their nature and be focused on a particular target, but also that in using any weapon, a commander must use it in a way that distinguishes between civilian and military objects.\textsuperscript{28}

GPI Article 52 provides similar protections for civilian objects.\textsuperscript{29} The test for civilian objects is whether their "nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.

8. Any violation of these prohibitions shall not release the Parties to the conflict from their legal obligations with respect to the civilian population and civilians, including the obligation to take the precautionary measures provided for in Article 57.

\textit{Id.}

25. \textit{Id.} para. 2, 1125 U.N.T.S. at 5 (listing the actions prohibited against civilians).

26. \textit{Id.} para. 3, 1125 U.N.T.S. at 6 (remarking on exceptions to the prohibition on targeting civilians).

27. \textit{See id.} para. 4, 1125 U.N.T.S. at 6 (defining what is meant by an "indiscriminate attack").

28. \textit{See Schmitt, supra} note 7, at 388 (specifying that regardless of application, the weapon or tactic must distinguish between combatant and civilian objectives).

29. \textit{See GPI, supra} note 21, art. 52, 1125 U.N.T.S. at 27. Article 52 of the GPI states:

\textit{Article 52—General protection of civilian objects.}

1. Civilian objects shall not be the object of attack or of reprisals. Civilian objects are all objects which are not military objectives as defined in paragraph 2.

2. Attacks shall be limited strictly to military objectives. In so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.

3. In case of doubt whether an object which is normally dedicated to civilian purposes, such as a place of worship, a house or other dwelling or a school, is being used to make an effective contribution to military action, it shall be presumed not to be so used.

\textit{Id.}
The commander who contemplates attacking a civilian object must satisfy both prongs of the test in order to overcome the law of war preclusion against attacking civilian objects. The first part of this test is the distinction analysis. The commander must decide whether the normally civilian object has been transformed into a military objective. If so, he continues to the second portion of the analysis, requiring him to determine the military necessity of attacking that target. This principle will be further discussed below.

Growing out of this protection of civilians and civilian objects, Article 57 of the GPI discusses specific steps that military leaders should take when attacking military forces in order to help accomplish this protection. Paragraph 2 requires a commander to

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30. See id. art. 52, para. 2, 1125 U.N.T.S. at 27 (explaining in the Commentary that the “nature” aspect of the test is defined as “all objects directly used by the armed forces: weapons, equipment, transports, fortifications, depots, buildings occupied by armed forces, staff headquarters, communications centers etc”); COMMENTARY ON THE ADDITIONAL PROTOCOLS OF 8 JUNE 1977 TO THE GENEVA CONVENTIONS OF 1949, para. 2020 (Y. Sandoz, et al. eds., 1998) [hereinafter GPI COMMENTARY]. “Location” may turn a civilian object into a military object if, for example, it is a bridge or other construction, or a site which is of special importance for military operations in view of its location, either because it is a site that must be seized or because it is important to prevent the enemy from seizing it, or otherwise because it is a matter of forcing the enemy to retreat from it. Id. para. 2021. “The criterion of ‘purpose’ is concerned with the intended future use of an object, while that of ‘use’ is concerned with its present function. Id. para. 2022.


32. See GPI COMMENTARY, supra note 30, para. 2018.

33. See id. para. 2020 (noting how objects can be turned into military targets depending on how they are used).

34. See infra Part I.C.

35. See GPI, supra note 21, art. 57, 1125 U.N.T.S. at 30. GPI Article 57 states:

Article 57—Precautions in attack.

1. In the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects.

2. With respect to attacks, the following precautions shall be taken:

(a) Those who plan or decide upon an attack shall:

(i) Do everything feasible to verify that the objectives to be attacked are neither civilians nor civilian objects and are not subject to special protection but are military objectives within the meaning of paragraph 2 of Article 52 and that it is not prohibited by the provisions of this Protocol to attack them;
verify that the object is not civilian in nature.\textsuperscript{36} Further, if an attack has already been launched and circumstances change such that a previously legitimate target is no longer valid, the commander is required to suspend or cancel the attack.\textsuperscript{37}

Complicating the practical application of these rules allows the potential for movement of civilian objects into and out of the military objective definition. Objects that are otherwise civilian in nature may, on a temporary basis, become a military object based on

(ii) Take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects;
(iii) Refrain from deciding to launch any attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated;
(b) An attack shall be canceled or suspended if it becomes apparent that the objective is not a military one or is subject to special protection or that the attack may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated;
(c) Effective advance warning shall be given of attacks which may affect the civilian population, unless circumstances do not permit.

3. When a choice is possible between several military objectives for obtaining a similar military advantage, the objective to be selected shall be that the attack on which may be expected to cause the least danger to civilian lives and to civilian objects.

4. In the conduct of military operations at sea or in the air, each Party to the conflict shall, in conformity with its rights and duties under the rules of international law applicable in armed conflict, take all reasonable precautions to avoid losses of civilian lives and damage to civilian objects.

5. No provision of this Article may be construed as authorizing any attacks against the civilian population, civilians or civilian objects.

Id; see also Matheson, supra note 21, at 426-27 (stating that the United States has no specific objections to this article and believes it reflects customary international law).

36. See GPI, supra note 21, art. 57, para. 2(a)(i), 1125 U.N.T.S. at 29 (mandating that military leaders take all feasible measures to verify that the targets for attack are not civilians or civilian objects).

37. See id. art. 57, para. 2(b), 1125 U.N.T.S. at 29 (requiring military leaders to cancel or suspend an attack upon discovering that the target is not a military object).
location, purpose, or use. For example, a bridge that normally carries civilian traffic and would be considered a civilian object would become a military objective based on its location if it became the means for the enemy’s armed forces to move to the battle. While still serving as a primary means for civilian transport over the river, the bridge is now a military object, as it is the primary means for the military to cross that same river. Objects like this are known as dual-use objects; objects that simultaneously serve civilian and military objectives. These dual-use objects present a unique challenge for commanders.

For example, assume a commander has information that a train depot is being used as a major hub for military transport of supplies and personnel. The commander is contemplating an attack on the train depot, but knows it is located within a populated area and also serves civilian trains. Under these circumstances, the train depot is a dual-use object because it normally services civilian and commercial rail transport, but the military also uses it for military purposes. This use makes the depot a legitimate military objective. However, just because the rail depot is a military object, the commander still has the requirement to try to limit his attack to the military portions of the rail depot, if possible. For example, if the commander knows that there are two particular areas of military concentration within this rail depot, he must attempt to limit his attack to those areas and distinguish between them and the other portions of the rail depot that are not currently serving a military purpose.

This principle of distinction must be a key element in the commander’s analysis during normal military operations. As will be

38. See GPI COMMENTARY, supra note 30, para. 2021, 2022 (noting how the GPI distinguishes purely civilian objects from those that can be viewed as military objectives).

39. See id. at para. 2020 (explaining that objects which by their very nature make an effective contribution to military action are deemed military objects).

40. See Meyer, supra note 11, at 178 (describing the concept of dual-use targets).

41. See GPI, supra note 21, art. 57, para. 2(a)(ii), 1125 U.N.T.S. at 29 (requiring military personnel to take “all feasible precautions in the choice of means and methods of attack” to avoid or minimize damage to civilian objects).
explained below, the principle of distinction is equally important, and perhaps more so, when conducting computer network operations.

B. DISTINCTION IN CNA

Because of the potential for new targets afforded by computer capabilities, traditional methodologies have come under attack as insufficient to protect noncombatants in this era of increased technological weaponry. To truly distinguish between civilian and military objects in an attack can be problematic. This makes distinction one of the most difficult current issues in CNA. Unlike traditional methods of warfare, in order to employ CNA, a commander will likely have to involve civilian objects, such as communication systems, to successfully accomplish his attack. In fact, "[ninety-five] percent of the U.S. military traffic mov[es] over civilian telecommunications and computer systems." This means that some civilian systems will be used, even if only to facilitate a CNA. Unless an attack originates on a Department of Defense

42. See Shulman, supra note 8, at 941 (discussing some problems and suggesting some guidelines for retaining discrimination as an international norm in the information age).

43. For the analysis in this paper, it is assumed that the military action amounts to an attack. Where there is a use of CNA, there is legitimate doubt that many of the currently proposed uses of CNO in a conflict would amount to an "attack," as defined in the GPI. For an excellent discussion on this issue, see Schmitt, supra note 7, at 375-78 (discussing the significance of the word "attack" and arguing that to meet the definition of attack, the action must be intended to cause, or foreseeably cause, injury, death, damage, or destruction). While conducting a CNA may not amount to an attack under Schmitt's definition, it is almost certainly a military operation encompassed under Article 49 of the GPI. See GPI, supra note 21, art. 49, 1125 U.N.T.S. at 25 (defining "attacks" as "acts of violence against the adversary, whether in offense or in defence").


("DOD") computer and travels solely over military communications equipment to an enemy’s military communications network, it will at some point be conducted by some medium that is civilian in nature and therefore, involve civilian objects.

In addition to facilitating either an operation or an attack over a civilian communication medium, other civilian objects are likely to be the military objective of a CNA during an armed conflict, such as Milosevic’s bank account mentioned at the opening of this article. These objects of attack may include facilities that are normally civilian, but through their location, purpose, or use, become legal military objectives. As the commander considers this enlarged target list, he will have the capability to attack additional targets that he could not previously reach. In the case of CNA, these targets will likely be dual-use targets, because they serve both military and civilian purposes. Civilian objects that may fall into this dual-use

exception for military transmissions from the general rule prohibiting member states from interfering with the communications of other members). Thus, Article 38 authorizes information operations over foreign telecommunications systems. See id. The potential legal issue still remains that the preclusion in Article 52(1) of the GPI against making civilian objects the “object of attack” will be deemed to include using civilian objects as the means or method of attack. See GPI, supra note 21, art. 52, para. 1, 1125 U.N.T.S. 27 (mandating that “civilian objects shall not be the object of attack or of reprisals”). Yet, under current international law and the law of war, there is no prohibition against conducting CNAs over civilian systems so long as the final destination is a valid military target and the attack complies with the rule of proportionality. See DEP’T OF DEF. OFF. OF THE GEN. COUNSEL, supra note 14, at 30-32 (discussing specific provisions of the ITC that permit military interference of civilian communications in certain circumstances).


47. See Shulman, supra note 8, at 948 (stating “[t]he assailant will probably route her assault through an innocent intermediary telecommunications systems”). “For example, a hacker would first route her communications through various servers around the world before attempting to gain access to a DOD computer system.” Id. Further, in an attempt to protect its own CNA assets from active enemy CNA responses, a nation is likely to purposefully send its CNAs through various intermediary communication systems, many of which will likely be purely civilian in nature. Id.

48. See supra note 39 and accompanying text (demonstrating how civilian objects can become military targets).

49. See Meyer, supra note 11, at 178 (providing the common definition of dual-use targets).
category include: computer networks of certain research facilities, air
traffic control networks that regulate both civilian and military
aircraft, computerized civilian logistics systems upon which military
supplies will be moved, electronic power grid control networks,
communications nodes and systems, including satellite and other
space-based systems, railroad and other transportation systems,
civilian government networks, and oil and gas distribution systems.
These targets may not only be lawful targets but may now be reached
in ways previously not available.  

Consider the fact that the U.S. military uses Microsoft Corporation
products to facilitate its communications, work product, and even its
CNA capabilities. Microsoft is not typically considered a defense
industry, rather its products are purchased by militaries as off-the-
shelf items. Nevertheless, it is possible to argue that Microsoft
Corporation Headquarters in Washington State is a valid dual-use
target, based on the support it provides to the U.S. war effort by
facilitating U.S. military operations. The fact that the corporation
and its headquarters provide a product that the military finds
essential to function, as well as customer service to support that
product, may provide sufficient facts to conclude that it is a dual-use
target.

Applying existing rules, including the requirement for a definite
military advantage when targeting objects that serve both a military
and civilian use, a commander must be able to determine what
objects are legitimate targets of this increased capability. Recent

50. See Michael N. Schmitt, Ethics and Military Force: The Jus in Bello,
Address Before the Carnegie Council on Ethics and International Affairs (Jan.
2002) (discussing additional targets that are available through CNA that were not
previously available, such as disrupting financial networks and altering data in

51. See Michael N. Schmitt, Bellum Americanum: The U.S. View of Twenty-
First Century War and its Possible Implications for the Law of Armed Conflict, 19
MICH. J. INT'L L. 1051, 1077 (1998) (questioning “would a Microsoft factory not
also offer an information dependent military definite enough advantage such that it
could be included on the Air Tasking Order?”).

52. See GPI COMMENTARY, supra note 30, para. 2024.
successes of dual-use targeting provide sufficient argument that the already enlarged quantitative and qualitative borders of what constitutes a legal target ought to be expanded even further. Given the bloodless nature of CNA and its ability to affect armed conflict, it can and should be a readily available weapon in the commander’s arsenal. Commanders should conduct the analysis on these and similar targets, and use CNA assets against them, subject to there being a military necessity to do so, and provided the attack will not cause unnecessary civilian deaths, injury, or damage to civilian property.

C. BALANCING MILITARY NECESSITY AND HUMANITY

Throughout history, militaries have generally acted with varying degrees of limitation on their ability to wage war to accomplish their purposes. In many cases, whatever means were necessary to accomplish their assigned tasks were permissible. In other cases, additional factors, such as the methods of war or the means used to conduct war, were given consideration. Though there were earlier attempts, international efforts to limit certain means and methods of warfare began to receive more attention in the nineteenth century, as evidenced by The Instructions for the Government of Armies of the United States in the Field, prepared by Francis Lieber and

53. See Dunlap, supra note 1, at 11 (arguing that the attack on dual-use facilities was one of the keys to NATO’s successful air campaign against the Serbs).

54. See GPI COMMENTARY, supra note 30, para. 2020-24 (discussing the rules of attacking dual-use targets).

55. See, e.g., 1 Samuel 15:3 (King James) (stating that the Israelite King Saul is told by the prophet Samuel “Now go and smite Amalek, and utterly destroy all that they have, and spare them not; but slay both man and woman, infant and suckling, ox and sheep, camel and ass”); 1 Samuel 15:22 (King James) (writing that Samuel rebukes Saul for not following his instructions and saving the Amalekite King, and the best of the animals, intending to use the animals for religious sacrifice).


57. See id. at 14 (discussing the unsuccessful attempt of the Lateran Council in 1139 to ban the use of the crossbows in warfare).
promulgated by President Lincoln on April 24, 1863. Lieber’s recognition that humanitarian concerns acted as a restraint upon the necessity of taking a specific military action reflected an emerging norm at the time. This was followed in 1868 by the St. Petersburg’s Declaration that renounced the use of exploding or inflammable projectiles below the weight of 400 grams. The object of the Declaration was to “[fix] the technical limits at which the necessities of war ought to yield to the requirements of humanity.”

This relationship between applying means and methods of warfare to accomplish a necessary military task and the considerations of humanity began to solidify in the twentieth century. This is exemplified in Article 22 of the 1899 Hague Convention on Land Warfare and the identical Article 22 of the 1907 Hague Convention on Land Warfare, which demonstrate the essential relationship

58. See Francis Lieber, Instructions for the Government of Armies of the United States in the Field, in SCHINDLER & TOMAN, supra note 13, at 3, 4, 7. Articles 4, 24, and 25 state:

Art. 4. As Martial Law is executed by military force, it is incumbent upon those who administer it to be strictly guided by the principles of justice, honor, and humanity – virtues adorning a soldier even more than other men, for the very reason that he possesses the power of his arms against the unarmed.

Art. 24. The almost universal rule in remote times was, and continues to be with barbarous armies, that the private individual of the hostile country is destined to suffer every privation of liberty and protection, and every disruption of family ties. Protection was, and still is with the uncivilized people, the exception.

Art. 25. In modern regular wars of the Europeans, and their descendants in other portions of the globe, protection of the inoffensive citizen of the hostile country is the rule; privation and disturbance of private relations are the exceptions.

Id. at 4, 6.

59. See St. Petersburg’s Declaration, supra note 20, at 95-97 (renouncing the use of explosive projectiles under 400 grams during war).

60. See id. at 96 (enumerating the obligations of the parties under the Declaration).

61. See id.

62. See GPI COMMENTARY, supra note 30, para. 1389 (explaining that the law of armed conflict reflects the balance between military necessity and humanity).
between military and humanitarian considerations. The signatories to these treaties agreed to what has become a foundational principle of customary international law; “[t]he right of belligerents to adopt means of injuring the enemy is not unlimited.” This foundational principle was supplemented by what is known as the Martens clause, found in the preambles of the 1899 and 1907 Hague Conventions. The Martens clause is significant because it describes the relationship between military methods and humanity, making it clear that if not constrained by a specific provision of the law of armed conflict, a commander is free to exercise military discretion, but only within the general bounds of international law. Therefore, a commander’s decision concerning military necessity allows the use of military means on targets indispensable for the accomplishment of the military mission, “provided that they are not inconsistent with the modern laws and usages of war.”


64. See id. at 76 (restricting the means of parties to injure their enemy during war).

65. See id. at 64. The preambles of the Hague Convention of 1899 and the Hague Convention of 1907 state:

[In] cases not included in the Regulations adopted by them, the inhabitants and the belligerents remain under the protection and the rule of the principles of the law of nations, as they result from the usages established among civilized peoples, from the laws of humanity, and the dictates of the public conscience.

Id.; see also A.P.V. ROGERS, LAW ON THE BATTLEFIELD 6-7 (1996) (explaining that this statement is known as the Martens Clause, named after its drafter, Professor de Martens of the University of St. Petersburg, legal advisor to the Russian imperial foreign ministry during the Hague conferences).

66. See GPI COMMENTARY, supra note 30, para. 1389 (stating that the Martens clause allows parties in a conflict to act freely within the framework of international law, if the law of armed conflict does not formally prohibit those acts).

67. See THOMAS E. HOLLAND, THE LAWS OF WAR ON LAND 12-13 (1908) (asserting that “[m]ilitary necessity justifies a resort to all measures which are indispensable for securing [the submission of the enemy]; provided that they are
Numerous writings and international agreements throughout the twentieth century have reinforced these principles, culminating in Article 1 of the GPI, and further refined by Article 35. Article 35, paragraphs 1 and 2, restate, in slightly different terms, the proscription found in the Hague Conventions of 1899 and 1907:

“1. In any armed conflict, the right of the Parties to the conflict to choose methods or means of warfare is not unlimited.

Not inconsistent with the modern laws and usages of warfare,” which reflects the modern view); see also GPI COMMENTARY, supra note 30, para. 1389 (stating that “a rule of the law of armed conflict cannot be derogated from by invoking military necessity unless this possibility is explicitly provided for by the rule in question”).


First, that a belligerent is justified in applying any amount and any kind of force which is necessary for the purpose of the war; that is, the complete submission of the enemy at the earliest possible moment with the least expenditure of men and money. Second, the principle of humanity, which says that all such kinds and degrees of violence as are not necessary for the purpose of war are not permitted to a belligerent. Third, the principle of chivalry, which demands a certain amount of fairness in offense and defense and a certain mutual respect between opposing forces.

Id.

See Taylor, supra, at 374 (asserting that, other than the reference to chivalry, “this is a plain statement of the rule of military necessity”). FM 27-10 confirms this principle by stating:

The law of war places limits on the exercise of a belligerent’s power in the interests [of protecting both combatants and noncombatants, safeguarding certain fundamental human rights, and facilitating the restoration of peace] and requires that belligerents refrain from employing any kind or degree of violence which is not actually necessary for military purposes and that they conduct hostilities with regard for the principles of humanity and chivalry.

FM 27-10, supra note 17, para. 3.

69. See GPI, supra note 21, art. 1, para. 2, 1125 U.N.T.S. at 7 (stating “[i]n cases not covered by this Protocol or by other international agreements, civilians and combatants remain under the protection and authority of the principles of international law derived from established custom, from the principles of humanity and from the dictates of public conscience”).

70. See id., art. 35, 1125 U.N.T.S. at 21.
2. It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering.\textsuperscript{771}

The Commentary to GPI states that the International Committee of the Red Cross initially wanted this provision to specifically refer to civilians as well as combatants.\textsuperscript{72} However, it appears that this is only done through implication of the principles of distinction, rather than being expressly stated in either the text or the commentary.\textsuperscript{73} Regardless, a military commander must balance the military necessity of his actions against humanitarian considerations when determining the methods and means he will use to accomplish that militarily necessary task.\textsuperscript{74} This is important when considering the use of CNA in hostilities. If CNA is to be governed by traditional law of war rules, any use of CNA as a method or means of warfare during armed conflict must be militarily necessary and able to comply with the principle of humanity.

D. MILITARY NECESSITY AND HUMANITY IN CNA

Though intertwined, a separate look at military necessity and humanity, as they relate to the use of CNA, will illustrate that the current laws of war are sufficient to guide commanders in the use of CNA as a method or means of warfare. Any use of CNA as a method or means of warfare during armed conflict must meet two requirements in order to comply with the law of war.\textsuperscript{75} CNA should first be militarily necessary\textsuperscript{76} and second, it should comply with the

\textsuperscript{71} See id. art. 35, paras. 1-2, 1125 U.N.T.S. at 21 (providing the basic rules for methods and means of warfare).

\textsuperscript{72} See GPI COMMENTARY, supra note 30, para. 1410 (referring to the treaty note negotiations).

\textsuperscript{73} See id. para. 1417.

\textsuperscript{74} See id., see also supra note 30, para. 1389 (explaining the balance between necessity and humanity).

\textsuperscript{75} See supra note 64 and accompanying text.

\textsuperscript{76} See Ariana Eunjung Cha & Jonathan Krim, White House Officials Debating Rules for Cyberwarfare, WASH. POST, Aug. 22, 2002, at 2 (quoting Mark Rasch, a technology security consultant and former Justice Department prosecutor as saying, "'[i]t's okay to blow up a bridge and kill everyone, including civilians' [if the bridge is believed to serve a military purpose] . . . 'but it might not be okay to hack into computer systems' that are not obviously serving a military purpose").
requirements of humanity, meaning that it should not cause unnecessary suffering or superfluous injury to accomplish the military purpose.\textsuperscript{77} Generally, CNA capability provides an enlarged target list that allows commanders to attack additional targets that they may believe are militarily necessary but previously unreachable.\textsuperscript{78} In conjunction with this expanded target list, the use of CNA as an alternative to traditional kinetic weapons presents an often more humane method of accomplishing the same overall objective.\textsuperscript{79}

Discussing military necessity first, the quote at the beginning of this paper exemplifies both the expanded target list and the balancing a commander must do between what is militarily possible and what is militarily necessary.\textsuperscript{80} If the portrayal of events is true, military commanders looked at the option CNA provided, weighed it against the necessity of engaging the target to accomplish the war effort, and determined that affecting Milosevic's bank accounts was not sufficiently necessary to warrant targeting. If the attack is possible, but not required for the war effort, it does not meet the test of military necessity discussed below. Creating other hypothetical situations where the commander must apply the same analysis is not difficult.

In each case, as the commander contemplates the use of CNA, he is required to determine, just as he would with any other target, whether it is militarily necessary.\textsuperscript{81} Commanders must also consider whether the war effort requires temporarily debilitating the communication networks for the opposing force's telephone systems. Such an action may be necessary depending on the circumstances,

\textsuperscript{77} See Walter G. Sharp, Sr., The Effective Deterrence of Environmental Damage During Armed Conflict: A Case Analysis of the Persian Gulf War, 137 Mil. L. REV. 1, 31 (1992) (discussing international customary law of armed conflict).

\textsuperscript{78} See Fulgham, supra note 5, at 30 (discussing the expansion of military targets due to CNA).

\textsuperscript{79} See Schmitt, supra note 2, at 166-67 (noting that the use of CNA and other technology will substantially decrease civilian casualties).

\textsuperscript{80} See supra note 1 and accompanying text.

\textsuperscript{81} See GPI COMMENTARY, supra note 30, para. 1389 (explaining military necessity of an object).
including what planned military operation is about to be executed. Commanders may also determine whether disabling the enemy's email system will further the prosecution of the war. This action may almost certainly advance the prosecution of the war, especially if military e-mail traffic is an important part of their normal communication methods. In contrast, using the enemy's e-mail system to incite dissension or just intimidate the civilians of an enemy country as an important part of offensive operations may pose other issues. This action may be necessary if the information campaign is a vital part of the conflict. Is shutting down a local radio and television transmission station necessary for a victory? It is quite possible, considering this same communications network may be used for military radio transmissions. Is disrupting a commercial shipping company's network and database a key element of a military victory? Potentially it is, depending on whether they also ship military goods.

Similar analysis may be made concerning the numerous other dual-use CNA targets, such as petroleum distribution networks, power distribution networks, computer information exchange networks, air traffic control networks, etc. Before continuing with further targeting analysis, the commander must first determine that the proposed target of the CNA meets the military necessity requirement of the law of war. To do this, the traditional analysis is sufficient. Returning to the example of Microsoft Corporation, it is unlikely that the connection is sufficient to make Microsoft headquarters a legitimate dual-use target. Such an attack on corporate headquarters is unlikely to prevent military CNA experts from using the software and capabilities of the computers they already have in their possession to conduct a CNA though it may degrade some


83. See GPI COMMENTARY, supra note 30, para. 2022 (listing the purpose of an object as a defining factor for it to be a military target).

84. See Meyer, supra note 11, at 178 (noting that civilian objects can become military targets if used for military purposes).

85. See supra notes 67-71 and accompanying text.
technical support capabilities. Therefore, it is much more difficult to establish a definite military advantage from such an attack.

Along with this expanded target list, CNA provides a relatively bloodless means of attack compared to traditional means of force. It can accomplish similar purposes without requiring traditional kinetic weapons and their accompanying destruction. In this way, it becomes a more humane weapon system, provided it can be appropriately limited in scope. For example, recall the case of the railway hub located in the populated area. The commander completes his analysis and determines that it is a militarily necessary target. His requirement now is to balance that military necessity with the laws of humanity and apply only the force necessary to accomplish the mission. Prior to CNA capabilities, he would have to choose which, amongst an arsenal of kinetic weapons, was best suited to accomplish that mission. If CNA is properly employed, it may be able to shut down the network controlling rail transport from that depot or even disable the track switching capabilities. Thus, the usefulness of that depot would be destroyed without any actual physical destruction beyond a computer or network server.

86. See Bayles, supra note 8, at 46-47 (describing CNA as the newest form of information operations); see also Schmitt, supra note 3, at 888 (explaining that there are many differences between cyber threats and traditional threat sources). CNA has a very expansive definition including both defensive and offensive information operations. See id. at 890-92.


88. See supra note 71 and accompanying text (stating the legal principle of military necessity).

89. But see Schmitt, supra note 50. The author states:

These computer network attacks (CNA) are able to cause enormous human suffering or physical damage. Examples range from shutting down air traffic control systems or disrupting financial networks to altering data in computerized medical records. In that attacks are typically targeted against a particular database or network, most CNA is extremely precise. However, it can also be highly indiscriminate. Perhaps the best example is launching a computer virus designed to spread randomly through an enemy’s network. The fact that it can spread so broadly is its attraction, particularly for those facing a computer dependent foe.
One cautionary note is necessary here. Over time, this capability may serve to restrict the commander’s options rather than increase his potential lethality. Once the commander has shown the capability to limit the use of kinetic force by advanced weapons technology, some will say that he is now required under humanitarian law to exercise that option in every case. This is analogous to the argument with precision-guided munitions (PGMs). Some have argued that if a country has the capability to use PGMs with their pinpoint accuracy resulting in decreased collateral damage, they are required to do so in every instance, regardless of the increased cost and potential effect on the mission. Unfortunately, as in the case with PGMs, the commander may not always have that option available or it may not accomplish his military mission as effectively as some other means of warfare. The fact that a commander is capable of using an advanced technology weapon to limit the use of force on a militarily necessary target may not equate to the fact that it is in the commander’s best interest to do so.

Return again to the example of the rail depot. Assume that the commander has just recently established the facts concerning the site that now make it a militarily necessary target. Assume further that he has information that a large shipment of military equipment is going to be transiting that rail depot the next day. His ability to interrupt that rail system will be significantly more effective if it can occur before that shipment leaves the rail depot. The personnel assigned to conduct the CNA to take down the rail depot network, however, cannot determine if they will be able to complete their work prior to the shipment leaving the station. When a commander has the eventual capability, does the law of war require that he delay his attack because his only available options would require a use of force

Id.


91. See Danielle L. Infeld, Note, Precision Guided Munitions Demonstrated Their Pinpoint Accuracy in Desert Storm; But is a Country Obligated to Use Precision Technology to Minimize Collateral Civilian Injury and Damage, 26 GEO. WASH. J. INT’L L. & ECON. 109 (1992); Schmitt, supra note 2, at 170 (noting that States will be subject to different standards based on their capabilities).
in excess of what may be necessary given additional time? Surely this would be a misuse of the law of war in constraining a commander.

As with PGMs, the commander’s use of CNA must be based on military necessity, balanced with humanity, as the commander perceives it at the time of the decision. The commander must take into consideration his military mission, not only over the short term, but also over the long term. He may not have the freedom to delay his offensive for a day, nor should he be required to delay under such circumstances. If the mission requires the offensive to be launched the next morning, the commander must determine what time he will have to make his decision to either use kinetic weapons or CNA. At the point that decision must be made is the point where the commander will apply his most appropriate weapon system to the task. The law of war does not and should not require more examination. This same analysis is of vital significance in analyzing the potential issue of “knock on” effects discussed in Part II below.

E. PROPORTIONALITY

Once a commander has determined that a target is a military objective and that it is militarily necessary, he must attack that target in a way that will not conflict with the rule of proportionality. The rule of proportionality is “an attempt to balance the conflicting military and humanitarian interests (or to balance military necessity and humanity) and is most evident in connection with the reduction of incidental damage caused by military operations.”

“Proportionality limits the amount of force that can be used to destroy a military objective to that which does not cause unnecessary collateral destruction of civilian property or unnecessary human suffering of civilians.” Even if the target is legitimate, the attacker is required to adjust his means and methods of attack so that the

92. See Matthew Lippman, Conundrums of Armed Conflict: Criminal Defenses to Violations of the Humanitarian Law of War, 15 DICK. J. INT’L L. 1, 63 (1996) (commenting on the Rendulic case discussed further in this paper); see also infra. Part II.C.

93. See Rogers, supra note 65, at 14 (defining the legal use of proportionality).

94. See Sharp, supra note 3, at 40 (discussing the law of conflict management and collateral damage to civilians).
destruction or death of the target does not include or cause a chain of events that will lead to the death of civilians or destruction of civilian property that is excessive to the concrete and direct military advantage to be gained. If he cannot sufficiently limit the expected result, he is required to refrain from the attack. This requirement of proportionality therefore, affects not only the type of weapons used or means of warfare, but also the effects of that use or method.

It is important to note here that the rule of proportionality only applies to civilians and civilian property. It is not an attempt to ensure a “fair fight” between combatants. In other words, there is no requirement that a combatant limit his force when engaging another combatant. The rule of proportionality will only affect an attack between combatants to the degree that civilians may suffer incidental injury, or civilian property may become collateral damage as a result of that attack. However, it does not preclude the attack. Rather, it requires the commander to balance the potential death or injury to civilians, the damage to civilian property, and the military necessity of destroying that military target against the potential damage and destruction to civilians and civilian objects.

95. See GPI, supra note 21, art. 57, para. 2(a)(ii), 1125 U.N.T.S. at 30 (mandating that attackers take reasonable precautions to minimize harm to civilians).

96. See id. para. 2(a)(iii) (directing refrain from attack if the expectation of civilian harm is excessive).

97. See Schmitt, supra note 7, at 393 (indicating that in addition to adhering to the rule of proportionality, attackers must choose methods that cause the least collateral damage).

98. See Schmitt, supra note 50 (discussing the various dilemmas associated with the rule of proportionality including the balance between civilian suffering and military advantage).

99. See Schmitt, supra note 2, at 169 (describing the fact that the rule of proportionality “makes civilian shields appealing”).

100. See id. (discussing the limits of proportionality).

101. See Sharp, supra note 3, at 40-41 (noting that if civilians support the war effort, they will be subject to incidental damage provided that the military objective is lawful).
This principle is codified in Article 51 of GPI. After prohibiting indiscriminate attacks,\(^\text{102}\) paragraph (5)(b) gives the following example of a prohibited indiscriminate attack: “an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”\(^\text{103}\) This provision is echoed in Article 57(2)(a)(iii), which requires those planning attacks to “refrain from deciding to launch any attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”\(^\text{104}\)

The test for whether the destruction of a civilian object offers a definite military advantage is also found in the GPI Commentary.\(^\text{105}\) In discussing what test must be met to satisfy the “concrete and direct military advantage,” the Commentary says, “[a] military advantage can only consist in ground gained and in annihilating or weakening the enemy armed forces. In addition, it should be noted that the words ‘concrete and direct’ impose stricter conditions on the attacker than those implied by the criteria defining military objectives in Article 52.”\(^\text{106}\)

Returning to the example of the rail depot, as the commander is determining how to strike the depot, he must ascertain his expectations of the attack. Once he has done that, he must determine if the expected incidental injury or damage to civilian objects is excessive to the military advantage of destroying that rail hub and military equipment. While this is a necessarily subjective decision,\(^\text{107}\)

\(^{102}\) See GPI, supra note 21, art. 51, para. 4, 1125 U.N.T.S. at 26 (prohibiting indiscriminate attacks).

\(^{103}\) See id. art. 51, 1125 U.N.T.S. at 26; see also Matheson, supra note 21, at 426 (reporting that the United States accepts Article 51 as customary international law, except the provision dealing with civilian reprisal).

\(^{104}\) See GPI, supra note 21, Article 57, para. 2(a)(iii), 1125 U.N.T.S. at 30.

\(^{105}\) See GPI COMMENTARY, supra note 30, para. 2024, 2218 (describing the test for military advantage of the destruction of civilian objects).

\(^{106}\) See id. para. 2218.

\(^{107}\) See Schmitt, supra note 2, at 150-51 (explaining that the decision is multi-tiered and complex).
it is one the commander must determine. In the case of the rail yard, it may be that the military portion of the depot is sufficiently segregated and there will be very limited effects on non-combatants. On the other hand, as it is a dual-use object, it may be that the commander will expect significant damage to civilian objects. If the damage is excessive to the military advantage gained, he must refrain from the attack.

Though proportionality is often spoken of in terms of what weapons systems are used in the attack, the focus should be on minimizing collateral damage around a necessary military target. Often, the means to limit such damage is the use of different weapons systems, such as PGMs, which are designed to accomplish such a goal. The U.S. position is that the law does not require advanced nations like the United States to use vastly more expensive weapons systems, such as PGMs, in order to comply with the rule of proportionality. The GPI Commentary, however, does not appear to agree with this view. In commenting on Article 48, the Commentary states “it is reprehensible for a Party possessing [means and methods of warfare capable of distinguishing between military and civilians] not to use them, and thus consciously prevent itself from making the required distinction.” As mentioned in connection with military necessity and humanity, this disagreement is likely to only get more significant with the increased use of CNA.

F. PROPORTIONALITY IN CNA

A commander’s requirement to comply with the rule of proportionality will often lead him to use CNA as an alternative to traditional kinetic weapons, due to its lack of inherent destruction. In many cases, CNA may be the weapon that will accomplish the mission, while causing the least amount of collateral damage.

108. See Rogers, supra, note 65, at 15.
109. See DEP’T OF DEF. OFF. OF THE GEN. COUNSEL, supra note 14, at 22 (arguing that in the case of protracted conflict, a military force would quickly exhaust its supply of PGMs if it used them whenever possible). But see Schmitt, supra note 2, at 152 (asserting that guided munitions should be used if they are readily available and would lessen expected loss and damages).
110. See GPI COMMENTARY, supra note 30, para. 2600.
The availability of computer network attack actually increases the options for minimizing collateral damage and incidental injury. Whereas in the past physical destruction may have been necessary to neutralize a target’s contribution to the enemy’s efforts, now it may be possible to simply “turn it off.” For instance, rather than bombing an airfield, air traffic control can be interrupted. The same is true of power production and distribution systems, communications, industrial plants, and so forth. Those who plan and execute such operations must still be concerned about collateral damage, incidental injury and knock-on effects, but the risks associated with conducting classic kinetic warfare are mitigated significantly through CNA. Also, depending on the desired result, it may be possible to simply interrupt operation of the target facility. This tactic would be particularly attractive in the case of dual-use objectives.\footnote{111}

CNA is an attractive alternative to a kinetic attack when considering compliance with the rule of proportionality due to its physical characteristics of blast and fragmentation and lack of heat, combined with the increasing dependence and corresponding vulnerability on computer networks.\footnote{112} CNA will be perceived as a less destructive use of force, in most cases, causing less collateral damage than kinetic weapons that accomplish the same task.\footnote{113} Depending on the target, it will likely result in fewer injuries and deaths, limited physical destruction, and a quicker recovery after hostilities cease.\footnote{114}

For example, degrading the rail transport system by kinetic weapons and CNA will have the same effect on the ability for military units to communicate point to point; but doing so with CNA will allow the physical structures to remain intact, including civilian objects and the building where civilian workers are located. It may not require damage to any trains or tracks, but it will still stop all rail movement. Similar analysis is true of the electronic power grids, transportation systems, and many other computer accessible systems that may be valid targets under the law of war. In most cases, in comparison with kinetic weapons on like targets, a resort to CNA

\begin{footnotes}
\footnote{111. Schmitt, supra note 7, at 394.}
\footnote{112. See Schmitt, supra note 2, at 166 (noting the positive aspects of the CNA in regards to proportionality).}
\footnote{113. See Schmitt, supra note 7, at 394 (discussing how the CNA is a less destructive force then the more traditional weapons).}
\footnote{114. See id. (explaining further the benefits of using CNA weapons).}
\end{footnotes}
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will more effectively comply with the rule of proportionality. The instance where this is most likely not true is that of unintended consequences as will be discussed in Part II.

G. SUMMARY OF CNA AND THE LAWS OF WAR

CNA presents new targets and additional means of attacking traditional targets. This expansion of the commander's potential target list has caused some to cast doubt on the ability of the commander to adequately apply the traditional principles of distinction, military necessity and humanity, and proportionality when using CNA. This concern is unwarranted. Applying the traditional analysis, including GPI's definition of military objective, gives the commander sufficient guidance to determine whether the location, purpose, or use of civilian or dual-use objects make them a legitimate military objective. Further, the current requirement to balance military necessity and humanity is sufficient in the context of CNA to guide a commander, particularly given the humane results of many proposed CNAs. Finally, CNA will allow a commander, in many cases, to reduce even further the collateral damage to civilian objects and human suffering to civilian populations. The advanced technological capabilities provided by CNA do not confront the commander with irresolvable legal issues. Rather, a correct application of the traditional analysis will expand the number of options available and allow the commander the freedom he needs to accomplish his legitimate military mission, while adequately protecting non-combatants from the destruction of war.

II. LEGAL CONSTRAINTS AND "KNOCK-ON" EFFECTS

A military commander faced with the decision of attacking a target with CNA assets must conduct the same legal analysis as if attacking

115. See supra Part I.B.
116. See supra Part I.D.
117. See supra Part I.F.
118. See Schmitt, supra note 7, at 378 (stating that traditional means remain while CNA allows for advances in technology to increase those means).
that target with traditional kinetic weapons. The same law of war principles apply despite the use of advanced technology. As discussed above, these principles give the commander guidance on whether he can conduct such an attack and how he may execute it. An area that deserves more detailed treatment, however, is that of “knock-on” effects or unexpected consequences. These are

119. See Rogers, supra note 65, at 69-70 (giving the obligations for a traditional kinetic attack). The obligations for a traditional kinetic attack are:

1. When planning military operations always take into account the effect they will have on the civilian population and civilian objects, including the environment.
2. Do everything feasible to verify that the target is a military objective.
3. Take all feasible precautions to reduce incidental damage and loss. This will involve a careful choice of weapons as well as care in preparing the plans for carrying out the attack.
4. Observe the rule of proportionality. This requires a calculation of the likely casualties, both military and civilian, and damage compared with the expected military advantage. It is probably too early to say whether it also involves an assessment of the risk and effect of weapons malfunctioning or of human error but it certainly does not include matters over which the attacker has no control such as the effect of enemy action. Obviously factors such as air supremacy of the availability of smart weapons will weigh heavily in favour of taking precautions to protect the civilian population.
5. Be ready to cancel or suspend an attack, if necessary. This also involves weighing military against humanitarian considerations.
6. Give warnings, unless circumstances do not permit.
7. Consider carefully his choice of targets in terms of what offers the best military advantage with the least incidental loss or damage.
8. Ensure that target lists are kept constantly under review in the light of changing circumstances.
Id. at 70 (citations omitted).

120. See Schmitt, supra note 7, at 378 (emphasizing that the “prescriptive architecture” remains the same despite CAN). But see Rogers, supra note 65, at 69-70 (arguing that “information warfare,” including computer network attack, represents a “revolution in military affairs” that will “challenge existing doctrine on the waging of war, necessitate a revised concept of battle space and expand the available methods and means of warfare”). “Of particular note will be the impact of information warfare on the principles of international humanitarian law – and vice versa.” Id. at 365.

121. See Charles J. Dunlap, Jr., A Virtuous Warrior in a Savage World, 8 U.S. A.F. ACAD. J. LEGAL STUD. 71, 88 (1997/1998) (explaining the role of the military leader in conflict); see also Frank J. Cilluffo et al., Bad Guys and Good Stuff: When and Where Will the Cyber Threats Converge?, 12 DEPAUL BUS. L.J. 131, 139-40 (1999/2000) (stating that there are many unintended problems that need to be accounted for, including cyberthreats).
consequences from an attack, known as second and third tier effects that were not accounted for in the planning stages of the attack, but occur due to some unexpected agent or circumstance. While this is equally applicable in the realm of kinetic attack, it has special significance when conducting CNA due to the nature of such operations. This difficulty is highlighted when considering the object of the attack or distinction, and the collateral effects of the attack or proportionality.

Consider the commander who is contemplating a CNA. His situation is not unlike the commander referred to earlier who is contemplating a kinetic attack against a dual-use rail depot. He knows the rail depot is a military objective, but also that it is in a populated civilian portion of a town. In an effort to avoid collateral damage, he determines a CNA on the rail transport network is more appropriate. In conducting his proportionality analysis, he needs to determine exactly what will be the secondary and tertiary results of that rail yard shut down. For example, that same network that controls the rail switching may also control some other system or services. Thus, the commander must answer the following questions. By shutting down the switching system, what will be the effects on incoming trains that are trying to enter the station? Similarly, will the shut down have an effect on trains not associated with this specific

122. See GPI, supra note 21, art. 51, para. 5(b), 1125 U.N.T.S. at 26 (using the term "expected" in relation to the consequences that need to be analyze). While this term is sometimes used interchangeably with the terms "unanticipated consequences" and "higher order effects," the proper legal term should be "unexpected consequences." Id.

123. See Wingfield, supra, note 90, at 138 (stating that in offensive information operations there may be unintended consequences); see also Schmitt, supra note 3, at 894 (describing CNA system interaction as sometimes random, unsynchronized, and unanticipated).

124. See Schmitt, supra note 50 (explaining the concept of proportionality).

Another false dilemma is the problem of reverberating effects. Should the second, third, fourth, and fifth tier effects of an attack on a legitimate target be considered when calculating proportionality? Of course they should... it simply does not matter whether incidental injury and collateral damage is a first or fourth tier effect. It must be included in the proportionality calculation. Id.

125. See supra note 123 and accompanying text (applying the terms second and third tier damage to a CNA attack).
rail depot that is the commander’s target? If so, what are those expected effects? Depending on the answers to these questions, the use of one kinetic weapon to destroy the rail depot may result in fewer deaths or injuries to civilians over the long term than does the CNA that shuts down the power supply maintaining that system.

In the broader picture, this becomes problematic as a commander tries to quantify “incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”126 When using kinetic weapons, determining, at least in the short term, what injury and damage will occur can be much clearer. This may not be so clear in relation to CNA.127 Commanders contemplating a use of CNA, particularly in relation to targets uniquely susceptible to CNA, should carefully weigh this consideration before authorizing an attack.

A. UNEXPECTED CONSEQUENCES, DISTINCTION AND PROPORTIONALITY

The rule of distinction has been explained in Part I,128 but attention was drawn to the fact that while the attacker may intend his CNA to be limited to a military objective, he may not have taken sufficient precautions or may be incapable of ensuring that his attack does not go beyond its intended target.129 This situation is highlighted by the following example in a recent article.130 Assume an attacker has decided to plant a disabling computer virus into an enemy’s military network. The article’s author argues that though the virus is capable of being targeted at the military network,

[s]uch code may be indiscriminate in that its effects cannot be limited. In many cases, once a viral code is launched against a target computer or network, the attacker will have no way to limit its subsequent retransmission. This may be true even in a closed network, for the virus

126. GPI, supra note 21, art. 51(5)(b), 1125 U.N.T.S. at 26.
127. See Schmitt, supra note 7, at 375-78 (explaining the complexities of computer network attack targets).
128. See supra Part I.A-B.
129. See supra notes 121-124 and accompanying text.
130. See Schmitt, supra note 7, at 389.
could, for instance, be transferred into it by diskette. Simply put, a malicious code likely to be uncontrollably spread throughout civilian systems is prohibited as an indiscriminate weapon.\textsuperscript{131}

The author’s point that “a malicious code likely to be uncontrollably spread throughout civilian systems is prohibited as an indiscriminate weapon”\textsuperscript{132} will not receive much argument. The validity of that statement, however, depends on the word “likely.” The example of a virus being transferred from a closed military network by diskette, with no intention or volition of the attacker, that subsequently infected civilian systems is more problematic. Is the legal standard that an attack is a violation of the law of war if it is “likely” to spread to unintended targets? Or, as intimated in the quote, is it a violation if unintended spread is “possible?”

\textbf{B. THE “MAY BE EXPECTED” STANDARD}

The misunderstanding or misapplication of the legal standard in CNO may prevent the valid use of CNO tools in armed conflict. There is no special standard for CNO, nor should there be. The same standard applies and provides sufficient guidance when considering the potential for “knock-on” effects or unexpected consequences. That standard is found in GPI Articles 51 and 57 of GPI. Article 51, paragraph 5(b) states:

\begin{quote}
Among others, the following types of attacks are to be considered as indiscriminate: an attack which \textit{may be expected} to cause incidental loss to civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.\textsuperscript{133}
\end{quote}

Note that the standard here is what may be “expected,” not what is likely or possible, or even what is foreseeable.\textsuperscript{134}

\begin{footnotes}
\item[131.] \textit{Id.} at 389.
\item[132.] \textit{Id.} (arguing the dangers of unexpected consequences on CNA attack).
\item[133.] GPI, \textit{supra} note 21, art. 51, para. 5(b), 1125 U.N.T.S. at 26 (emphasis added).
\item[134.] See Bayles, \textit{supra} note 8, at 53 (explaining the concepts of \textit{jus in bello} and \textit{proportionality}); see also Schmitt, \textit{supra} note 7, at 374 (stating that sporadic or isolated actions are not covered under humanitarian law).
\end{footnotes}
This same standard is repeated in GPI Article 57, paragraph 2(a)(iii). In discussing precautions in attack, it states:

With respect to attacks, the following precautions shall be taken: those who plan or decide upon an attack shall refrain from deciding to launch any attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.135

As before, the legal standard is what injury to civilians or damage to civilian objects is “expected” to occur.136

The GPI Commentary to the above-quoted Articles focuses on the meaning of “concrete and direct military advantage anticipated.”137 Yet, there are two very important comments that shed some light on the meaning of the word “expected” in this situation. The first highlights some of the discussion that went into choosing this specific language.

Some would have preferred the words ‘which risks causing’ rather than ‘which may be expected to cause.’ Committee III adopted the present wording . . . Despite these clarifications, the provision allows for a fairly broad margin of judgment, as stated above; several delegations regretfully stressed this fact. In contrast, other delegations commended the fact that in future military commanders would have a universally recognized guideline as regards their responsibilities to the civilian population during attacks against military objectives.138

While these are only words, and words carry different meanings for different people, it seems clear that the final language was less restrictive than the proposed language. Had the words “which risks causing” been accepted, the standard would be closer to what is “likely” or even what is “possible.” It seems clear, however, that by prohibiting attacks “which may be expected” to cause collateral

135. See GPI, supra note 21, at art. 57, para. 2a(iii), 1125 U.N.T.S. at 30 (emphasis added).
136. See id. art. 51, para. 5(b), 1125 U.N.T.S. at 26.
137. See GPI COMMENTARY, supra note 30, para. 2209-10.
138. See id.
The international community has allowed the military commander more discretion in his attacks.

The second applicable provision in the Commentary is a more general comment addressing the commander's use of discretion, "[e]ven if this system is based to some extent on a subjective evaluation, the interpretation must above all be a question of common sense and good faith for military commanders." Therefore, the commander's requirement is to exercise good faith in determining what injury to civilians and damage to civilian objects may be expected to occur from his attack. This standard of good faith is clarified in what is known as the Rendulic Rule.

C. THE RENDULIC RULE

In June 1944, Generaloberst (United States equivalent of a 4-star General) Lothar Rendulic was appointed as the Commander in Chief of the 20th Mountain Army, stationed in Scandinavia. Along its Eastern front, Rendulic's forces were spread from the Arctic Ocean in the north to central Finland in the south. In September of 1944, Finland signed a separate peace agreement with Russia that included the requirement for German troops to withdraw from Finland within fourteen days, a distance of over 1000 kilometers for the southernmost German units. This withdrawal ended up being a hard-fought movement against oncoming Russian soldiers.

139. See GPI, supra note 21, art. 51, para 5(b), 1125 U.N.T.S. at 26.
140. Id. para. 2208.
141. See infra Part II.C.
As part of this contested withdrawal, General Rendulic ordered a “scorched earth” policy in the Norwegian province of Finmark. This policy was based on General Rendulic’s understanding of the situation at the time, that he was being pursued by “excellent [Russian] troops” along several land and sea routes. The Nuremburg court clearly stated that, in judging the legality of a commander’s actions, the standard was what the military commander believed to be true at the time, not the actual facts.

There is evidence in the record that there was no military necessity for this destruction and devastation. An examination of the facts in retrospect can well sustain this conclusion. But we are obliged to judge the situation as it appeared to the defendant at the time. If the facts were such as would justify the action by the exercise of judgment, after giving consideration to all factors and existing possibilities, even though the conclusion reached may have been faulty, it cannot be said to be criminal.

In this case, despite the extreme destruction General Rendulic ordered, the Court concluded, “[a]fter giving careful consideration to all the evidence on the subject, we are convinced that the defendant cannot be held criminally responsible although when viewed in retrospect, the danger did not actually exist.”

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144. Id. at 1295-96 (describing the “scorched earth” policy). The evidence at Rendulic’s trial indicated that:

Villages were destroyed. Isolated habitations met a similar fate. Bridges and highways were blasted. Communication lines were destroyed. Port installations were wrecked. A complete destruction of all housing communication, and transport facilities took place. This was not only true along the coast and highways but in the interior sections as well. The destruction was as complete as an efficient army could do it. Three years after the devastation was discernible to the eye.

Id. at 1296.

145. See id. at 1295-96 (stating that the evidence at trial demonstrated that the Russian troops were of excellent caliber).

146. See id. (stating the standard of review for the rule of military necessity).

147. Id. at 1296.

148. Id. The Court continued:

We are not called upon to determine whether urgent military necessity for the devastation and destruction in the province of Finmark actually existed. We are concerned with the question whether the defendant at the time of its occurrence acted within the limits of honest judgment on the basis of the
The standard the Court held General Rendulic to was the requirement to give "consideration to all factors and existing possibilities" as they "appeared to the defendant at the time." While the specific facts of the case dealt with General Rendulic's decision concerning the military necessity of his action, the Court's reasoning reflects that this standard is not confined to solely that decision, but would also apply to a commander's decision contemplated in GPI Articles 51 and 57. This is the same standard with which military commanders contemplating the use of CNA must comply.

Note that the requirement to give consideration to all factors and existing possibilities is balanced with the overarching constraint of taking facts as they appear at the time of the decision. Must the commander remain in inaction until he feels he has turned over every stone in search of that last shred of information concerning all factors and possibilities that might affect his decision? The answer must be "no." Instead, he must act in good faith and, in accordance with GPI, do everything feasible to get this information.

**D. EVERYTHING FEASIBLE**

GPI Article 57, paragraph 2 states:

> 2. With respect to attacks, the following precautions shall be taken:  
> (a) those who plan or decide upon an attack shall:  
> (i) do everything feasible to verify that the objectives to be attacked are neither civilians nor civilian objects and are not subject to special protection but are military objectives within the meaning of paragraph 2 of Article 52 and that it is not prohibited by the provisions of this Protocol to attack them;

conditions prevailing at the time. The course of a military operation by the enemy is loaded with uncertainties . . . It is our considered opinion that the conditions, as they appeared to the defendant at the time were sufficient upon which he could honestly conclude that urgent military necessity warranted the decision made. This being true, the defendant may have erred in the exercise of his judgment but he was guilty of no criminal act. We find the defendant not guilty on this portion of the charge.  

*Id.* at 1297.

149. *See id.*

150. *See GPI, supra* note 21, art. 51, 57, 1125 U.N.T.S. at 26, 30.

151. *See supra* notes 147-148 and accompanying text.
(ii) take all feasible precautions in the choice of means and methods of
attack with a view to avoiding, and in any event to minimizing, incidental
loss of civilian life, injury to civilians and damage to civilian objects.152

This requirement of doing everything feasible underlies the
Rendulic Rule.153 Once a commander has done everything feasible to
gather information and learn the specific circumstances of the object
of his attack, he can rely on those facts in taking action.

In the world of CNO, the practical question becomes feasibility. In
the technologically advanced world of CNO, feasibility is really
about what computer operations can legitimately be conducted to
learn the intelligence needed to make an informed decision. Ignoring
this paper's assumption that the attacker is already involved in
international armed conflict with an enemy, a particular action will
likely not be as feasible prior to the onset of hostilities as it will be
once hostilities have commenced. This is true because some legal
uses of CNO allowing the collection of helpful information prior to
an attack, may constitute a use of force under the United Nations
Charter and initiate the premature onset of hostilities between the
two nations.154 In contrast, as this paper assumes, once the attacker is
in international armed conflict with an enemy, the feasible scope of
CNO is much broader. Hostilities are already commenced between
the nations and the commander need not worry whether his actions
will cross the threshold of a use of force. Rather, he is only
constrained by what is legal and what is technologically possible.155

Returning once again to the example of the rail depot, if the
commander wants to use CNA as opposed to bombing the rail hub,
he must take feasible precautions before initiating that attack to
ensure that any expected loss of civilian life or damage to civilian
property is not excessive to the concrete and direct military
advantage to be gained.156 Some of these feasible precautions may

152. GPI, supra note 21, Article 57, paras. 2a(i) and (ii), 1125 U.N.T.S. at 30
(emphasis added).
153. See supra Part II.C.
154. See supra note 3 (discussing CNA as a use of force prior to hostilities).
155. See supra Part I (discussing the laws of war).
156. See GPI COMMENTARY, supra note 30, para. 1389 (defining military
necessity).
include mapping the network, or creating an accurate picture of the computer network that will be attacked to ensure that the attack can be controlled and that the attacker knows all the systems that will be affected. By doing this, the commander will be able to ascertain what other effects are expected from his attack. Further, the structure of the network may affect the CNA tool he uses to accomplish his purpose. If the rail network is isolated, a different tool can be used than if the network is highly interconnected. The commander may also monitor the traffic that travels along the network to try and determine volume levels and attempt to determine the location of

157. See Michael C. Sirak, Threat to the Nets, A.F. MAG., Oct. 2001, at 24 (explaining the Department of Defense Computer Network Defense system); see also William Arkin & Robert Windrem, The U.S. China Information War: Major Headaches, Aug. 20, 2001 (claiming that the first step information warfare defense is mapping the networks of the opponent), available at http://www.msnbc.com/news/607031.asp#BODY (last visited Mar. 26, 2003); Mannion, supra note 87 (quoting Andrew Krepinevich, director of the Center for Budgetary and Strategic Assessments as saying, "[w]e may not know about the use of information warfare for years after this war happens because it is shrouded in secrecy, but I think that another way they are going to go after [Saddam Hussein's] ability to exercise control over his forces"). Specific capabilities are not only beyond the scope of this paper, but are also mostly classified. See id.; cf. Bill Gertz, High Tech Warfare, Beijing's Strategy Targets Taiwan's Information Networks, WASH. TIMES, July 22, 2001, at A3 (discussing some potential cyber weapons and tactics in a future war)

158. See GPI, supra note 21, Art. 36, 1125 U.N.T.S. 21. No attempt is made in this paper to discuss the actual means, or tools, by which the attack would take place. It is sufficient to mention that Article 36 of GPI states:

In the study, development, acquisition or adoption of a new weapon, means or method of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party.

Id.; see also Lt. Col Elizabeth Kelly, Bullet Background Paper on Cancellation of DOD 5000 Series Publications, Sept. 17, 2002 (on file with the author) (noting that the publications, Department of Defense Directive 5000.1 and Department of Defense Instruction 5000.2, where this requirement was codified were canceled on September 30, 2002). The Department of Defense publications are expected to be reissued in the near future containing the same requirement. See also Air Force Instruction 51-402 (demonstrating that The Services generally have similar requirements in their own regulations), available at http://www.e-publishing.af.mil/pubfiles/af/51/afi51-402/afi51-402.pdf (last visited Mar. 26, 2003).
protective firewalls.\textsuperscript{159} The important point is that a commander is required only to do what is feasible, given the prevailing circumstances, including the time he has to make a decision and the amount of information he has during that time.

E. AFFIRMATIVE OBLIGATION TO SEGREGATE\textsuperscript{160}

Additionally, it is important to note that GPI Article 58(b) places an affirmative obligation for nations to segregate civilian objects and populations from military objectives.

The Parties to the conflict shall, to the maximum extent feasible:
(a) without prejudice to Article 49 of the Fourth Convention, endeavour to remove the civilian population, individual civilians and civilian objects under their control from the vicinity of military objectives;
(b) avoid locating military objectives within or near densely populated areas;
(c) take the other necessary precautions to protect the civilian population, individual civilians and civilian objects under their control against the dangers resulting from military operations.\textsuperscript{161}

Though this requirement appears problematic in the internet sphere, the obligation still remains. As written above, paragraphs (a) and (b) deal with the destination of the attack and removing civilian lines of communication from the required segregation.\textsuperscript{162} Therefore, as long as a nation does not so closely tie civilian and military networks that an attack cannot affect one without similarly affecting the other, it is in compliance with the law. This known international legal requirement may assist the commander in situations where his intelligence is limited and he has to base his decision on little information.\textsuperscript{163}

\textsuperscript{159} William B. Scott, \textit{CINCSPACE: Focus More on Space Control}, 153 AVIATION WK. \& SPACE TECH., 80 (2000) (explaining the complexities of developing a CNA because of the constant evolution of technology).

\textsuperscript{160} See Rogers, \textit{supra} note 65, at 71-83 (providing an excellent general discussion of the obligation to segregate military objects from civilian objects).

\textsuperscript{161} GPI, \textit{supra} note 21, art. 58, 1125 U.N.T.S. at 31.

\textsuperscript{162} See id. (listing the necessary precautions to be taken prior to an attack).

\textsuperscript{163} But see Schmitt, \textit{supra} note 2, at 169 (arguing that a nation's ability to conduct precision engagement, including CNA, may encourage enemy nations to
F. SUMMARY

As commanders consider the expanded target list offered by CNA capabilities, there is the possibility for violations of the principle of distinction and the rule of proportionality, particularly when accounting for potential secondary, tertiary, or "knock-on" effects. While this consideration may have some unique aspects in CNO, it is based on the same law and principles that apply to all military operations. The commander need not base his decision on what the "possible," "likely," or even "foreseeable" effects will be of his attack. Rather, the international law standard for CNO is that a commander may use CNA if he, in good faith, believes that the damage to civilian objects and injury to civilians expected from the attack, given the circumstances as known to him at the time after taking all feasible measures to ascertain those circumstances, is not excessive to the concrete and direct military advantage anticipated.

CONCLUSION

The law of war clearly applies to the use of CNA in armed conflict. CNA not only provides the commander with increased capability to hit already reachable targets, but it also provides an expanded list of targets available to attack. There is no legal gap that prevents a commander from analyzing the law and then applying these capabilities in armed conflict. By applying the standard principles of the law of war, including distinction, the application of methods and means of warfare by balancing military necessity and humanity, and the rule of proportionality, a commander will come to the correct application of these weapons systems regardless of the targets CNA provides, to include dual-use targets.

The risk of secondary and tertiary effects that should serve as no roadblock to the increased use of CNA, provided the standard legal

\footnotesize{\textsuperscript{164} See supra Part II.A.}  
\footnotesize{\textsuperscript{165} See supra Part II.C-D.}  
\footnotesize{\textsuperscript{166} See supra note 78 and accompanying text (noting the increased number of available targets for the CNA).}  
\footnotesize{\textsuperscript{167} See supra Part I.}
analysis is completed by the commander, keeping in mind the Rendulic Rule and the feasibility requirement.\textsuperscript{168} Compliance with this internationally grounded standard will ensure the legality of CAN, while allowing the commander the flexibility to utilize this effective tool to accomplish his mission.

\footnote{168. \textit{See supra} Part II.C-D.}