

Cybersecurity: Authoritative Reports and Resources

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Summary

Cybersecurity vulnerabilities challenge governments, businesses, and individuals worldwide. Attacks have been initiated by individuals, as well as countries. Targets have included government networks, military defenses, companies, or political organizations, depending upon whether the attacker was seeking military intelligence, conducting diplomatic or industrial espionage, or intimidating political activists. In addition, national borders mean little or nothing to cyberattackers, and attributing an attack to a specific location can be difficult, which also makes a response problematic.

Congress has been actively involved in cybersecurity issues, holding hearings every year since 2001. There is no shortage of data on this topic: government agencies, academic institutions, think tanks, security consultants, and trade associations have issued hundreds of reports, studies, analyses, and statistics.

This report provides links to selected authoritative resources related to cybersecurity issues. This report includes information on

- "Legislation"
- "Executive Orders and Presidential Directives"
- "Data and Statistics"
- "Cybersecurity Glossaries"
- "Reports by Topic"
  - Government Accountability Office (GAO) reports
  - White House/Office of Management and Budget reports
  - Military/DOD
  - Cloud Computing
  - Critical Infrastructure
  - National Strategy for Trusted Identities in Cyberspace (NSTIC)
  - Cybercrime/Cyberwar
  - International
  - Education/Training/Workforce
  - Research and Development (R&D)
- "Related Resources: Other Websites"

The report will be updated as needed.

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Introduction

Cybersecurity is a sprawling topic that includes national, international, government, and private industry dimensions. In the 113th Congress, three bills have been introduced in the Senate and 14 in the House. More than 40 bills and resolutions with provisions related to cybersecurity were introduced in the first session of the 112th Congress, including several proposing revisions to current laws. In the 111th Congress, the total was more than 60. Several of those bills received committee or floor action, but none have become law. In fact, no comprehensive cybersecurity legislation has been enacted since 2002.

This report provides links to cybersecurity hearings and legislation under consideration in the 113th and 112th Congresses, as well as executive orders and presidential directives, data and statistics, glossaries, and authoritative reports.

For CRS analysis, please see the collection of CRS reports found on the Issues in Focus: Cybersecurity site.

Legislation

No major legislative provisions relating to cybersecurity have been enacted since 2002, despite many recommendations made over the past decade. The Obama Administration sent Congress a package of legislative proposals in May 2011[1] to give the federal government new authority to ensure that corporations that own the assets most critical to the nation's security and economic prosperity are adequately addressing the risks posed by cybersecurity threats.

Cybersecurity legislation advanced in both chambers in the 112th Congress. The House passed a series of bills that address a variety of issues—from toughening law enforcement of cybercrimes to giving the Department of Homeland Security oversight of federal information technology and critical infrastructure security to lessening liability for private companies that adopt cybersecurity best practices. The Senate pursued a comprehensive cybersecurity bill with several committees working to create a single vehicle for passage, backed by the White House—to no avail. The Senate bill also got mired in a procedural dispute over amendments.

Table 1 and **Table 2** provide lists of Senate and House legislation under consideration in the 113th Congress, in order by date introduced. When viewed in HTML, the bill numbers are active links to the Bill Summary and Status page in the Legislative Information Service (LIS).

CRS Reports and Other CRS Products: Legislation

- CRS Legal Sidebar, *House Intelligence Committee Marks Up Cybersecurity Bill* CISPA, Richard M. Thompson II
- CRS Legal Sidebar, *Privacy and Civil Liberties Issues Raised by CISPA*, Andrew Nolan
- CRS Legal Sidebar, *CISPA, Private Actors, and the Fourth Amendment*, Richard M. Thompson

[1] White House, *International Strategy for Cyberspace: Prosperity, Security, and Openness in a Networked World*, May 2011, at http://www.whitehouse.gov/sites/default/files/rss_viewer/international_strategy_for_cyberspace.pdf.

Table 1. Major Legislation: Senate (113th Congress)

Bill No.	Title	Committee(s)	Date Introduced
S. 1111	Cyber Economic Espionage Accountability Act	Judiciary	June 6, 2013
S. 884	Deter Cyber Theft Act	Finance	May 7, 2013
S. 658	Cyber Warrior Act of 2013	Armed Services	March 22, 2013
S. 21	Cybersecurity and American Cyber Competitiveness Act of 2013	Homeland Security and Government Affairs	January 22, 2013

Source: Legislative Information System (LIS).

Table 2. Major Legislation: House (113th Congress)

Bill No.	Title	Committee(s)	Date Introduced
H.R. 2281	Cyber Economic Espionage Accountability Act	Foreign Affairs, Judiciary, Financial Services	June 6, 2013
H.R. 1163	Federal Information Security Amendments Act of 2013	Oversight and Government Reform	March 14, 2013
H.R. 1121	Cyber Privacy Fortification Act of 2013	Judiciary	March 13, 2013
H.R. 967	Advancing America's Networking and Information Technology Research and Development Act of 2013	Science, Space, and Technology	March 14, 2013
H.R. 756	Cybersecurity R&D	Science, Space, and Technology	February 15, 2013
H.R. 624	Cyber Intelligence Sharing and Protection Act (CISPA)	Permanent Select Committee on Intelligence	February 13, 2013
H.R. 86	Cybersecurity Education Enhancement Act of 2013	Education and the Workforce; Homeland Security; Science, Space and Technology	January 3, 2013

Source: LIS.

Table 3 and **Table 5** list major Senate and House legislation considered by the 112th Congress, in order by date introduced. When viewed in HTML, the bill numbers are active links to the Bill Summary and Status page in the Legislative Information Service (LIS). The tables include bills with committee action, floor action, or significant legislative interest. **Table 4** provides *Congressional Record* links to Senate floor debate of S. 3414, the Cybersecurity Act of 2012.

Table 3. Major Legislation: Senate (112th Congress)

Bill No.	Title	Committee(s)	Date Introduced
S. 413	Cybersecurity and Internet Freedom Act of 2011	Homeland Security and Governmental Affairs	February 17, 2011
S. 1151	Personal Data Privacy and Security Act of 2011	Judiciary	June 7, 2011
S. 1342	Grid Cyber Security Act	Energy and Natural Resources	July 11, 2011

Bill No.	Title	Committee(s)	Date Introduced
S. 1535	Personal Data Protection and Breach Accountability Act of 2011	Judiciary	September 22, 2011
S. 2102	Cybersecurity Information Sharing Act of 2012	Homeland Security and Governmental Affairs	February 13, 2012
S. 2105	Cybersecurity Act of 2012	Homeland Security and Governmental Affairs	February 14, 2012
S. 2151	SECURE IT Act	Commerce, Science, and Transportation	March 1, 2012
S. 3333	Data Security and Breach Notification Act of 2012	Commerce, Science, and Transportation	June 21. 2012
S. 3342	SECURE IT	N/A (Placed on Senate Legislative Calendar under General Orders. Calendar No. 438)	June 28, 2012
S. 3414	Cybersecurity Act of 2012	N/A (Placed on Senate Legislative Calendar under Read the First Time)	July 19, 2012

Source: LIS.

Table 4. Senate Floor Debate: S. 3414 (112th Congress)

Title	Date	*Congressional Record* Pages
Cybersecurity Act of 2012: Motion to Proceed	July 26, 2012	S5419-S5449 http://www.gpo.gov/fdsys/pkg/CREC-2012-07-26/pdf/CREC-2012-07-26-pt1-PgS5419-6.pdf#page=1
Cybersecurity Act of 2012: Motion to Proceed – Continued and Cloture Vote	July 26, 2012	S5450-S5467 http://www.gpo.gov/fdsys/pkg/CREC-2012-07-26/pdf/CREC-2012-07-26-pt1-PgS5450-2.pdf#page=1
Cybersecurity Act of 2012	July 31, 2012	S5694-S5705 http://www.gpo.gov/fdsys/pkg/CREC-2012-07-31/pdf/CREC-2012-07-31-pt1-PgS5694.pdf#page=1
Cybersecurity Act of 2012: Continued	July 31, 2012	S5705-S5724 http://www.gpo.gov/fdsys/pkg/CREC-2012-07-31/pdf/CREC-2012-07-31-pt1-PgS5705-2.pdf#page=1
Cybersecurity Act of 2012: Debate and Cloture Vote	August 2, 2012	S5907-S5919 http://www.gpo.gov/fdsys/pkg/CREC-2012-08-02/pdf/CREC-2012-08-02-pt1-PgS5904-2.pdf#page=4
Cybersecurity Act of 2012: Motion to Proceed	November 14, 2012	S6774-S6784 http://www.gpo.gov/fdsys/pkg/CREC-2012-11-14/pdf/CREC-2012-11-14-pt1-PgS6774.pdf#page=1

Source: *Congressional Record* (GPO).

Table 5. Major Legislation: House (112th Congress)

Bill No.	Title	Committee(s)	Date Introduced
H.R. 76	Cybersecurity Education Enhancement Act of 2011	Homeland Security; House Oversight and Government Reform	January 5, 2011
H.R. 174	Homeland Security Cyber and Physical Infrastructure Protection Act of 2011	Technology; Education and the Workforce; Homeland Security	January 5, 2011
H.R. 2096	Cybersecurity Enhancement Act of 2011	Science, Space, and Technology	June 2, 2011
H.R. 3523	Cyber Intelligence Sharing and Protection Act	Committee on Intelligence (Permanent Select)	November 30, 2011
H.R. 3674	PRECISE Act of 2011	Homeland Security; Oversight and Government Reform; Science, Space, and Technology; Judiciary; Intelligence (Permanent Select)	December 15, 2011
H.R. 4263	SECURE IT Act of 2012 Strengthening and Enhancing Cybersecurity by Using Research, Education, Information, and Technology	Oversight and Government Reform, the Judiciary, Armed Services, and Intelligence (Permanent Select)	March 27, 2012
H.R. 3834	Advancing America's Networking and Information Technology Research and Development Act of 2012	Science, Space, and Technology	January 27, 2012
H.R. 4257	Federal Information Security Amendments Act of 2012	Oversight and Government Reform	April 18, 2012

Source: LIS.

Hearings in the 113th Congress

The following tables list cybersecurity hearings in the 113th Congress. **Table 6** and **Table 7** contain identical content but are organized differently. **Table 6** lists House hearings arranged by date (most recent first), and **Table 7** lists House hearings arranged by committee.

Table 6. House Hearings (113th Congress), by Date

Title	Date	Committee	Subcommittee
Cyber Threats and Security Solutions	May 21, 2013	Energy and Commerce	
Cybersecurity: An Examination of the Communications Supply Chain	May 21, 2013	Energy and Commerce	Communications and Technology
Facilitating Cyber Threat Information Sharing and Partnering with the Private Sector to Protect Critical Infrastructure: An Assessment of DHS Capabilities	May 16, 2013	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
Striking the Right Balance: Protecting Our Nation's Critical Infrastructure from Cyber Attack and Ensuring Privacy and Civil Liberties	April 25, 2013	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
Cyber Attacks: An Unprecedented Threat to U.S. National Security	March 21, 2013	Foreign Affairs	Europe, Eurasia, and Emerging Threats
Protecting Small Business from Cyber-Attacks	March 21, 2013	Small Business	Healthcare and Technology
Cybersecurity and Critical Infrastructure [CLOSED hearing]	March 20, 2013	Appropriations	
Cyber Threats from China, Russia and Iran: Protecting American Critical Infrastructure	March 20, 2013	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
DHS Cybersecurity: Roles and Responsibilities to Protect the Nation's Critical Infrastructure	March 13, 2013	Homeland Security	
Investigating and Prosecuting 21st Century Cyber Threats	March 13, 2013	Judiciary	Crime, Terrorism, Homeland Security and Investigations
Information Technology and Cyber Operations: Modernization and Policy Issues to Support the Future Force	March 13, 2013	Armed Services	Intelligence, Emerging Threats and Capabilities
Cyber R&D [Research and Development] Challenges and Solutions	February 26, 2013	Science, Space, and Technology	Technology
Advanced Cyber Threats Facing Our Nation	February 14, 2013	Select Committee on Intelligence	

Source: Compiled by the Congressional Research Service (CRS).

Table 7. House Hearings (113th Congress), by Committee

Committee	Subcommittee	Title	Date
Appropriations		Cybersecurity and Critical Infrastructure [CLOSED hearing]	March 20, 2013
Armed Services	Intelligence, Emerging Threats and Capabilities	Information Technology and Cyber Operations: Modernization and Policy Issues to Support the Future Force	March 13, 2013
Energy and Commerce		Cyber Threats and Security Solutions	May 21, 2013
Energy and Commerce	Communications and Technology	Cybersecurity: An Examination of the Communications Supply Chain	May 21, 2013
Foreign Affairs	Europe, Eurasia, and Emerging Threats	Cyber Attacks: An Unprecedented Threat to U.S. National Security	March 21, 2013
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	Facilitating Cyber Threat Information Sharing and Partnering with the Private Sector to Protect Critical Infrastructure: An Assessment of DHS Capabilities	May 16, 2013
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	Striking the Right Balance: Protecting Our Nation's Critical Infrastructure from Cyber Attack and Ensuring Privacy and Civil Liberties	April 25, 2013
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	Cyber Threats from China, Russia and Iran: Protecting American Critical Infrastructure	March 20, 2013
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	DHS Cybersecurity: Roles and Responsibilities to Protect the Nation's Critical Infrastructure	March 13, 2013
Judiciary	Crime, Terrorism, Homeland Security and Investigations	Investigating and Prosecuting 21st Century Cyber Threats	March 13, 2013
Science, Space, and Technology	Technology	Cyber R&D [Research and Development] Challenges and Solutions	February 26, 2013
Select Committee on Intelligence		Advanced Cyber Threats Facing Our Nation	February 14, 2013
Small Business	Healthcare and Technology	Protecting Small Business from Cyber-Attacks	March 21, 2013

Source: Compiled by CRS.

Table 8. Senate Hearings (113th Congress), by Date

Title	Date	Committee	Subcommittee
Cybersecurity: Preparing for and Responding to the Enduring Threat	June 12, 2013	Appropriations	
Cyber Threats: Law Enforcement and Private Sector Responses	May 8, 2013	Judiciary	Crime and Terrorism
Defense Authorization: Cybersecurity Threats: To receive a briefing on cybersecurity threats in review of the Defense Authorization Request for Fiscal Year 2014 and the Future Years Defense Program.	March 19, 2013	Armed Services	Emerging Threats and Capabilities
Fiscal 2014 Defense Authorization, Strategic Command: U.S. Cyber Command	March 12, 2013	Armed Services	
The Cybersecurity Partnership Between the Private Sector and Our Government: Protecting Our National and Economic Security	March 7, 2013	(Joint) Homeland Security and Governmental Affairs and Commerce, Science and Transportation	

Source: Compiled by CRS.

Table 9. Senate Hearings (113th Congress), by Committee

Committee	Subcommittee	Title	Date
Appropriations		Cybersecurity: Preparing for and Responding to the Enduring Threat	June 12, 2013
Armed Services	Emerging Threats and Capabilities	Defense Authorization: Cybersecurity Threats	March 19, 2013
Armed Services		Fiscal 2014 Defense Authorization, Strategic Command: U.S. Cyber Command	March 12, 2013
(Joint) Homeland Security and Governmental Affairs and Commerce, Science and Transportation		The Cybersecurity Partnership Between the Private Sector and Our Government: Protecting Our National and Economic Security	March 7, 2013
Judiciary	Crime and Terrorism	Cyber Threats: Law Enforcement and Private Sector Responses	May 8, 2013

Source: Compiled by CRS.

Hearings in the 112th Congress

The following tables list cybersecurity hearings in the 112th Congress. **Table 10** and **Table 11** contain identical content but are organized differently. **Table 10** lists House hearings arranged by date (most recent first) and **Table 11** lists House hearings arranged by committee. **Table 12** lists House markups by date; **Table 13** and **Table 14** contain identical content. **Table 13** lists Senate hearings arranged by date and **Table 14** lists Senate hearings arranged by committee. When viewed in HTML, the document titles are active links.

Table 10. House Hearings (112th Congress), by Date

Title	Date	Committee	Subcommittee
Investigation of the Security Threat Posed by Chinese Telecommunications Companies Huawei and ZTE	September 13, 2012	Permanent Select Committee on Intelligence	
Resilient Communications: Current Challenges and Future Advancements	September 12, 2012	Homeland Security	Emergency Preparedness, Response and Communications
Cloud Computing: An Overview of the Technology and the Issues facing American Innovators	July 25, 2012	Judiciary	Intellectual Property, Competition, and the Internet
Digital Warriors: Improving Military Capabilities for Cyber Operations	July 25, 2012	Armed Services	Emerging Threats and Capabilities
Cyber Threats to Capital Markets and Corporate Accounts	June 1, 2012	Financial Services	Capital Markets and Government Sponsored Enterprises
Iranian Cyber Threat to U.S. Homeland	April 26, 2012	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies and Counterterrorism and Intelligence
America is Under Cyber Attack: Why Urgent Action is Needed	April 24, 2012	Homeland Security	Oversight, Investigations and Management
The DHS and DOE National Labs: Finding Efficiencies and Optimizing Outputs in Homeland Security Research and Development	April 19, 2012	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
Cybersecurity: Threats to Communications Networks and Public-Sector Responses	March 28, 2012	Energy and Commerce	Communications and Technology
IT Supply Chain Security: Review of Government and Industry Efforts	March 27, 2012	Energy and Commerce	Oversight and Investigations
Fiscal 2013 Defense Authorization: IT and Cyber Operations	March 20, 2012	Armed Services	Emerging Threats and Capabilities
Cybersecurity: The Pivotal Role of Communications Networks	March 7, 2012	Energy and Commerce	Communications and Technology
NASA Cybersecurity: An Examination of the Agency's Information Security	February 29, 2012	Science, Space, and Technology	Investigations and Oversight
Critical Infrastructure Cybersecurity: Assessments of Smart Grid Security	February 28, 2012	Energy and Commerce	Oversight and Investigations

Title	Date	Committee	Subcommittee
Hearing on Draft Legislative Proposal on Cybersecurity	December 6, 2011	Homeland Security and Governmental Affairs	Cybersecurity, Infrastructure Protection and Security Technologies
Cyber Security: Protecting Your Small Business	December 1, 2011	Small Business	Healthcare and Technology
Cyber Security: Protecting Your Small Business	November 30, 2011	Small Business	Healthcare and Technology
Combating Online Piracy (H.R. 3261, Stop the Online Piracy Act)	November 16, 2011	Judiciary	
Cybersecurity: Protecting America's New Frontier	November 15, 2011	Judiciary	Crime, Terrorism and Homeland Security
Institutionalizing Irregular Warfare Capabilities	November 3, 2011	Armed Services	Emerging Threats and Capabilities
Cloud Computing: What are the Security Implications?	October6, 2011	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
Cyber Threats and Ongoing Efforts to Protect the Nation	October 4, 2011	Permanent Select Intelligence	
The Cloud Computing Outlook	September 21, 2011	Science, Space, and Technology	Technology and Innovation
Combating Cybercriminals	September 14, 2011	Financial Services	Financial Institutions and Consumer Credit
Cybersecurity: An Overview of Risks to Critical Infrastructure	July 26, 2011	Energy and Commerce	Oversight and Investigations
Cybersecurity: Assessing the Nation's Ability to Address the Growing Cyber Threat	July 7, 2011	Oversight and Government Reform	
Field Hearing: Hacked Off: Helping Law Enforcement Protect Private Financial Information"	June 29, 2011	Financial Services (field hearing in Hoover, AL)	
Examining the Homeland Security Impact of the Obama Administration's Cybersecurity Proposal	June 24, 2011	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
Sony and Epsilon: Lessons for Data Security Legislation	June 2, 2011	Energy and Commerce	Commerce, Manufacturing, and Trade
Protecting the Electric Grid: the Grid Reliability and Infrastructure Defense Act	May 31, 2011	Energy and Commerce	
Unlocking the SAFETY Act's [Support Anti-terrorism by Fostering Effective Technologies - P.L. 107-296] Potential to Promote Technology and Combat Terrorism	May 26, 2011	Homeland Security	Cybersecurity, Infrastructure Protection, and Security Technologies
Protecting Information in the Digital Age: Federal Cybersecurity Research and Development Efforts	May 25, 2011	Science, Space and Technology	Research and Science Education

Title	Date	Committee	Subcommittee
Cybersecurity: Innovative Solutions to Challenging Problems	May 25, 2011	Judiciary	Intellectual Property, Competition and the Internet
Cybersecurity: Assessing the Immediate Threat to the United States	May 25, 2011	Oversight and Government Reform	National Security, Homeland Defense and Foreign Operations
DHS Cybersecurity Mission: Promoting Innovation and Securing Critical Infrastructure	April 15, 2011	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
Communist Chinese Cyber-Attacks, Cyber-Espionage and Theft of American Technology	April 15, 2011	Foreign Affairs	Oversight and Investigations
Budget Hearing - National Protection and Programs Directorate, Cybersecurity and Infrastructure Protection Programs	March 31, 2011	Appropriations (closed/classified)	Energy and Power
Examining the Cyber Threat to Critical Infrastructure and the American Economy	March 16, 2011	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
2012 Budget Request from U.S. Cyber Command	March 16, 2011	Armed Services	Emerging Threats and Capabilities
What Should the Department of Defense's Role in Cyber Be?	February 11, 2011	Armed Services	Emerging Threats and Capabilities
Preventing Chemical Terrorism: Building a Foundation of Security at Our Nation's Chemical Facilities	February 11, 2011	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
World Wide Threats	February 10, 2011	Permanent Select Intelligence	

Source: Compiled by CRS.

Table 11. House Hearings (112th Congress), by Committee

Committee	Subcommittee	Title	Date
Appropriations (closed/classified)		Budget Hearing - National Protection and Programs Directorate, Cybersecurity and Infrastructure Protection Programs	March 31, 2011
Armed Services	Emerging Threats and Capabilities	Digital Warriors: Improving Military Capabilities for Cyber Operations	July 25, 2012
Armed Services	Emerging Threats and Capabilities	Fiscal 2013 Defense Authorization: IT and Cyber Operations	March 20, 2012
Armed Services	Emerging Threats and Capabilities	Institutionalizing Irregular Warfare Capabilities	November 3, 2011
Armed Services	Emerging Threats and Capabilities	2012 Budget Request for U.S. Cyber Command	March 16, 2011
Armed Services	Emerging Threats and Capabilities	What Should the Department of Defense's Role in Cyber Be?	February 11, 2011

Committee	Subcommittee	Title	Date
Energy and Commerce	Communications and Technology	Cybersecurity: Threats to Communications Networks and Public-Sector Responses	March 28, 2012
Energy and Commerce	Oversight and Investigations	IT Supply Chain Security: Review of Government and Industry Efforts	March 27, 2012
Energy and Commerce	Communications and Technology	Cybersecurity: The Pivotal Role of Communications Networks	March 7, 2012
Energy and Commerce	Oversight and Investigations	Critical Infrastructure Cybersecurity: Assessments of Smart Grid Security	February 28, 2012
Energy and Commerce	Oversight and Investigations	Cybersecurity: An Overview of Risks to Critical Infrastructure	July 26, 2011
Energy and Commerce	Commerce, Manufacturing, and Trade	Sony and Epsilon: Lessons for Data Security Legislation	June 2, 2011
Energy and Commerce	Energy and Power	Protecting the Electric Grid: the Grid Reliability and Infrastructure Defense Act	May 31, 2011
Financial Services	Capital Markets and Government Sponsored Enterprises	Cyber Threats to Capital Markets and Corporate Account	June 1, 2012
Financial Services	Financial Institutions and Consumer Credit	Combating Cybercriminals	September 14, 2011
Financial Services	Field hearing in Hoover, AL	Field Hearing: "Hacked Off: Helping Law Enforcement Protect Private Financial Information"	June 29, 2011
Foreign Affairs	Oversight and Investigations	Communist Chinese Cyber-Attacks, Cyber-Espionage and Theft of American Technology	April 15, 2011
Homeland Security	Emergency Preparedness, Response and Communications	Resilient Communications: Current Challenges and Future Advancement	September 12, 2012
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies and Counterterrorism and Intelligence	Iranian Cyber Threat to U.S. Homeland	April 26, 2012
Homeland Security	Oversight, Investigations and Management	America is Under Cyber Attack: Why Urgent Action is Needed	April 24, 2012
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	The DHS and DOE National Labs: Finding Efficiencies and Optimizing Outputs in Homeland Security Research and Development	April 19, 2012
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	Hearing on Draft Legislative Proposal on Cybersecurity	December 6, 2011
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	Cloud Computing: What are the Security Implications?	October 6, 2011
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	Examining the Homeland Security Impact of the Obama Administration's Cybersecurity Proposal	June 24, 2011

Committee	Subcommittee	Title	Date
Homeland Security		Unlocking the SAFETY Act's [Support Anti-terrorism by Fostering Effective Technologies - P.L. 107-296] Potential to Promote Technology and Combat Terrorism	May 26, 2011
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	DHS Cybersecurity Mission: Promoting Innovation and Securing Critical Infrastructure	April 15, 2011
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	Examining the Cyber Threat to Critical Infrastructure and the American Economy	March 16, 2011
Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies	Preventing Chemical Terrorism: Building a Foundation of Security at Our Nation's Chemical Facilities	February 11, 2011
Judiciary	Intellectual Property, Competition and the Internet	Cloud Computing: An Overview of the Technology and the Issues facing American Innovators	July 25, 2012
Judiciary		Combating Online Piracy (H.R. 3261, Stop the Online Piracy Act)	November 16, 2011
Judiciary	Crime, Terrorism and Homeland Security	Cybersecurity: Protecting America's New Frontier	November 15, 2011
Judiciary	Intellectual Property, Competition and the Internet	Cybersecurity: Innovative Solutions to Challenging Problems	May 25, 2011
Oversight and Government Reform		Cybersecurity: Assessing the Nation's Ability to Address the Growing Cyber Threat	July 7, 2011
Oversight and Government Reform	Subcommittee on National Security, Homeland Defense and Foreign Operations	Cybersecurity: Assessing the Immediate Threat to the United States	May 25, 2011
Permanent Select Intelligence		Investigation of the Security Threat Posed by Chinese Telecommunications Companies Huawei and ZTE	September 13, 2012
Permanent Select Intelligence		Cyber Threats and Ongoing Efforts to Protect the Nation	October 4, 2011
Permanent Select Intelligence		World Wide Threats	February 10, 2011
Science, Space and Technology	Investigations and Oversight	NASA Cybersecurity: An Examination of the Agency's Information Security	February 29, 2012
Science, Space and Technology	Technology and Innovation	The Cloud Computing Outlook	September 21, 2011
Science, Space and Technology	Research and Science Education	Protecting Information in the Digital Age: Federal Cybersecurity Research and Development Efforts	May 25, 2011
Small Business	Healthcare and Technology	Cyber Security: Protecting Your Small Business	November 30, 2011

Source: Compiled by CRS.

Table 12. House Markups (112th Congress), by Date

Title	Date	Committee	Subcommittee
Consideration and Markup of H.R. 3674	February 1, 2012	Homeland Security	Cybersecurity, Infrastructure Protection and Security Technologies
Markup: Draft Bill: Cyber Intelligence Sharing and Protection Act of 2011	December 1, 2011	Permanent Select Intelligence	
Markup on H.R. 2096, Cybersecurity Enhancement Act of 2011	July 21, 2011	Science, Space and Technology	
Discussion Draft of H.R. 2577, a bill to require greater protection for sensitive consumer data and timely notification in case of breach	June 15, 2011	Energy and Commerce	Commerce, Manufacturing, and Trade

Source: Compiled by CRS.

Table 13. Senate Hearings (112th Congress), by Date

Title	Date	Committee	Subcommittee
State of Federal Privacy and Data Security Law: Lagging Behind the Times?	July 31, 2012	Homeland Security and Governmental Affairs	Oversight of Government Management, the Federal Workforce and the District of Columbia
Protecting Electric Grid From Cyber Attacks	July 17, 2012	Energy and Natural Resources Committee	
To receive testimony on U.S. Strategic Command and U.S. Cyber Command in review of the Defense Authorization Request for Fiscal Year 2013 and the Future Years Defense Program.	March 27, 2012	Armed Services	
To receive testimony on cybersecurity research and development in review of the Defense Authorization Request for Fiscal Year 2013 and the Future Years Defense Program	March 20, 2012	Armed Services	Emerging Threats and Capabilities
The Freedom of Information Act: Safeguarding Critical Infrastructure Information and the Public's Right to Know	March 13, 2012	Judiciary	
Securing America's Future: The Cybersecurity Act of 2012	February 16, 2012	Homeland Security and Governmental Affairs	
Cybercrime: Updating the Computer Fraud and Abuse Act to Protect Cyberspace and Combat Emerging Threats	September 7, 2011	Judiciary	
Role of Small Business in Strengthening Cybersecurity Efforts in the United States	July 25, 2011	Small Business and Entrepreneurship	
Privacy and Data Security: Protecting Consumers in the Modern World	June 29, 2011	Commerce, Science and Transportation	

Title	Date	Committee	Subcommittee
Cybersecurity: Evaluating the Administration's Proposals	June 21, 2011	Judiciary	Crime and Terrorism
Cybersecurity and Data Protection in the Financial Sector	June 21, 2011	Banking, Housing and Urban Affairs	
Protecting Cyberspace: Assessing the White House Proposal	May 23, 2011	Homeland Security and Governmental Affairs	
Cybersecurity of the Bulk-Power System and Electric Infrastructure	May 5, 2011	Energy and Natural Resources	
To receive testimony on the health and status of the defense industrial base and its science and technology-related elements	May 3, 2011	Armed Services	Emerging Threats and Capabilities
Cyber Security: Responding to the Threat of Cyber Crime and Terrorism	April 12, 2011	Judiciary	Crime and Terrorism
Oversight of the Federal Bureau of Investigation	March 30, 2011	Judiciary	
Cybersecurity and Critical Electric Infrastructure[a]	March 15, 2011	Energy and Natural Resources	
Information Sharing in the Era of WikiLeaks: Balancing Security and Collaboration	March 10, 2011	Homeland Security and Governmental Affairs	
Homeland Security Department's Budget Submission for Fiscal Year 2012	February 17, 2011	Homeland Security and Governmental Affairs	

Source: Compiled by CRS.

a. The March 15, 2011, hearing before the Committee on Energy and Natural Resources was closed. The hearing notice was removed from the committee's website.

Table 14. Senate Hearings (112th Congress), by Committee

Committee	Subcommittee	Title	Date
Armed Services	Emerging Threats and Capabilities	To receive testimony on cybersecurity research and development in review of the Defense Authorization Request for Fiscal Year 2013 and the Future Years Defense Program	March 20, 2012
Armed Services	Emerging Threats and Capabilities	To receive testimony on the health and status of the defense industrial base and its science and technology-related elements	May 3, 2011
Banking, Housing and Urban Affairs		Cybersecurity and Data Protection in the Financial Sector	June 21, 2011
Commerce, Science and Transportation		Privacy and Data Security: Protecting Consumers in the Modern World	June 29, 2011
Energy and Natural Resources		Protecting the Electric Grid from Cyber Attacks	July 17, 2012
Energy and Natural Resources		Cybersecurity of the Bulk-Power System and Electric Infrastructure	May 5, 2011

Committee	Subcommittee	Title	Date
Energy and Natural Resources (closed)		Cybersecurity and Critical Electric Infrastructure[a]	March 15, 2011
Homeland Security & Governmental Affairs	Oversight of Government Management, the Federal Workforce and the District of Columbia	State of Federal Privacy and Data Security Law: Lagging Behind the Times?	July 31, 2012
Homeland Security & Governmental Affairs		Securing America's Future: The Cybersecurity Act of 2012	February 16, 2012
Homeland Security and Governmental Affairs		Protecting Cyberspace: Assessing the White House Proposal	May 23, 2011
Homeland Security and Governmental Affairs		Information Sharing in the Era of WikiLeaks: Balancing Security and Collaboration	March 10, 2011
Homeland Security and Governmental Affairs		Homeland Security Department's Budget Submission for Fiscal Year 2012	February 17, 2011
Judiciary		The Freedom of Information Act: Safeguarding Critical Infrastructure Information and the Public's Right to Know	March 13, 2012
Judiciary		Cybercrime: Updating the Computer Fraud and Abuse Act to Protect Cyberspace and Combat Emerging Threats	September 7, 2011
Judiciary	Crime and Terrorism	Cybersecurity: Evaluating the Administration's Proposals	June 21, 2011
Judiciary	Crime and Terrorism	Cyber Security: Responding to the Threat of Cyber Crime and Terrorism	April 12, 2011
Judiciary		Oversight of the Federal Bureau of Investigation	March 30, 2011
Small Business and Entrepreneurship		Role of Small Business in Strengthening Cybersecurity Efforts in the United States	July 25, 2011

Source: Compiled by CRS.

a. The March 15, 2011, hearing before the Committee on Energy and Natural Resources was closed. The hearing notice was removed from the committee's website.

Table 15. Congressional Committee Investigative Reports

Title	Committee	Date	Pages	Notes
Investigative Report on the U.S. National Security Issues Posed by Chinese Telecommunications Companies Huawei and ZTE	House Permanent Select Committee on Intelligence	October 8, 2012	60	The committee initiated this investigation in November 2011 to inquire into the counterintelligence and security threat posed by Chinese telecommunications companies doing business in the United States.
Federal Support for and Involvement in State and Local Fusion Centers	U. S. Senate Permanent Subcommittee on Investigations	October 3, 2012	141	A two-year bipartisan investigation found that U.S. Department of Homeland Security efforts to engage state and local intelligence "fusion centers" has not yielded significant useful information to support federal counterterrorism intelligence efforts. In Section VI, "Fusion Centers Have Been Unable to Meaningfully Contribute to Federal Counterterrorism Efforts," Part G, "Fusion Centers May Have Hindered, Not Aided, Federal Counterterrorism Efforts," the report discusses the Russian "Cyberattack" in Illinois.

Source: Compiled by CRS.

Executive Orders and Presidential Directives

Executive orders are official documents through which the President of the United States manages the operations of the federal government. Presidential directives pertain to all aspects of U.S. national security policy and are signed or authorized by the President.

The following reports provide additional information on executive orders and presidential directives:

- CRS Report RS20846, *Executive Orders: Issuance, Modification, and Revocation*, by Todd Garvey and Vivian S. Chu, and
- CRS Report 98-611, *Presidential Directives: Background and Overview*, by L. Elaine Halchin.

Table 16 provides a list of executive orders and presidential directives pertaining to information and computer security.

Table 16. Executive Orders and Presidential Directives

(by date of issuance)

Title	Date	Source	Notes
E.O. 13636, Improving Critical Infrastructure Cyberesecurity http://www.gpo.gov/fdsys/pkg/FR-2013-02-19/pdf/2013-03915.pdf	February 12, 2013	White House	The order directs agencies to take steps to expand cyberthreat information sharing with companies. It also tells them to come up with incentives for owners of the most vital and vulnerable digital infrastructure—like those tied to the electricity grid or banking system—to voluntarily comply with a set of security standards. And it orders them to review their regulatory authority on cybersecurity and propose new regulations in some cases.
Presidential Policy Directive (PPD) 21 - Critical Infrastructure Security and Resilience http://www.whitehouse.gov/the-press-office/2013/02/12/presidential-policy-directive-critical-infrastructure-security-and-resil	February 12, 2013	White House	This directive establishes national policy on critical infrastructure security and resilience. This endeavor is a shared responsibility among the federal, state, local, tribal, and territorial (SLTT) entities, and public and private owners and operators of critical infrastructure (hereinafter referred to as "critical infrastructure owners and operators"). This directive also refines and clarifies the critical infrastructure-related functions, roles, and responsibilities across the federal government, as well as enhances overall coordination and collaboration. The federal government also has a responsibility to strengthen the security and resilience of its own critical infrastructure, for the continuity of national essential functions, and to organize itself to partner effectively with and add value to the security and resilience efforts of critical infrastructure owners and operators.
Fact Sheet: Presidential Policy Directive on Critical Infrastructure Security and Resilience http://www.whitehouse.gov/the-press-office/2013/02/12/fact-sheet-presidential-policy-directive-critical-infrastructure-securit	February 12, 2013	White House	Lists three strategic imperatives that drive the federal approach to strengthen critical infrastructure security and resilience, and the six deliverables that will accomplish those goals.

Title	Date	Source	Notes
E.O. 13587, Structural Reforms to Improve the Security of Classified Networks and the Responsible http://www.gpo.gov/fdsys/pkg/FR-2011-10-13/pdf/2011-26729.pdf	October 7, 2011	White House	This order directs structural reforms to ensure responsible sharing and safeguarding of classified information on computer networks that shall be consistent with appropriate protections for privacy and civil liberties. Agencies bear the primary responsibility for meeting these twin goals. These policies and minimum standards will address all agencies that operate or access classified computer networks, all users of classified computer networks (including contractors and others who operate or access classified computer networks controlled by the federal government), and all classified information on those networks.
E.O. 13407, Public Alert and Warning System http://www.gpo.gov/fdsys/pkg/WCPD-2006-07-03/pdf/WCPD-2006-07-03-Pg1226.pdf	June 26, 2006	White House	Assigns the Secretary of Homeland Security the responsibility to establish or adopt, as appropriate, common alerting and warning protocols, standards, terminology, and operating procedures for the public alert and warning system to enable interoperability and the secure delivery of coordinated messages to the American people through as many communication pathways as practicable, taking account of Federal Communications Commission rules as provided by law.
HSPD-7, Homeland Security Presidential Directive No. 7: Critical Infrastructure Identification, Prioritization, and Protection http://www.dhs.gov/xabout/laws/gc_1214597989952.shtm	December 17, 2003	White House	Assigns the Secretary of Homeland Security the responsibility of coordinating the nation's overall efforts in critical infrastructure protection across all sectors. HSPD-7 also designates the Department of Homeland Security (DHS) as lead agency for the nation's information and telecommunications sectors.
E.O. 13286, Amendment of Executive Orders, and Other Actions, in Connection With the Transfer of Certain Functions to the Secretary of Homeland Security http://edocket.access.gpo.gov/2003/pdf/03-5343.pdf	February 28, 2003	White House	Designates the Secretary of Homeland Security the Executive Agent of the National Communication System Committee of Principals, which are the agencies, designated by the President, that own or lease telecommunication assets identified as part of the National Communication System, or which bear policy, regulatory, or enforcement responsibilities of importance to national security and emergency preparedness telecommunications.

Title	Date	Source	Notes
Presidential Decision Directive/NSC-63 http://www.fas.org/irp/offdocs/pdd/pdd-63.htm	May 22, 1998	White House	Sets as a national goal the ability to protect the nation's critical infrastructure from intentional attacks (both physical and cyber) by the year 2003. According to the PDD, any interruptions in the ability of these infrastructures to provide their goods and services must be "brief, infrequent, manageable, geographically isolated, and minimally detrimental to the welfare of the United States."
NSD-42, National Security Directive 42 - National Policy for the Security of National Security Telecommunications and Information Systems http://bushlibrary.tamu.edu/research/pdfs/nsd/nsd42.pdf	July 5, 1990	White House	Establishes the National Security Telecommunications and Information Systems Security Committee, now called the Committee on National Security Systems (CNSS). CNSS is an interagency committee, chaired by the Department of Defense. Among other assignments, NSD-42 directs the CNSS to provide system security guidance for national security systems to executive departments and agencies; and submit annually to the Executive Agent an evaluation of the security status of national security systems. NSD-42 also directs the Committee to interact, as necessary, with the National Communications System Committee of Principals.
E.O. 12472, Assignment of National Security and Emergency Preparedness Telecommunications Functions (amended by E.O. 13286 of February 28, 2003, and changes made by E.O. 13407, June 26, 2006) http://www.ncs.gov/library/policy_docs/eo_12472.html	April 3, 1984	National Communications System (NCS)	Established a national communication system as those telecommunication assets owned or leased by the federal government that can meet the national security and emergency preparedness needs of the federal government, together with an administrative structure that could ensure that a national telecommunications infrastructure is developed that is responsive to national security and emergency preparedness needs.

Note: Descriptions compiled by CRS from government websites.

Data and Statistics

This section identifies data and statistics from government, industry, and IT security firms regarding the current state of cybersecurity threats in the United States and internationally. These include incident estimates, costs, and annual reports on data security breaches, identity theft, cybercrime, malware, and network security.

Table 17. Data and Statistics: Cyber Incidents, Data Breaches, Cybercrime

Title	Date	Source	Pages	Notes
2013 Data Breach Investigations Report http://www.verizonenterprise.com/DBIR/2013/	April 23, 2013	Verizon	63	The annual report counted 621 confirmed data breaches last year, and more than 47,000 reported "security incidents." The victims spanned a wide range of industries. Thirty-seven percent of breached companies were financial firms; 24% were retailers and restaurants; 20% involved manufacturing, transportation and utility industries; and 20% of the breaches affected organizations that Verizon qualified as "information and professional services firms." (The totals exceed 100% because of rounding.)
2013 Internet Security Threat Report, Vol. 18 https://www.symantec.com/security_response/publications/threatreport.jsp?om_ext_cid=biz_socmed_twitter_facebook_marketwire_linkedin_2013Apr_worldwide_ISTR18	April 2013	Symantec	58	Threats to online security have grown and evolved considerably in 2012. From the threats of cyberespionage and industrial espionage to the widespread, chronic problems of malware and phishing, malware authors have constantly improved innovation. There has also been an expansion of traditional threats into new forums. In particular, social media and mobile devices have come under increasing attack in 2012, even as spam and phishing attacks via traditional routes have fallen. Online criminals are following users onto these new platforms.
Overview of Current Cyber Attacks (logged by 97 Sensors) http://www.sicherheitstacho.eu/	March 6, 2013	Deutsche Telekom	N/A	Provides a real-time visualization and map of cyberattacks detected by a network of 97 sensors placed around the world.
Real-Time Web Monitor http://www.akamai.com/html/technology/dataviz1.html	March 5, 2013	Akamai	N/A	Akamai monitors global Internet conditions around the clock. The map identifies the global regions with the greatest attack traffic.

Title	Date	Source	Pages	Notes
Linking Cybersecurity Policy and Performance http://blogs.technet.com/b/trustworthycomputing/archive/2013/02/06/linking-cybersecurity-policy-and-performance-microsoft-releases-special-edition-security-intelligence-report.aspx	February 6, 2013	Microsoft Trustworthy Computing	27	Introduces a new methodology for examining how socio-economic factors in a country or region impact cybersecurity performance, examining measures such as use of modern technology, mature processes, user education, law enforcement and public policies related to cyberspace. This methodology can build a model that will help predict the expected cybersecurity performance of a given country or region.
SCADA and Process Control Security Survey https://www.sans.org/reading_room/analysts_program/sans_survey_scada_2013.pdf	February 1, 2013	SANS Institute	19	SANS Institute surveyed professionals who work with SCADA and process control systems. Seventy percent of the nearly 700 respondents said they consider their SCADA systems to be at high or severe risk. One-third of them suspect that they have been already been infiltrated
Blurring the Lines: 2013 TMT Global Security Study http://www.deloitte.com/assets/Dcom-UnitedKingdom/Local%20Assets/Documents/Services/Audit/uk-ers-blurring-line-2013-tmt-studyv2.pdf.pdf	January 8, 2013	Deloitte	24	Report states that 88% of companies do not believe that they are vulnerable to an external cyber threat, while more than half of those surveyed have experienced a security incident in the last year. Companies rated mistakes by their employees as a top threat, with 70% highlighting a lack of security awareness as a vulnerability. Despite this, less than half of companies (48%) offer even general security-related training, with 49% saying that a lack of budget was making it hard to improve security.
Improving the Evidence Base for Information Security and Privacy Policies: Understanding the Opportunities and Challenges related to Measuring Information Security, Privacy and the Protection of Children Online http://www.oecd-ilibrary.org/science-and-technology/improving-the-evidence-base-for-information-security-and-privacy-policies_5k4dq3rkb19n-en	December 20, 2012	Organisation for Economic Cooperation and Development	94	This report provides an overview of existing data and statistics in fields of information security, privacy, and the protection of children online. It highlights the potential for the development of better indicators in these respective fields showing in particular that there is an underexploited wealth of empirical data that, if mined and made comparable, will enrich the current evidence base for policy making.

Title	Date	Source	Pages	Notes
Emerging Cyber Threats Report 2013 http://www.gtsecuritysummit.com/pdf/2013ThreatsReport.pdf	November 14, 2012	Georgia Institute of Technology	9	The year ahead will feature new and increasingly sophisticated means to capture and exploit user data, escalating battles over the control of online information and continuous threats to the U.S. supply chain from global sources. (From the annual Georgia Tech Cyber Security Summit 2012).
State Governments at Risk: a Call for Collaboration and Compliance http://www.nascio.org/publications/documents/Deloitte-NASCIOCybersecurityStudy2012.pdf	October 23, 2012	National Association of State Chief Information Officers and Deloitte	40	Assesses the state of cybersecurity across the nation found that only 24% of chief information security officers (CISOs) are very confident in their states' ability to guard data against external threats.
Cybercrime Costs Rise Nearly 40 Percent, Attack Frequency Doubles http://www.hp.com/hpinfo/newsroom/press/2012/121008a.html	October 8, 2012	HP and the Ponemon Institute	N/A	The 2012 Cost of Cyber Crime Study found that the average annualized cost of cybercrime incurred by a benchmark sample of U.S. organizations was $8.9 million. This represents a 6% increase over the average cost reported in 2011, and a 38% increase over 2010. The 2012 study also revealed a 42% increase in the number of cyberattacks, with organizations experiencing an average of 102 successful attacks per week, compared with 72 attacks per week in 2011 and 50 attacks per week in 2010.
2012 NCSA/Symantec National Small Business Study http://www.staysafeonline.org/download/datasets/4389/2012_ncsa_symantec_small_business_study.pdf.	October 2012	National Cyber Security Alliance	18	The NCSA surveyed more than 1,000 small and midsize businesses. The survey found that 83% of respondents said they don't have a written plan for protecting their companies against cyberattacks, while 76% think they are safe from hackers, viruses, malware, and cybersecurity breaches.
McAfee Explains The Dubious Math Behind Its 'Unscientific' $1 Trillion Data Loss Claim http://www.forbes.com/sites/andygreenberg/2012/08/03/mcafee-explains-the-dubious-math-behind-its-unscientific-1-trillion-data-loss-claim/	August 3, 2012	Forbes.com	N/A	No, the statistic was not simply made up. Yes, it's just a "ballpark figure" and an "unscientific" one, the company admits. But despite Pro Publica's criticisms and its own rather fuzzy math, the company stands by its trillion-dollar conclusion as a (very) rough estimate.

Title	Date	Source	Pages	Notes
Does Cybercrime Really Cost $1 Trillion? http://www.propublica.org/article/does-cybercrime-really-cost-1-trillion	August 1, 2012	ProPublica	N/A	In a news release from computer security firm McAfee announcing its 2009 report, "Unsecured Economies: Protecting Vital Information," the company estimated a trillion dollar global cost for cybercrime. That number does not appear in the report itself. McAfee's trillion-dollar estimate is questioned by the three independent researchers from Purdue University whom McAfee credits with analyzing the raw data from which the estimate was derived. An examination of their origins by ProPublica has found new grounds to question the data and methods used to generate these numbers, which McAfee and Symantec say they stand behind.
ICS-CERT Incident Response Summary Report http://www.us-cert.gov/control_systems/pdf/ICS-CERT_Incident_Response_Summary_Report_09_11.pdf	June 28, 2012	U.S. Industrial Control System Cyber Emergency Response Team (ICS-CERT)	17	The number of reported cyberattacks on U.S. critical infrastructure increased sharply—from 9 incidents in 2009 to 198 in 2011; water sector-specific incidents, when added to the incidents that affected several sectors, accounted for more than half of the incidents; in more than half of the most serious cases, implementing best practices, such as login limitation or properly configured firewall, would have deterred the attack, reduced the time it would have taken to detect an attack, and minimized its impact.
Measuring the Cost of Cybercrime http://weis2012.econinfosec.org/papers/Anderson_WEIS2012.pdf	June 25, 2012	11th Annual Workshop on the Economics of Information Security	N/A	"For each of the main categories of cybercrime we set out what is and is not known of the direct costs, indirect costs and defence costs - both to the UK and to the world as a whole."
Worldwide Threat Assessment: Infection Rates and Threat Trends by Location http://www.microsoft.com/security/sir/threat/default.aspx#!introduction	ongoing	Microsoft Security Intelligence Report (SIR)	N/A	Data on infection rates, malicious websites, and threat trends by regional location, worldwide.
McAfee Research & Reports (multiple) http://www.mcafee.com/us/about/newsroom/research-reports.aspx	2009-2012	McAfee	N/A	Links to reports on cybersecurity threats, malware, cybercrime, and spam.

Title	Date	Source	Pages	Notes
Significant Cyber Incidents Since 2006 http://csis.org/publication/cyber-events-2006	January 19, 2012	Center for Strategic and International Studies (CSIS)	9	A list of significant cyber events since 2006. From the report, "Significance is in the eye of the beholder, but we focus on successful attacks on government agencies, defense and high tech companies, or economic crimes with losses of more than a million dollars."
2011 ITRC Breach Report Key Findings http://www.idtheftcenter.org/artman2/publish/headlines/Breaches_2011.shtml	December 10, 2011	Identity Theft Resource Center (ITRC)	N/A	According to the report, hacking attacks were responsible for more than one-quarter (25.8%) of the data breaches recorded in the Identity Theft Resource Center's *2011 Breach Report*, hitting a five-year all-time high. This was followed by "Data on the Move" (when an electronic storage device, laptop, or paper folders leave the office where they are normally stored) and "Insider Theft," at 18.1% and 13.4% respectively.
The Risk of Social Engineering on Information Security: A Survey of IT Professionals http://www.checkpoint.com/press/downloads/social-engineering-survey.pdf	September 2011	Check Point	7	[The] report reveals 48% of large companies and 32% of companies of all sizes surveyed have been victims of social engineering, experiencing 25 or more attacks in the past two years, costing businesses anywhere from $25,000 to over $100,000 per security incident. [P]hishing and social networking tools are the most common sources of socially engineered threats.
Second Annual Cost of Cyber Crime Study http://www.arcsight.com/collateral/whitepapers/2011_Cost_of_Cyber_Crime_Study_August.pdf	August 2011	Ponemon Institute	30	[T]he median annualized cost for 50 benchmarked organizations is $5.9 million per year, with a range from $1.5 million to $36.5 million each year per company. This represents an increase in median cost of 56% from [Ponemon's] first cyber cost study published last year.
Revealed: Operation Shady RAT: an Investigation of Targeted Intrusions into 70+ Global Companies, Governments, and Non-Profit Organizations During the Last 5 Years http://www.mcafee.com/us/resources/white-papers/wp-operation-shady-rat.pdf	August 2, 2011	McAfee Research Labs	14	A comprehensive analysis of victim profiles from a five-year targeted operation which penetrated 72 government and other organizations, most of them in the United States, and copied everything from military secrets to industrial designs. See page 4 for types of compromised parties, page 5 for geographic distribution of victim's country of origin, pages 7-9 for types of victims, and pages 10-13 for the number of intrusions for 2007-2010.

Title	Date	Source	Pages	Notes
2010 Annual Study: U.S. Cost of a Data Breach http://www.symantec.com/content/en/us/about/media/pdfs/symantec_ponemon_data_breach_costs_report.pdf?om_ext_cid=biz_socmed_twitter_facebook_marketwire_linkedin_2011Mar_worldwide_costofdatabreach	March 2011	Ponemon Institute/Symantec	39	The average organizational cost of a data breach increased to $7.2 million and cost companies an average of $214 per compromised record.
FY2010 Report to Congress on the Implementation of the Federal Information Security Management Act of 2002 http://www.whitehouse.gov/sites/default/files/omb/assets/egov_docs/FY10_FISMA.pdf	March 2011	White House/ Office of Management and Budget	48	The number of attacks against federal networks increased nearly 40% last year, while the number of incidents targeting U.S. computers overall was down roughly 1% for the same period. (See pp. 12-13).
A Good Decade for Cybercrime: McAfee's Look Back at Ten Years of Cybercrime http://www.mcafee.com/us/resources/reports/rp-good-decade-for-cybercrime.pdf	December 29, 2010	McAfee	11	A review of the most publicized, pervasive, and costly cybercrime exploits from 2000-2010.

Note: Statistics are from the source publication and have not been independently verified by CRS.

Cybersecurity Glossaries

Table 18 includes links to glossaries of useful cybersecurity terms, including those related to cloud computing and cyberwarfare.

Table 18. Glossaries of Cybersecurity Terms

Title	Source	Date	Pages	Notes
Glossary of Key Information Security Terms, Revision 2 http://nvlpubs.nist.gov/nistpubs/ir/2013/NIST.IR.7298r2.pdf	National Institute of Standards and Technology (NIST)	May 2013	222	Besides providing some 1,500 definitions, the glossary offers a source for each term from either a NIST or Committee for National Security Systems publication. The committee is a forum of government agencies that issues guidance aimed at protecting national security systems.
Cloud Computing Reference Architecture http://collaborate.nist.gov/twiki-cloud-computing/pub/CloudComputing/ReferenceArchitectureTaxonomy/NIST_SP_500-292_-_090611.pdf	National Institute of Standards and Technology (NIST)	September 2011	35	Provides guidance to specific communities of practitioners and researchers.
Glossary of Key Information Security Terms http://csrc.nist.gov/publications/nistir/ir7298-rev1/nistir-7298-revision1.pdf	NIST	February 2011	211	The glossary provides a central resource of terms and definitions most commonly used in NIST information security publications and in Committee for National Security Systems (CNSS) information assurance publications.
CIS Consensus Information Security Metrics http://benchmarks.cisecurity.org/en-us/?route=downloads.show.single.metrics.110	Center for Internet Security	November 2010	175	Provides definitions for security professionals to measure some of the most important aspects of the information security status. The goal is to give an organization the ability to repeatedly evaluate security in a standardized way, allowing it to identify trends, understand the impact of activities and make responses to improve the security status. (Free registration required.)
Joint Terminology for Cyberspace Operations http://www.projectcyw-d.org/resources/items/show/51	Chairman of the Joint Chiefs of Staff	November 1, 2010	16	This lexicon is the starting point for normalizing terms in all cyber-related documents, instructions, CONOPS, and publications as they come up for review.
Department of Defense Dictionary of Military and Associated Terms http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf	Chairman of the Joint Chiefs of Staff	November 8, 2010 (as amended through January 15, 2012)	547	Provides joint policy and guidance for Information Assurance (IA) and Computer Network Operations (CNO) activities.

Title	Source	Date	Pages	Notes
DHS Risk Lexicon http://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf	Department of Homeland Security (DHS) Risk Steering Committee	September 2010	72	The lexicon promulgates a common language, facilitates the clear exchange of structured and unstructured data, and provides consistency and clear understanding with regard to the usage of terms by the risk community across the DHS.

Note: Highlights compiled by CRS from the reports.

Reports by Topic

This section gives references to analytical reports on cybersecurity from CRS, other governmental agencies, and trade organizations. The reports are grouped under the following cybersecurity topics: policy framework overview, critical infrastructure, and cybercrime and national security.

For each topic, CRS reports are listed first and then followed by tables with reports from other organizations. The overview reports provide an analysis of a broad range of cybersecurity issues (**Table 19** to **Table 25**). The critical infrastructure reports (**Table 26**) analyze cybersecurity issues related to telecom infrastructure, the electricity grid, and industrial control systems. The cybercrime and national security reports (**Table 27**) analyze a wide range of cybersecurity issues, including identify theft and government policies for dealing with cyberwar scenarios. In addition, tables with selected reports on international efforts to address cybersecurity problems, training for cybersecurity professionals, and research and development efforts in other areas are also provided (**Table 28** to **Table 30**).

CRS Reports and Other CRS Products Overview: Cybersecurity Policy Framework

- CRS Report R42114, *Federal Laws Relating to Cybersecurity: Overview and Discussion of Proposed Revisions*, by Eric A. Fischer
- CRS Report R41941, *The Obama Administration's Cybersecurity Proposal: Criminal Provisions*, by Gina Stevens
- CRS Report R42984, *The 2013 Cybersecurity Executive Order: Overview and Considerations for Congress*, by Eric A. Fischer et al.
- CRS Report R40150, *A Federal Chief Technology Officer in the Obama Administration: Options and Issues for Consideration*, by John F. Sargent Jr.
- CRS Report R42409, *Cybersecurity: Selected Legal Issues*, by Edward C. Liu et al.
- CRS Report R43015, *Cloud Computing: Constitutional and Statutory Privacy Protections*, by Richard M. Thompson II.
- CRS Legal Sidebar, *House Intelligence Committee Marks Up Cybersecurity Bill CISPA*, Richard M. Thompson II
- CRS Legal Sidebar, *Can the President Deal with Cybersecurity Issues via Executive Order?*, Vivian S. Chu

Table 19. Selected Reports: Cybersecurity Overview

Title	Source	Date	Pages	Notes
Defending an Open, Global, Secure, and Resilient Internet http://www.cfr.org/cybersecurity/defending-open-global-secure-resilient-internet/p30836	Council on Foreign Relations	June 2013	127	The Task Force recommends that the United States develop a digital policy framework based on four pillars, the last of which is that U.S.-based industry work rapidly to establish an industry-led approach to counter current and future cyberattacks.
Measuring What Matters: Reducing Risk by Rethinking How We Evaluate Cybersecurity http://www.safegov.org/media/46155/measuring_what_matters_final.pdf	Safegov.org, in coordination with the National Academy of Public Administration	March 2013	39	Rather than periodically auditing whether an agency's systems meet the standards enumerated in FISMA at a static moment in time, agencies and their inspectors general should keep running scorecards of "cyber risk indicators" based on continual IG assessments of a federal organization's cyber vulnerabilities.,
Developing a Framework To Improve Critical Infrastructure Cybersecurity (*Federal Register* Notice; Request for Information) http://www.gpo.gov/fdsys/pkg/FR-2013-02-26/pdf/2013-04413.pdf	National Institute of Standards and Technology (NIST)	February 12, 2013	5	NIST announced the first step in the development of a Cybersecurity Framework, which will be a set of voluntary standards and best practices to guide industry in reducing cyber risks to the networks and computers that are vital to the nation's economy, security, and daily life.
The National Cyber Security Framework Manual http://www.ccdcoe.org/publications/books/NationalCyberSecurityFrameworkManual.pdf	NATO Cooperative Cyber Defense Center of Excellence	December 11, 2012	253	Provides detailed background information and in-depth theoretical frameworks to help the reader understand the various facets of National Cyber Security, according to different levels of public policy formulation. The four levels of government—political, strategic, operational and tactical/technical—each have their own perspectives on National Cyber Security, and each is addressed in individual sections within the Manual.

Title	Source	Date	Pages	Notes
Cyber Security Task Force: Public-Private Information Sharing http://bipartisanpolicy.org/sites/default/files/Public-Private%20Information%20Sharing.pdf	Bipartisan Policy Center	July 2012	24	Outlines a series of proposals that would enhance information sharing. The recommendations have two major components: (1) mitigation of perceived legal impediments to information sharing, and (2) incentivizing private sector information sharing by alleviating statutory and regulatory obstacles.
Cyber-security: The Vexed Question of Global Rules: An Independent Report on Cyber-Preparedness Around the World http://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf	McAfee and the Security Defense Agenda	February 2012	108	The report examines the current state of cyber-preparedness around the world, and is based on survey results from 80 policy-makers and cybersecurity experts in the government, business, and academic sectors from 27 countries. The countries were ranked on their state of cyber-preparedness.
Mission Critical: A Public-Private Strategy for Effective Cybersecurity http://businessroundtable.org/uploads/studies-reports/downloads/2011_10_Mission_Critical_A_Public-Private_Strategy_for_Effective_Cybersecurity_4_20_12.pdf	Business Roundtable	October 11, 2011	28	According to the report, "[p]ublic policy solutions must recognize the absolute importance of leveraging policy foundations that support effective global risk management, in contrast to "check-the-box" compliance approaches that can undermine security and cooperation." The document concludes with specific policy proposals and activity commitments.
Twenty Critical Security Controls for Effective Cyber Defense: Consensus Audit Guidelines (CAG) http://www.sans.org/critical-security-controls/	SANS	October 3, 2011	77	The 20 critical security control measures are intended to focus agencies and large enterprises' limited resources by plugging the most common attack vectors.
World Cybersecurity Technology Research Summit (Belfast 2011) http://www.csit.qub.ac.uk/InnovationatCSIT/Reports/Filetoupload,295594,en.pdf	Centre for Secure Information Technologies (CSIT)	September 12, 2011	14	The Belfast 2011 event attracted international cyber security experts from leading research institutes, government bodies, and industry who gathered to discuss current cyber security threats, predict future threats and the necessary mitigation techniques, and to develop a collective strategy for next research.

Title	Source	Date	Pages	Notes
A Review of Frequently Used Cyber Analogies http://www.nsci-va.org/WhitePapers/2011-07-22-Cyber-Analogies-Whitepaper-K-McKee.pdf	National Security Cyberspace Institute	July 22, 2011	7	The current cybersecurity crisis can be described several ways with numerous metaphors. Many compare the current crisis with the lawlessness to that of the Wild West and the out-dated tactics and race to security with the Cold War. When treated as a distressed ecosystem, the work of both national and international agencies to eradicate many infectious diseases serves as a model as how poor health can be corrected with proper resources and execution. Before these issues are discussed, what cyberspace actually is must be identified.
America's Cyber Future: Security and Prosperity in the Information Age http://www.cnas.org/node/6405	Center for a New American Security	June 1, 2011	296	To help U.S. policymakers address the growing danger of cyber insecurity, this two-volume report features chapters on cyber security strategy, policy, and technology by some of the world's leading experts on international relations, national security, and information technology.
Resilience of the Internet Interconnection Ecosystem http://www.enisa.europa.eu/act/res/other-areas/inter-x/report/interx-report	European Network and Information Security Agency (ENISA)	April 11, 2011	238	Part I: Summary and Recommendations; Part II: State of the Art Review (a detailed description of the Internet's routing mechanisms and analysis of their robustness at the technical, economic and policy levels.); Part III: Report on the Consultation (a broad range of stakeholders were consulted. This part reports on the consultation and summarizes the results). Part IV: Bibliography and Appendices.
Improving our Nation's Cybersecurity through the Public-Private Partnership: A White Paper http://www.cdt.org/files/pdfs/20110308_cbyersec_paper.pdf	Business Software Alliance, Center for Democracy & Technology, U.S. Chamber of Commerce, Internet Security Alliance, Tech America	March 8, 2011	26	This paper proposes expanding the existing partnership within the framework of the National Infrastructure Protection Plan. Specifically, it makes a series of recommendations that build upon the conclusions of President Obama's *Cyberspace Policy Review*.

Title	Source	Date	Pages	Notes
Cybersecurity Two Years Later http://csis.org/files/publication/110128_Lewis_CybersecurityTwoYearsLater_Web.pdf	CSIS Commission on Cybersecurity for the 44th Presidency, Center for Strategic and International Studies	January 2011	22	From the report: "We thought then [in 2008] that securing cyberspace had become a critical challenge for national security, which our nation was not prepared to meet.... In our view, we are still not prepared."
Toward Better Usability, Security, and Privacy of Information Technology: Report of a Workshop http://www.nap.edu/catalog.php?record_id=12998	National Research Council	September 21, 2010	70	Discusses computer system security and privacy, their relationship to usability, and research at their intersection. This is drawn from remarks made at the National Research Council's July 2009 *Workshop on Usability, Security and Privacy of Computer Systems* as well as recent reports from the NRC's Computer Science and Telecommunications Board on security and privacy.
National Security Threats in Cyberspace http://nationalstrategy.com/Portals/0/documents/National%20Security%20Threats%20in%20Cyberspace.pdf	Joint Workshop of the National Security Threats in Cyberspace and the National Strategy Forum	September 15, 2009	37	The two-day workshop brought together more than two dozen experts with diverse backgrounds: physicists; telecommunications executives; Silicon Valley entrepreneurs; federal law enforcement, military, homeland security, and intelligence officials; congressional staffers; and civil liberties advocates. For two days they engaged in an open-ended discussion of cyber policy as it relates to national security, under Chatham House Rules: their comments were for the public record, but they were not for attribution.

Note: Highlights compiled by CRS from the reports.

Table 20. Selected Government Reports: Government Accountability Office (GAO)

Title	Date	Pages	Notes
Telecommunications Networks: Addressing Potential Security Risks of Foreign-Manufactured Equipment http://www.gao.gov/products/GAO-13-652T	May 21. 2013	52	The federal government has begun efforts to address the security of the supply chain for commercial networks... There are a variety of other approaches for addressing the potential risks posed by foreign-manufactured equipment in commercial communications networks, including those approaches taken by foreign governments... Although these approaches are intended to improve supply chain security of communications networks, they may also create the potential for trade barriers, additional costs, and constraints on competition, which the federal government would have to take into account if it chose to pursue such approaches.
Outcome-Based Measures Would Assist DHS in Assessing Effectiveness of Cybersecurity Efforts http://www.gao.gov/products/GAO-13-275?source=ra	April 11, 2013	45	Until the Department of Homeland Security and its sector partners develop appropriate outcome-oriented metrics, it will be difficult to gauge the effectiveness of efforts to protect the nation's core and access communications networks and critical support components of the Internet from cyber incidents. While no cyber incidents have been reported affecting the nation's core and access networks, communications networks operators can use reporting mechanisms established by FCC and DHS to share information on outages and incidents.
Cybersecurity: A Better Defined and Implemented National Strategy Is Needed to Address Persistent Challenges http://www.gao.gov/products/GAO-13-462T	March 7, 2013	36	"[A]lthough federal law assigns the Office of Management and Budget (OMB) responsibility for oversight of federal government information security, OMB recently transferred several of these responsibilities to DHS.... [I]t remains unclear how OMB and DHS are to share oversight of individual departments and agencies. Additional legislation could clarify these responsibilities."
2013 High Risk List http://www.gao.gov/highrisk#t=0	February 14, 2013	275	Every two years at the start of a new Congress, GAO calls attention to agencies and program areas that are high risk due to their vulnerabilities to fraud, waste, abuse, and mismanagement, or are most in need of transformation. Cybersecurity programs on the list include: *Protecting the Federal Government's Information Systems and the Nation's Cyber Critical Infrastructures* and *Ensuring the Effective Protection of Technologies Critical to U.S. National Security Interests*.
Cybersecurity: National Strategy, Roles, and Responsibilities Need to Be Better Defined and More Effectively Implemented http://www.gao.gov/products/GAO-13-187	February 14, 2013	112	GAO recommends that the White House Cybersecurity Coordinator develop an overarching federal cybersecurity strategy that includes all key elements of the desirable characteristics of a national strategy. Such a strategy would provide a more effective framework for implementing cybersecurity activities and better ensure that such activities will lead to progress in cybersecurity.

Title	Date	Pages	Notes
Information Security: Federal Communications Commission Needs to Strengthen Controls over Enhanced Secured Network Project http://www.gao.gov/products/GAO-13-155	January 25, 2013	35	"The FCC did not effectively implement appropriate information security controls in the initial components of the Enhanced Secured Network (ESN) project.... Weaknesses identified in the commission's deployment of components of the ESN project as of August 2012 resulted in unnecessary risk that sensitive information could be disclosed, modified, or obtained without authorization. GAO is making seven recommendations to the FCC to implement management controls to help ensure that ESN meets its objective of securing FCC's systems and information."
Cybersecurity: Challenges in Securing the Electricity Grid http://www.gao.gov/products/GAO-12-926T	July 17, 2012	25	In a prior report, GAO has made recommendations related to electricity grid modernization efforts, including developing an approach to monitor compliance with voluntary standards. These recommendations have not yet been implemented.
Information Technology Reform: Progress Made but Future Cloud Computing Efforts Should be Better Planned http://www.gao.gov/products/GAO-12-756	July 11, 2012	43	To help ensure the success of agencies' implementation of cloud-based solutions, the Secretaries of Agriculture, Health and Human Services, Homeland Security, State, and the Treasury, and the Administrators of the General Services Administration and Small Business Administration should direct their respective chief information officer (CIO) to establish estimated costs, performance goals, and plans to retire associated legacy systems for each cloud-based service discussed in this report, as applicable.
DOD Actions Needed to Strengthen Management and Oversight http://www.gao.gov/products/GAO-12-479?source=ra	July 9, 2012	46	DOD's oversight of electronic warfare capabilities may be further complicated by its evolving relationship with computer network operations, which is also an information operations-related capability. Without clearly defined roles and responsibilities and updated guidance regarding oversight responsibilities, DOD does not have reasonable assurance that its management structures will provide effective department-wide leadership for electronic warfare activities and capabilities development and ensure effective and efficient use of its resources.
Information Security: Cyber Threats Facilitate Ability to Commit Economic Espionage http://www.gao.gov/products/GAO-12-876T	June 28, 2012	20	This statement discusses (1) cyber threats facing the nation's systems, (2) reported cyber incidents and their impacts, (3) security controls and other techniques available for reducing risk, and (4) the responsibilities of key federal entities in support of protecting IP.
Cybersecurity: Challenges to Securing the Modernized Electricity Grid http://www.gao.gov/products/GAO-12-507T	February 28, 2012	19	As GAO reported in January 2011, securing smart grid systems and networks presented a number of key challenges that required attention by government and industry. GAO made several recommendations to the Federal Energy Regulatory Commission (FERC) aimed at addressing these challenges. The commission agreed with these recommendations and described steps it is taking to implement them.

Title	Date	Pages	Notes
Critical Infrastructure Protection: Cybersecurity Guidance Is Available, but More Can Be Done to Promote Its Use http://www.gao.gov/products/GAO-12-92	December 9, 2011	77	Given the plethora of guidance available, individual entities within the sectors may be challenged in identifying the guidance that is most applicable and effective in improving their security posture. Improved knowledge of the guidance that is available could help both federal and private sector decision makers better coordinate their efforts to protect critical cyber-reliant assets.
Cybersecurity Human Capital: Initiatives Need Better Planning and Coordination http://www.gao.gov/products/GAO-12-8	November 29, 2011	86	All the agencies GAO reviewed faced challenges determining the size of their cybersecurity workforce because of variations in how work is defined and the lack of an occupational series specific to cybersecurity. With respect to other workforce planning practices, all agencies had defined roles and responsibilities for their cybersecurity workforce, but these roles did not always align with guidelines issued by the federal Chief Information Officers Council (CIOC) and National Institute of Standards and Technology (NIST).
Federal Chief Information Officers: Opportunities Exist to Improve Role in Information Technology Management http://www.gao.gov/products/GAO-11-634	October 17, 2011	72	GAO is recommending that OMB update its guidance to establish measures of accountability for ensuring that CIOs' responsibilities are fully implemented and require agencies to establish internal processes for documenting lessons learned.
Information Security: Additional Guidance Needed to Address Cloud Computing Concerns http://www.gao.gov/products/GAO-12-130T	October 5, 2011	17	Twenty-two of 24 major federal agencies reported that they were either concerned or very concerned about the potential information security risks associated with cloud computing. GAO recommended that the NIST issue guidance specific to cloud computing security.
Information Security: Weaknesses Continue Amid New Federal Efforts to Implement Requirements http://www.gao.gov/products/GAO-12-137	October 3, 2011	49	Weaknesses in information security policies and practices at 24 major federal agencies continue to place the confidentiality, integrity, and availability of sensitive information and information systems at risk. Consistent with this risk, reports of security incidents from federal agencies are on the rise, increasing over 650% over the past 5 years. Each of the 24 agencies reviewed had weaknesses in information security controls.
Federal Chief Information Officers: Opportunities Exist to Improve Role in Information Technology Management http://www.gao.gov/products/GAO-11-634	October 17, 2011	72	GAO is recommending that the Office of Management and Budget (OMB) update its guidance to establish measures of accountability for ensuring that CIOs' responsibilities are fully implemented and require agencies to establish internal processes for documenting lessons learned.
Defense Department Cyber Efforts: Definitions, Focal Point, and Methodology Needed for DOD to Develop Full-Spectrum Cyberspace Budget Estimates http://www.gao.gov/products/GAO-11-695R	July 29, 2011	33	This letter discusses the Department of Defense's cyber and information assurance budget for FY2012 and future years defense spending. The objectives of this review were to (1) assess the extent to which DOD has prepared an overarching budget estimate for full-spectrum cyberspace operations across the department and (2) identify the challenges DOD has faced in providing such estimates.

Title	Date	Pages	Notes
Continued Attention Needed to Protect Our Nation's Critical Infrastructure http://www.gao.gov/products/GAO-11-463T	July 26, 2011	20	A number of significant challenges remain to enhancing the security of cyber-reliant critical infrastructures, such as (1) implementing actions recommended by the President's cybersecurity policy review; (2) updating the national strategy for securing the information and communications infrastructure; (3) reassessing DHS's planning approach to critical infrastructure protection; (4) strengthening public-private partnerships, particularly for information sharing; (5) enhancing the national capability for cyber warning and analysis; (6) addressing global aspects of cybersecurity and governance; and (7) securing the modernized electricity grid.
Defense Department Cyber Efforts: DOD Faces Challenges in Its Cyber Activities http://www.gao.gov/products/GAO-11-75	July 25, 2011	79	GAO recommends that DOD evaluate how it is organized to address cybersecurity threats; assess the extent to which it has developed joint doctrine that addresses cyberspace operations; examine how it assigned command and control responsibilities; and determine how it identifies and acts to mitigate key capability gaps involving cyberspace operations.
Information Security: State Has Taken Steps to Implement a Continuous Monitoring Application, but Key Challenges Remain http://www.gao.gov/products/GAO-11-149	July 8, 2011	63	The Department of State implemented a custom application called iPost and a risk scoring program that is intended to provide continuous monitoring capabilities of information security risk to elements of its information technology (IT) infrastructure. To improve implementation of iPost at State, the Secretary of State should direct the Chief Information Officer to develop, document, and maintain an iPost configuration management and test process.
Cybersecurity: Continued Attention Needed to Protect Our Nation's Critical Infrastructure and Federal Information Systems http://www.gao.gov/products/GAO-11-463T	March 16, 2011	16	Executive branch agencies have made progress instituting several government-wide initiatives aimed at bolstering aspects of federal cybersecurity, such as reducing the number of federal access points to the Internet, establishing security configurations for desktop computers, and enhancing situational awareness of cyber events. Despite these efforts, the federal government continues to face significant challenges in protecting the nation's cyber-reliant critical infrastructure and federal information systems.
Electricity Grid Modernization: Progress Being Made on Cybersecurity Guidelines, but Key Challenges Remain to be Addressed http://www.gao.gov/products/GAO-11-117	January 12, 2011	50	GAO identified six key challenges: (1) Aspects of the regulatory environment may make it difficult to ensure smart grid systems' cybersecurity. (2) Utilities are focusing on regulatory compliance instead of comprehensive security. (3) The electric industry does not have an effective mechanism for sharing information on cybersecurity. (4) Consumers are not adequately informed about the benefits, costs, and risks associated with smart grid systems. (5) There is a lack of security features being built into certain smart grid systems. (6) The electricity industry does not have metrics for evaluating cybersecurity.

Title	Date	Pages	Notes
Information Security: Federal Agencies Have Taken Steps to Secure Wireless Networks, but Further Actions Can Mitigate Risk http://www.gao.gov/products/GAO-11-43	November 30, 2010	50	Existing government-wide guidelines and oversight efforts do not fully address agency implementation of leading wireless security practices. Until agencies take steps to better implement these leading practices, and OMB takes steps to improve government-wide oversight, wireless networks will remain at an increased vulnerability to attack.
Cyberspace Policy: Executive Branch Is Making Progress Implementing 2009 Policy Review Recommendations, but Sustained Leadership Is Needed http://www.gao.gov/products/GAO-11-24	October 6, 2010	66	Of the 24 recommendations in the President's May 2009 cyber policy review report, 2 have been fully implemented, and 22 have been partially implemented. While these efforts appear to be steps forward, agencies were largely not able to provide milestones and plans that showed when and how implementation of the recommendations was to occur.
DHS Efforts to Assess and Promote Resiliency Are Evolving but Program Management Could Be Strengthened http://www.gao.gov/products/GAO-10-772	September 23, 2010	46	The Department of Homeland Security (DHS) has not developed an effective way to ensure that critical national infrastructure, such as electrical grids and telecommunications networks, can bounce back from a disaster. DHS has conducted surveys and vulnerability assessments of critical infrastructure to identify gaps, but has not developed a way to measure whether owners and operators of that infrastructure adopt measures to reduce risks.
Information Security: Progress Made on Harmonizing Policies and Guidance for National Security and Non-National Security Systems http://www.gao.gov/products/GAO-10-916	September 15, 2010	38	OMB and NIST established policies and guidance for civilian non-national security systems, while other organizations, including the Committee on National Security Systems (CNSS), DOD, and the U.S. intelligence community, have developed policies and guidance for national security systems. GAO was asked to assess the progress of federal efforts to harmonize policies and guidance for these two types of systems.
United States Faces Challenges in Addressing Global Cybersecurity and Governance http://www.gao.gov/products/GAO-10-606	August 2, 2010	53	GAO recommends that the Special Assistant to the President and Cybersecurity Coordinator should make recommendations to appropriate agencies and interagency coordination committees regarding any necessary changes to more effectively coordinate and forge a coherent national approach to cyberspace policy.
Critical Infrastructure Protection: Key Private and Public Cyber Expectations Need to Be Consistently Addressed http://www.gao.gov/products/GAO-10-628	July 15, 2010	38	The Special Assistant to the President and Cybersecurity Coordinator and the Secretary of Homeland Security should take two actions: (1) use the results of this report to focus their information-sharing efforts, including their relevant pilot projects, on the most desired services, including providing timely and actionable threat and alert information, access to sensitive or classified information, a secure mechanism for sharing information, and security clearance and (2) bolster the efforts to build out the National Cybersecurity and Communications Integration Center as the central focal point for leveraging and integrating the capabilities of the private sector, civilian government, law enforcement, the military, and the intelligence community.

Title	Date	Pages	Notes
Federal Guidance Needed to Address Control Issues With Implementing Cloud Computing http://www.gao.gov/products/GAO-10-513	July 1, 2010	53	To assist federal agencies in identifying uses for cloud computing and information security measures to use in implementing cloud computing, the Director of OMB should establish milestones for completing a strategy for implementing the federal cloud computing initiative.
Continued Attention Is Needed to Protect Federal Information Systems from Evolving Threats http://www.gao.gov/products/GAO-10-834t	June 16, 2010	15	Multiple opportunities exist to improve federal cybersecurity. To address identified deficiencies in agencies' security controls and shortfalls in their information security programs, GAO and agency inspectors general have made hundreds of recommendations over the past several years, many of which agencies are implementing. In addition, the White House, OMB, and certain federal agencies have undertaken several government-wide initiatives intended to enhance information security at federal agencies. While progress has been made on these initiatives, they all face challenges that require sustained attention, and GAO has made several recommendations for improving the implementation and effectiveness of these initiatives.
Information Security: Concerted Response Needed to Resolve Persistent Weaknesses http://www.gao.gov/products/GAO-10-536t	March 24, 2010	21	Without proper safeguards, federal computer systems are vulnerable to intrusions by individuals who have malicious intentions and can obtain sensitive information. The need for a vigilant approach to information security has been demonstrated by the pervasive and sustained cyberattacks against the United States; these attacks continue to pose a potentially devastating impact to systems and the operations and critical infrastructures they support.
Cybersecurity: Continued Attention Is Needed to Protect Federal Information Systems from Evolving Threats http://www.gao.gov/products/GAO-11-463T	March 16, 2010	15	The White House, the Office of Management and Budget, and certain federal agencies have undertaken several government-wide initiatives intended to enhance information security at federal agencies. While progress has been made on these initiatives, they all face challenges that require sustained attention, and GAO has made several recommendations for improving the implementation and effectiveness of these initiatives.
Concerted Effort Needed to Consolidate and Secure Internet Connections at Federal Agencies http://www.gao.gov/products/GAO-10-237	April 12, 2010	40	To reduce the threat to federal systems and operations posed by cyberattacks on the United States, OMB launched, in November 2007, the Trusted Internet Connections (TIC) initiative, and later, in 2008, DHS's National Cybersecurity Protection System (NCPS), operationally known as Einstein, which became mandatory for federal agencies as part of TIC. To further ensure that federal agencies have adequate, sufficient, and timely information to successfully meet the goals and objectives of the TIC and Einstein programs, DHS's Secretary should, to better understand whether Einstein alerts are valid, develop additional performance measures that indicate how agencies respond to alerts.

Title	Date	Pages	Notes
Cybersecurity: Progress Made But Challenges Remain in Defining and Coordinating the Comprehensive National Initiative http://www.gao.gov/products/GAO-10-338	March 5, 2010	64	To address strategic challenges in areas that are not the subject of existing projects within CNCI but remain key to achieving the initiative's overall goal of securing federal information systems, OMB's Director should continue developing a strategic approach to identity management and authentication, linked to HSPD-12 implementation, as initially described in the CIOC's plan for implementing federal identity, credential, and access management, so as to provide greater assurance that only authorized individuals and entities can gain access to federal information systems.
Continued Efforts Are Needed to Protect Information Systems from Evolving Threats http://www.gao.gov/products/GAO-10-230t	November 17, 2009	24	GAO has identified weaknesses in all major categories of information security controls at federal agencies. For example, in FY2008, weaknesses were reported in such controls at 23 of 24 major agencies. Specifically, agencies did not consistently authenticate users to prevent unauthorized access to systems; apply encryption to protect sensitive data; and log, audit, and monitor security-relevant events, among other actions.
Efforts to Improve Information sharing Need to Be Strengthened http://www.gao.gov/products/GAO-03-760	August 27, 2003	59	Information on threats, methods, and techniques of terrorists is not routinely shared; and the information that is shared is not perceived as timely, accurate, or relevant.

Source: Highlights compiled by CRS from the GAO reports.

Table 21. Selected Government Reports: White House/Office of Management and Budget

Title	Date	Pages	Notes
Cross Agency Priority Goal: Cybersecurity, FY2013 Q2 Status Report http://goals.performance.gov/node/39069	June 2013	26	Executive branch departments and agencies will achieve 95% implementation of the Administration's priority cybersecurity capabilities by the end of FY 2014. These capabilities include strong authentication, Trusted Internet Connections (TIC), and Continuous Monitoring.
Improving Cybersecurity http://technology.performance.gov/initiative/ensure-cybersecurity/home	March 2013	N/A	The Administration updated all 14 cross-agency priority goals on the Performance.gov portal, giving all new targets for agencies to hit over the next two years. The Office of Management and Budget also is using the opportunity to better connect agency performance improvement officers to the Trusted Internet Connections and Homeland Security.
FY 2012 Report to Congress on the Implementation of the Federal Information Security Management Act of 2002 http://www.whitehouse.gov/sites/default/files/omb/assets/egov_docs/fy12_fisma.pdf	March 2013	68	More government programs violated data security law standards in 2012 than in the previous year, and at the same time, computer security costs have increased by more than $1 billion. Inadequate training was a large part of the reason all-around FISMA adherence scores slipped from 75% in 2011 to 74% in 2012. Agencies reported that about 88% of personnel with system access privileges received annual security awareness instruction, down from 99% in 2011. Meanwhile, personnel expenses accounted for the vast majority—90%—of the $14.6 billion departments spent on information technology security in 2012.
Administration Strategy for Mitigating the Theft of U.S. Trade Secrets http://www.whitehouse.gov//sites/default/files/omb/IPEC/admin_strategy_on_mitigating_the_theft_of_u.s._trade_secrets.pdf	February 20, 2013	141	"First, we will increase our diplomatic engagement.... Second, we will support industry-led efforts to develop best practices to protect trade secrets and encourage companies to share with each other best practices that can mitigate the risk of trade secret theft.... Third, DOJ will continue to make the investigation and prosecution of trade secret theft by foreign competitors and foreign governments a top priority.... Fourth, President Obama recently signed two pieces of legislation that will improve enforcement against trade secret theft.... Lastly, we will increase public awareness of the threats and risks to the U.S. economy posed by trade secret theft."
National Strategy for Information Sharing and Safeguarding http://www.whitehouse.gov/sites/default/files/docs/2012sharingstrategy_1.pdf	December 2012	24	Provides guidance for effective development, integration, and implementation of policies, processes, standards, and technologies to promote secure and responsible information sharing.
Collaborative and Cross-Cutting Approaches to Cybersecurity http://www.whitehouse.gov/blog/2012/08/01/collaborative-and-cross-cutting-approaches-cybersecurity	August 1, 2012	N/A	Michael Daniel, White House Cybersecurity Coordinator, highlights a few recent initiatives where voluntary, cooperative actions are helping to improve the nation's overall cybersecurity.

Title	Date	Pages	Notes
Trustworthy Cyberspace: Strategic Plan for the Federal Cybersecurity Research and Development Program http://www.whitehouse.gov/sites/default/files/microsites/ostp/fed_cybersecurity_rd_strategic_plan_2011.pdf	December 6, 2011	36	As a research and development strategy, this plan defines four strategic thrusts: Inducing Change; Developing Scientific Foundations; Maximizing Research Impact; and Accelerating Transition to Practice.
Structural Reforms to Improve the Security of Classified Networks and the Responsible Sharing and Safeguarding of Classified Information http://www.whitehouse.gov/the-press-office/2011/10/07/executive-order-structural-reforms-improve-security-classified-networks-	October 7, 2011	N/A	President Obama signed an executive order outlining data security measures and rules for government agencies to follow to prevent further data leaks by insiders. The order included the creation of a senior steering committee that will oversee the safeguarding and sharing of information.
FY 2012 Reporting Instructions for the Federal Information Security Management Act and Agency Privacy Management[a] http://www.whitehouse.gov/sites/default/files/omb/memoranda/2011/m11-33.pdf	September 14, 2011	29	Rather than enforcing a static, three-year reauthorization process, agencies are expected to conduct ongoing authorizations of information systems through the implementation of continuous monitoring programs. Continuous monitoring programs thus fulfill the three year security reauthorization requirement, so a separate re-authorization process is not necessary.
International Strategy for Cyberspace http://www.whitehouse.gov/sites/default/files/rss_viewer/international_strategy_for_cyberspace.pdf	May 16, 2011	30	The strategy marks the first time any administration has attempted to set forth in one document the U.S. government's vision for cyberspace, including goals for defense, diplomacy, and international development.
Cybersecurity Legislative Proposal (Fact Sheet) http://www.whitehouse.gov/the-press-office/2011/05/12/fact-sheet-cybersecurity-legislative-proposal	May 12, 2011	N/A	The Administration's proposal ensures the protection of individuals' privacy and civil liberties through a framework designed expressly to address the challenges of cybersecurity. The Administration's legislative proposal includes: Management, Personnel, Intrusion Prevention Systems, and Data Centers.
Federal Cloud Computing Strategy http://www.cio.gov/documents/Federal-Cloud-Computing-Strategy.pdf	February 13, 2011	43	The strategy outlines how the federal government can accelerate the safe, secure adoption of cloud computing, and provides agencies with a framework for migrating to the cloud. It also examines how agencies can address challenges related to the adoption of cloud computing, such as privacy, procurement, standards, and governance.
25 Point Implementation Plan to Reform Federal Information Technology Management http://www.cio.gov/documents/25-Point-Implementation-Plan-to-Reform-Federal%20IT.pdf	December 9, 2010	40	The plan's goals are to reduce the number of federally run data centers from 2,100 to approximately 1,300, rectify or cancel one-third of troubled IT projects, and require federal agencies to adopt a "cloud first" strategy in which they will move at least one system to a hosted environment within a year.

Title	Date	Pages	Notes
Clarifying Cybersecurity Responsibilities http://www.whitehouse.gov/sites/default/files/omb/assets/memoranda_2010/m10-28.pdf	July 6, 2010	39	This memorandum outlines and clarifies the respective responsibilities and activities of the Office of Management and Budget (OMB), the Cybersecurity Coordinator, and DHS, in particular with respect to the Federal Government's implementation of the Federal Information Security Management Act of 2002 (FISMA).
The National Strategy for Trusted Identities in Cyberspace: Creating Options for Enhanced Online Security and Privacy http://www.dhs.gov/xlibrary/assets/ns_tic.pdf	June 25, 2010	39	The NSTIC, which is in response to one of the near term action items in the President's Cyberspace Policy Review, calls for the creation of an online environment, or an Identity Ecosystem, where individuals and organizations can complete online transactions with confidence, trusting the identities of each other and the identities of the infrastructure where transaction occur.
Comprehensive National Cybersecurity Initiative (CNCI) http://www.whitehouse.gov/cybersecurity/comprehensive-national-cybersecurity-initiative	March 2, 2010	5	The CNCI establishes a multi-pronged approach the federal government is to take in identifying current and emerging cyber threats, shoring up current and future telecommunications and cyber vulnerabilities, and responding to or proactively addressing entities that wish to steal or manipulate protected data on secure federal systems.
Cyberspace Policy Review: Assuring a Trusted and Resilient Communications Infrastructure http://www.whitehouse.gov/assets/documents/Cyberspace_Policy_Review_final.pdf	May 29, 2009	76	The President directed a 60-day, comprehensive, "clean-slate" review to assess U.S. policies and structures for cybersecurity. The review team of government cybersecurity experts engaged and received input from a broad cross-section of industry, academia, the civil liberties and privacy communities, state governments, international partners, and the legislative and executive branches. This paper summarizes the review team's conclusions and outlines the beginning of the way forward toward a reliable, resilient, trustworthy digital infrastructure for the future.

Source: Highlights compiled by CRS from the White House reports.

a. White House and Office of Management and Budget.

Table 22. Selected Government Reports: Department of Defense (DOD)

Title	Source	Date	Pages	Notes
Military and Security Developments Involving the People's Republic of China 2013 (Annual Report to Congress) http://www.defense.gov/pubs/2013_China_Report_FINAL.pdf	Department of Defense	May 6, 2013	92	China is using its computer network exploitation capability to support intelligence collection against the U.S. diplomatic, economic and defense industrial base sectors that support U.S. national defense programs. The information targeted could potentially be used to benefit China's defense industry, high-technology industries, policymaker interest in U.S. leadership thinking on key China issues, and military planners building a picture of U.S. network defense networks, logistics, and related military capabilities that could be exploited during a crisis.
Resilient Military Systems and the Advanced Cyber Threat http://www.defense.gov/pubs/2013_China_Report_FINAL.pdf	Department of Defense Science Board	January 2013	146	The report states that, despite numerous Pentagon actions to parry sophisticated attacks by other countries, efforts are "fragmented" and the Defense Department "is not prepared to defend against this threat." The report lays out a scenario in which cyberattacks in conjunction with conventional warfare damaged the ability of U.S. forces to respond, creating confusion on the battlefield and weakening traditional defenses.
FY 2012 Annual Report http://www.dote.osd.mil/pub/reports/FY2012/pdf/other/2012DOTEAnnualReport.pdf	Department of Defense	January 2013	372	Annual report to Congress by J. Michael Gilmore, director of Operational Test and Evaluation. Assesses the operational effectiveness of systems being developed for combat. See "Information Assurance (I/A) and Interoperability (IOP)" chapter, pages 305-312, for information on network exploitation and compromise exercises.
Basic Safeguarding of Contractor Information Systems (Proposed Rule) http://www.gpo.gov/fdsys/pkg/FR-2012-08-24/pdf/2012-20881.pdf	Department of Defense (DoD), General Services Administration (GSA), and National Aeronautics and Space Administration (NASA)	August 24, 2012	4	This regulation authored by the DOD, General Services Administration (GSA), and National Aeronautics and Space Administration (NASA) "would add a contract clause to address requirements for the basic safeguarding of contractor information systems that contain or process information provided by or generated for the government (other than public information)."

Title	Source	Date	Pages	Notes
DOD Actions Needed to Strengthen Management and Oversight http://www.gao.gov/products/GAO-12-479?source=ra	GAO	July 9, 2012	46	DOD's oversight of electronic warfare capabilities may be further complicated by its evolving relationship with computer network operations, which is also an information operations-related capability. Without clearly defined roles and responsibilities and updated guidance regarding oversight responsibilities, DOD does not have reasonable assurance that its management structures will provide effective department-wide leadership for electronic warfare activities and capabilities development and ensure effective and efficient use of its resources.
Cloud Computing Strategy http://www.defense.gov/news/DoDCloudComputingStrategy.pdf	DOD, Chief Information Officer	July 2012	44	The DOD Cloud Computing Strategy introduces an approach to move the department from the current state of a duplicative, cumbersome, and costly set of application silos to an end state, which is an agile, secure, and cost effective service environment that can rapidly respond to changing mission needs.
DOD Defense Industrial Base (DIB) Voluntary Cyber Security and Information Assurance Activities http://www.gpo.gov/fdsys/pkg/FR-2012-05-11/pdf/2012-10651.pdf	Federal Register	May 11, 2012		DOD interim final rule to establish a voluntary cyber security information sharing program between DOD and eligible DIB companies. The program enhances and supplements DIB participants' capabilities to safeguard DOD information that resides on, or transits, DIB unclassified information.
DOD Information Security Program: Overview, Classification, and Declassification http://www.fas.org/sgp/othergov/dod/5200_01v1.pdf	DOD	February 16, 2012	84	Describes the DOD Information Security Program, and provides guidance for classification and declassification of DOD information that requires protection in the interest of the national security.
Cyber Sentries: Preparing Defenders to Win in a Contested Domain http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA561779&Location=U2&doc=GetTRDoc.pdf	Air War College	February 7, 2012	38	This paper examines the current impediments to effective cybersecurity workforce preparation and offers new concepts to create Cyber Sentries through realistic training, network authorities tied to certification, and ethical training. These actions present an opportunity to significantly enhance workforce quality and allow the Department to operate effectively in the contested cyber domain in accordance with the vision established in its Strategy for Cyberspace Operations

Title	Source	Date	Pages	Notes
Defense Department Cyber Efforts: Definitions, Focal Point, and Methodology Needed for DOD to Develop Full-Spectrum Cyberspace Budget Estimates http://www.gao.gov/products/GAO-11-695R	Government Accountability Office (GAO)	July 29, 2011	33	This letter discusses DOD's cyber and information assurance budget for fiscal year 2012 and future years defense spending. The objectives of this review were to (1) assess the extent to which DOD has prepared an overarching budget estimate for full-spectrum cyberspace operations across the department; and (2) identify the challenges DOD has faced in providing such estimates.
Legal Reviews of Weapons and Cyber Capabilities http://www.e-publishing.af.mil/shared/media/epubs/AFI51-402.pdf	Secretary of the Air Force	July 27, 2011	7	States the Air Force must subject cyber capabilities to legal review for compliance with the Law of Armed Conflict and other international and domestic laws. The Air Force judge advocate general must ensure that all cyber capabilities "being developed, bought, built, modified or otherwise acquired by the Air Force" must undergo legal review—except for cyber capabilities within a Special Access Program, which must undergo review by the Air Force general counsel.
Department of Defense Strategy for Operating in Cyberspace http://www.defense.gov/news/d20110714cyber.pdf	DOD	July 14, 2011	19	This is an unclassified summary of DOD's cyber-security strategy.
Cyber Operations Personnel Report (DOD) http://www.hsdl.org/?view&did=488076	DOD	April, 2011	84	This report focuses on FY2009 Department of Defense Cyber Operations personnel, with duties and responsibilities as defined in Section 934 of the Fiscal Year 2010 National Defense Authorization Act (NDAA). Appendix A—Cyber Operations-related Military Occupations Appendix B—Commercial Certifications Supporting the DOD Information Assurance Workforce Improvement Program Appendix C—Military Services Training and Development Appendix D—Geographic Location of National Centers of Academic Excellence in Information Assurance
Anomaly Detection at Multiple Scales (ADAMS) http://info.publicintelligence.net/DARPA-ADAMS.pdf	Defense Advanced Research Projects Agency (DARPA)	November 9, 2011	74	The design document was produced by Allure Security and sponsored by the Defense Advanced Research Projects Agency (DARPA). It describes a system for preventing leaks by seeding believable disinformation in military information systems to help identify individuals attempting to access and disseminate classified information.

Title	Source	Date	Pages	Notes
Critical Code: Software Producibility for Defense http://www.nap.edu/catalog.php?record_id=12979	National Research Council, Committee for Advancing Software-Intensive Systems Producibility	October 20, 2010	161	Assesses the nature of the national investment in software research and, in particular, considers ways to revitalize the knowledge base needed to design, produce, and employ software-intensive systems for tomorrow's defense needs.
Defending a New Domain http://www.foreignaffairs.com/articles/66552/william-j-lynn-iii/defending-a-new-domain	U.S. Deputy Secretary of Defense, William J. Lynn (Foreign Affairs)	September 2010	N/A	In 2008, the U.S. Department of Defense suffered a significant compromise of its classified military computer networks. It began when an infected flash drive was inserted into a U.S. military laptop at a base in the Middle East. This previously classified incident was the most significant breach of U.S. military computers ever, and served as an important wake-up call.
The QDR in Perspective: Meeting America's National Security Needs In the 21st Century (QDR Final Report) http://www.usip.org/quadrennial-defense-review-independent-panel-/view-the-report	Quadrennial Defense Review	July 30, 2010	159	From the report: "The expanding cyber mission also needs to be examined. The Department of Defense should be prepared to assist civil authorities in defending cyberspace – beyond the Department's current role."
Cyberspace Operations: Air Force Doctrine Document 3-12 http://www.e-publishing.af.mil/shared/media/epubs/afdd3-12.pdf	U.S. Air Force	July 15, 2010	62	This Air Force Doctrine Document (AFDD) establishes doctrinal guidance for the employment of U.S. Air Force operations in, through, and from cyberspace. It is the keystone of Air Force operational-level doctrine for cyberspace operations.
DON (Department of the Navy) Cybersecurity/Information Assurance Workforce Management, Oversight and Compliance http://www.doncio.navy.mil/PolicyView.aspx?ID=1804	U.S. Navy	June 17, 2010	14	To establish policy and assign responsibilities for the administration of the Department of the Navy (DON) Cybersecurity (CS)/Information Assurance Workforce (IAWF) Management Oversight and Compliance Program.

Note: Highlights compiled by CRS from the reports.

Table 23. Selected Government Reports: National Strategy for Trusted Identities in Cyberspace (NSTIC)

Title	Source	Date	Pages	Notes
Five Pilot Projects Receive Grants to Promote Online Security and Privacy http://www.nist.gov/itl/nstic-092012.cfm	NIST	September 20, 2012	N/A	NIST announced more than $9 million in grant awards to support the National Strategy for Trusted Identities in Cyberspace (NSTIC). Five U.S. organizations will pilot identity solutions that increase confidence in online transactions, prevent identity theft, and provide individuals with more control over how they share their personal information.
Recommendations for Establishing an Identity Ecosystem Governance Structure for the National Strategy for Trusted Identities in Cyberspace http://www.nist.gov/nstic/2012-nstic-governance-recs.pdf	NIST	February 17, 2012	51	NIST responds to comments received in response to the related Notice of Inquiry published in the *Federal Register* on June 14, 2011.
Models for a Governance Structure for the National Strategy for Trusted Identities in Cyberspace http://www.nist.gov/nstic/nstic-frn-noi.pdf	Department of Commerce	June 14, 2011	4	The department seeks public comment from all stakeholders, including the commercial, academic and civil society sectors, and consumer and privacy advocates on potential models, in the form of recommendations and key assumptions in the formation and structure of the steering group.
Administration Releases Strategy to Protect Online Consumers and Support Innovation and Fact Sheet on National Strategy for Trusted Identities in Cyberspace http://www.whitehouse.gov/the-press-office/2011/04/15/administration-releases-strategy-protect-online-consumers-and-support-in	White House	April 15, 2011	52	Press release on a proposal to administer the processes for policy and standards adoption for the Identity Ecosystem Framework in accordance with the National Strategy for Trusted Identities in Cyberspace (NSTIC).
National Strategy for Trusted Identities in Cyberspace http://www.whitehouse.gov/blog/2010/06/25/national-strategy-trust cyberspace	White House	April 15, 2011	52	The NSTIC aims to make online transactions more trustworthy, thereby giving businesses and consumers more confidence in conducting business online.

Note: Highlights compiled by CRS from the reports.

Table 24. Selected Government Reports: Other Federal Agencies

Title	Source	Date	Pages	Notes
Content of Premarket Submissions for Management of Cybersecurity in Medical Devices http://www.gpo.gov/fdsys/pkg/FR-2013-06-14/pdf/2013-14167.pdf	Food and Drug Administration (FDA)	June 14, 2013	1	This guidance identifies cybersecurity issues that manufacturers should consider in preparing premarket submissions for medical devices in order to maintain information confidentiality, integrity, and availability.
Mobile Security Reference Architecture https://cio.gov/wp-content/uploads/downloads/2013/05/Mobile-Security-Reference-Architecture.pdf	Federal CIO Council and the Department of Homeland Security (DHS)	May 23, 2013	104	Gives agencies guidance in the secure implementation of mobile solutions through their enterprise architectures. The document provides an in-depth reference architecture for mobile computing.
Initial Analysis of Cybersecurity Framework RFI Responses http://csrc.nist.gov/cyberframework/rfi_initial_responses.html	National Institute of Standards and Technology (NIST)	May 21, 2013	33	NIST released an initial analysis of 243 responses to the Feb. 26 RFI. The analysis will form the basis for an upcoming workshop at Carnegie Mellon University in Pittsburgh as NIST moves forward on creating a cybersecurity framework for essential energy, utility and communications systems.
Proposed Establishment of a Federally Funded Research and Development Center-First Notice http://www.gpo.gov/fdsys/pkg/FR-2013-04-22/pdf/2013-09376.pdf	National Institute of Standards and Technology (NIST)	April 22, 2013	2	To help the National Cybersecurity Center of Excellence (NCCoE) address industry's needs most efficiently, NIST will sponsor its first Federally Funded Research and Development Center (FFRDC) to facilitate public-private collaboration for accelerating the widespread adoption of integrated cybersecurity tools and technologies.
Privacy Impact Assessment for EINSTEIN 3 - Accelerated (E3A) http://www.dhs.gov/sites/default/files/publications/privacy/PIAs/PIA%20NPPD%20E3A%202013041 9%20FINAL%20signed.pdf	Department of Homeland Security	April 19, 2013	27	DHS will deploy EINSTEIN 3 Accelerated (E3A) to enhance cybersecurity analysis, situational awareness, and security response. Under the direction of DHS, ISPs will administer intrusion prevention and threat-based decision-making on network traffic entering and leaving participating federal civilian Executive Branch agency networks. This Privacy Impact Assessment (PIA) is being conducted because E3A will include analysis of federal network traffic, which may contain personally identifiable information (PII).
Cyber Student Initiative http://www.dhs.gov/sites/default/files/publications/SHP_Cyber_Student_Initiative_Bulletin.pdf	Department of Homeland Security	April 18, 2013	2	The Cyber Student Initiative program will begin at Immigration and Customs Enforcement computer forensic labs in 36 cities nationwide, where students will be trained and gain hands-on experience within the department's cybersecurity community. The unpaid volunteer program is only available to community college students and veterans pursuing a degree in the cybersecurity field.

Title	Source	Date	Pages	Notes
Security and Privacy Controls for Federal Information Systems (SP 800-53) http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53r4.pdf	National Institute of Standards and Technology (NIST)	April 2013	3	Special Publication 800-53, Revision 4, provides a more holistic approach to information security and risk management by providing organizations with the breadth and depth of security controls necessary to fundamentally strengthen their information systems and the environments in which those systems operate—contributing to systems that are more resilient in the face of cyberattacks and other threats. This "Build It Right" strategy is coupled with a variety of security controls for "Continuous Monitoring" to give organizations near real-time information that is essential for senior leaders making ongoing risk-based decisions affecting their critical missions and business functions.
Guide to Attribute Based Access Control Definition and Consideration (SP 800-162)	National Institute of Standards and Technology (NIST)	April 2013	54	Improving information sharing while maintaining control over access to that information is a primary goal of guidance coming from the NIST.
Measuring What Matters: Reducing Risks by Rethinking How We Evaluate Cybersecurity http://www.safegov.org/media/46155/measuring_what_matters_final.pdf	National Academy of Public Administration and Safegov.org	March 2013	39	Rather than periodically auditing whether an agency's systems meet the standards enumerated in Federal Information Security Management Act (FISMA) at a static moment in time, agencies and their inspectors general should keep running scorecards of "cyber risk indicators" based on continual IG assessments of a federal organization's cyber vulnerabilities.
Developing a Framework To Improve Critical Infrastructure Cybersecurity http://www.gpo.gov/fdsys/pkg/FR-2013-02-26/pdf/2013-04413.pdf	National Institute of Standards and Technology (NIST)	February 26, 2013	5	NIST announced the first step in the development of a Cybersecurity Framework, which will be a set of voluntary standards and best practices to guide industry in reducing cyber risks to the networks and computers that are vital to the nation's economy, security, and daily life.

Title	Source	Date	Pages	Notes
Follow-up Audit of the Department's Cyber Security Incident Management Program https://www.hsdl.org/?view&did=728459	Department of Energy Inspector General	December 2012	25	"In 2008, we reported in The Department's Cyber Security Incident Management Program (DOE/IG-0787, January 2008) that the Department and NNSA established and maintained a number of independent, at least partially duplicative, cyber security incident management capabilities. Although certain actions had been taken in response to our prior report, we identified several issues that limited the efficiency and effectiveness of the Department's cyber security incident management program and adversely impacted the ability of law enforcement to investigate incidents. For instance, we noted that the Department and NNSA continued to operate independent, partially duplicative cyber security incident management capabilities at an annual cost of more than $30 million. The issues identified were due, in part, to the lack of a unified, Department-wide cyber security incident management strategy. In response to our finding, management concurred with the recommendations and indicated that it had initiated actions to address the issues identified."
Secure and Trustworthy Cyberspace (SaTC) Program Solicitation http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504709	National Science Foundation and the National Science and Technology Council (NSTC)	October 4, 2012	N/A	This grant program seeks proposals that address Cybersecurity from a Trustworthy Computing Systems perspective (TWC); a Social, Behavioral and Economic Sciences perspective (SBE); and a Transition to Practice perspective (TPP).
Cybersecurity: CF Disclosure Guidance: Topic No. 2 http://www.sec.gov/divisions/corpfin/guidance/cfguidance-topic2.htm	Securities and Exchange Commission	October 13, 2011	N/A	The statements in this CF Disclosure Guidance represent the views of the Division of Corporation Finance. This guidance is not a rule, regulation, or statement of the Securities and Exchange Commission. Further, the Commission has neither approved nor disapproved its content.

Notes: Highlights compiled by CRS from the reports.

Table 25. Selected Reports: Cloud Computing

Title	Source	Date	Pages	Notes
Delivering on the Promise of Big Data and the Cloud http://www.boozallen.com/media/file/BigDataInTheCloud.pdf	Booz, Allen, Hamilton	January 9, 2013	7	Reference architecture does away with conventional data and analytics silos, consolidating all information into a single medium designed to foster connections called a "data lake," which reduces complexity and creates efficiencies that improve data visualization to allow for easier insights by analysts.
Cloud Computing: An Overview of the Technology and the Issues facing American Innovators http://judiciary.house.gov/hearings/Hearings%202012/hear_07252012_2.html	House Judiciary Comm., Subcom. on Intellectual Property, Competition, and the Internet	July 25, 2012	156	Overview and discussion of cloud computing issues.
Information Technology Reform: Progress Made but Future Cloud Computing Efforts Should be Better Planned http://www.gao.gov/products/GAO-12-756	GAO	July 11, 2012	43	To help ensure the success of agencies' implementation of cloud-based solutions, the Secretaries of Agriculture, Health and Human Services, Homeland Security, State, and the Treasury, and the Administrators of the General Services Administration and Small Business Administration should direct their respective CIO to establish estimated costs, performance goals, and plans to retire associated legacy systems for each cloud-based service discussed in this report, as applicable.
Cloud Computing Strategy http://www.defense.gov/news/DoDCloudComputingStrategy.pdf	DOD, Chief Information Officer	July 2012	44	The DOD Cloud Computing Strategy introduces an approach to move the department from the current state of a duplicative, cumbersome, and costly set of application silos to an end state, which is an agile, secure, and cost effective service environment that can rapidly respond to changing mission needs.
A Global Reality: Governmental Access to Data in the Cloud - A Comparative Analysis of Ten International Jurisdictions http://www.hldataprotection.com/uploads/file/Hogan%20Lovells%20White%20Paper%20Government%20Access%20to%20Cloud%20Data%20Paper%20%281%29.pdf	Hogan Lovells	May 23, 2012	13	This White Paper compares the nature and extent of governmental access to data in the cloud in many jurisdictions around the world.

Title	Source	Date	Pages	Notes
Policy Challenges of Cross-Border Cloud Computing http://www.usitc.gov/journals/Policy_Challenges_of_Cross-border_Cloud_Computing_rev.pdf	U.S. International Trade Commission	May 1, 2012	38	Examine the main policy challenges associated with cross-border cloud computing—data privacy, security, and ensuring the free flow of information—and the ways that countries are addressing them through domestic policymaking, international agreements, and other cooperative arrangements.
Cloud Computing Synopsis and Recommendations http://csrc.nist.gov/publications/nistpubs/800-146/sp800-146.pdf	NIST	May 2012	81	The National Institute of Standards and Technology has unveiled a guide that explains cloud technologies in "plain terms" to federal agencies and provides recommendations for IT decision makers.
Global Cloud Computing Scorecard a Blueprint for Economic Opportunity http://portal.bsa.org/cloudscorecard2012/	Business Software Alliance	February 2, 2012	24	This report notes that while many developed countries have adjusted their laws and regulations to address cloud computing, the wide differences in those rules make it difficult for companies to invest in the technology.
Concept of Operations: FedRAMP http://www.gsa.gov/graphics/staffoffices/FedRAMP_CONOPS.pdf	General Services Administration (GSA)	February 7, 2012	47	Implementation of FedRAMP will be in phases. This document describes all the services that will be available at initial operating capability—targeted for June 2012. The Concept of Operations will be updated as the program evolves toward sustained operations.
Federal Risk and Authorization Management Program (FedRAMP) http://www.gsa.gov/portal/category/102371	Federal CIO Council	January 4, 2012	N/A	The Federal Risk and Authorization Management Program or FedRAMP has been established to provide a standard approach to Assessing and Authorizing (A&A) cloud computing services and products.
Security Authorization of Information Systems in Cloud Computing Environments (FedRAMP) http://www.cio.gov/fedrampmemo.pdf	White House/Office of Management and Budget (OMB)	December 8, 2011	7	The Federal Risk and Authorization Management Program (FedRAMP) will now be required for all agencies purchasing storage, applications and other remote services from vendors. The Obama Administration has championed cloud computing as a means to save money and accelerate the government's adoption of new technologies.

Title	Source	Date	Pages	Notes
U.S. Government Cloud Computing Technology Roadmap, Volume I, Release 1.0 (Draft). High-Priority Requirements to Further USG Agency Cloud Computing Adoption http://www.nist.gov/itl/cloud/upload/SP_500_293_volumeI-2.pdf	NIST	December 1, 2011	32	Volume I is aimed at interested parties who wish to gain a general understanding and overview of the background, purpose, context, work, results, and next steps of the U.S. Government Cloud Computing Technology Roadmap initiative.
U.S. Government Cloud Computing Technology Roadmap, Release 1.0 (Draft), Volume II Useful Information for Cloud Adopters http://www.nist.gov/itl/cloud/upload/SP_500_293_volumeII.pdf	NIST	December 1, 2011	85	Volume II is designed to be a technical reference for those actively working on strategic and tactical cloud computing initiatives, including, but not limited to, U.S. government cloud adopters. Volume II integrates and summarizes the work completed to date, and explains how these findings support the roadmap introduced in Volume I.
Information Security: Additional Guidance Needed to Address Cloud Computing Concerns http://www.gao.gov/products/GAO-12-130T	GAO	October 5, 2011	17	Twenty-two of 24 major federal agencies reported that they were either concerned or very concerned about the potential information security risks associated with cloud computing. GAO recommended that the NIST issue guidance specific to cloud computing security. NIST has issued multiple publications which address such guidance; however, one publication remains in draft, and is not to be finalized until the first quarter of fiscal year 2012.
Cloud Computing Reference Architecture http://www.nist.gov/customcf/get_pdf.cfm?pub_id=909505	NIST	September 1, 2011	35	This “Special Publication," which is not an official U.S. government standard, is designed to provide guidance to specific communities of practitioners and researchers.
Guide to Cloud Computing for Policy Makers http://www.siia.net/index.php?option=com_docman&task=doc_download&gid=3040&Itemid=318	Software and Information Industry Association (SAII)	July 26, 2011	27	The SAII concludes “that there is no need for cloud-specific legislation or regulations to provide for the safe and rapid growth of cloud computing, and in fact, such actions could impede the great potential of cloud computing."

Title	Source	Date	Pages	Notes
Federal Cloud Computing Strategy http://www.cio.gov/documents/Federal-Cloud-Computing-Strategy.pdf	White House	February 13, 2011	43	The strategy outlines how the federal government can accelerate the safe, secure adoption of cloud computing, and provides agencies with a framework for migrating to the cloud. It also examines how agencies can address challenges related to the adoption of cloud computing, such as privacy, procurement, standards, and governance.

Notes: These reports analyze cybersecurity issues related to the federal government's adoption of cloud computing storage options. Highlights compiled by CRS from the reports.

CRS Reports: Critical Infrastructure

- CRS Report R42683, *Critical Infrastructure Resilience: The Evolution of Policy and Programs and Issues for Congress*, by John D. Moteff
- CRS Report RL30153, *Critical Infrastructures: Background, Policy, and Implementation*, by John D. Moteff
- CRS Report R42660, *Pipeline Cybersecurity: Federal Policy*, by Paul W. Parfomak
- CRS Report R41536, *Keeping America's Pipelines Safe and Secure: Key Issues for Congress*, by Paul W. Parfomak
- CRS Report R41886, *The Smart Grid and Cybersecurity—Regulatory Policy and Issues*, by Richard J. Campbell
- CRS Report R42338, *Smart Meter Data: Privacy and Cybersecurity*, by Brandon J. Murrill, Edward C. Liu, and Richard M. Thompson II
- CRS Report RL33586, *The Federal Networking and Information Technology Research and Development Program: Background, Funding, and Activities*, by Patricia Moloney Figliola
- CRS Report 97-868, *Internet Domain Names: Background and Policy Issues*, by Lennard G. Kruger
- CRS Report R42351, *Internet Governance and the Domain Name System: Issues for Congress*, by Lennard G. Kruger

Table 26. Selected Reports: Critical Infrastructure

Title	Source	Date	Pages	Notes
FFIEC Forms Cybersecurity and Critical Infrastructure Working Group http://op.bna.com/bar.nsf/id/jtin-98errp/$File/ffieccyber.pdf	Federal Financial Institutions Examination Council (FFIEC)	June 6, 2013	2	FFIEC announced the formation of a working group to further promote coordination across the federal and state banking regulatory agencies on critical infrastructure and cybersecurity issues.
Electric Grid Vulnerability: Industry Responses Reveal Security Gaps http://markey.house.gov/sites/markey.house.gov/files/documents/Markey%20Grid%20Report_05.21.13.pdf	Rep. Edward Markey and Rep. Henry Waxman	May 21, 2013	35	The report found that less than a quarter of investor-owned utilities and less than half of municipal and cooperation-owned utilities followed through with voluntary standards issued by the Federal Energy Regulatory Commission after the Stuxnet worm struck in 2010.
Initial Analysis of Cybersecurity Framework RFI Responses http://csrc.nist.gov/cyberframework/nist-initial-analysis-of-rfi-responses.pdf	National Institute of Standards and Technology	May 20, 2013	33	Comments on the challenges of protecting the nation's critical infrastructure have identified a handful of top-of-mind issues for the more than 200 people and organizations who responded to a formal request for information. NIST has released an initial analysis of 243 responses to the Feb. 26 RFI. The analysis will form the basis for an upcoming workshop at Carnegie Mellon University in Pittsburgh as NIST moves forward on creating a cybersecurity framework for essential energy, utility and communications systems.
Joint Working Group on Improving Cybersecurity and Resilience Through Acquisition, Notice of Request for Information http://www.gpo.gov/fdsys/pkg/FR-2013-05-13/pdf/2013-11239.pdf	General Services Administration	May 13, 2013	3	Among other things, PPD–21 requires the General Services Administration, in consultation with DOD and DHS, to jointly provide and support government-wide contracts for critical infrastructure systems and ensure that such contracts include audit rights for the security and resilience of critical infrastructure.
Version 5 Critical Infrastructure Protection Reliability Standards (Notice of Proposed Rulemaking) http://www.gpo.gov/fdsys/pkg/FR-2013-04-24/pdf/2013-09643.pdf	Federal Energy Regulatory Commission	April 24, 2013	18	FERC proposes to approve the Version 5 Critical Infrastructure Protection Reliability Standards, CIP-002-5 through CIP-011-1, submitted by the North American Electric Reliability Corporation, the Commission-certified Electric Reliability Organization. The proposed Reliability Standards, which pertain to the cyber security of the bulk electric system, represent an improvement over the current Commission-approved CIP Reliability Standards as they adopt new cyber security controls and extend the scope of the systems that are protected by the CIP Reliability Standards.

Title	Source	Date	Pages	Notes
Incentives To Adopt Improved Cybersecurity Practices http://www.ntia.doc.gov/federal-register-notice/2013/notice-inquiry-incentives-adopt-improved-cybersecurity-practices-html	National Institute of Standards and Technology and the National Telecommunications and Information Administration	March 28, 2013	N/A	The Commerce Department is preparing a report on ways to incentivize companies and organizations to improve their cybersecurity. To better understand what stakeholders – such as companies, trade associations, academics and others – believe would best serve as incentives, the Department has released a series of questions to gather public comments in a Notice of Inquiry.
SCADA and Process Control Security Survey https://www.sans.org/reading_room/analysts_program/sans_survey_scada_2013.pdf	SANS Institute	February 1, 2013	19	SANS Institute surveyed professionals who work with SCADA and process control systems. Of the nearly 700 respondents, 70% said they consider their SCADA systems to be at high or severe risk; one-third of them suspect that they have been already been infiltrated.
Follow-up Audit of the Department's Cyber Security Incident Management Program https://www.hsdl.org/?view&did=728459	U.S. Department of Energy Inspector General's Office	December 1, 2012	25	In 2008, it was reported in the Department's Cyber Security Incident Management Program (DOE/IG-0787, January 2008) that the department and NNSA established and maintained a number of independent, at least partially duplicative, cyber security incident management capabilities. Although certain actions had been taken in response to the prior report, identified were several issues that limited the efficiency and effectiveness of the department's cyber security incident management program and adversely affected the ability of law enforcement to investigate incidents. In response to the finding, management concurred with the recommendations and indicated that it had initiated actions to address the issues identified.
Terrorism and the Electric Power Delivery System http://www.nap.edu/catalog.php?record_id=12050	National Academies of Science	November 2012	146	Focuses on measures that could make the power delivery system less vulnerable to attacks, restore power faster after an attack, and make critical services less vulnerable while the delivery of conventional electric power has been disrupted.
New FERC Office to Focus on Cyber Security http://www.ferc.gov/media/news-releases/2012/2012-3/09-20-12.asp	U.S. Department of Energy	September 20, 2012	N/A	The Federal Energy Regulatory Commission announced the creation of the agency's new Office of Energy Infrastructure Security, which will work to reduce threats to the electric grid and other energy facilities. The goal is for the office to help FERC, as well as other agencies and private companies, better identify potential dangers and solutions.

Title	Source	Date	Pages	Notes
Canvassing the Targeting of Energy Infrastructure: The Energy Infrastructure Attack Database http://www.ensec.org/index.php?option=com_content&view=article&id=379:canvassing-the-targeting-of-energy-infrastructure-the-energy-infrastructure-attack-database&catid=128:issue-content&Itemid=402	Journal of Energy Security	August 7, 2012	8	The Energy Infrastructure Attack Database (EIAD) is a non-commercial dataset that structures information on reported (criminal and political) attacks to EI (worldwide) since 1980, by non-state actors. In building this resource, the objective was to develop a product that could be broadly accessible and also connect to existing available resources
Smart-Grid Security http://cip.gmu.edu/archive/CIPHS_TheCIPReport_August2012_SmartGridSecurity.pdf#page=2	Center for Infrastructure Protection and Homeland Security, George Mason School of Law	August 1, 2012	26	Highlights the significance of and the challenges with securing the smart grid.
Cybersecurity: Challenges in Securing the Electricity Grid http://www.gao.gov/products/GAO-12-926T	GAO	July 17, 2012	25	In a prior report, GAO has made recommendations related to electricity grid modernization efforts, including developing an approach to monitor compliance with voluntary standards. These recommendations have not yet been implemented.
ICS-CERT Incident Response Summary Report http://www.us-cert.gov/control_systems/pdf/ICS-CERT_Incident_Response_Summary_Report_09_11.pdf	U.S. Industrial Control System Cyber Emergency Response Team (ICS-CERT)	June 28, 2012	17	The number of reported cyberattacks on U.S. critical infrastructure increased sharply—from 9 incidents in 2009 to 198 in 2011; water sector-specific incidents, when added to the incidents that affected several sectors, accounted for more than half of the incidents; in more than half of the most serious cases, implementing best practices such as login limitation or properly configured firewall, would have deterred the attack, reduced the time it would have taken to detect an attack, and minimize its impact.
Energy Department Develops Tool with Industry to Help Utilities Strengthen Their Cybersecurity Capabilities http://energy.gov/articles/energy-department-develops-tool-industry-help-utilities-strengthen-their-cybersecurity	U.S. Department of Energy	June 28, 2012	N/A	The Cybersecurity Self-Evaluation Tool utilizes best practices that were developed for the Electricity Subsector Cybersecurity Capability Maturity Model Initiative, which involved a series of workshops with the private sector to draft a maturity model that can be used throughout the electric sector to better protect the grid.
Electricity Subsector Cybersecurity Risk Management Process http://energy.gov/oe/downloads/cybersecurity-risk-management-process-rmp-guideline-final-may-2012	Department of Energy, Office of Electricity Delivery & Energy Reliability	May 2012	96	The guideline describes a risk management process that is targeted to the specific needs of electricity sector organizations. The objective of the guideline is to build upon existing guidance and requirements to develop a flexible risk management process tuned to the diverse missions, equipment, and business needs of the electric power industry.

Title	Source	Date	Pages	Notes
Cybersecurity for Energy Delivery Systems Program http://energy.gov/oe/technology-development/energy-delivery-systems-cybersecurity	Department of Energy, Office of Electricity Delivery & Energy Reliability	ongoing	N/A	The program assists the energy sector asset owners (electric, oil, and gas) by developing cybersecurity solutions for energy delivery systems through integrated planning and a focused research and development effort. CEDS co-funds projects with industry partners to make advances in cybersecurity capabilities for energy delivery systems.
ICT Applications for the Smart Grid: Opportunities and Policy Implications http://www.oecd-ilibrary.org/content/workingpaper/5k9h2q8v9bln-en	Organization for Economic Co-operation and Development (OECD)	January 10, 2012	44	This report discusses "smart" applications of information and communication technologies (ICTs) for more sustainable energy production, management and consumption. The report outlines policy implications for government ministries dealing with telecommunications regulation, ICT sector and innovation promotion, and consumer and competition issues.
The Department's Management of the Smart Grid Investment Grant Program http://energy.gov/ig/downloads/departments-management-smart-grid-investment-grant-program-oas-ra-12-04	Department of Energy (DOE) Inspector General	January 1, 2012	21	According to the Inspector General, DOE's rush to award stimulus grants for projects under the next generation of the power grid, known as the Smart grid, resulted in some firms receiving funds without submitting complete plans for how to safeguard the grid from cyberattacks.
Critical Infrastructure Protection: Cybersecurity Guidance Is Available, but More Can Be Done to Promote Its Use http://www.gao.gov/products/GAO-12-92	Government Accountability Office (GAO)	December 9, 2011	77	Given the plethora of guidance available, individual entities within the sectors may be challenged in identifying the guidance that is most applicable and effective in improving their security posture. Improved knowledge of the available guidance could help both federal and private-sector decision makers better coordinate their efforts to protect critical cyber-reliant assets.
The Future of the Electric Grid http://web.mit.edu/mitei/research/studies/the-electric-grid-2011.shtml	Massachusetts Institute of Technology (MIT)	December 5, 2011	39	Chapter 1 provides an overview of the status of the grid, the challenges and opportunities it will face, and major recommendations. To facilitate selective reading, detailed descriptions of the contents of each section in Chapters 2–9 are provided in each chapter's introduction, and recommendations are collected and briefly discussed in each chapter's final section. (See Chapter 9, Data Communications, Cybersecurity, and Information Privacy, pages 208-234).
FCC's Plan for Ensuring the Security of Telecommunications Networks ftp://ftp.fcc.gov/pub/Daily_Releases/Daily_Business/2011/db0610/DOC-307454A1.txt	Federal Communications Commission (FCC)	June 3, 2011	1	FCC Chairman Genachowski's response to letter from Rep. Anna Eshoo dated November 2, 2010, re: concerns about the implications of foreign-controlled telecommunications infrastructure companies providing equipment to the U.S. market.

Title	Source	Date	Pages	Notes
Cyber Infrastructure Protection http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubid=1067	U.S. Army War College	May 9, 2011	324	Part 1 deals with strategy and policy issues related to cybersecurity and discusses the theory of cyberpower, Internet survivability, large scale data breaches, and the role of cyberpower in humanitarian assistance. Part 2 covers social and legal aspects of cyber infrastructure protection and discusses the attack dynamics of political and religiously motivated hackers. Part 3 discusses the technical aspects of cyber infrastructure protection, including the resilience of data centers, intrusion detection, and a strong emphasis on Internet protocol (IP) networks.
In the Dark: Crucial Industries Confront Cyberattacks http://www.mcafee.com/us/resources/reports/rp-critical-infrastructure-protection.pdf	McAfee and Center for Strategic and International Studies (CSIS)	April 21, 2011	28	The study reveals an increase in cyberattacks on critical infrastructure such as power grids, oil, gas, and water; the study also shows that that many of the world's critical infrastructures lacked protection of their computer networks, and reveals the cost and impact of cyberattacks
Cybersecurity: Continued Attention Needed to Protect Our Nation's Critical Infrastructure and Federal Information Systems http://www.gao.gov/products/GAO-11-463T	Government Accountability Office (GAO)	March 16, 2011	16	According to GAO, executive branch agencies have also made progress instituting several government-wide initiatives that are aimed at bolstering aspects of federal cybersecurity, such as reducing the number of federal access points to the Internet, establishing security configurations for desktop computers, and enhancing situational awareness of cyber events. Despite these efforts, the federal government continues to face significant challenges in protecting the nation's cyber-reliant critical infrastructure and federal information systems.
Federal Energy Regulatory Commission's Monitoring of Power Grid Cyber Security http://www.wired.com/images_blogs/threatlevel/2011/02/DoE-IG-Report-on-Grid-Security.pdf	North American Electric Reliability Corp. (NERC)	January 26, 2011	30	NERC developed Critical Infrastructure Protection (CIP) cyber security reliability standards which were approved by the FERC in January 2008. Although the Commission had taken steps to ensure CIP cyber security standards were developed and approved, NERC's testing revealed that such standards did not always include controls commonly recommended for protecting critical information systems. In addition, the CIP standards implementation approach and schedule approved by the Commission were not adequate to ensure that systems-related risks to the nation's power grid were mitigated or addressed in a timely manner.

Title	Source	Date	Pages	Notes
Electricity Grid Modernization: Progress Being Made on Cybersecurity Guidelines, but Key Challenges Remain to be Addressed http://www.gao.gov/products/GAO-11-117	Government Accountability Office (GAO)	January 12, 2011	50	To reduce the risk that NIST's smart grid cybersecurity guidelines will not be as effective as intended, the Secretary of Commerce should direct the Director of NIST to finalize the agency's plan for updating and maintaining the cybersecurity guidelines, including ensuring it incorporates (1) missing key elements identified in this report, and (2) specific milestones for when efforts are to be completed. Also, as a part of finalizing the plan, the Secretary of Commerce should direct the Director of NIST should assess whether any cybersecurity challenges identified in this report should be addressed in the guidelines.
Partnership for Cybersecurity Innovation http://www.whitehouse.gov/blog/2010/12/06/partnership-cybersecurity-innovation	White House (Office of Science & Technology Policy)	December 6, 2010	4	The Obama Administration released a Memorandum of Understanding signed by the National Institute of Standards and Technology (NIST) of the Department of Commerce, the Science and Technology Directorate of the Department of Homeland Security (DHS/S&T), and the Financial Services Sector Coordinating Council (FSSCC). The goal of the agreement is to speed the commercialization of cybersecurity research innovations that support the nation's critical infrastructures.
WIB Security Standard Released http://www.isssource.com/wib/	International Instrument Users Association (WIB)	November 10, 2010		The Netherlands-based International Instrument Users Association (WIB), an international organization that represents global manufacturers in the industrial automation industry, announced the second version of the Process Control Domain Security Requirements For Vendors document—the first international standard that outlines a set of specific requirements focusing on cyber security best practices for suppliers of industrial automation and control systems.
Information Security Management System for Microsoft Cloud Infrastructure http://cdn.globalfoundationservices.com/documents/InformationSecurityMangSysforMSCloudInfrastructure.pdf	Microsoft	November 2010	15	This study describes the standards Microsoft follows to address current and evolving cloud security threats. It also depicts the internal structures within Microsoft that handle cloud security and risk management issues.
NIST Finalizes Initial Set of Smart Grid Cyber Security Guidelines http://www.nist.gov/public_affairs/releases/nist-finalizes-initial-set-of-smart-grid-cyber-security-guidelines.cfm	National Institute of Standards and Technology (NIST)	September 2, 2010	N/A	NIST released a three-volume set of recommendations on all things relevant to securing the Smart Grid. The guidelines address a variety of topics, including high-level security requirements, a risk assessment framework, an evaluation of privacy issues in residences and recommendations for protecting the evolving grid from attacks, malicious code, cascading errors, and other threats.

Title	Source	Date	Pages	Notes
Critical Infrastructure Protection: Key Private and Public Cyber Expectations Need to Be Consistently Addressed http://www.gao.gov/products/GAO-10-628	Government Accountability Office (GAO)	July 15, 2010	38	Private-sector stakeholders reported that they expect their federal partners to provide usable, timely, and actionable cyber threat information and alerts; access to sensitive or classified information; a secure mechanism for sharing information; security clearances; and a single centralized government cybersecurity organization to coordinate government efforts. However, according to private sector stakeholders, federal partners are not consistently meeting these expectations.
The future of cloud computing http://pewinternet.org/Reports/2010/The-future-of-cloud-computing.aspx	Pew Research Center's Internet & American Life Project	June 11, 2010	26	Technology experts and stakeholders say they expect they will "live mostly in the cloud" in 2020 and not on the desktop, working mostly through cyberspace-based applications accessed through networked devices.
The Reliability of Global Undersea Communications Cable Infrastructure (The ROGUCCI Report) http://www.ieee-rogucci.org/files/The%20ROGUCCI%20Report.pdf	IEEE/EastWest Institute	May 26, 2010	186	This study submits 12 major recommendations to the private sector, governments and other stakeholders—especially the financial sector—for the purpose of improving the reliability, robustness, resilience, and security of the world's undersea communications cable infrastructure.
NSTB Assessments Summary Report: Common Industrial Control System Cyber Security Weaknesses http://www.fas.org/sgp/eprint/nstb.pdf	Department of Energy, Idaho National Laboratory	May 1, 2010	123	Computer networks controlling the electric grid are plagued with security holes that could allow intruders to redirect power delivery and steal data. Many of the security vulnerabilities are strikingly basic and fixable problems.
Explore the reliability and resiliency of commercial broadband communications networks http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-305618A1.doc	Federal Communications Commission (FCC)	April 21, 2010	N/A	The Federal Communications Commission launched an inquiry on the ability of existing broadband networks to withstand significant damage or severe overloads as a result of natural disasters, terrorist attacks, pandemics or other major public emergencies, as recommended in the National Broadband Plan.
Security Guidance for Critical Areas of Focus in Cloud Computing V2.1 http://www.cloudsecurityalliance.org/csaguide.pdf	Cloud Security Alliance	December 2009	76	"Through our focus on the central issues of cloud computing security, we have attempted to bring greater clarity to an otherwise complicated landscape, which is often filled with incomplete and oversimplified information. Our focus ... serves to bring context and specificity to the cloud computing security discussion: enabling us to go beyond gross generalizations to deliver more insightful and targeted recommendations."

Title	Source	Date	Pages	Notes
21 Steps to Improve Cyber Security of SCADA Networks http://www.oe.netl.doe.gov/docs/prepare/21stepsbooklet.pdf	U.S. Department of Energy, Infrastructure Security and Energy Restoration	January 1, 2007	10	The President's Critical Infrastructure Protection Board and the Department of Energy have developed steps to help any organization improve the security of its SCADA networks. The steps are divided into two categories: specific actions to improve implementation, and actions to establish essential underlying management processes and policies.

Note: Highlights compiled by CRS from the reports.

CRS Reports and Other CRS Products: Cybercrime and National Security

- CRS Report 97-1025, *Cybercrime: An Overview of the Federal Computer Fraud and Abuse Statute and Related Federal Criminal Laws*, by Charles Doyle
- CRS Report 94-166, *Extraterritorial Application of American Criminal Law*, by Charles Doyle
- CRS Report R42403, *Cybersecurity: Cyber Crime Protection Security Act (S. 2111, 112th Congress)—A Legal Analysis*, by Charles Doyle
- CRS Report 98-326, *Privacy: An Overview of Federal Statutes Governing Wiretapping and Electronic Eavesdropping*, by Gina Stevens and Charles Doyle
- CRS Report RL32706, *Spyware: Background and Policy Issues for Congress*, by Patricia Moloney Figliola
- CRS Report CRS Report R41975, *Illegal Internet Streaming of Copyrighted Content: Legislation in the 112th Congress*, by Brian T. Yeh
- CRS Report R42112, *Online Copyright Infringement and Counterfeiting: Legislation in the 112th Congress*, by Brian T. Yeh
- CRS Report R40599, *Identity Theft: Trends and Issues*, by Kristin Finklea
- CRS Report R41927, *The Interplay of Borders, Turf, Cyberspace, and Jurisdiction: Issues Confronting U.S. Law Enforcement*, by Kristin Finklea
- CRS Report RL34651, *Protection of Children Online: Federal and State Laws Addressing Cyberstalking, Cyberharassment, and Cyberbullying*, by Alison M. Smith

  CRS Report R42547, *Cybercrime: Conceptual Issues for Congress and U.S. Law Enforcement*, by Kristin Finklea and Catherine A. Theohary

  CRS Legal Sidebar, Legal Barriers to an Expanded Role of the Military in Defending Against Domestic Cyberattacks, Andrew Nolan

  CRS Legal Sidebar, Obstacles to Private Sector Cyber Threat Information Sharing, Edward C. Liu

Table 27. Selected Reports: Cybercrime/Cyberwar

Title	Source	Date	Pages	Notes
Electric Grid Vulnerability: Industry Responses Reveal Security Gaps http://markey.house.gov/sites/markey.house.gov/files/documents/Markey%20Grid%20Report_05.21.13.pdf	Rep. Edward Markey and Rep. Henry Waxman	May 21, 2013	35	The report found that less than a quarter of investor-owned utilities and less than half of municipal and cooperation-owned utilities followed through with voluntary standards issued by the Federal Energy Regulatory Commission after the Stuxnet worm struck in 2010.
Towards Trustworthy Social Media and Crowdsourcing http://www.scribd.com/doc/138508756/Towards-Trustworthy-Social-Media-and-Crowdsourcing#download	Wilson Center	May 2013	12	Individuals and organizations interested in using social media and crowdsourcing currently lack two key sets of information: a systematic assessment of the vulnerabilities in these technologies and a comprehensive set of best practices describing how to address those vulnerabilities. Identifying those vulnerabilities and developing those best practices are necessary to address a growing number of cybersecurity incidents ranging from innocent mistakes to targeted attacks that have claimed lives and cost millions of dollars.
Remaking American Security: Supply Chain Vulnerabilities & National Security Risks Across the U.S. Defense Industrial Base http://americanmanufacturing.org/files/RemakingAmericanSecurityMay2013.pdf	Alliance for American Manufacturing	May 2013	355	Because the supply chain is global, it makes sense for U.S. officials to cooperate with other nations to ward off cyberattacks. Increased international cooperation to secure the integrity of the global IT system is a valuable long-term objective.
Role of Counterterrorism Law in Shaping 'ad Bellum' Norms for Cyber Warfare https://www.hsdl.org/?view&did=734375	International Law Studies (U.S. Naval War College)	April 1, 2013	42	The prospect of cyber war has evolved from science fiction and over-the-top doomsday depictions on television, films, and in novels to reality and front-page news… To date there has been little attention given to the possibility that international law generally and counterterrorism law in particular could and should develop a subset of cyber-counterterrorism law to respond to the inevitability of cyberattacks by terrorists and the use of cyber weapons by governments against terrorists, and to supplement existing international law governing cyber war where the intrusions do not meet the traditional kinetic thresholds.

Title	Source	Date	Pages	Notes
The Tallinn Manual on the International Law Applicable to Cyber Warfare http://ccdcoe.org/249.html	Cambridge University Press/ NATO Cooperative Cyber Defence Center of Excellence	March 5, 2013	282	The Tallinn Manual identifies the international law applicable to cyber warfare and sets out 95 'black-letter rules' governing such conflicts. An extensive commentary accompanies each rule, which sets forth each rules' basis in treaty and customary law, explains how the group of experts interpreted applicable norms in the cyber context, and outlines any disagreements within the group as to each rules' application. (Note: The manual is not an official NATO publication, but an expression of opinions of a group of independent experts acting solely in their personal capacity.)
APT1: Exposing One of China's Cyber Espionage Units http://intelreport.mandiant.com/ Mandiant_APT1_Report.pdf	Mandiant	February 19, 2013	76	The details analyzed during hundreds of investigations signal that the groups conducting these activities (computer security breaches around the world) are based primarily in China and that the Chinese government is aware of them.
Video demo of Chinese hacker activity http://intelreport.mandiant.com/	Mandiant	February 19, 2013	N/A	Video of APT1 attacker sessions and intrusion activities (5-minute video).
Crisis and Escalation in Cyberspace http://www.rand.org/pubs/monographs/MG1215.html	RAND Corp.	December 2012	200	The genesis for this work was the broader issue of how the Air Force should integrate kinetic and nonkinetic operations. Central to this process was careful consideration of how escalation options and risks should be treated, which, in turn, demanded a broader consideration across the entire crisis-management spectrum. Such crises can be managed by taking steps to reduce the incentives for other states to step into crisis, by controlling the narrative, understanding the stability parameters of the crises, and trying to manage escalation if conflicts arise from crises.
Cyberattacks Among Rivals: 2001-2011 (from the article, "The Fog of Cyberwar" by Brandon Variano and Ryan Maness (subscription required) http://www.foreignaffairs.com/cyberattacks-by-initiator-and-victim	Foreign Affairs	November 21, 2012	N/A	A chart showing cyberattacks by initiator and victim, 2001-2011.
Emerging Cyber Threats Report 2013 http://www.gtsecuritysummit.com/pdf/ 2013ThreatsReport.pdf	Georgia Institute of Technology	November 14, 2012	9	The year ahead will feature new and increasingly sophisticated means to capture and exploit user data, escalating battles over the control of online information and continuous threats to the U.S. supply chain from global sources. (From the annual Georgia Tech Cyber Security Summit 2012).

Title	Source	Date	Pages	Notes
Proactive Defense for Evolving Cyber Threats http://prod.sandia.gov/techlib/access-control.cgi/2012/1210177.pdf	Sandia National Labs	November 1, 2012	98	The project applied rigorous predictability-based analytics to two central and complementary aspects of the network defense problem—attack strategies of the adversaries and vulnerabilities of the defenders' systems—and used the results to develop a scientifically-grounded, practically-implementable methodology for designing proactive cyber defense systems.
Safeguarding Cyber-Security, Fighting in Cyberspace http://www.isn.ethz.ch/isn/Editorial-Plan/Dossiers/Detail/?lng=en&id=154059&contextid782=154059	International Relations and Security Network (ISN)	October 22, 2012	N/A	Looks at the Militarisation of Cyber Security as a Source of Global Tension, and makes the case that cyber-warfare is already an essential feature of many leading states' strategic calculations, followed by its opposite—i.e., one that believes the threat posed by cyber-warfare capabilities is woefully overstated.
Before We Knew It: An Empirical Study of Zero-Day Attacks In The Real World http://users.ece.cmu.edu/~tdumitra/public_documents/bilge12_zero_day.pdf	Symantec Research Labs	October 16, 2012	12	The paper describes a method for automatically identifying zero-day attacks from field-gathered data that records when benign and malicious binaries are downloaded on 11 million real hosts around the world. Searching this data set for malicious files that exploit known vulnerabilities indicates which files appeared on the Internet before the corresponding vulnerabilities were disclosed.
ZeroAccess: We're Gonna Need a Bigger Planet http://www.f-secure.com/weblog/archives/00002428.html	F-Secure and Google Maps	October 15, 2012	N/A	The idea of a network of malware-infected zombie computers rigged to do the bidding of criminals conjures up a frightening image on its own. A new visualization of the so-called ZeroAcess botnet shows how widespread such schemes can become.
Investigative Report on the U.S. National Security Issues Posed by Chinese Telecommunications Companies Huawei and ZTE http://intelligence.house.gov/press-release/investigative-report-us-national-security-issues-posed-chinese-telecommunications	House Permanent Select Committee on Intelligence	October 8, 2012	60	The committee initiated this investigation in November 2011 to inquire into the counterintelligence and security threat posed by Chinese telecommunications companies doing business in the United States.
Federal Support for and Involvement in State and Local Fusion Centers http://www.hsgac.senate.gov/download/?id=49139e81-1dd7-4788-a3bb-d6e7d97dde04	U. S. Senate Permanent Subcommittee on Investigations	October 3, 2012	141	A two-year bipartisan investigation found that U.S. Department of Homeland Security efforts to engage state and local intelligence "fusion centers" has not yielded significant useful information to support federal counterterrorism intelligence efforts. In Section VI, "Fusion Centers Have Been Unable to Meaningfully Contribute to Federal Counterterrorism Efforts," Part G, "Fusion Centers May Have Hindered, Not Aided, Federal Counterterrorism Efforts," the report discusses the Russian "Cyberattack" in Illinois.
HoneyMap - Visualizing Worldwide Attacks in Real-Time http://www.honeynet.org/node/960	The Honeynet Project	October 1, 2012	N/A	The HoneyMap shows a real-time visualization of attacks against the Honeynet Project's sensors deployed around the world.

Title	Source	Date	Pages	Notes
Manual on International Law Applicable to Cyber Warfare ("The Tallinn Manual") http://www.ccdcoe.org/249.html	NATO Cooperative Cyber Defence Centre of Excellence, Tallinn, Estonia	August 2012	N/A	The Tallinn Manual is a nonbinding yet authoritative restatement of the law of armed conflict as it relates to cyberwar. It offers guidance to attackers, defenders, and legal experts on how cyberattacks can be classified as actions covered under the law, such as armed attacks.
Does Cybercrime Really Cost $1 Trillion? http://www.propublica.org/article/does-cybercrime-really-cost-1-trillion	ProPublica	August 1, 2012	N/A	In a news release from computer security firm McAfee to announce its 2009 report, "Unsecured Economies: Protecting Vital Information," the company estimated a trillion dollar global cost for cybercrime. The number does not appear in the report itself. McAfee's trillion-dollar estimate is questioned even by the three independent researchers from Purdue University whom McAfee credits with analyzing the raw data from which the estimate was derived. An examination of their origins by ProPublica has found new grounds to question the data and methods used to generate these numbers, which McAfee and Symantec say they stand behind.
Putting the "war" in cyberwar: Metaphor, analogy, and cybersecurity discourse in the United States http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/3848/3270	First Monday	July 2, 2012	N/A	This essay argues that current contradictory tendencies are unproductive and even potentially dangerous. It argues that the war metaphor and nuclear deterrence analogy are neither natural nor inevitable and that abandoning them would open up new possibilities for thinking more productively about the full spectrum of cyber security challenges, including the as-yet unrealized possibility of cyber war.
Information Security: Cyber Threats Facilitate Ability to Commit Economic Espionage http://www.gao.gov/products/GAO-12-876T	GAO	June 28, 2012	20	This statement discusses (1) cyber threats facing the nation's systems, (2) reported cyber incidents and their impacts, (3) security controls and other techniques available for reducing risk, and (4) the responsibilities of key federal entities in support of protecting IP.
Measuring the Cost of Cybercrime http://weis2012.econinfosec.org/papers/Anderson_WEIS2012.pdf	11th Annual Workshop on the Economics of Information Security	June 25, 2012	N/A	"For each of the main categories of cybercrime we set out what is and is not known of the direct costs, indirect costs and defence costs - both to the UK and to the world as a whole."

Title	Source	Date	Pages	Notes
Nodes and Codes: The Reality of Cyber Warfare http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA567190&Location=U2&doc=GetTRDoc.pdf	U.S. Army School of Advanced Military Studies, Command and General Staff	May 17, 2012	62	Explores the reality of cyber warfare through the story of Stuxnet. Three case studies evaluate cyber policy, discourse, and procurement in the United States, Russia, and China before and after Stuxnet to illustrate their similar, yet unique, realities of cyber warfare.
The Impact of Cybercrime on Businesses http://www.checkpoint.com/products/downloads/whitepapers/ponemon-cybercrime-2012.pdf	Ponemon Institute	May 2012	21	The study found that targeted attacks on businesses cost enterprises an average of $214,000. The expenses are associated with forensic investigations, investments in technology, and brand recovery costs.
Proactive Policy Measures by Internet Service Providers against Botnets http://www.oecd-ilibrary.org/science-and-technology/proactive-policy-measures-by-internet-service-providers-against-botnets_5k98tq42t18w-en	Organisation for Economic Co-operation and Development	May 7, 2012	25	This report analyzes initiatives in a number of countries through which end-users are notified by ISPs when their computer is identified as being compromised by malicious software and encouraged to take action to mitigate the problem.
Developing State Solutions to Business Identity Theft: Assistance, Prevention and Detection Efforts by Secretary of State Offices http://www.nass.org/index.php?option=com_docman&task=doc_download&gid=1257	National Association of Secretaries of State	January 2012	23	This white paper is the result of efforts by the 19-member NASS Business Identity Theft Task Force to develop policy guidelines and recommendations for state leaders dealing with identity fraud cases involving public business records.
A Cyberworm that Knows No Boundaries http://www.rand.org/content/dam/rand/pubs/occasional_papers/2011/RAND_OP342.pdf	RAND	December 21, 2011	55	Stuxnet-like worms pose a serious threat even to infrastructure and computer systems that are not connected to the Internet. However, defending against such attacks is an increasingly complex prospect.
Department of Defense Cyberspace Policy Report: A Report to Congress Pursuant to the National Defense Authorization Act for Fiscal Year 2011, Section 934 http://www.defense.gov/home/features/2011/0411_cyberstrategy/docs/NDAA%20Section%20934%20Report_For%20webpage.pdf	DOD	November 15, 2011	14	From the report: "When warranted, we will respond to hostile attacks in cyberspace as we would to any other threat to our country. We reserve the right to use all necessary means - diplomatic, informational, military and economic - to defend our nation, our allies, our partners and our interests."

Title	Source	Date	Pages	Notes
W32.Duqu: The Precursor to the Next Stuxnet http://www.symantec.com/connect/w32_duqu_precursor_next_stuxnet	Symantec	October 24, 2011	N/A	On October 14, 2011, a research lab with strong international connections alerted Symantec to a sample that appeared to be very similar to Stuxnet, the malware which wreaked havoc in Iran's nuclear centrifuge farms last summer. The lab named the threat "Duqu" because it creates files with the file name prefix "DQ". The research lab provided Symantec with samples recovered from computer systems located in Europe, as well as a detailed report with their initial findings, including analysis comparing the threat to Stuxnet.
Cyber War Will Not Take Place http://www.tandfonline.com/doi/abs/10.1080/01402390.2011.608939	Journal of Strategic Studies	October 5, 2011	29	The paper argues that cyber warfare has never taken place, is not currently taking place, and is unlikely to take place in the future.
Twenty Critical Security Controls for Effective Cyber Defense: Consensus Audit Guidelines (CAG) http://www.sans.org/critical-security-controls/	SANS	October 3, 2011	77	The 20 measures are intended to focus agencies' limited resources on plugging the most common attack vectors.
Revealed: Operation Shady RAT: an Investigation Of Targeted Intrusions Into 70+ Global Companies, Governments, and Non-Profit Organizations During the Last 5 Years http://www.mcafee.com/us/resources/white-papers/wp-operation-shady-rat.pdf	McAfee	August 2, 2011	14	A cyber-espionage operation lasting many years penetrated 72 government and other organizations, most of them in the United States, and has copied everything from military secrets to industrial designs, according to technology security company McAfee. See page 4 for the types of compromised parties), page 5 for the geographic distribution of victim's country of origin, pages 7-9 for the types of victims, and pages 10-13 for the number of intrusions for 2007-2010.
USCYBERCOM and Cyber Security: Is a Comprehensive Strategy Possible?	Army War College	May 12, 20122	32	Examine five aspects of USCYBERCOM: organization, command and control, computer network operations (CNO), synchronization, and resourcing. Identify areas that currently present significant risk to USCYBERCOM's ability to create a strategy that can achieve success in its cyberspace operations. Recommend potential solutions that can increase the effectiveness of the USCYBERCOM strategy.
A Four-Day Dive Into Stuxnet's Heart http://www.wired.com/threatlevel/2010/12/a-four-day-dive-into-stuxnets-heart/	Threat Level Blog (Wired)	December 27, 2010	N/A	From the article, "It is a mark of the extreme oddity of the Stuxnet computer worm that Microsoft's Windows vulnerability team learned of it first from an obscure Belarusian security company that even they had never heard of."

Title	Source	Date	Pages	Notes
Did Stuxnet Take Out 1,000 Centrifuges at the Natanz Enrichment Plant? Preliminary Assessment http://isis-online.org/isis-reports/detail/did-stuxnet-take-out-1000-centrifuges-at-the-natanz-enrichment-plant/	Institute for Science and International Security	December 22, 2010	10	This report indicates that commands in the Stuxnet code intended to increase the frequency of devices targeted by the malware exactly match several frequencies at which rotors in centrifuges at Iran's Natanz enrichment plant are designed to operate optimally or are at risk of breaking down and flying apart.
The Role of Internet Service Providers in Botnet Mitigation: an Empirical Analysis Bases on Spam Data http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.165.2211&rep=rep1&type=pdf	Organisation for Economic Co-operation and Development	November 12, 2010	68	This working paper considers whether ISPs can be critical control points for botnet mitigation, how the number of infected machines varies across ISPs, and why.
Stuxnet Analysis http://www.enisa.europa.eu/media/press-releases/stuxnet-analysis	European Network and Information Security Agency	October 7, 2010	N/A	EU cybersecurity agency warns that the Stuxnet malware is a game changer for critical information infrastructure protection; PLC controllers of SCADA systems infected with the worm might be programmed to establish destructive over/under pressure conditions by running pumps at different frequencies.
Proceedings of a Workshop on Deterring Cyberattacks: Informing Strategies and Developing Options for U.S. Policy http://www.nap.edu/catalog.php?record_id=12997#description	National Research Council	October 5, 2010	400	Per request of the Office of the Director of National Intelligence, the National Research Council undertook a two-phase project aimed to foster a broad, multidisciplinary examination of strategies for deterring cyberattacks on the United States and of the possible utility of these strategies for the U.S. government.
Untangling Attribution: Moving to Accountability in Cyberspace [Testimony] http://i.cfr.org/content/publications/attachments/Knake%20-Testimony%20071510.pdf	Council on Foreign Relations	July 15, 2010	14	Robert K. Knake's testimony before the House Committee on Science and Technology on the role of attack attribution in preventing cyber attacks and how attribution technologies can affect the anonymity and the privacy of Internet users.
Technology, Policy, Law, and Ethics Regarding U.S. Acquisition and Use of Cyberattack Capabilities http://www.nap.edu/catalog.php?record_id=12651&utm_medium=etmail&utm_source=National%20Academies%20Press&utm_campaign=NAP+mail+eblast+10.27.09+-+Cyberattack+Preorder+sp&utm_content=Downloader&utm_term=#description	National Research Council	January 1, 2009	368	This report explores important characteristics of cyberattack. It describes the current international and domestic legal structure as it might apply to cyberattack, and considers analogies to other domains of conflict to develop relevant insights.

Note: Highlights compiled by CRS from the reports.

Table 28. Selected Reports: International Efforts

Title	Source	Date	Pages	Notes
Proposal for a Directive of the European Parliament and of the Council on Attacks Against Information Systems http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-%2f%2fEP%2f%2fNONSGML%2bCOMPARL%2bPE-480.665%2b01%2bDOC%2bPDF%2bV0%2f%2fEN	European Parliament Civil Liberties Committee	June 6, 2013	58	Cyber criminals will face tougher EU-wide penalties, under a draft directive agreed by MEPs, Council and Commission negotiators last year and endorsed by the Civil Liberties Committee. The compromise text is to be voted by the full House in July and be formally adopted by the Council shortly thereafter.
Telecommunications Networks: Addressing Potential Security Risks of Foreign-Manufactured Equipment http://www.gao.gov/products/GAO-13-652T	General Accountability Office	May 21, 2013	52	The federal government has begun efforts to address the security of the supply chain for commercial networks... There are a variety of other approaches for addressing the potential risks posed by foreign-manufactured equipment in commercial communications networks, including those approaches taken by foreign governments... While these approaches are intended to improve supply chain security of communications networks, they may also create the potential for trade barriers, additional costs, and constraints on competition, which the federal government would have to take into account if it chose to pursue such approaches.
The Global Cyber Game: Achieving Strategic Resilience in the Global Knowledge Society http://www.da.mod.uk/publications/library/technology/20130508-Cyber_report_final_U.pdf/view	Defence Academy of the United Kingdom	May 8, 2013	127	Provides a systematic way of thinking about cyberpower and its use by a range of global players. The global cyberpower contest is framed as a Global Cyber Game, played out on a 'Cyber Gameboard'—a framework that can be used for strategic and tactical thinking about cyber strategy.
Defence White Paper 2013 http://www.defence.gov.au/whitepaper2013/docs/WP_2013_web.pdf	Australia Department of Defence	May 3, 2013	148	The Australian Cyber Security Centre will bring together security capabilities from the Defence Signals Directorate, Defence Intelligence Organisation, Australian Security Intelligence Organisation (ASIO), the Attorney-General's Department's Computer Emergency Response Team (CERT) Australia, Australian Federal Police (AFP) and the Australian Crime Commission (ACC).

Title	Source	Date	Pages	Notes
Remaking American Security: Supply Chain Vulnerabilities & National Security Risks Across the U.S. Defense Industrial Base http://americanmanufacturing.org/files/RemakingAmericanSecurityMay2013.pdf	Alliance for American Manufacturing	May 2013	355	Because the supply chain is global, it makes sense for U.S. officials to cooperate with other nations to ward off cyberattacks. Increased international cooperation to secure the integrity of the global IT system is a valuable long-term objective.
Cyber Security Information Partnership (CISP) https://www.gov.uk/government/news/government-launches-information-sharing-partnership-on-cyber-security	Cabinet Office, United Kingdom	March 27, 2013	N/A	CISP introduces a secure virtual 'collaboration environment' where government and industry partners can exchange information on threats and vulnerabilities in real time. The Cyber Security Information Sharing Partnership will be complemented by a 'Fusion Cell,' which will be supported on the government side by the Security Service, GCHQ and the National Crime Agency, and by industry analysts from a variety of sectors.
The Tallinn Manual on the International Law Applicable to Cyber Warfare http://ccdcoe.org/249.html	Cambridge University Press/ NATO Cooperative Cyber Defence Center of Excellence	March 5, 2013	282	The Tallinn Manual identifies the international law applicable to cyber warfare and sets out ninety-five 'black-letter rules' governing such conflicts. An extensive commentary accompanies each rule, which sets forth each rules' basis in treaty and customary law, explains how the group of experts interpreted applicable norms in the cyber context, and outlines any disagreements within the group as to each rules' application. (Note: The manual is not an official NATO publication, but an expression of opinions of a group of independent experts acting solely in their personal capacity.)

Title	Source	Date	Pages	Notes
Administration Strategy for Mitigating the Theft of U.S. Trade Secrets http://www.whitehouse.gov//sites/default/files/omb/IPEC/admin_strategy_on_mitigating_the_theft_of_u.s._trade_secrets.pdf	White House	February 20, 2013	141	"First, we will increase our diplomatic engagement.... Second, we will support industry-led efforts to develop best practices to protect trade secrets and encourage companies to share with each other best practices that can mitigate the risk of trade secret theft.... Third, DOJ will continue to make the investigation and prosecution of trade secret theft by foreign competitors and foreign governments a top priority.... Fourth, President Obama recently signed two pieces of legislation that will improve enforcement against trade secret theft.... Lastly, we will increase public awareness of the threats and risks to the U.S. economy posed by trade secret theft."
APT1: Exposing One of China's Cyber Espionage Units http://intelreport.mandiant.com/Mandiant_APT1_Report.pdf	Mandiant	February 19, 2013	76	The details analyzed during hundreds of investigations signal that the groups conducting these activities (computer security breaches around the world) are based primarily in China and that the Chinese government is aware of them.
Video demo of Chinese hacker activity http://intelreport.mandiant.com/	Mandiant	February 19, 2013	N/A	Video of APT1 attacker sessions and intrusion activities (5-minute video).
An Open, Safe and Secure Cyberspace http://ec.europa.eu/digital-agenda/en/news/eu-cybersecurity-plan-protect-open-internet-and-online-freedom-and-opportunity-cyber-security	European Union	February 7, 2013	20	The strategy articulates the EU's vision of cyber-security in terms of five priorities: achieving cyber resilience; drastically reducing cybercrime; developing cyber defence policy and capabilities related to the Common Security and Defence Policy (CSDP); developing the industrial and technological resources for cyber-security; establishing a coherent international cyberspace policy for the European Union and promoting core EU values.

Title	Source	Date	Pages	Notes
Linking Cybersecurity Policy and Performance http://blogs.technet.com/b/trustworthycomputing/archive/2013/02/06/linking-cybersecurity-policy-and-performance-microsoft-releases-special-edition-security-intelligence-report.aspx	Microsoft Trustworthy Computing	February 6, 2013	27	Introduces a new methodology for examining how socio-economic factors in a country or region impact cybersecurity performance. Examine measures such as use of modern technology, mature processes, user education, law enforcement and public policies related to cyberspace. This methodology can build a model that will help predict the expected cybersecurity performance of a given country or region.
The Chinese Defense Economy Takes Off: Sector-by-Sector Assessments and the Role of Military End-Users http://igcc.ucsd.edu/assets/001/504355.pdf	UC Institute on Global Conflict and Cooperation	January 25, 2013	87	This collection of 15 policy briefs explores how China has made such impressive military technological progress over the past few years, what is in store, and what are the international security implications. The briefs are summaries of a series of longer research papers presented at the third annual Chinese defense economy conference held by the Study of Innovation and Technology in China in July 2012.
Defence and Cyber-Security, vol. 1 - Report, together with formal minutes, oral and written evidence http://www.publications.parliament.uk/pa/cm201213/cmselect/cmdfence/106/106.pdf Defence and Cyber-Security, vol. 2 - Additional Written Evidence http://www.publications.parliament.uk/pa/cm201213/cmselect/cmdfence/106/106vw.pdf	House of Commons Defence Committee (UK)	December 18, 2012	51 (vol. 1) 37 (vol. 2)	Given the inevitable inadequacy of the measures available to protect against a constantly changing and evolving threat, and given the Minister for the Cabinet Office's comment, it is not enough for the Armed Forces to do their best to prevent an effective attack. In its response to this report the Government should set out details of the contingency plans it has in place should such an attack occur. If it has none, it should say so—and urgently create some.

Title	Source	Date	Pages	Notes
The Challenge of Cyber Power for Central African Countries: Risks and Opportunities http://handle.dtic.mil/100.2/ADA576285	Naval Postgraduate School	December 2012	209	"The Central African militaries, which are supposed to be the first line of defense for their governments' institutions, are dramatically behind the times. To address this situation, the governments of Central Africa need to adopt a collaborative cyber strategy based on common investment in secure cyber infrastructures. Such cooperation will help to create a strong cyber environment conducive of the confidence and trust necessary for the emergence of a cyber community of Central African States (C3AS). For Central African militaries, massive training and recruiting will be the first move to begin the process of catching up."
Cybersecurity: Managing risks for greater opportunities http://oecdinsights.org/2012/11/29/cybersecurity-managing-risks-for-greater-opportunities/	Organization for Economic Co-operation and Development	November 29, 2012	N/A	The OECD launched a broad consultation of all stakeholders from member and non-member countries to review its Security Guidelines. The review will take into account newly emerging risks, technologies and policy trends around such areas as cloud computing, digital mobility, the Internet of things, social networking, etc.
Cybersecurity Policy Making at a Turning Point: Analysing a New Generation of National Cybersecurity Strategies for the Internet Economy http://www.oecd-ilibrary.org/cybersecurity-policy-making-at-a-turning-point_5k8zq92vdgtl.pdf?contentType=/ns/WorkingPaper&itemId=/content/workingpaper/5k8zq92vdgtl-en&containerItemId=/content/workingpaperseries/20716826&accessItemIds=&mimeType=application/pdfhttp://www.oecd-ilibrary.org/cybersecurity-policy-making-at-a-turning-point_5k8zq92vdgtl.pdf?contentType=/ns/WorkingPaper&itemId=/content/workingpaper/5k8zq92vdgtl-en&containerItemId=/content/workingpaperseries/20716826&accessItemIds=&mimeType=application/pdf	Organization for Economic Co-operation and Development	November 16, 2012	57	This report analyses the latest generation of national cybersecurity strategies in ten OECD countries and identifies commonalities and differences.

Title	Source	Date	Pages	Notes
2012 Report to Congress of the U.S.-China Economic and Security Review Commission, One Hundred Twelfth Congress, Second Session, November 2012 https://www.hsdl.org/?view&did=725530	U.S.-China Economic and Security Review Commission	November 2012	509	This report responds to the mandate for the Commission 'to monitor, investigate, and report to Congress on the national security implications of the bilateral trade and economic relationship between the United States and the People's Republic of China. See "China's Cyber Activities," Chapter 2, Section 2, pp. 147-169.
Australia: Telecommunications data retention—an overview http://parlinfo.aph.gov.au/parlInfo/download/library/prspub/1998792/upload_binary/1998792.pdf	Parliamentary Library of Australia	October 24, 2012	32	In July 2012, the Commonwealth Attorney-General's Department released a Discussion Paper, Equipping Australia against emerging and evolving threats, on the proposed national security reforms.... Of the 18 primary proposals and the 41 individual reforms that they comprise, the suggestion that carriage service providers (CSPs) be required to routinely retain certain information associated with every Australian's use of the Internet and phone services for a period of up to two years ('data retention') is the issue that seems to have attracted the most attention.
More Than Meets the Eye: Clandestine Funding, Cutting-Edge Technology and China's Cyber Research & Development Program http://www.osti.gov/bridge/servlets/purl/1055833/	Lawrence Livermore National Laboratory	October 23, 2012	17	Analyzes how the Chinese leadership views information technology research and development (R&D), as well as the role cyber R&D plays in China's various strategic development plans. Explores the organizational structure of China's cyber R&D base. Concludes with a projection of how China might field new cyber capabilities for intelligence platforms, advanced weapons systems, and systems designed to support asymmetric warfare operations.
Investigative Report on the U.S. National Security Issues Posed by Chinese Telecommunications Companies Huawei and ZTE http://intelligence.house.gov/press-release/investigative-report-us-national-security-issues-posed-chinese-telecommunications	House Permanent Select Committee on Intelligence	October 8, 2012	60	The committee initiated this investigation in November 2011 to inquire into the counterintelligence and security threat posed by Chinese telecommunications companies doing business in the United States.

Title	Source	Date	Pages	Notes
Manual on International Law Applicable to Cyber Warfare ("The Tallinn Manual") http://www.ccdcoe.org/249.html	NATO Cooperative Cyber Defence Centre of Excellence, Tallinn, Estonia	August 2012	N/A	The Tallinn Manual is a nonbinding yet authoritative restatement of the law of armed conflict as it relates to cyberwar. It offers attackers, defenders, and legal experts guidance on how cyberattacks can be classified as actions covered under the law, such as armed attacks.
Bilateral Discussions on Cooperation in Cybersecurity http://www.cicir.ac.cn/chinese/newsView.aspx?nid=3878	China Institute of Contemporary International Relations and the Center for Strategic and International Studies (CSIS)	June 2012	N/A	(Scroll down for English). Since 2009, CSIS and CICIR have held six formal meetings on cybersecurity (accompanied by several informal discussions), called "Sino-U.S. Cybersecurity Dialogue." The meetings have been attended by a broad range of U.S. and Chinese officials and scholars responsible for cybersecurity issues. The goals of the discussions have been to reduce misperceptions and to increase transparency of both countries' authorities and understanding on how each country approaches cybersecurity, and to identify areas of potential cooperation.
Five Years after Estonia's Cyber Attacks: Lessons Learned for NATO? http://www.ndc.nato.int/download/downloads.php?icode=334	NATO	May 2012	8	In April 2007 a series of cyberattacks targeted Estonian information systems and telecommunication networks. Lasting 22 days, the attacks were directed at a range of servers (web, e-mail, DNS) and routers. The 2007 attacks did not damage much of the Estonian information technology infrastructure. However, the attacks were a true wake-up call for NATO, offering a practical demonstration that cyberattacks could now cripple an entire nation dependent on IT networks.
Cyber-security: The Vexed Question of Global Rules: An Independent Report on Cyber-Preparedness Around the World http://www.mcafee.com/us/resources/reports/rp-sda-cyber-security.pdf?cid=WBB048	McAfee	February 1, 2012	108	Forty-five percent of legislators and cybersecurity experts representing 27 countries think cybersecurity is just as important as border security. The authors surveyed 80 professionals from business, academia and government to gauge worldwide opinions of cybersecurity.

Title	Source	Date	Pages	Notes
Cyber Power Index http://www.cyberhub.com/CyberPowerIndex	Booz Allen Hamilton and the Economist Intelligence Unit	January 15, 2012	N/A	The index of developing countries' ability to withstand cyberattacks and build strong digital economies, rates the countries on their legal and regulatory frameworks; economic and social issues; technology infrastructure; and industry. The index puts the United States in the No. 2 spot, and the UK in No. 1.
Foreign Spies Stealing US Economic Secrets in Cyberspace http://www.ncix.gov/publications/reports/fecie_all/Foreign_Economic_Collection_2011.pdf	Office of the National Counterintelligence Executive	November 3, 2011	31	According to the report, espionage and theft through cyberspace are growing threats to the United States' security and economic prosperity, and the world's most persistent perpetrators happen to also be U.S. allies.
The UK Cyber Security Strategy: Protecting and promoting the UK in a digital world http://www.cabinetoffice.gov.uk/sites/default/files/resources/uk-cyber-security-strategy-final.pdf	Cabinet Office (United Kingdom)	November 2011	43	Chapter 1 describes the background to the growth of the networked world and the immense social and economic benefits it is unlocking. Chapter 2 describes these threats. The impacts are already being felt and will grow as our reliance on cyberspace grows. Chapter 3 sets out where we want to end up—with the government's vision for UK cyber security in 2015.
Cyber Dawn: Libya http://www.unveillance.com/wp-content/uploads/2011/05/Project_Cyber_Dawn_Public.pdf	Cyber Security Forum Initiative	May 9, 2011	70	Project Cyber Dawn: Libya uses open source material to provide an in-depth view of Libyan cyberwarfare capabilities and defenses.
China's Cyber Power and America's National Security http://www.dtic.mil/dtic/tr/fulltext/u2/a552990.pdf	U.S. Army War College, Strategy Research Project	March 24, 2011	86	This report examines the growth of Chinese cyber power; their known and demonstrated capabilities for offensive, defensive and exploitive computer network operations; China's national security objectives; and the possible application of Chinese cyber power in support of those objectives.
Worldwide Threat Assessment of the U.S. Intelligence Community (Testimony) http://www.dni.gov/testimonies/20110210_testimony_clapper.pdf	James Clapper, Director of National Intelligence	February 10, 2011	34	Provides an assessment of global threats: convergence, malware, the "Chinese" connection, foreign military capabilities in cyberspace, counterfeit computer hardware and intellectual property theft, and identity theft/finding vulnerable government operatives.

Title	Source	Date	Pages	Notes
Working Towards Rules for Governing Cyber Conflict: Rendering the Geneva and Hague Conventions in Cyberspace http://vialardi.org/nastrazzuro/pdf/US-Russia.pdf	EastWest Institute	February 3, 2011	60	[The authors] led the cyber and traditional security experts through a point-by-point analysis of the Geneva and Hague Conventions. Ultimately, the group made five immediate recommendations for Russian and U.S.-led joint assessments, each exploring how to apply a key convention principle to cyberspace.
The Reliability of Global Undersea Communications Cable Infrastructure (The Rogucci Report) http://www.ieee-rogucci.org/files/The%20ROGUCCI%20Report.pdf	IEEE/EastWest Institute	May 26, 2010	186	This study submits 12 major recommendations to the private sector, governments and other stakeholders—especially the financial sector—for the purpose of improving the reliability, robustness, resilience, and security of the world's undersea communications cable infrastructure.
ITU Toolkit for Cybercrime Legislation http://www.itu.int/ITU-D/cyb/cybersecurity/docs/itu-toolkit-cybercrime-legislation.pdf	International Telecommunications Union	February 2010	N/A	This document aims to provide countries with sample legislative language and reference material that can assist in the establishment of harmonized cybercrime laws and procedural rules.

Note: Highlights compiled by CRS from the reports.

Table 29. Selected Reports: Education/Training/Workforce

Title	Source	Date	Pages	Notes
Global Information Security Workforce Study https://www.isc2.org/workforcestudy/default.aspx	(ISC)² and Frost & Sullivan	May 7, 2013	28	Federal cyber workers earn an average salary of $106,430, quite a bit less than the average private sector salary of $111,376. The lag in federal salaries is likely due to federal budget restraints and nearly three years of a continuing resolution.
NCCoE Celebrates National Cybersecurity Excellence Partnerships http://csrc.nist.gov/nccoe/The-Center/News/News.html	NIST National Cybersecurity Center of Excellence	April 15, 2013	N/A	Eleven private organizations agreed to partner with the National Institute of Standards and Technology to share cybersecurity staff and best practices to help better combat cyber threats.
2012 Information Technology Workforce Assessment for Cybersecurity https://cio.gov/wp-content/uploads/downloads/2013/04/ITWAC-Summary-Report_04-01-2013.pdf	U.S. Department of Homeland Security	April 3, 2013	131	The report, which is based on an anonymous survey of nearly 23,000 cyber workers across 52 departments and agencies, also found that while the majority (49%) of cyber feds have more than 10 years of service until they reach retirement eligibility, nearly 33% will be eligible to retire in the next three years.
National Initiative for Cybersecurity Careers and Studies (NICCS) http://niccs.us-cert.gov/	U.S. Department of Homeland Security	February 21, 2013	N/A	NICCS is an online resource for cybersecurity career, education, and training information. It is a partnership between DHS, the National Institute of Standards and Technology, the Office of the Director of National Intelligence, the Department of Defense, the Department of Education, the National Science Foundation, and the Office of Personnel Management.
Michigan Cyber Range http://www.merit.edu/cyberrange/	Partnership between the state of Michigan, Merit Network, federal and local governments, colleges and universities, and the private sector	November 12, 2012	N/A	Enables individuals and organizations to develop detection and reaction skills through simulations and exercises.
CyberSkills Task Force Report https://www.hsdl.org/hslog/?q=node/7934	U.S. Department of Homeland Security	October 1, 2012	41	DHS's Task Force on CyberSkills proposes far-reaching improvements to enable DHS to recruit and retain the cybersecurity talent it needs.

Title	Source	Date	Pages	Notes
Cyber Security Test Bed: Summary and Evaluation Results http://sites.duke.edu/ihss/files/2011/12/Cyber-Security-Test-Bed_Final-Report_Rowe.pdf	Institute for Homeland Security Solutions	October 2012	89	The Cyber Test Bed project was a case study analysis of how a set of interventions, including threat analysis, best practices sharing, and executive and staff training events, over the course of one year, would impact a group of nine small and mid-size businesses in North Carolina. Pre- and post-Test Bed interviews were conducted with company officials to establish a baseline and evaluate the impact of the Test Bed experience. After the Cyber Test Bed experience, decision makers at these companies indicated an increase in their perceptions of the risk of cyberattacks and an increase in their knowledge of possible solution.
Information Assurance Scholarship Program http://www.doncio.navy.mil/ContentView.aspx?id=535	U.S Navy	August 28, 2012	N/A	The Information Assurance Scholarship Program is designed to increase the number of qualified personnel entering the information assurance and information technology fields within the department, Defense officials said last week. The scholarships also are an attempt to effectively retain military and civilian cybersecurity and IT personnel.
Preparing the Pipeline: The U.S. Cyber Workforce for the Future http://handle.dtic.mil/100.2/ADA577318	National Defense University	August 2012	17	This paper addresses methods to close the gaps between demand and the current existing capabilities and capacity in the U.S. cyber workforce. A large number of professionals with not only technical skills, but also an understanding of cyber policy, law, and other disciplines will be needed to ensure the continued success of the U.S. economy, government, and society in the 21st-century information age. Innovative methods have been developed by the government, think tanks, and private sector for closing these gaps, but more needs to be done.
Smart Grid Cybersecurity: Job Performance Model Report http://www.pnl.gov/main/publications/external/technical_reports/PNNL-21639.pdf	Pacific Northwest National Laboratory	August 1, 2012	178	This report outlines the work done to develop a smart grid cybersecurity certification. The primary purpose is to develop a measurement model that may be used to guide curriculum, assessments, and other development of technical and operational smart grid cybersecurity knowledge, skills, and abilities.

Title	Source	Date	Pages	Notes
National Centers of Academic Excellence (CAE) in Cyber Operations Program http://www.nsa.gov/academia/nat_cae_cyber_ops/index.shtml	National Security Agency (NSA)	May 29, 2012	N/A	The NSA has launched National Centers of Academic Excellence (CAE) in Cyber Operations Program; the program is intended to be a deeply technical, inter-disciplinary, higher education program grounded in the computer science (CS), computer engineering (CE), or electrical engineering (EE) disciplines, with extensive opportunities for hands-on applications via labs and exercises.
Cybersecurity Human Capital: Initiatives Need Better Planning and Coordination http://www.gao.gov/products/GAO-12-8	Government Accountability Office (GAO)	November 29, 2011	86	To ensure that government-wide cybersecurity workforce initiatives are better coordinated and planned, and to better assist federal agencies in defining roles, responsibilities, skills, and competencies for their workforce, the Secretary of Commerce, Director of the Office of Management and Budget, Director of the Office of Personnel Management, and Secretary of Homeland Security should collaborate through the NICE initiative to develop and finalize detailed plans allowing agency accountability, measurement of progress, and determination of resources to accomplish agreed-upon activities.
NICE Cybersecurity Workforce Framework http://www.nist.gov/manuscript-publication-search.cfm?pub_id=909505	National Initiative for Cybersecurity Education (NICE)	November 21, 2011	35	The adoption of cloud computing into the federal government and its implementation depend upon a variety of technical and non-technical factors. A fundamental reference point, based on the NIST definition of cloud computing, is needed to describe an overall framework that can be used government-wide. This document presents the NIST Cloud Computing Reference Architecture (RA) and Taxonomy (Tax) that will accurately communicate the components and offerings of cloud computing.
2011 State of Cyberethics, Cybersafety and Cybersecurity Curriculum in the U.S. Survey http://www.staysafeonline.org/sites/default/files/resource_documents/2011%20National%20K-12%20Study%20Final_0.pdf	National Cyber Security Alliance and Microsoft	May 13, 2011	16	This year's survey further explores the perceptions and practices of U.S. teachers, school administrators and technology coordinators in regards to cyberethics, cybersafety, and cybersecurity education. This year's survey finds that young people still are not receiving adequate training and that teachers are ill-prepared to teach the subjects due, in large part, to lack of professional development.

Title	Source	Date	Pages	Notes
Cyber Operations Personnel Report (DOD) http://www.nsci-va.org/CyberReferenceLib/2011-04-Cyber%20Ops%20Personnel.pdf	Department of Defense	April 2011	84	This report is focused on FY09 Department of Defense Cyber Operations personnel, with duties and responsibilities as defined in Section 934 of the Fiscal Year (FY) 2010 National Defense Authorization Act (NDAA). Appendix A—Cyber Operations-related Military Occupations Appendix B—Commercial Certifications Supporting the DoD Information Assurance Workforce Improvement Program Appendix C—Military Services Training and Development Appendix D—Geographic Location of National Centers of Academic Excellence in Information Assurance
Design of the DETER Security Testbed http://www.isi.edu/deter/news/news.php?story=20	University of Southern California (USC) Information Sciences Institute, University of California Berkeley (UCB), McAfee Research	January 13, 2011	N/A	The Department of Homeland Security (DHS) will invest $16 million over the next five years to expand a cybersecurity testbed at the University of Southern California (USC). The Deterlab testbed provides an isolated 400-node mini-Internet, in which researchers can investigate malware and other security threats without danger of infecting the real Internet. It also supports classroom exercises in computer security for nearly 400 students at 10 universities and colleges.
The Power of People: Building an Integrated National Security Professional System for the 21st Century http://www.pnsr.org/data/images/pnsr_the_power_of_people_report.pdf	Project on National Security Reform (PNSR)	November 2010	326	This study was conducted in fulfillment of Section 1054 of the *National Defense Authorization Act for Fiscal Year 2010*, which required the commissioning of a study by "an appropriate independent, nonprofit organization, of a system for career development and management of interagency national security professionals."

Note: Highlights compiled by CRS from the reports.

Table 30. Selected Reports: Research & Development (R&D)

Title	Source	Date	Pages	Notes
Open Trusted Technology Provider Standard (O-TTPS)™, Version 1.0: Mitigating Maliciously Tainted and Counterfeit Products https://www2.opengroup.org/ogsys/catalog/C139	The Open Group	April 18, 2013	44	Specifically intended to prevent maliciously tainted and counterfeit products from entering the supply chain, this first release of the O-TTPS codifies best practices across the entire COTS ICT product lifecycle, including the design, sourcing, build, fulfillment, distribution, sustainment, and disposal phases. The O-TTPS will enable organizations to implement best practice requirements and allow all providers, component suppliers, and integrators to obtain Trusted Technology Provider status. (Registration required).
Governor McDonnell Announces Creation of MACH37, America's Premier Market-Centric Cyber Security Accelerator http://www.commerce.virginia.gov/News/viewRelease.cfm?id=1761	Virginia Secretary of Commerce and Trade	April 11, 2013	N/A	Virginia Governor Bob McDonnell announced the creation of MACH37, America's premier market-centric cyber security accelerator to be located at the Center for Innovative Technology. Initially funded by the Commonwealth of Virginia, the accelerator will leverage private investments to launch new, high growth cyber technology companies in Virginia.
The International Cyber-Security Ecosystem (video lecture) http://smartech.gatech.edu/handle/1853/45450	Anthony M. Rutkowski, Distinguished Senior Research Fellow at the Georgia Institute of Technology, Nunn School Center for International Strategy Technology and Policy (CISTP)	November 6, 2012	N/A	Overview of the various forums/communities and methodologies that comprise the security assurance ecosystem—often also referred to as the Information Assurance.
20 Critical Security Controls for Effective Cyber Defense: Consensus Audit Guidelines - version 4.0 http://www.sans.org/critical-security-controls/	Center for Strategic & International Studies	November 2012	89	The Top 20 security controls were agreed upon by a consortium. Members of the Consortium include NSA, US CERT, DOD JTF-GNO, the Department of Energy Nuclear Laboratories, Department of State, DOD Cyber Crime Center plus commercial forensics experts in the banking and critical infrastructure communities.

Title	Source	Date	Pages	Notes
National Cybersecurity Center of Excellence http://csrc.nist.gov/nccoe/	National Institute of Standards and Technology (NIST)	June 29, 2012	N/A	The National Cybersecurity Center of Excellence (NCCoE) is a new public-private collaboration to bring together experts from industry, government and academia to design, implement, test, and demonstrate integrated cybersecurity solutions and promote their widespread adoption.
Information Security Risk Taking http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=1127185	National Science Foundation (NSF)	January 17, 2012	N/A	The NSF is funding research on giving organizations information-security risk ratings, similar to credit ratings for individuals.
Anomaly Detection at Multiple Scales (ADAMS) http://info.publicintelligence.net/DARPA-ADAMS.pdf	Defense Advanced Research Projects Agency (DARPA)	November 9, 2011	74	The design document was produced by Allure Security and sponsored by the Defense Advanced Research Projects Agency (DARPA). It describes a system for preventing leaks by seeding believable disinformation in military information systems to help identify individuals attempting to access and disseminate classified information.
At the Forefront of Cyber Security Research http://www.livescience.com/15423-forefront-cyber-security-research-nsf-bts.html	NSF	August 11, 2011	N/A	TRUST is a university and industry consortium that examines cyber security issues related to health care, national infrastructures, law and other issues facing the general public.
Designing A Digital Future: Federally Funded Research And Development In Networking And Information Technology http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-nitrd-report-2010.pdf	White House	December 16, 2010	148	The President's Council of Advisors on Science and Technology (PCAST) has made several recommendations in a report about the state of the government's Networking and Information Technology Research and Development (NITRD) Program.
Partnership for Cybersecurity Innovation http://www.whitehouse.gov/blog/2010/12/06/partnership-cybersecurity-innovation	White House Office of Science and Technology Policy	December 6, 2010	10	The Obama Administration released a Memorandum of Understanding signed by the National Institute of Standards and Technology (NIST) of the Department of Commerce, the Science and Technology Directorate of the Department of Homeland Security (DHS/S&T), and the Financial Services Sector Coordinating Council (FSSCC). The goal of the agreement is to speed the commercialization of cybersecurity research innovations that support our nation's critical infrastructures.

Title	Source	Date	Pages	Notes
Science of Cyber-Security http://www.fas.org/irp/agency/dod/jason/cyber.pdf	Mitre Corp (JASON Program Office)	November 2010	86	JASON was requested by DOD to examine the theory and practice of cyber-security, and evaluate whether there are underlying fundamental principles that would make it possible to adopt a more scientific approach, identify what is needed in creating a science of cyber-security, and recommend specific ways in which scientific methods can be applied.
American Security Challenge http://www.americansecuritychallenge.com/	National Security Initiative	October 18, 2010	N/A	The objective of the Challenge is to increase the visibility of innovative technology and help the commercialization process so that such technology can reach either the public or commercial marketplace faster to protect our citizens and critical assets.

Note: Highlights compiled by CRS from the reports.

Related Resources: Other Websites

This section contains other cybersecurity resources, including U.S. government, international, news sources, and other associations and institutions.

Table 31. Related Resources: Congressional/Government

Name	Source	Notes
Integrated Intelligence Center http://www.cisecurity.org/#	Center for Internet Security	A new unit at the Center for Internet Security is focused on merging cyber and physical security to aid governments in dealing with emerging threats.
Computer Security Resource Center http://csrc.nist.gov/	National Institute of Standards and Technology (NIST)	Links to NIST resources, publications, and computer security groups.
Congressional Cybersecurity Caucus http://cybercaucus.langevin.house.gov/	Led by Representatives Jim Langevin and Mike McCaul.	Provides statistics, news on congressional cyberspace actions, and links to other informational websites.
Cybersecurity and Trustworthiness Projects and Reports http://sites.nationalacademies.org/CSTB/CSTB_059144	Computer Science and Telecommunications Board, National Academy of Sciences	A list of independent and informed reports on cybersecurity and public policy.
Cybersecurity http://www.whitehouse.gov/cybersecurity	White House National Security Council	Links to White House policy statements, key documents, videos, and blog posts.
Cybersecurity http://www.ntia.doc.gov/category/cybersecurity	National Telecommunications & Information Administration (U.S. Department of Commerce)	The Department of Commerce's Internet Policy Task Force is conducting a comprehensive review of the nexus between cybersecurity challenges in the commercial sector and innovation in the Internet economy.
Cybersecurity and Information System Trustworthiness http://sites.nationalacademies.org/CSTB/CSTB_045327#Cybersecurity	National Academy of Sciences, Computer Science and Telecommunications Board	A list of independent and informed reports on cybersecurity and public policy.
Office of Cybersecurity and Communications (CS&C) http://www.dhs.gov/xabout/structure/gc_1185202475883.shtm	U.S. Department of Homeland Security	As the sector-specific agency for the communications and IT sectors, CS&C coordinates national level reporting that is consistent with the National Response Framework (NRF).
U.S. Cyber Command http://www.defense.gov/home/features/2010/0410_cybersec/	U.S. Department of Defense	Links to press releases, fact sheets, speeches, announcements, and videos.
U.S. Cyber-Consequences Unit http://www.usccu.us/	U.S. Cyber-Consequences Unit (U.S.-CCU)	U.S.-CCU, a nonprofit 501c(3) research institute, provides assessments of the strategic and economic consequences of possible cyber-attacks and cyber-assisted physical attacks. It also investigates the likelihood of such attacks and examines the cost-effectiveness of possible counter-measures.

Note: Highlights compiled by CRS from the reports.

Table 32. Related Resources: International Organizations

Name	Source	Notes
Australian Internet Security Initiative http://www.acma.gov.au/WEB/STANDARD/pc=PC_310317	Australian Communications and Media Authority	The Australian Internet Security Initiative (AISI) is an antibotnet initiative that collects data on botnets in collaboration with Internet Service Providers (ISPs), and two industry codes of practice.
Cybercrime http://www.coe.int/t/DGHL/cooperation/economiccrime/cybercrime/default_en.asp	Council of Europe	Links to the Convention on Cybercrime treaty, standards, news, and related information.
Cybersecurity Gateway http://groups.itu.int/Default.aspx?alias=groups.itu.int/cybersecurity-gateway	International Telecommunications Union (ITU)	ITU's Global Cybersecurity Agenda (GCA) is the framework for international cooperation with the objective of building synergies and engaging all relevant stakeholders in our collective efforts to build a more secure and safer information society for all.
Cybercrime Legislation - Country Profiles http://www.coe.int/t/dg1/legalcooperation/economiccrime/cybercrime/Documents/CountryProfiles/default_en.asp	Council of Europe	These profiles have been prepared within the framework of the Council of Europe's Project on Cybercrime in view of sharing information on cybercrime legislation and assessing the current state of implementation of the Convention on Cybercrime under national legislation.
ENISA: Securing Europe's Information Society http://www.enisa.europa.eu/	European Network and Information Security Agency (ENISA)	ENISA inform businesses and citizens in the European Union on cybersecurity threats, vulnerabilities, and attacks. (Requires free registration to access.)
German Anti-Botnet Initiative http://www.oecd.org/dataoecd/42/50/45509383.pdf	Organisation for Economic Co-operation and Development (OECD) (English-language summary)	This is a private industry initiative which aims to ensure that customers whose personal computers have become part of a botnet without them being aware of it are informed by their Internet Service Providers about this situation and at the same time are given competent support in removing the malware.
International Cyber Security Protection Alliance (ICSPA) https://www.icspa.org/about-us/	International Cyber Security Protection Alliance (ICSPA)	A global not-for-profit organization that aims to channel funding, expertise, and help directly to law enforcement cyber-crime units around the world.
NATO Cooperative Cyber Defence Centre of Excellence (CCD COE) http://www.ccdcoe.org/	North Atlantic Treaty Organization (NATO)	The Center is an international effort that currently includes Estonia, Latvia, Lithuania, Germany, Hungary, Italy, the Slovak Republic, and Spain as sponsoring nations, to enhance NATO's cyber-defence capability.

Note: Highlights compiled by CRS from the reports.

Table 33. Related Resources: News

Name	Source
Computer Security (Cybersecurity) http://topics.nytimes.com/top/reference/timestopics/subjects/c/computer_security/index.html	*New York Times*
Cybersecurity http://www.nextgov.com/cybersecurity/?oref=ng-nav	NextGov.com
Cyberwarfare and Cybersecurity http://benton.org/taxonomy/term/1193	Benton Foundation
Homeland Security http://homeland.cq.com/hs/news.do	Congressional Quarterly (CQ)
Cybersecurity http://www.homelandsecuritynewswire.com/topics/cybersecurity	Homeland Security News Wire

Table 34. Related Resources: Other Associations and Institutions

Name	Notes
Cyber Aces Foundation http://www.cyberaces.org/	Offers challenging and realistic cybersecurity competitions, training camps, and educational initiatives through which high school, college students, and young professionals develop the practical skills needed to excel as cybersecurity practitioners
Cybersecurity from the Center for Strategic & International Studies (CSIS) http://csis.org/category/topics/technology/cybersecurity	Links to experts, programs, publications, and multimedia. CSIS is a bipartisan, nonprofit organization whose affiliated scholars conduct research and analysis and develop policy initiatives that look to the future and anticipate change.
Cyberconflict and Cybersecurity Initiative from the Council on Foreign Relations http://www.cfr.org/projects/world/cyberconflict-and-cybersecurity-initiative/pr1497	Focuses on the relationship between cyberwar and the existing laws of war and conflict; how the United States should engage other states and international actors in pursuit of its interests in cyberspace; how the promotion of the free flow of information interacts with the pursuit of cybersecurity; and the private sector's role in defense, deterrence, and resilience.
Federal Cyber Service from the Scholarship For Service (SFS) https://www.sfs.opm.gov/	Scholarship For Service (SFS) is designed to increase and strengthen the cadre of federal information assurance professionals that protect the government's critical information infrastructure. This program provides scholarships that fully fund the typical costs that students pay for books, tuition, and room and board while attending an approved institution of higher learning.
Institute for Information Infrastructure Protection (I3P) http://www.thei3p.org/	I3P is a consortium of leading universities, national laboratories and nonprofit institutions dedicated to strengthening the cyber infrastructure of the United States.
Internet Security Alliance (ISA) http://www.isalliance.org/	ISAalliance is a nonprofit collaboration between the Electronic Industries Alliance (EIA), a federation of trade associations, and Carnegie Mellon University's CyLab.
National Association of State Chief Information Officers (NASCIO) http://www.nascio.org/advocacy/cybersecurity	NASCIO's cybersecurity awareness website. The Resource Guide provides examples of state awareness programs and initiatives.
National Board of Information Security Examiners (NBISE) http://www.nbise.org/certifications.php	The National Board of Information Security Examiners (NBISE) mission is to increase the security of information networks, computing systems, and industrial and military technology by improving the potential and performance of the cyber security workforce.
National Initiative for Cybersecurity Education (NICE) http://csrc.nist.gov/nice/	NICE Attempts to forge a common set of definitions for the cybersecurity workforce.
National Security Cyberspace Institute (NSCI) http://www.nsci-va.org/whitepapers.htm	NSCI provides education, research and analysis services to government, industry, and academic clients aiming to increase cyberspace awareness, interest, knowledge, and/or capabilities.
U.S. Cyber Challenge (USCC) http://www.uscyberchallenge.org/	USCC's goal is to find 10,000 of America's best and brightest to fill the ranks of cybersecurity professionals where their skills can be of the greatest value to the nation.

Source: Highlights compiled by CRS from the reports of related associations and institutions.

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