State of North Carolina

Statewide Information Security Manual

Prepared by the Enterprise Security and Risk Management Office

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Introduction

The Statewide Information Security Manual is the foundation for information technology security in North Carolina. It sets out the statewide information security standards required by N.C.G.S. §147-33.110, which directs the State Chief Information Officer (State CIO) to establish a statewide set of standards for information technology security to maximize the functionality, security, and interoperability of the State's distributed information technology assets. These standards apply to all executive branch agencies, their agents or designees subject to Article 3D of N.C.G.S. §147. Use by local governments, local education agencies (LEAs), community colleges, constituent institutions of the University of North Carolina (UNC) and other executive branch agencies is encouraged to the extent allowed by law.

The Manual is based on industry best practices and follows the International Organization for Standardization Standard 27002 (ISO 27002) for information technology security framework. The manual also incorporates references to the National Institute of Standards and Technology (NIST) and other relevant standards. The statewide information security standards have been extensively reviewed by representatives of each agency within the executive branch of state government and are continuously reviewed as technology and security needs change.

The Manual sets forth the basic information technology security requirements for state government. Standing alone, it provides each executive branch agency with a basic information security manual. Some agencies may need to supplement the manual with more detailed policies and standards that relate to their specific operations and any applicable statutory requirements, such as the Health Insurance Portability and Accountability Act (HIPAA), the Internal Revenue Code, and the Payment Card Industry Data Security Standard (PCI DSS). The Enterprise Security and Risk Management Office (ESRMO) staff is available to answer any questions related to the Statewide Information Security Manual and to assist agencies in meeting their unique needs.

Implementation and Management

While this Manual is the foundation for information technology security in state government and is required for all executive branch agencies to follow in order to comply with statewide information security standards, simply complying with these standards will not provide a comprehensive security program. Agency management should emphasize the importance of information security throughout their organizations with applicable agency specific security policies, ongoing training and sufficient personnel, resources and support. When considering the specific controls that are to be used to comply with the statewide information security standards, agencies should refer to statewide and industry security practices related to information technology implementation.

Agencies should also consider periodic internal and external reviews of their information security program. The reviews may be staggered but should collectively include technical security controls, such as devices and networks, and non-technical security controls, which include policies, processes, and self-reviews. Independent information security reviews should be considered when there are significant changes to the agency's information security posture because of a technology overhaul, significant change in business case or information protection needs.

ISO 27002 REFERENCES

6.1.1 Management commitment to information security
6.1.2 Information security coordination
6.1.3 Allocation of information security responsibilities
6.1.8 Independent review of information security

Chapter 1 – Classifying Data and Legal Requirements

Section 01 Classifying and Storing Information

010101 Classifying Information

Purpose: To properly classify the State's information.

POLICY

Information includes all data, regardless of physical form or characteristics, made or received in connection with the transaction of public business by any agency of State government. The State's information shall be handled in a manner that protects the information from unauthorized or accidental disclosure, modification or loss.

1. All agency information and data shall be classified as to its confidentiality, its value and its criticality.
2. Agencies shall establish procedures for evaluating information and data to ensure that they are classified appropriately. Agency custodians of data and their designees are responsible for agency data and shall establish procedures for appropriate data handling.
3. All agency data shall be labeled to reflect its confidentiality, its value, and its criticality. All data must be clearly labeled so that all users are aware of the custodian, classification and value of the data.
4. Confidentiality is to be determined in accordance with N.C.G.S. Chapter 132 - Public Records Law - and all other applicable legal and regulatory requirements. Data, files, and software shall be clearly marked in such a way that identifies the process by which such information is to be made available or accessible.
5. All agencies shall maintain a comprehensive and up-to-date inventory of their information assets and periodically review the inventory to ensure that it is complete and accurate.
6. All agencies are required to protect and secure the information assets under their control. The basic information requirements include but are not limited to, the following:
    - Determine the vulnerability, risk level, and organizational value of information assets to the agency and the business processes they support.
    - Provide the level of protection for information assets the agency deems appropriate in accordance with applicable laws and standards based upon their vulnerability, risk level, and organizational value.
    - Comply with applicable federal and state laws, such as the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and all applicable standards, such as the Payment Card Industry Data Security Standard (PCI DSS), and the Department of Homeland Security (DHS) Protective Critical Infrastructure Information (PCII).

ISO 27002 REFERENCES

7.1.1 Inventory of assets
7.1.2 Ownership of assets
7.2 Information classification
7.2.1 Classification guidelines
7.2.2 Information labeling and handling

010102 Storing and Handling Information

Purpose: To protect the State's information through the establishment of proper controls.

POLICY

The State's information, data and documents shall be handled in a manner that will protect the information, data and documents from unauthorized or accidental disclosure, modification or loss. All information, data and documents must be processed and stored in accordance with the classification levels assigned to those data in order to protect their integrity, availability, and confidentiality. The degree of protection required shall be commensurate with the nature of the information, the operating environment, and the potential exposures resulting from loss, misuse or unauthorized access to or modification of the data.

1. If information includes both confidential data and non-confidential data, the classification level shall default to confidential.
2. Electronic media brought into or removed from State-maintained premises shall be appropriately controlled.
3. Storage areas and facilities for media containing confidential data shall be secured. Filing cabinets used for the storage of confidential information shall have locking devices.
4. When confidential information is shipped, the agency shall determine the steps necessary to ensure the delivery is verified. If technically possible, confidential data shall be encrypted according to the minimum requirements for encrypting data in policy 030501 - Using Encryption Techniques.
5. An agency that obtains confidential information from another agency shall observe and maintain all confidentiality conditions imposed by the providing agency. Special protection and handling shall be provided for information that is covered by statutes that address, for example, the confidentiality of financial records, taxpayer information, and personally identifiable information (PII).
6. The State CIO shall manage and protect confidential information technology security records that agencies provide to the SCIO's office and the Office of Information Technology Services (OITS). Records including confidential information submitted to the State CIO or OITS shall be labeled. Such records that include information technology security features shall be labeled by affixing the following statement on each page of the document: "Confidential per N.C.G.S. §132-6.1(c)."
7. Confidential information shall be provided only to agencies and their designated representatives when necessary to perform their job functions.
8. Confidential information shall not be transmitted electronically over public[1] networks, such as FTP or electronic mail, unless encrypted while in transit. See policy 030501 - Using Encryption Techniques for the minimum requirement for encrypting data.
9. All State and agency data, confidential and non-confidential, shall be encrypted when stored on a laptop. Confidential data shall be encrypted when stored on other mobile computing devices and portable storage devices, including non-State owned devices authorized for use. See policy 030501 - Using Encryption Techniques for the minimum requirement for encrypting data.
10. Federally protected confidential data shall not be stored on non-State owned/managed devices without proper approval.
11. Agencies shall ensure that legal and business risks associated with contractors' access are determined, assessed, and appropriate measures are taken such as through non-disclosure agreements, contracts, and indemnities.

GUIDELINES

1. An appropriate set of policies and procedures should be defined for information labeling and handling in accordance with the classification scheme adopted by the agency. The procedures should cover

[1] For the purpose of this standard, a public network includes the State Network. It does not apply to internal agency networks.

information assets in both physical and electronic formats. For each classification, handling procedures should be defined to cover the following types of information-processing activity:

- Copying
- Storage
- Transmission by post, fax, and electronic mail
- Transmission by spoken word, including mobile phone, voice mail, and answering machines

2. Where appropriate, physical assets should be labeled. Some information assets, such as documents in electronic form, cannot be physically labeled and electronic means of labeling need to be used. In other cases, such as with tapes, a physical label is appropriate for the outside of the tape in addition to electronic labeling of documents contained on the tape.
3. Documents that contain confidential information should be restricted to authorized personnel using controls such as passwords to augment other technical and administrative controls. Any person who prints or photocopies confidential data should label and control the original and copied document in accordance with all applicable policies, statutes and regulations. Proper retention, archive and disposal procedures for such documents should be observed. State employees should consider using document headers and footers to notify readers of files classified as confidential.

ISO 27002 REFERENCES

7.2.2 Information labeling and handling
10.7.3 Information handling procedures
11.6.2 Sensitive system isolation
15.1 Compliance with legal requirements

Section 02 Complying with Legal Obligations

010201 Being Aware of Legal Obligations

Purpose: To ensure that employees are familiar with the laws that govern use of information technology systems and the data contained within those systems and that agencies comply with such laws.

POLICY

State agencies are subject to Federal, State and local laws governing the use of information technology systems and the data contained in those systems.

1. Agencies shall comply with all applicable laws and take measures to protect the information technology systems and the data contained within information systems.
2. Agencies shall ensure that all employees and contractors are aware of legal and regulatory requirements that address the use of information technology systems and the data that reside on those systems.
3. Agencies shall ensure that each public employee and other State Network user is provided with a summary of the legal and regulatory requirements.

Examples of laws that affect computer and telecommunications use in North Carolina are as follows:

- **Federal**
  - 18 U.S.C. §1030. Fraud and related activity in connection with computers.
  - 18 U.S.C. §2701 et seq. Stored Communications Act.
  - 17 U.S.C. §§ 500 and 506. Copyright infringements and remedies.
- **North Carolina**
  - N.C.G.S. §114-15.1. Department heads to report possible misuse of state property to the SBI.

- N.C.G.S. §14-196. Using profane, indecent or threatening language to any person over the telephone; annoying or harassing by repeated telephoning or making false statements over telephone. The statute includes the sending by computer modem of any false language concerning death, injury, illness, disfigurement, indecent conduct or criminal conduct of the person receiving the information or any close family member.
- N.C.G.S. §14-454. Accessing computers.
- N.C.G.S. §14-455. Damaging computers, computer systems, computer networks, and resources.
- N.C.G.S. §14-458. Computer trespass; penalty.
- N.C.G.S. §14-155. Unauthorized connections with telephone or telegraph.

Examples of laws that affect data residing on State information technology systems are as follows:

- **Federal**
  - 26 U.S.C. §§6103, 7213, 7213A, 7431, Internal Revenue Code.
  - Public Law 104-191, 104th Congress, Health Insurance Portability and Accountability Act of 1996.
  - 5 U.S.C. §552a, as amended. Privacy Act of 1974.
- **North Carolina**
  - N.C.G.S. Chapter 132. Public records law.
  - N.C.G.S. §105-259. Secrecy required of officials (tax information).
  - N.C.G.S. §122C-52. Client rights to confidentiality (disability clients).

Laws that relate to confidential records held by North Carolina government are summarized in the following document:

http://www.records.ncdcr.gov/guides/confidential_publicrec_2009.pdf

ISO 27002 REFERENCES
8.1.3 Terms and conditions of employment
15.1.1 Identification of applicable legislation
15.1.4 Data protection and privacy of personal information

010202 Complying with General Copyright Laws

Purpose: To ensure that agencies comply with laws that address copyright protection.

POLICY

1. Agencies shall provide employees, contractors and other third parties with guidelines for obeying software licensing agreements and shall not permit the installation of unauthorized copies of software on technology devices that connect to the State Network. The guidelines shall inform employees, contractors and other third parties of the following:
   - Persons involved in the illegal reproduction of software can be subject to civil damages and criminal penalties.
   - Employees, contractors and other third parties shall obey licensing agreements and shall not install unauthorized copies of software on State agency technology devices.
   - Employees, contractors and other third parties who make, acquire or use unauthorized copies of software shall be disciplined as appropriate. Such discipline may include termination.
2. Agencies shall inform their users of any proprietary rights in databases or similar compilations and the appropriate use of such data.

3. Agencies shall inform users of any sanctions that may arise from inappropriate use of databases or similar compilations.
4. Agencies shall define policies and procedures to comply with legal and regulatory requirements in regards to the protection of intellectual property.
5. Each agency shall establish procedures for software use, distribution and removal within the agency to ensure that agency use of software meets all copyright and licensing requirements. The procedures shall include the development of internal controls to monitor the number of licenses available and the number of copies in use.

ISO 27002 REFERENCES
15.1.1 Identification of applicable legislation
15.1.2 Intellectual property rights (IPR)

010203 Legal Safeguards against Computer Misuse

Purpose: To disclose to users of State information systems the legal policy requirements for using State information technology resources as well as any methods an agency may use to monitor usage.

POLICY

1. Agencies shall provide users of information technology services with the legal policy requirements that apply to use of State information technology systems and, where practical and appropriate, agencies shall provide notice to users of State information technology systems that they are using government computer systems.
2. If an agency monitors computer users, it shall provide notice to computer users that their activities on State information technology systems may be monitored and disclosed to third parties. The notice may take many forms, such as a privacy statement on an Internet Web page or a monitoring notice affixed to a computer monitor.
3. Where practical and appropriate, sign-on warning banners shall be posted on State information technology systems to appear just before or just after login on all systems that are connected to the State Network. This gives notice to users that they are accessing State resources and that their actions while using these resources are being monitored and are subject to disclosure to third parties, including law enforcement personnel.

Examples of warning banners:

- WARNING: This is a government computer system, which may be accessed and used only for authorized business by authorized personnel. Unauthorized access or use of this computer system may subject violators to criminal, civil and/or administrative action.
- All information on this computer system may be intercepted, recorded, read, copied and disclosed by and to authorized personnel for official purposes, including criminal investigations. Such information includes data encrypted to comply with confidentiality and privacy requirements. Access or use of this computer system by any person, whether authorized or unauthorized, constitutes consent to these terms. There is no right of privacy in this system.
- NOTICE: This system is the property of the State of North Carolina and is for authorized use only. Unauthorized access is a violation of federal and State law. All software, data transactions and electronic communications are subject to monitoring.
- This is a government system restricted to authorized use and subject to being monitored at any time. Anyone using this system expressly consents to such monitoring and to any evidence of unauthorized access, use or modification being used for criminal prosecution and civil litigation.

- *Notice to Users:* This is a government computer system and is the property of the State of North Carolina. It is for authorized use only. Users (authorized or unauthorized) have no explicit or implicit expectation of privacy.
- Any or all uses of this system and all files on this system may be intercepted, monitored, recorded, copied, audited, inspected and disclosed to law enforcement personnel, as well as to authorized officials of other agencies. By using this system, the user consents to such interception, monitoring, recording, copying, auditing, inspection and disclosure at the discretion of the agency.
- Unauthorized or improper use of this system may result in administrative disciplinary action and civil and criminal penalties. By continuing to use this system, you indicate your awareness of and consent to these terms and conditions of use. LOG OFF IMMEDIATELY if you do not agree to the conditions stated in this warning.

ISO 27002 REFERENCES

15.1.5 Prevention of misuse of information processing facilities

Chapter 2 – Securing the End User

Section 01 Controlling Access to Information and Systems

020101 Managing Access Control Standards

Purpose: To establish requirements for controlling access to State information assets.

POLICY

Access to State information technology assets shall be controlled and managed to ensure that only authorized devices/persons have appropriate access in accordance with an agency's business needs.

1. All computers that are permanently or intermittently connected to an agency's network shall have an approved credentials-based access control system. Access shall be controlled by the following:
    - User profiles that define roles and access.
    - Documented review of standard users' rights.
    - Documented review of administrator user accounts every 3 months.
    - Revocation upon termination of employment.
2. Regardless of the network connections, all systems handling the State's confidential data shall employ approved authentication credentials-based access control systems and encryption for data in transit. For the State's encryption policy, see 030501 – Using Encryption Techniques.
3. Only authorized users shall be granted access to the State's information systems, and the principle of least privilege shall be used and enforced.
4. Assignment of privileges shall be based on an individual's job classification, job function, and the person's authority to access information. Job duties shall be separated as appropriate to prevent any single person or user from having any access not required by their job function.
5. Default access for systems containing confidential information shall be deny-all.

ISO 27002 REFERENCES
11.1.1 Access control policy
11.2.4 Review of user access rights
11.5.6 Limitation of connection time

020102 Managing User Access

Purpose: To prevent unauthorized access to agency networks.

POLICY

1. Agencies shall establish policies and procedures for managing access rights for use of their networks throughout the life cycle of the user's credentials, such as user IDs, ID cards, tokens, or biometrics.
2. There shall be a documented approval process whereby authorized parties create user accounts and specify required privileges for user access to systems and data.
3. Agencies shall communicate user account policies and procedures including authentication procedures and requirements to all users of an information system.

4. Agencies shall identify a backup system administrator to assist with user account management when the primary system administrator is unavailable.
5. Users shall be responsible for maintaining the security of their user authentication credentials.
6. User credentials shall be individually assigned and unique in order to maintain accountability.
7. User credentials shall not be shared but only used by the individual assigned to the account, who is responsible for every action initiated by the account linked to that credential.
8. Where supported, the system shall display (after successful login) the date and time of last use of the individual's account so that unauthorized use may be detected.
9. Default/generic credentials shall be disabled or changed prior to a system being put into production.
10. User credentials shall be disabled immediately upon the account owner's termination from work for the State or when the account owner no longer needs access to the system or application.
11. Access rights of users in the form of read, write and execute shall be controlled appropriately and the outputs of those rights shall be seen only by authorized individuals.
12. The default access method for files and documents is role-based access control (RBAC), however, other methods to securely access files and documents may be used.
13. Access to confidential information shall be restricted to authorized individuals who require access to the information as part of their job responsibilities.
14. An agency may change, restrict or eliminate user access privileges at any time.
15. Agencies shall modify an individual's access to a State information technology asset upon a change of employment or change in authorization, such as termination, a leave of absence or temporary reassignment.
16. Where possible, an information system shall limit unsuccessful logon attempts to three (3) before the user's account is disabled. The locked out duration shall be at least thirty (30) minutes, unless the end user successfully unlocks the account through a challenge question scenario or an administrator re-enables the user's account.
17. User credentials that are inactive for a maximum of ninety (90) days must be disabled, except as specifically exempted by the security administrator.
18. All accounts that have been disabled for greater than 365 days shall be deleted.
19. Only authorized system or security administrators or an authorized service desk staff shall be allowed to enable or re-enable a user credential except in situations where a user can do so automatically through challenge/response questions or other user self-service mechanisms.
20. All user credential creation, deletion and change activity performed by system administrators and others with privileged access shall be securely logged and reviewed on a regular basis.
21. For those systems and applications that enforce a maximum number of concurrent connections for an individual user credential, the number of concurrent connections must be set to two (2).
22. User credentials established for a non-employee/contractor must have a specified expiration date unless a user credential without a specified expiration date is approved in writing by the agency security liaison. If an expiration date is not provided, a default of thirty (30) days must be used.
23. Access control may need to be modified in response to the confidentiality, integrity or availability of information stored on the system, if existing access controls pose a risk to that information.
24. In order to facilitate intrusion detection, information shall be retained on all logon attempts until the agency determines the information is no longer valuable, or as required by law or the standards of this Security Manual.

ISO 27002 REFERENCES
11.2 User access management
11.2.4 Review of user access rights
11.6.1 Information access restriction
11.1.1 Access control policy

020103 Securing Unattended Work Stations

Purpose: To prevent unauthorized system access.

POLICY

Machines that access a State or agency system shall be safeguarded from unauthorized access — especially when left unattended. Agencies shall inform personnel of the risks involved in leaving confidential work on their computer screens while away from their desks.

1. Each agency shall be responsible for configuring all workstations to require a password-protected screen saver after a maximum of thirty (30) minutes of inactivity.
2. Users shall not disable the password-protected configuration established by their agency.
3. Users shall lock their workstations when leaving them unattended.
4. When not in use for an extended period of time, as defined by the agency, users shall log off from their workstation(s).
5. Personnel shall load only software, including screen savers, which have been approved by their agencies. Agencies shall train their employees on the risks of acquiring malware such as viruses, spyware and Trojan horses by downloading and installing unauthorized software.
6. Personnel shall transmit confidential data to printers residing in common areas only when there is a person authorized to receive the information present to protect the confidentiality of the printed material. Personnel shall clear all printers and fax machines of confidential printouts.

GUIDELINES

Agencies should consider requiring all personnel to shutdown/power off computers when they are not in use for an extended period of time, as defined by the agency.

ISO 27002 REFERENCES
10.7 Media handling
11.2 User management
11.3.2 Unattended user equipment
11.3.3 Clear desk and clear screen policy

020104 Managing Network Access Controls

Purpose: To establish requirements for the access and use of the State Network and agency networks.

POLICY

Access to networks operated by State agencies, including the State Network, shall be controlled to prevent unauthorized access and to prevent malicious attacks on the networks. Access to all agency computing and information systems shall be restricted unless explicitly authorized.

1. When end users on the agency networks access State or agency resources, they shall comply with all state and agency acceptable use policies.
2. Users shall not extend or retransmit network services without appropriate management approval.

3. Users shall not install network hardware or software that provides network services, such as routers, switches, hubs and wireless access points, without appropriate management approval.
4. Non-State of North Carolina computer systems that require connectivity to the State Network shall conform to statewide information security standards.
5. Non-State of North Carolina computer systems that require connectivity to agency networks shall conform to agency information security standards.
6. Users shall not download, install or run security programs or utilities, such as password-cracking programs, packet sniffers, network-mapping tools or port scanners, that:
   a) Reveal weaknesses in the State Network without prior written approval from the State CIO; or
   b) Reveal weaknesses of agency networks without appropriate agency management approval.
7. Users shall not be permitted to alter network hardware in any way.

ISO 27002 REFERENCES
11.4 Network access control

020105 Controlling Access to Operating System Software

Purpose: To limit access to operating system administrative software to those individuals authorized to perform system administration/management functions.

POLICY

Only those individuals designated as system administrators shall have access to operating system administrative commands and programs.

1. Internal network configuration and other system design information shall be limited to only those individuals who require access in the performance of tasks or services essential to the fulfillment of a work assignment, contract or program.
2. State agencies shall maintain a list of administrative contacts for their systems.
3. All authorized users of administrative-access accounts shall receive appropriate training on the use of those accounts.
4. Each individual who uses an administrative-access account shall use the account only for administrative duties. For other work being performed, the individual shall use a regular user account.
5. When special-access accounts are needed for internal or external audit, software development, software installation, or other defined need, they shall be:
   a) Authorized in advance by agency management;
   b) Have a specific expiration date; and
   c) Be removed when the work is completed.
6. Administrative-access accounts must connect in a secure manner at all times and their activity must be logged.

ISO 27002 REFERENCES
11.5 Operating System Access Control

020106 Managing Passwords

Purpose: To prevent unauthorized access and to establish user accountability when using IDs and passwords to access State information systems.

POLICY

The combination of a unique user credential and a valid password shall be the minimum requirement for granting access to an information system when IDs and passwords are used as the method of performing identification and authentication. If passwords are used, agencies shall manage passwords to ensure that all users are properly identified and authenticated before being allowed to access a State resource.

Password Management Standards

1. Where technically feasible, passwords shall be at least eight (8) characters long for access to all systems and applications.
2. Passwords shall be composed of a variety of letters, numbers and symbols[2] with no spaces in between.
3. Passwords shall be random characters from the required categories of letters, numbers and symbols.
4. Passwords shall not contain dictionary words or abbreviations.
5. Passwords shall not contain number or character substitutes to create dictionary words (e.g., *d33psl33p* for *deep sleep*[3]).
6. Passwords for internal State resources shall be different from passwords for external, non-State resources.
7. Agency approved password generators that create random passwords shall be allowed.
8. Application or system features that allow users to maintain password lists and/or automate password inputs shall be prohibited, except for simplified/single sign-on systems approved by the State CIO.
9. Passwords shall not be revealed to anyone, including supervisors, help desk personnel, security administrators, family members or co-workers.
10. Users shall enter passwords manually for each application or system, except for simplified/single sign-on systems that have been approved by the State CIO.
11. Passwords shall not be stored in clear text on hard drives, diskettes, or other electronic media. If stored, passwords shall be stored in encrypted format.
12. Passwords shall not be displayed in clear text during the logon process or other processes.
13. All typical user passwords (e.g., UNIX, Windows, personal computing, RACF, applications, etc.) shall be changed at least every ninety (90) days. This includes Government employee and contractor passwords (e.g., email, Web and calendar) used to access systems and applications. Passwords shall not be reused until six additional passwords have been created.
14. Passwords for citizens and business users do not need to be changed; use of strong passwords and periodic password changes, however, are recommended.
15. Passwords shall not be inserted into email messages or other forms of electronic communication without proper encryption. Attempts to gain access to a user's password through these social engineering means must be reported to the agency security administrator.

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[2] For Resource Access Control Facility (RACF), valid symbols are @, $, #, and _, and the first character of a password must be a letter and the password must contain a number.

[3] Other examples of numbers/symbols for letters are *0* for *o*, *$* or *5* for *S*, *1* for *i*, and *1* for *l*, as in *capta1n k1rk* or *mr5pock*.

16. Where technically possible, access to password-protected systems shall be timed out after an inactivity period of thirty (30) minutes or less, or as required by law, regulation, or industry standard.
17. Passwords shall be changed whenever there is a chance the password or system is compromised.
18. There shall be an agency approved process for validating the identity of an end user who requests a password reset. Initial passwords and subsequent password resets shall utilize a unique password for each user account.

Password Management Standards—System Administration

1. Passwords for administrative accounts, including any user accounts with more privileges than those of a typical user, shall be changed at least every thirty (30) days whenever possible but must not exceed every sixty (60) days.
2. Credentials with administrative privileges, more privileges than a typical user account, or programs with elevated access shall have a different password from all other accounts held by that user.
3. Password files shall be retrievable only by the system administrator or other designated personnel.
4. The password for a shared administrative-access account shall change when any individual who knows the password leaves the agency that owns the account or when job responsibilities change.
5. All systems should have more than one administrator. In situations where a system has only one administrator, agencies shall establish a password escrow procedure so that, in the absence of the administrator, someone can gain access to the administrator account.

Password Management Standards—Service Accounts

1. As used in this policy, a service account is an account created by system administrators for automated use by an application, operating system or network device for their business purpose.
2. Service accounts must be dedicated solely to their business purpose.
3. Service accounts shall be separate from any other accounts.
4. Agency approved controls must be in place to prevent misuse of a service account.
5. All service accounts must have appropriate logging as specified by the agency of account activity. The application/device owner must audit the service account usage at least every 30 days.
6. All service account passwords must meet system administrator password complexity standards.
7. Whenever possible, service account passwords must have change intervals appropriate to the level of risk posed by a potential compromise of the system. At a minimum, change intervals shall not exceed 180 days (6 months).
8. In the special case where an application or other control software is specifically designed for service accounts to use ‘non-expiring’ passwords to complete their business purpose, these accounts must be preapproved by agency management and the agency’s security liaison. Agency approved controls, policies, and procedures must be in place to closely monitor and mitigate the risk of non-expiring passwords.
9. A service account password must be changed immediately after any potential compromise or any individual who knows the password leaves the agency or changes roles within the agency.

ISO 27002 REFERENCES

11.2.3 User password management
11.3.1 Password use
11.5.1 Secure log-on procedures
11.5.2 User identification and authentication
11.5.3 Password management system

020107 Monitoring System Access and Use

Purpose: To establish requirements and guidelines for monitoring user activity.

POLICY

Agencies shall have the right and ability to monitor use of information systems by employee and third-party contractor users. Agencies that monitor the use of their systems shall do the following:

1. Examine the relevant information technology processes and determine all instances in which individually identifiable information is collected when an employee or third-party contractor uses agency information resources.
2. Establish policies that provide adequate notice to all system users of the scope and manner of monitoring for any information system and never exceed the scope of any written monitoring statement in the absence of any clearly stated exception. The policies shall also state that users shall have no expectation of privacy unless expressly granted by an agency.
3. Obtain a written receipt from State employees and third-party contractors acknowledging that they have received, read and understood the agency's monitoring policies. End users on the State and agency networks should have no expectation of privacy.
4. Inform State employees and third-party contractors of any activities that are prohibited when using the agency's information systems.

ISO 27002 REFERENCES
10.10.2 Monitoring system use

020108 Controlling Remote User Access

Purpose: To require users of State information technology systems who access agency information technology systems remotely to do so in a secure manner.

POLICY

Where there is a business need and prior agency management approval, authorized users of agency computer systems, the State Network and data repositories shall be permitted to remotely connect to those systems, networks and data repositories to conduct State-related business through secure, authenticated and carefully managed agency approved access methods.

1. Access to the State Network and agency internal networks via external connections from local or remote locations including homes, hotel rooms, wireless devices and off-site offices shall not be automatically granted with network or system access. Systems shall be available for on- or off-site remote access only after an explicit request is made by the user and approved by the manager for the system in question.

2. Access shall be permitted through an agency-managed secure tunnel such as a Virtual Private Network (VPN) or Internet Protocol Security (IPSec) that provides encryption and secure authentication. Virtual private networks (VPNs) shall require user authentication and encryption strength compliant with the statewide encryption policy, 030501 – Using Encryption Techniques.

Authentication

1. Access shall require authentication and authorization to access needed resources, and access rights shall be regularly reviewed. The authentication and authorization system for remote access shall be managed by the agency. Agencies that need centralized network infrastructure services shall use the state-wide authentication and authorization service known as NCID.

2. Each user who remotely accesses an internal network or system shall be uniquely identifiable. Account passwords shall not traverse the network in clear text and must meet minimum requirements of the statewide password management standards.
3. All users wishing to establish a remote connection via the Internet to the agency's internal network must first authenticate themselves at a firewall or security device.

Users

1. User Credentials: All users who require remote access privileges shall be responsible for the activity performed with their user credentials. User credentials shall never be shared with those not authorized to use the credential. User credentials shall not be utilized by anyone but the individuals to whom they have been issued. Similarly, users shall be forbidden to perform any activity with user credentials belonging to others.
2. Revocation/Modification: Remote access shall be revoked at any time for reasons including non-compliance with security policies, request by the user's supervisor or negative impact on overall network performance attributable to remote connections. Remote access privileges shall be terminated upon an employee's or contractor's termination from service. Remote access privileges shall be reviewed upon an employee's or contractor's change of assignments and in conjunction with other regularly scheduled user account reviews.
3. Anonymous Interaction: With the exception of Web servers or other systems where regular users are anonymous, users are prohibited from remotely logging into any state computer system or network anonymously (for example, using "guest" accounts). If users employ system facilities that allow them to change the active user ID to gain certain privileges, such as the switch user (su) command in Unix/Linux, they must have initially logged in with a user ID that clearly indicates their identity.

Configuration

1. Default to Denial: If an agency computer or network access control system is not functioning properly, it shall default to denial of access privileges to users. If access control systems are malfunctioning, the systems they support must remain unavailable until such time as the problem has been rectified.
2. Privilege Access Controls: All computers permanently or intermittently connected to external networks must operate with privilege access controls approved by the agency. Multi-user systems must employ user credentials unique to each user, as well as user privilege restriction mechanisms, including directory and file access permissions.
3. Antivirus and Firewall Protection: External computers or networks making remote connection to internal agency computers or networks shall utilize an agency-approved active virus scanning and repair program and an agency-approved personal firewall system (hardware or software). The agency shall ensure that updates to virus scanning software and firewall systems are available to users. External computers or networks making a remote connection to a public Web server are exempted.
4. Time-out: Network-connected single-user systems, such as laptops and PCs, shall employ agency-approved hardware or software mechanisms that control system booting and that include a time-out-after-no-activity (for example, a screen saver).
    - To the extent possible, all systems accepting remote connections from public-network-connected users, such as users connected through dial-up phone modems, dial-up Internet service providers, DSL or cable modems, shall include a time-out system.
    - This time-out system must terminate all sessions that have had no activity for a period of thirty (30) minutes or less. For some higher risk information systems, the requirement for a session idle timeout may be more stringent as determined by agency policy, industry standard (*e.g.,* PCI DSS) or other regulations.
    - An absolute time-out shall occur after twenty-four (24) hours of continuous connection and shall require reconnection and authentication to re-enter the State Network. In addition, all user

credentials registered to networks or computers with external access facilities shall be automatically suspended after a period of ninety (90) days of inactivity.

- Agencies shall conduct a risk assessment and determine the appropriate system time-out period for hand-held devices, (*e.g.,* smart phones, tablets, etc.), that connect to the State Network. The risk assessment shall balance the business needs for immediate access to the hand held device against the security risks associated with the loss of the device. Agencies shall also comply with any legal and regulatory requirements associated with the information that may be contained on the device, such as requirements for confidentiality, security and record retention.[4]

5. Failure to authenticate: To the extent possible, all systems accepting remote connections from public-network-connected users shall temporarily terminate the connection or time out the user credential following three (3) unsuccessful attempts to log in. For example, if an incorrect password is provided three (3) consecutive times, remote access systems shall drop the connection.
6. Modems: Dial-up modems shall be disabled by removing the modem device or uninstalling the modem device driver and disabling the modem within the operating system, unless agency management has approved their use and the communications software used with them. If used, dial-up modems shall not be left in auto-answer mode.
7. For client-to-server/gateway VPN solutions with split tunneling options, the agency must evaluate the associated risks and implement mitigating controls before enabling the split tunneling option to permit network bridging. Agencies that decide to use split tunneling must take responsibility for the security of their endpoints, implementing appropriate mechanisms (such as access controls, firewalls, antivirus, etc.) to enforce standards that will reduce risk such as data loss and malware due to bridging the networks to which they are connected when the VPN is active.

Access to Single-Host Systems

1. Remote access to single-equipment hosts (*e.g.,* agency servers, Web-hosting equipment) shall be permitted provided the equipment requires authenticated access, is appropriately protected by a VPN, and prevents onward connection to the State network.
2. Management consoles and other special needs: Users requiring telecommunications access, such as dial-up modem access, for “out of band” management or special needs must obtain agency management approval as set forth in agency policy and procedures. Any dial-up server that grants network access must authenticate each user, minimally, by a unique identification with password and shall encrypt the data stream. All calls must be logged, and logs of access shall be retained for ninety (90) days. At the completion of each dial-up session to a server, the accessing workstation shall be secured via password.

Miscellaneous

1. Administrators shall take all precautions necessary to ensure that administrative activities performed remotely cannot be intercepted or spoofed by others, such as configuring timestamps, using encryption, and/or dial-back mechanisms.
2. Disclosure of systems information: The internal addresses, configurations, dial-up modem numbers, and related system design information for agency computers and networks shall be kept confidential and shall not be disclosed to the public. Likewise, the security measures employed to protect agency computers and networks shall be kept confidential and shall be similarly protected.
3. Systems shall log all remote access occurrences, including both policy user and administrator activity (user credential, date/time, and duration of connection at a minimum).
4. Access to diagnostic and configuration ports (especially dial-up diagnostic ports) shall be securely controlled and enabled only when needed for authorized diagnostic access.

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[4] *See,* **120201** Managing Media Storage and Record Retention

ISO 27002 REFERENCES
11.4.2 User authentication for external connections

020109 Contracting with External Suppliers/Other Service Providers

Purpose: To address information security issues involving third parties who provide services to the State.

POLICY

Each agency shall ensure that third parties who provide information technology services agree to follow the agency's information technology security policies when providing services to the agency.

1. Third parties are non-State employees, such as vendors, suppliers, individuals, interns, contractors and consultants, responsible for providing goods or services to the State. In order to perform the requested services, a third party might need to use agency information technology assets and access agency information determined to be valuable to operations and/or classified as non-public or restricted by law.
2. Access must be granted to third-party users only when required for performing work and with the full knowledge and prior approval of the information asset owner.
3. Third parties shall be fully accountable to the State for any actions taken while completing their agency assignments.
4. Agency staff overseeing the work of third parties shall be responsible for communicating and enforcing applicable laws, as well as State and agency security policies, and procedures.
5. Agency operational and/or restricted information must not be released to third parties without properly executed contracts and confidentiality agreements. These contracts must specify conditions of use and security requirements and the access, roles and responsibilities of the third party before access is granted.

ISO 27002 REFERENCES
6.1.3 Allocation of Information Security responsibilities
6.1.5 Confidentiality agreements

Section 02 Personnel Information Security Responsibilities

020201 Accessing State Resources in an Acceptable Way

Purpose: To establish a policy pertaining to the acceptable use of the State Network and the global Internet by state employees and other State Network users.

POLICY

1. Agencies shall develop Acceptable Use Policies (AUPs) for staff, customers and third parties to follow.
2. AUPs shall define the proper use of information assets and shall include critical technologies such as remote access technologies, removable electronic media, laptops, tablets, smartphones, email usage and Internet usage.
3. While performing work-related functions, while on the job, or while using publicly owned or publicly provided information processing resources, state employees and other State Network users shall be

expected to use the State Network and the Internet responsibly and professionally and shall make no intentional use of these services in an illegal, malicious or obscene manner.

4. Each agency shall determine the extent of personal use its employees and other State Network users, under its control, may make of the State Network and the Internet.
5. Agencies that use the State Network shall prohibit users from the download and installation of unapproved software as defined by each agency's IT policies.
6. It shall be the responsibility of public employees and State Network users to help prevent the introduction or propagation of computer viruses.
   - All files downloaded from a source external to the State Network, including all data received on a diskette, compact disc (CD), USB flash drive, or any other electronic medium, shall be scanned for malicious software such as viruses, Trojan horses, worms or other destructive code. This includes files obtained as email attachments and through any other file transfer mechanism.
   - All files downloaded from a source external to the State Network shall come from a known, trusted source.
7. All agencies shall ensure that they have currently supported and patched software on their networks in order to mitigate vulnerabilities and reduce the risk of malicious activity.
8. State employees and other State Network users shall not access or attempt to gain access to any computer account which they are not authorized to access. They shall not access or attempt to access any portions of the State Network to which they are not authorized to have access.
9. Public employees and other State Network users shall not intercept or attempt to intercept data transmissions of any kind that they are not authorized to access.
10. State employees and other State Network users shall not use state computers and networks for the circumvention of copyright protections or the illegal sharing of copyrighted material. Users who receive email that they consider to be unacceptable according to this policy can forward the original email message (including all headers) to the appropriate email *abuse@<host domain name>* account.

GUIDELINES

1. Agencies may want to address other acceptable use issues in their own internal policies on subjects such as use of instant messaging, social networking, and personal use of state computers, servers, and Local Area Network (LAN).
2. Additionally, agencies should develop internal policies concerning the storage of personal files such as music, images and other files unrelated to the employees' assigned duties.

ISO 27002 REFERENCES

7.1.3 Acceptable use of assets
8.2.3 Disciplinary process
10.4.1 Controls against malicious code
15.1.5 Prevention of misuse of information processing facilities

Section 03 Training and Awareness

020301 Delivering Awareness Programs to Staff

Purpose: To provide awareness programs that ensure employees are familiar with information technology security policies, standards and procedures.

POLICY

The senior management of each agency shall lead by example by ensuring that information security is given a high priority. Agency senior management shall ensure that information security communications are given priority by staff and shall support information security awareness programs. All agencies shall provide new employees and contractors with mandatory information security training as part of job orientation. The agency shall provide regular and relevant information security awareness communications to all staff by various means, which may include:

- Electronic updates, briefings, pamphlets and newsletters.
- Self-based information security awareness training to enhance awareness and educate staff on information technology security threats and the appropriate safeguards.
- An employee handbook or summary of information security policies, which shall be formally delivered to and acknowledged by employees before they access agency resources.

Agencies shall provide information relevant to effective information security practices to staff members in a timely manner. On a periodic basis, agency management shall receive input from information security staff on the effectiveness of information security measures and recommended improvements.

All levels of management must ensure employees, contractors, and vendors adhere to approved information security procedures by ensuring staff are informed about their security responsibilities and attain continued education relevant to information security and their position in the organization.

ISO 27002 REFERENCES
5.1.2 Review of the information security policy
8.2.1 Management duties
8.2.2 Information security awareness, education and training

020302 Third Party Contractor: Awareness Programs

Purpose: To ensure contractors are familiar with information security policies, standards and procedures.

POLICY

All contractors shall have provisions in their contracts with State agencies that set forth the requirement that they must comply with all agency information security policies. The agency shall provide contractors with regular and relevant information security policies. The agency shall provide regular and relevant information security awareness communications to contractors by various means, which include the following:

- A handbook or summary of information security policies, which shall be formally delivered to and signed by contractors before beginning work.
- Mandatory information security awareness training before beginning work.
- Formal information technology security training appropriate for work responsibilities, on a regular basis and whenever their work responsibilities change.
- Training in information security threats and safeguards, with the extent of technical details to reflect the contractor's individual responsibility for configuring and maintaining information security.

ISO 27002 REFERENCES
6.2.3 Addressing security in third party agreements
8.2.2 Information security awareness, education and training

020303 User: Information Security Training

Purpose: To ensure that all users receive adequate training.

POLICY

All agencies shall provide training to users on relevant information security threats and safeguards. The extent of technical training shall reflect the person's individual responsibility for configuration and/or maintaining information security systems. When staff members change jobs, their information security needs must be reassessed, and any new training on procedures or proper use of information-processing facilities shall be provided as a priority. Agency training shall include the following:

- Mandatory information security awareness training to new staff as part of job orientation.
- Formal information security training appropriate for work responsibilities, on an annual basis.
- Training in information security threats and safeguards, with the technical details to reflect the staff's individual responsibility for configuring and maintaining information security.

Agencies shall provide training to technical staff in critical areas of information security, including vendor-specific recommended safeguards to improve the following:

- Server and PC security management.
- Packet-filtering techniques implemented on routers, firewalls, etc.
- Intrusion detection and prevention.
- Software configuration, change and patch management.
- Virus prevention/protection procedures.
- Business continuity practices and procedures.

All users of new systems shall receive training to ensure that their use of the systems is effective and does not compromise information security. Agencies shall train users on how new systems will integrate into their current responsibilities. Agencies shall notify staff of all existing and any new policies that apply to new systems.

When staff members who are responsible for information technology systems change jobs, their information security needs must be reassessed, and any new training on procedures or proper use of information-processing facilities shall be provided as a priority.

ISO 27002 REFERENCES
8.2.2 Information security awareness, education and training

Chapter 3 – Securing the Network

Section 01 Networks

030101 Configuring Networks and Configuring Domain Name Servers (DNS)

Purpose: To establish a framework for the configuration of networks and domain name servers.

POLICY

Agency network infrastructures shall be designed and configured using controls to safeguard the State's information systems. Failure to protect network infrastructures against threats can result in the loss of data integrity, data unavailability and/or unauthorized data use. Secure configuration of the network infrastructure shall include the following:

1. All hardware connected to the State Network or agency network shall be configured to support State/agency management and monitoring standards.
2. The cabled network infrastructure must comply with industry standards and be installed by a licensed, bonded contractor.
3. Perimeter defense systems, including routers and firewalls, and network-connected equipment, including switches, wireless access points, personal computers and servers, shall be configured to secure specifications.
4. Critical hardware and systems, including the network infrastructure, shall be connected to an uninterruptible power supply (UPS) that is regularly tested and maintained.
5. Network devices shall be configured to support authentication, authorization and accountability mechanisms when being administered.
6. Configuration management, patch management and change management standards and procedures shall be applied to all network attached systems.
7. Extending, modifying or retransmitting network services, such as through the installation of new switches or wireless access points, in any way is prohibited, unless prior agency approval is granted.
8. Network servers/services such as email, Web, and FTP shall be segregated from an agency's file and print services and end user machines.
9. A controlled pathway shall be used in agency networks to assist in secure communications and prevent unmanaged network connections. Controlled paths shall be specified for remote users and local users when accessing State resources.
10. To maintain the correct time and accuracy of data and audit logs on information systems residing within the State Network, system clocks must be synchronized regularly across various agency platforms. System time clocks must be updated on a daily basis from an accepted time source that agrees with the Coordinated Universal Time, and the synchronized correct time must then be disseminated to all systems on an agency's network. Time synchronization data and configurations shall be protected from unauthorized modification.
11. DNS servers shall not be configured to allow zone transfers to unknown secondary servers.
    a) If an agency maintains a primary DNS server, zone transfers will be allowed only to trusted (known) servers.
    b) If an agency maintains a secondary DNS server, zone transfers will be allowed to the primary DNS server only.

c) When a domain has a US extension (*i.e.,* state.nc.us), the US Domain Registry requires the domain allow copies to be transferred to the US Domain Registry's Master Server. Therefore, all domains registered with US Domain Registry will allow transfers of copies of their zones to the Master Server for the US Domain Registry. When OITS maintains the DNS, agencies may request OITS to allow additional IP addresses to receive zone transfers. Agencies must work with OITS to define acceptable IP addresses and/or IP address ranges.

ISO 27002 REFERENCES

10.6 Network security management
10.10.6 Clock synchronization
11.4 Network access control
11.4.2 User authentication for external connections

030102 Managing the Networks

Purpose: To establish a framework for the management and protection of the State's network resources.

POLICY

Agencies shall manage the security of their respective networks based on business needs and the associated risks. Agencies' network infrastructure shall be managed using controls to safeguard the State's information systems. Failure to protect against threats can result in loss of data integrity, data unavailability and/or unauthorized use of data. Access to information available through the State network shall be strictly controlled in accordance with approved access control policies and procedures. Secure management of the network infrastructure shall include but not be limited to the following:

1. Users shall have direct access only to those services that they have been authorized to use.
2. Use of secure protocols such as Secure Shell (SSH), Secure Sockets Layer (SSL), and Internet Protocol Security (IPSec).
3. For public networks, management software tools that communicate with devices shall use Simple Network Management Protocol (SNMP) version 3 for network management. For private networks, management software tools that communicate with devices may use SNMP version 2 or version 3 for network management.
4. Use of authentication, authorization and accounting mechanisms when administering network devices.
5. Monitoring for attempts to deny service or degrade the performance of information systems (including computers, microcomputers, networks, telephone systems and video systems).
6. Definition of tasks/roles/responsibilities involved in management and security of agency IT resources in job descriptions.

ISO 27002 REFERENCES

8.1 Prior to employment
10.6.1 Network controls
11.4.1 Policy on use of network services
11.4.2 User authentication for external connections
11.4.6 Network connection control

030103 Defending Network Information from Malicious Attack

Purpose: To protect information residing on State and agency networks.

POLICY

Agencies shall implement layers of information security (defense in depth) to defend against attacks on the State's information resources. All safeguards and network security plans shall incorporate the following:

1. Configuration of system hardware, operating systems and applications software and network and communication systems to standards and secure specifications required by the statewide information security standards and other agency specific standards. When such standards do not exist, agencies are expected to conform to security standards from institutes such as the SANS Institute or the National Institute of Standards and Technology (NIST).
2. Implementation of measures to prevent snooping, sniffing, network reconnaissance and other means of gathering information about the network infrastructure.
3. Implementation of measures to filter unwanted traffic (spam, bots, etc.) attempting to enter the internal network.
4. Installation of antivirus software that protects the State's infrastructure from downloads, media transfers, electronic-mail attachments of malicious software, or other malware.
5. Monitoring and reviewing system usage for activities that may lead to business risks by personnel who are able to quantify and qualify potential threats and business risks. Appropriate controls and separation of duties shall be employed to provide review and monitoring of system usage of personnel normally assigned to this task. Some events that should be monitored include over utilization of bandwidth, un-authorized login attempts, and un-authorized attempts to make changes to system settings.
6. Periodic review of system logs for signs of misuse, abuse or attack.

GUIDELINES

Agencies should consider technologies that eliminate single points of failure on critical systems, such as server clustering, redundant links, load balancing and redundant array of independent disks (RAID).

ISO 27002 REFERENCES
10.4.1.1 Controls against malicious code
10.10.2 Monitoring system use

030104 Network Segregation

Purpose: To help protect internal networks through network segregation.

POLICY

1. Agencies' internal network infrastructures (*i.e.,* agency local area networks [LANs]) shall be segregated into network zones to protect application servers from the user LAN. In addition, production and non-production environments (*e.g.,* test, development, QC, etc.) shall be segregated from one another.
2. Wireless networks shall be physically or logically segregated from internal networks such that an unknown external user cannot access an agency's internal network.
3. Agencies shall follow the matrix below, the Access Control Framework for Network Security Matrix, to prevent unauthorized access to information systems through appropriate placement and configuration of state resources that provide protective measures commensurate with the security level required to protect the data contained in those systems.
4. Agencies shall assess the risk associated with each business system to determine what security requirements apply to it. The security assessment determines the appropriate placement of each system and application within the security framework and evaluates the network resources, systems, data and applications based upon their criticality. As the critical nature of the data and applications increases, the security measures required to protect the data and applications also increase.

Security Requirements

1. Security for the network infrastructure and for distributed systems operated by state agencies shall comply with the security requirements of the matrix below, which is expressly made part of this policy.
2. The Access Control Framework for Network Security Matrix below describes the network security requirements for devices attached to the State's network. The columns represent network zones that are segregated by agency approved firewalls or other network segmentation mechanism.
3. For the Application and Database secure zones, an agency approved firewall or other network segmentation mechanism, such as VLANs, is required to segregate application servers and database servers.
4. Where end user access is allowed to a resource at the agency's discretion, it is designated with "Opt." for optional. Client-server applications that operate on an agency LAN and are not public facing (*i.e.,* Internet accessible) may fall under the agency Internal LAN column of the matrix below.
5. For the purpose of the framework, software components installed on end points (*i.e.,* thick clients) do not constitute a valid network zone.
6. Facility management systems, such as heating, ventilation or air conditioning (HVAC), badge access, electrical generators, power distribution, water, and closed-circuit television (CCTV) may be excluded from the Access Control Framework network zoning requirements, provided those systems are not publicly accessible, are logically isolated (*i.e.,* VLANs) from other networked systems and cannot access other shared systems/services, and have appropriate access control mechanisms in place, such as Access Control Lists (ACLs), authentication mechanisms, or a VPN. These systems shall comply with other statewide information security standards mentioned in this manual.

Special Assembly Security Requirements

1. Agencies not able to adhere to the DMZ and/or other security requirements in the Access Control Framework shall develop a Special Assembly zone and document the rationale for developing the Special Assembly zone. Security controls in the Special Assembly area are not as structured as controls in the DMZ/Secure zones. Agencies acknowledge that additional security risks are associated with the Special Assembly zone.
2. Agency CIOs shall develop a process for creating Application Unique Domain (AUD) special assembly zones and maintain a list of their AUDs.

Virtual Environment Requirements

1. Virtual machines are hosted on physical machines. Virtual machines (guests) shall use equivalent security controls as is required in a physical computing environment to assure data availability, integrity and confidentiality. The approach to virtual machine security control and segregation shall balance the business needs, practical approach, and the associated risk.
2. Virtual computing environments shall use secure communication between the virtual machines and shall use equivalent network zoning as the physical environment does (See the Access Control Framework for Network Security Matrix below).
3. Agencies should consider separating high risk virtual machine farms from lower risk virtual machine farms on to separate physical servers.
4. Whereas a virtual machine may store or process confidential data, the virtual machine image file shall use appropriate controls to protect the data at rest.
5. The virtual environment requirements apply to cloud computing in which dynamically scalable and often virtualized resources are provided as a service to customers over the Internet. Vendors of cloud computing services or other types of hosted solutions shall agree to comply with all statewide information security standards through SLAs and contracts when the State utilizes such services.

Access Control Framework for Network Security Matrix

	DMZ			Secure Zone				Special Assemblies			
Destination ->	**Web / User Facing**			**Application Services**		**DB Services**		**Mgmt. Domain**	**Application Unique Domain*******	**Agency Internal LAN**	**Infrastructure State WAN**
	Public	**State**	**Vendor**	**Std.**	**High**	**Std.**	**High**				
Operational Controls											
User/Device											
Access	Yes	Yes	Yes	Opt.	No	No	No	No	Yes	Yes	Yes
Authentication*	Opt.	Opt.	Opt.	Req.	N/A	N/A	N/A	N/A	TBD	Opt.	Req.
Authorization	Opt.	Opt.	Opt.	Req.	N/A	N/A	N/A	N/A	TBD	Opt.	Req.
Encryption**	Opt.	Opt.	Opt.	Opt.	N/A	N/A	N/A	N/A	TBD	Opt.	Opt.
Administrator											
Access	Yes	Yes	Opt.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Authentication*	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	TBD	Req.	Req.
Authorization	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	TBD	Req.	Req.
Encryption**	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	TBD	Opt.	Req.

Access Control Framework for Network Security Matrix

	DMZ			Secure Zone				Special Assemblies			
Destination ->	**Web / User Facing**			**Application Services**		**DB Services**		**Mgmt. Domain**	**Application Unique Domain*****	**Agency Internal LAN**	**Infrastructure State WAN**
Application to Application/Server to Server	**Public**	**State**	**Vendor**	**Std.**	**High**	**Std.**	**High**				
Access	Opt.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Authentication*	Opt.	Req.	Req.	Opt.	Req.	Opt.	Req.	Opt.	TBD	Opt.	Opt.
Authorization	Opt.	Req.	Req.	Opt.	Req.	Opt.	Req.	Opt.	TBD	Opt.	Opt.
Management Controls											
Asset Management	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Ad-Hoc	Req.
Configuration Management***	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.
Physical Access Controls	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.
Documented User Access / Certificate Policy & Process	Opt.	Opt.	Opt.	Opt.	Req.	Opt.	Req.	Opt.	TBD	Opt.	Opt.
Audit Controls											
Configuration Audit & Integrity Check	Ad-Hoc	Ad-Hoc	Ad-Hoc	Annual	Semi-Annually	Annual	Semi-Annually	Ad-Hoc	Ad-Hoc	Ad-Hoc	Ad-Hoc
Physical Access Audit	Ad-Hoc	Ad-Hoc	Ad-Hoc	Annual	Semi-Annually	Annual	Semi-Annually	Ad-Hoc	Ad-Hoc	Ad-Hoc	Ad-Hoc

Access Control Framework for Network Security Matrix

	DMZ			Secure Zone				Special Assemblies			
	Web / User Facing			**Application Services**		**DB Services**		**Mgmt. Domain**	**Application Unique Domain*******	**Agency Internal LAN**	**Infrastructure State WAN**
	Public	**State**	**Vendor**	**Std.**	**High**	**Std.**	**High**				
User Access	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.
Vulnerability Assessment	Ad-Hoc	Ad-Hoc	Ad-Hoc	Annual	Semi-Annually	Annual	Semi-Annually	Ad-Hoc	Ad-Hoc	Ad-Hoc	Ad-Hoc
Operational Controls											
Firewall/Access Control******	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Req.
IDS/IPS – Network********	Req.	Req.	Req.	Req.	Req.	Req.	Req.	Opt.	TBD	Opt.	Req.
IDS/IPS - Host	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.	Opt.	TBD	Opt.	Opt.

* Authentication shall be performed via an encrypted channel when used for system administration or confidential data access.

** Encryption applies to data in transit.

*** Must follow Statewide Vulnerability Management Policy.

**** Refer to 030105 – Routing Controls and Firewall Configuration Policy.

***** Application Unique Domain provides the ability for non-conforming applications to have a custom designed network security architecture that provides additional security measures as needed to mitigate identified risks.

****** Enterprise IDS/IPS deployment may already provide an appropriate IDS/IPS solution. The Enterprise IDS/IPS is the minimum to meet the requirements of the IDS/IPS in the Access Control Framework. Minimum security level for IDS/IPS deployment in the enterprise infrastructure is determined by the SCIO.

ISO 27002 REFERENCES

11.4.5 Segregation in networks
11.11.1 Access control policy

030105 Routing Controls and Firewall Configuration

Purpose: To protect access to the State's routed networks.

POLICY

Agencies shall deploy mechanisms to control access to the State's network backbone and/or routed infrastructure. Protective controls shall at a minimum include the following:

1. Positive source and destination address checking to restrict rogue networks from manipulating the State's routing tables.
2. Authentication to ensure that routing tables do not become corrupted with false entries.
3. Network address translation (NAT) to screen internal network addresses from external view.
4. Firewalls shall control inbound and outbound network traffic by limiting that traffic to only that which is necessary to accomplish the mission of the agencies.

Firewall Configuration and Installation

1. The default firewall policy is for all ports to be closed. Only those ports for which an agency has written, documented business reasons for opening shall be open.
2. Each agency shall establish a process for evaluating policy changes that, at a minimum, incorporates requirements for compliance to the security matrix for communications across trust levels and emphasizes alternative methodologies to comply with industry best practices.
3. All agencies shall designate a minimum of two (2) authorized firewall administrators. At least one of the designated firewall administrators will be a security specialist who is consulted before firewall policy changes are approved and implemented.[5]
4. The process methodology shall incorporate an approach to block all ports then permit specific ports which have a business requirement access while incorporating additional hardening as necessary to have a comprehensive security policy.
5. For temporary or emergency port openings, the agency process shall establish a maximum time for the port to be open, which shall not exceed 15 days. The agency authorized firewall policy administrators, or the entity managing the firewall, shall subsequently close the port or develop additional hardening.
6. System administrators shall configure the firewall so that it cannot be identifiable as such to other network(s), or, at most, appears to be just another router.
7. Firewalls shall be installed in locations that are physically secure from tampering. The agency security liaison shall approve the physical location of the firewalls. Firewalls shall not be relocated without the prior approval of the agency security liaison.
8. Firewall rules sets shall always block the following types of network traffic:
    - Inbound network traffic from a non-authenticated source system with a destination address of the firewall system itself.
    - Inbound network traffic with a source address indicating that the packet originated on a network behind the firewall.
    - Traffic inbound to the State Network containing ICMP (Internet Control Message Protocol) traffic will be blocked at the perimeter with the following exceptions: To allow testing initiated from internal IT support groups, ICMP echo replies and ICMP TTL expired will be permitted inbound to the State

[5] A security specialist for firewall configuration is an individual who understands firewall technology and security requirements. If OITS manages the firewall, OITS will provide the security specialist.

Network but will be limited to specific IP addresses or small subnets representing the internal support group. A ping point can be established at the perimeter, for troubleshooting purposes, with the sole purpose and sole capability of responding to a ping.

- Inbound network traffic containing IP Source Routing information.
- Inbound or outbound network traffic containing a source or destination address of 0.0.0.0
- Inbound or outbound network traffic containing directed broadcast addresses.

9. Minimum Firewall Requirements:
   - Local user accounts shall be configured on network firewalls, for the sole purpose of eliminating possible extended outages.
   - Local accounts shall be configured to only become active when the device cannot make contact with the central unit. During normal operation, the local account exists but is unusable.
   - Firewalls must use an authentication mechanism that provides accountability for the individual.
   - Passwords on firewalls shall be kept in a secure encrypted form.

10 Monitoring and Filtering
   - Logging features on state network firewalls shall capture all packets dropped or denied by the firewall, and agency staff or the entity managing the firewall shall review those logs at least monthly.
   - Each agency's firewall policy shall be reviewed and verified by agency staff at least quarterly. If an outside entity, such as OITS, manages the firewall, then that entity shall be responsible for reviewing and verifying the agency's firewall policy at least quarterly.

ISO 27002 REFERENCES
11.4.7 Network routing control

030106 Responsibilities and Agreements

Purpose: To protect the integrity and ensure the stability of the statewide network from fraudulent use and/or abuse resulting from access and use of the network and to define the security attributes delivered with network services.

POLICY

1. OITS is responsible for the security of the infrastructure of the state's network.
2. Any and all actions that jeopardize the integrity and stability of the state network will be addressed commensurate to the level of risk.
3. OITS is authorized to immediately suspend network service to any organization when the level of risk warrants immediate action. When network service is suspended, OITS will provide immediate notice to the organization. When possible, OITS will notify any organization of any such action in advance of such an action. OITS will work with the organization to rectify the problem that caused the suspension.
4. Organizations with connections to the state network are responsible for managing risk and providing appropriate security for their networks. Security measures must conform to statewide information security standards and statewide architecture.
5. Agency internal security measures shall be deployed only on agency internal networks and must not adversely affect the state network.
6. Any violations of this network security standard are subject to review by the State Chief Information Officer (State CIO) and organization management and are subject to action that conforms to state disciplinary policies and all relevant laws. These actions may include termination of service. Termination requires appropriate notification by OITS, including notification to its upstream providers,

and the termination shall be at the lowest level necessary to safeguard network security and minimize disruption of business activities.

7. Network service agreements shall specify detailed information and requirements regarding the security features, service levels, and management requirements for all network services provided. When network services are outsourced, the agreement shall include provisions for the agency to monitor and audit the outsourced provider's adherence to the agreement.

ISO 27002 REFERENCES
10.6.2 Security of network services

030107 Time-Out Facility

Purpose: To prevent network misuse, and unauthorized access through the implementation of time-out mechanisms.

POLICY

1. Agencies shall implement time-out mechanisms that terminate sessions after a specified period of inactivity, such that the user must re-authenticate his identity to resume the session.
2. If the user is connected via external networks (*e.g.,* a telecommuter logging in from home), the time-out mechanism must also terminate the network connection.
3. The period of inactivity for session and terminal time-outs shall be established based on the agency's needs, system or application criticality, the confidentiality of the information accessed through the system or application, or other risk factors, but shall not exceed 30 minutes.
4. For some higher risk information systems, such as systems that process health care data, tax data, or credit card information, the requirement for a session idle timeout shall be 15 minutes or less, as determined by law or industry standards.

ISO 27002 REFERENCES
11.5.5 Session time-out

030108 Authentication of Network Connecting Equipment

Purpose: To control and/or detect the installation of unknown equipment on a network.

POLICY

1. To protect the State Network from vulnerabilities that can be introduced when users access the network with unmanaged devices, agencies shall require that all users accessing the State Network with any devices adhere to required security configurations for those devices, including required patches and updated anti-virus signature files on those devices.
2. Procedures that verify node authentication measures shall be developed and tested on a semi-annual basis.

GUIDELINES

1. Equipment identification may be achieved through various methods, including validation of the media access control (MAC) address, validation of other unique equipment identifiers, or through the use of digitally signed certificates that are associated with a specific server or device.

2. Network routing controls should be implemented to supplement equipment identification by allowing specific equipment to connect only from specified external networks or internal sub–networks ("subnets").
3. Testing should occur on the following connections to verify proper operational behavior:
   - Remote user – VPN authentication.
   - Dial back; dial backup and dial-up authentication mechanisms.
   - Wireless authentication.
   - Server authentication (email, domain logon, secure portals, etc.)

ISO 27002 REFERENCES
11.4.2 User authentication for external connections
11.4.3 Equipment identification in networks

Section 02 System Operation and Administration

030201 Controlling Data Distribution and Transmission

Purpose: To protect the State's data and information from unauthorized disclosure.

POLICY

1. Agencies shall manage the electronic exchange or transfer of data to ensure that the confidentiality and integrity of the data are maintained during the transfer process.
2. Agencies shall address the risk involved in the transfer of different types of data and implement safeguards through the means of exchange used, such as through email, the Internet, or exchange of electronic media and tapes.
3. Technical access controls or procedures shall be implemented to ensure that data and information are transmitted only as authorized and as appropriate.
4. Access controls and/or procedures shall, in part, be based on agency business requirements.
5. All confidential data shall be encrypted when transmitted across wireless or public networks[6], including transmissions such as FTP and electronic mail. For the encryption requirements of secure transmission of confidential data, please see 030501 - Using Encryption Techniques.

ISO 27002 REFERENCES
9.1 Secure Areas
10.8.1 Information exchange policies and procedures

030202 Controlling On-Line Transactions

Purpose: To protect on-line transactions and the parties involved in on-line transactions.

POLICY

When agencies accept or initiate on-line transactions, they shall implement controls or verify that controls exist to:

1. Validate the identity of the parties involved in the transaction.

[6] For the purpose of this standard, a public network includes the State Network. It does not apply to internal agency networks. Internal agency networks are considered private networks.

2. Gain proper approval for the transaction, if necessary.
3. Protect the confidential data involved in the transaction.
4. Ensure the integrity of the transaction.
5. Obtain proof that the transaction is completed correctly.
6. Prevent unauthorized or accidental replay of a transaction so that it will not be duplicated.

GUIDELINES

Methods to implement the controls above are dependent on the nature of the transaction and the level of risk but could include:

1. Using electronic signatures that are validated through an approved, known certificate authority (CA).
2. Using enhanced authentication techniques, such as multi-factor authentication.
3. Implementing automated two-person controls for approving transactions.
4. Encrypting the message content when transmitted over an unsecured communications link.
5. Encrypting the communications link through secure protocols.
6. Storing transaction details in a secure location not accessible to unauthorized persons.

ISO 27002 REFERENCES
11.5.6 On-Line Transactions

Section 03 Email and Internet Communication

030301 Sending and Receiving Electronic Mail (Email)

Purpose: To establish requirements for sending electronic mail.

POLICY

Agencies shall develop policies regarding unacceptable use of email and set forth the extent to which users may use agency-provided email for personal use.

1. Agency personnel shall exercise due care when addressing email correspondence to ensure that the correspondence is addressed correctly and that the intended recipient is authorized to view content within emails or documents. Examples of email content that constitute unacceptable use include the following:
    a. Private or personal for-profit activities. This includes personal use of email for marketing or business transactions, advertising of products or services or any other activity intended to foster personal gain.
    b. Unauthorized not-for-profit business activities.
    c. Seeking/exchanging information, software, etc., that is not related to one's job duties and responsibilities.
    d. Unauthorized distribution of State data and information including the unauthorized use of email auto-forwarding.
    e. Use for, or in support of, unlawful/prohibited activities as defined by federal, State and local laws or regulations.

2. Prohibited activities relating to Internet and network access include the following:
    a. Tampering with computer hardware or software.
    b. Knowingly vandalizing or destroying computer files.
    c. Transmitting threatening, obscene or harassing materials.
    d. Attempting to penetrate a remote site/computer without proper authorization.
    e. Using the Internet in an effort to access data that are protected and not intended for public access.
    f. Violating federal and State laws dealing with copyrighted materials or materials protected by a trade secret.
    g. Sending confidential information without encrypting that information, exposing the data to discovery by unintended recipients.
    h. Intentionally seeking information about, obtaining copies of or modifying contents of files, other data belonging to other users, unless explicitly authorized to do so by those users.
    i. Attempts to subvert network security, to impair functionality of the network, or to bypass restrictions set by network administrators. Assisting others in violating these standards by sharing information or passwords is also unacceptable behavior.
    j. Deliberate interference or disruption of another user's work or system. Users must not take actions that cause interference to the network or cause interference with the work of others on the network. Users are prohibited from performing any activity that will cause the loss or corruption of data, the abnormal use of computing resources (degradation of system/network performance) or the introduction of computer worms or viruses by any means.
3. Misdirected or unsolicited email shall be treated with caution. Recipients shall not open or respond to unsolicited email. Agencies shall develop policies and/or training to educate users about the potential security risks involved in responding to unsolicited commercial email (spam), including responding to an invitation contained in such email to have one's email address removed from the sender's list.
4. Agencies shall develop policies to encourage due care by users when forwarding messages so that users do not do the following:
    a. Auto-forward email without first obtaining agency approval.
    b. Knowingly send out an email message that contains viruses, Trojan horses or other malware.
    c. Use the electronic-mail system or network resources to propagate chain letters, misinformation or hoax information.
    d. Forward any confidential information to any unauthorized party without the prior approval of a local department manager.
    e. Forward any confidential information without appropriate protections such as encryption.
    f. Forward the wrong attachment.
    g. Send information or files that can cause damage to the State of North Carolina or its citizens.
    h. Send unsolicited messages to large groups of people except as required to conduct agency business.
5. Agencies shall provide training on the security issues involved in receiving email to ensure that employees are aware of potential problems that can be introduced into the network and how to avoid them.
6. Agencies shall protect State resources by not taking action on unsolicited commercial electronic mail. Agencies shall also establish procedures that address the following issues:
    a. Attacks on electronic mail (*e.g.,* viruses, interception, user identification, defensive systems).

b. Activating or clicking on hyperlinks in documents or email messages that are from unknown sources or part of unsolicited messages (spam).

c. Responding to or following hyperlinks asking for user names and passwords when asked to do so by unsolicited phishing emails.

d. Protection of electronic mail attachments using such techniques as filtering, stripping and store and forward.

e. Use of cryptography to protect the confidentiality and integrity of electronic messages.

7. Communications sent or received by agency email systems and/or email communications on State business in personal email accounts may be public records as defined by the North Carolina Public Records Law, N.C.G.S. §132.1, *et seq.,* and shall be managed according to the requirements of an agency's record retention policy or as set forth in the General Schedule for Electronic Records published by the Department of Cultural Resources.

GUIDELINES

Agencies not using the State's email system should encourage the attachment of a statement to email(s) that the message and any response to the message received by the agency are being sent on a State email system and may be subject to monitoring and disclosure to third parties, including law enforcement personnel.

An example is as follows:

> Email correspondence to and from this sender may be subject to the North Carolina Public Records Law and may be disclosed to third parties, including law enforcement personnel.

Instructions and disclaimers should be reviewed and approved by the agency or State legal staff prior to use.

ISO 27002 REFERENCES

10.4.1 Controls against malicious code
10.8.2 Exchange agreements
10.8.4 Electronic messaging
10.8.5 Business information systems
12.2.3 Message integrity

030302 Using the Internet for Work Purposes

Purpose: To provide standards for the State's infrastructure and Internet use.

POLICY

Persons responsible for setting up Internet access for an agency shall ensure that the agency's network is safeguarded from malicious external intrusion by deploying, at a minimum, a configured and managed firewall. The configuration shall ensure that only the minimum services are installed to allow the business functions. All unnecessary ports and services shall be uninstalled or denied.

While performing work-related functions or while using publicly owned/publicly provided information-processing resources, State employees and authorized users shall use network resources and the Internet responsibly. Users accessing the State Network shall do the following:

1. Ensure that there is no intentional use of such services in an illegal, malicious or obscene manner.

2. Ensure compliance with State and agency acceptable use policies.

3. Ensure that all applicable software copyright and licensing laws are followed.

4. Guard against wasting State Network resources, such as excessive personal use.

5. Not use the State Network for distributing unsolicited commercial advertising or personal Web hosting.
6. Avoid using Internet streaming sites except as consistent with the mission of the agency and for the minimum amount of time necessary to obtain the desired amount of information.
7. Not take actions that would constitute a criminal offense or make the State liable to civil suits, such as stalking, or actions that are abusive, fraudulent, hateful, defamatory, obscene or pornographic in content.
8. Not access or attempt to gain access to any computer account or network that they are not authorized to access.
9. Not intercept, attempt to intercept, forge or attempt to forge data transmissions that they are not authorized to access or send.
10. Users of Internet search engines shall take precautions when using Internet search engines to verify the integrity of the information provided by the search engine. As users collect information gathered from the Internet, they must do the following:
    a. Check data for their integrity and accuracy before using them for business purposes.
    b. Observe all copyrights, end user licensing agreements, and other property rights.
    c. Use caution when downloading files from websites, ensuring that all downloads are scanned for viruses and other malicious code.

Using Social Media and Networking Sites

Each agency must assess risk and determine under what circumstances if any, social media and networking sites are appropriate for use in connection with performing its State governmental business activities. Social networking tools use customized, web based environments for collaborative communication and dissemination of relevant information. Social media sites such as Facebook, Twitter, MySpace and LinkedIn, etc., enable users to post and exchange information, in order to develop and maintain online connections and relationships. These sites allow a community of users, usually with common interests, to communicate information and feedback about those interests. When a particular social networking site is approved for use by an agency, then the agency shall do the following:

1. Develop a policy on the purpose and appropriate use of the social networking site by the agency.
2. Provide guidance to authorized agency personnel for use and maintenance of any social networking sites used in connection with agency business.
3. Provide guidance to agency personnel for appropriate use or disclosure of employment or other State-related information in connection with personal use of social networking sites.
4. To help prevent fraud and unauthorized access, agencies shall advise users:
    a. To use a different user credential and password for each social networking and other non-State owned/hosted site. Accounts and passwords used to access social networking sites used by agencies shall never be the same as accounts and passwords used for other personal or professional business. In particular, an employee's NCID username or password must never be used for access to any other site or account outside of State government.
    b. To guard against disclosing too much personally identifiable information, such as birthdates.
5. Prohibit users from:
    a) Any action or statement that implies the user is speaking, or may speak, on behalf of the state, unless the user is specifically authorized to do so; and
    b) Disclosure of State information learned as a result of their employment when visiting social networking sites for their own personal use.
6. Train users on appropriate practices for use of social networking sites.

7. Monitor user access and use of all social networking sites.
8. Institute data preservation and loss prevention measures.

ISO 27002 REFERENCES
11.1.1 Access control policy

030303 Downloading Files and Information from the Internet

Purpose: To establish restrictions pertaining to downloading files and use of the Internet.

POLICY

Personnel shall only download files that aid in the performance of work-related functions. While downloading files or information from the Internet, State employees and State network users shall comply with the agency's acceptable use policy and the statewide information security standards that address the security of all devices connecting to the network, including those listed below. Safeguards that shall be in place to limit the risk of downloading files that may contain malware include the following:

1. Use of antivirus software that scans files before they are downloaded.
2. Having only approved software installed to a system.
3. Validating before installation the source of software and the reputation of the site from which it is downloaded.
4. Not opening files from people not known to the user or files that are spammed via email.
5. Not downloading or using software or any other materials that may constitute a copyright or licensing violation or implicate the State for licensing agreements.
6. Not running unauthorized P2P applications to facilitate the downloading and sharing of copyrighted material.
7. Not utilizing the Worldwide Web to download applications designed to remove copyright protections from protected content such as DVD media.

ISO 27002 REFERENCES
10.4.1 Controls against malicious code
11.1.1 Access control policy

030304 Setting Up Intranet / Extranet Access

Purpose: To implement and manage an agency Intranet in a secure manner.

POLICY

1. Agencies that have Intranet / Extranet sites shall provide the same controls on access to the site as to the files located on the network, in accordance with other statewide access control standards.
2. Traffic to the Intranet site from an external location shall be blocked unless it is tunneled through a virtual private network (VPN).
3. All new connections between third parties and State agencies shall be documented in an agreement that includes information technology security requirements for the connections. The agreement shall be signed by an agency employee who is legally authorized to sign on behalf of the agency and by a representative from the third party who is legally authorized to sign on behalf of the third party. The signed document must be kept on file with the relevant extranet/network group.

GUIDELINES

When setting up access to the Intranet / Extranet site, agencies should implement the following best practices:

1. A documented approval process should be created before any information is posted to the site.
2. Before posting material to the site, workers should be required to thoroughly check all information and programs to make sure they do not include viruses, Trojan horses, or other malicious code.
3. All legal issues such as disclosure of confidential information and copyright infringement should be resolved prior to posting.
4. Workers should also be required to confirm the information's accuracy, timeliness and relevance to the agency's mission before posting it.

ISO 27002 REFERENCES
11.1.1 Access control policy

030305 Giving Information When Ordering Goods on the Internet

Purpose: To provide awareness that there are potential security risks in revealing confidential information when ordering items via the Internet.

POLICY

State employees who are responsible for ordering goods and services via the Internet must be cognizant that they are responsible for protecting State information. When making payments via the Internet, personnel must do the following:

1. Ensure that all State credit or debit card details are kept confidential (including personal identification numbers [PINs], account numbers and details).
2. Make every effort to verify that the third party is a legitimate e-business.
3. Consider potential risks involved in conducting business on a Web site that has been compromised or is insecure.
4. Verify that the third party is using the desired secure Web site by checking that the site address starts with https, not http, and that the Web uniform resource locator (URL) is accurate and has been typed in directly.
5. Revert to ordering goods via telephone if any doubts or suspicions arise.
6. Reconcile any credit card(s) used against credit card statements and scan statements for fraudulent or bogus charges.

ISO 27002 REFERENCES
10.9.1 Electronic commerce
10.9.3 Publicly available information

030306 Web Browser Security

Purpose: To ensure the proper settings of Web browsers and other Internet software.

POLICY

Agencies shall ensure that Web browser software is properly configured to protect the State's information technology systems. System administrators, support personnel, and system users must be aware of the following:

1. Most Web servers automatically collect information about any user visiting the site, including the user's Internet Protocol (IP) address, browser type and referrer, by reading this information (which every browser provides) from the user's browser.
2. Confidential data may be stored on cookies on their machine automatically and that these cookies are updated automatically.
3. Viruses, spyware, Trojan applications and other malicious code may be able to cause damage to the State's infrastructure via Web browsers and therefore shall be continuously scanned.
4. Built-in security features must be used to ensure the best security for Web browsers.
5. Web browser vulnerabilities must be addressed through the installation of software patches needed to mitigate the vulnerabilities.

GUIDELINES

Users should exercise caution when prompted to download or run programs from a web site. Also, support personnel should consider removing cookies from machines on a regular basis.

ISO 27002 REFERENCES
10.9.3 Publicly available information

030307 Filtering Inappropriate Material from the Internet

Purpose: To protect the State from the accessing of inappropriate Internet sites and material.

POLICY

If an agency determines that it should filter access to Internet sites and materials, it shall develop a policy that sets forth the criteria by which it will determine when filtering will be performed and shall notify users of the policy. The implementation of access controls or other techniques to filter out inappropriate Internet sites and materials may be necessary to protect network resources and ensure the following:

1. Employees do not accidentally or deliberately view, access or download inappropriate materials from the Internet that may cause concern or distress to themselves or other employees.
2. Employees are restricted from inappropriate use that may result in criminal or civil penalties to the agency or State.
3. Corrective actions can be taken for repeated instances of inappropriate use.

GUIDELINES

Agencies should consider the installation of a proxy server or content filtering appliance.

ISO 27002 REFERENCES
11.1.1 Access control policy

030308 Mobile Device Applications

Purpose: To protect the State Network from mobile code that performs unauthorized and malicious actions.

POLICY

Agencies shall develop a policy to protect the State Network and local networks from mobile code that may perform unauthorized and harmful actions. Mobile code is software that is transferred between systems and executed on a local system without explicit installation or execution by the recipient. Active X and Java are examples of mobile code that can inadvertently breach agency network defenses.

GUIDELINES

Agencies should implement measures based on the level of access and the level of risk the agency is willing to accept. Listed below are sample access and security settings that an agency may use to refine their policy.

- **Internet Server Usage.** These policies would cover the usage of mobile code served via the Internet by the organization's servers. A typical security setting should be high.
- **Internet Client Usage.** These policies would cover which categories of mobile code a client or user could access via the Internet. A typical security setting should be medium.
- **Intranet Usage**. These policies would cover the usage of mobile code only on the organization's intranet. A typical security setting might be medium or medium low.
- **Mobile Device Usage.** Similar to an Internet client, these policies are for mobile devices accessing various mobile code resources. A typical security setting might be medium.

Security Settings

HIGH

a. The safest way to browse but also the least functional
b. Few secure features are disabled
c. Appropriate setting for avoiding sites that may have harmful content

MEDIUM

a. Safe browsing and still functional
b. Prompts before downloading potentially unsafe content
c. Unsigned ActiveX controls are not downloaded
d. Appropriate setting for most Internet sites

MEDIUM-LOW

a. Same as Medium without prompts
b. Most content will be run without prompts
c. Unsigned ActiveX controls will not be downloaded
d. Appropriate for sites on your local network (Intranet)

LOW

a. Minimal safeguards and warning prompts are provided
b. Most content is downloadable and run without prompts
c. All active content can run
d. Appropriate for sites that you absolutely trust

ISO 27002 REFERENCES

10.4.2 Controls against mobile code

Section 04 Telephones and Faxes

030401 Making Conference Calls

Purpose: To ensure that confidential information is provided only to authorized individuals.

POLICY

Confidential information shall not be discussed on speakerphones or other electronic media, including Voice over IP systems, during conference calls unless:

1. All authorized parties participating in the call have been authenticated.
2. All authorized participating parties have previously verified that no unauthorized persons are in such proximity that they might overhear the conversation.
3. The conference call is made in an area of the building that is secure (*i.e*., offices or conference rooms where the door can be closed and conversations cannot be overheard through thin walls).
4. All parties involved in the conference call are openly identified.

GUIDELINES

1. Use of publicly available Voice over IP systems should be avoided when an agency or state operated Voice over IP system is available.
2. When use of a publicly available Voice over IP provider is necessary, due diligence should be taken to ensure the call is conducted in accordance with this standard.

ISO 27002 REFERENCES
10.8.1 Information exchange policies and procedures
10.8.5 Business information systems

030402 Using Videoconferencing Facilities

Purpose: To ensure that confidential information is provided only to authorized individuals.

POLICY

Confidential information shall not be discussed on videoconferences or other electronic media, including Voice over IP, unless:

1. All authorized participants have been authenticated.
2. All authorized participants have previously verified that no unauthorized persons are in such proximity that they might overhear the conversation.
3. The videoconference call is being made in an area of the building that is secured (*i.e.,* offices or conference rooms where the door can be closed and conversations cannot be overheard through thin walls).
4. All parties involved in the conference call are openly identified.

ISO 27002 REFERENCES
10.8.1 Information exchange policies and procedures
10.8.5 Business information systems

030403 Recording of Telephone Conversations

Purpose: To establish requirements for policies that disclose to employees and third-party contractors using State telephone systems that their use of such systems may be monitored.

POLICY

State agencies using monitoring technologies shall establish policies to provide appropriate notice to State employees and third-party contractors of what the agency will be monitoring. The policies shall include the circumstances under which the monitoring will take place.

GUIDELINES

1. Specify the scope and manner of monitoring for telephones and never exceed the scope of any written monitoring statement in the absence of any clearly stated exception.
2. When appropriate, obtain a written receipt from State employees and third-party contractors acknowledging that they have received, read and understood the agency's monitoring policy.
3. Inform State employees and third-party contractors of any activities that are prohibited when using agency telephones.

ISO 27002 REFERENCES
10.8.1 Information exchange policies and procedures
10.8.5 Business information systems

030404 Receiving Misdirected Information by Facsimile

Purpose: To ensure that confidential information is provided only to authorized individuals.

POLICY

1. Agencies shall develop guidelines for handling the receipt of unsolicited facsimiles, including advertising material, as well as misdirected facsimiles.
2. When an agency receives a facsimile in error (wrong number, person, office, location or department), it shall notify the sender, if appropriate.
3. Misdirected facsimiles shall be treated as confidential documents.
4. Facsimiles that carry advertisements may be discarded.

ISO 27002 REFERENCES
10.8.1 Information exchange policies and procedures
10.8.5 Business information systems

030405 Providing Confidential Information over the Telephone

Purpose: To provide awareness that giving information over the telephone presents security risks.

POLICY

1. To reduce the possibility that confidential information will be provided to unauthorized individuals, agencies shall establish procedures for employees and contractors to follow when conveying confidential information over the telephone.
2. When confidential information (*e.g.,* credit card number, social security number) is required or requested while conducting business (*i.e.,* ordering goods) using the telephone, employees must ensure that they know exactly to whom they are speaking and whether that person is authorized to receive such information.
3. Confidential information must not be left on answering machines or other recording devices.

4. Care must be taken to ensure that confidential information cannot be overheard when it is disclosed over the telephone.
5. Agencies shall provide employees and contractors with awareness training on social engineering and the requirements for protecting confidential data.

ISO 27002 REFERENCES
10.8.1 Information exchange policies and procedures
10.8.5 Business information systems

Section 05 Securing Data

030501 Using Encryption Techniques

Purpose: To protect the State's confidential information using encryption techniques.

POLICY

1. Each agency shall document and retain on file a case-by-case risk management determination for each type of confidential information as to the appropriateness of its unencrypted transmission to a party not served by the agency's internal network.
2. All laptops that are used to conduct the public's business shall use encryption to protect all information from unauthorized disclosure, including confidential information, such as personal information.
3. All other mobile computing devices and portable computing devices such as personal digital assistants (PDAs), smart phones, tablets and portable storage devices such as compact disks (CDs), digital video disks (DVDs), media players (MP3 players) and flash drives that are used to conduct the public's business, shall use encryption to protect all Personally Identifiable Information (PII) and confidential information from unauthorized disclosure.

Device	Encryption Requirements
Laptops, Notebooks, and Netbooks	All devices shall use Full Disk Encryption (sector-level) using a FIPS 140-2 Level 1 certified AES-256 encryption algorithm.[7]
Mobile and portable computing devices, such as tablets, smart phones and personal digital assistants. Removable Media such as CDs, DVDs, memory sticks (flash drives), tape media, or any other portable device that stores data.	All Personally Identifiable Information (PII) and other confidential information shall be encrypted using a FIPS 140-2 Level 1 certified algorithm of at least a 128-bit strength. Whenever possible, State data should be stored on State issued and owned removable media.

4. Agencies using key-based encryption systems must provide for an encryption key escrow to ensure present and future agency access to encrypted data.
5. Agencies must ensure that only authorized personnel have access to keys used to access confidential information.
6. Proper management control of encryption keys and processes must be ensured when archiving confidential electronic files or documents.

[7] For a list of validated cryptographic modules and products, refer to the following NIST publication: http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/140val-all.htm.

7. Agencies shall develop and enforce polices concerning the storage of the State's confidential data on all portable and removable media devices.
8. Confidential data shall be encrypted only by authorized users when stored on non-State owned devices.
9. Federally protected confidential data shall not be stored on non-State owned/managed devices.
10. All confidential data shall be encrypted when transmitted across wireless or public networks, including transmissions such as FTP and electronic mail. Secure transmission of confidential data shall include the following:
    - Protocol version: Secure Socket Layer (SSL) v3, Transport Layer Security (TLS) v1.1, or Datagram Transport Layer Security (DTLS) v1.0.
    - Key algorithms: 2048 bit RSA or those algorithms that are accepted and certified by the National Institute of Standards and Technology (NIST).
    - Key hashing: SHA-1 (Note: Industry standard is moving to SHA-2, (*e.g.,* SHA-256), minimum on or around January 2016). MD5, equivalent, or less hashing algorithms shall not be used.
    - Cipher algorithms: 128 bit GCM, SGC, or those algorithms that are accepted and certified by the National Institute of Standards and Technology (NIST). 256 bit is recommended for high confidential data. The RC4 algorithm is not recommended, due to a low vulnerability, until it is fixed but may be used if no other cipher algorithm is supported and a risk assessment has been done. NULL, Anonymous, and Export ciphers shall not be used for confidential data.

GUIDELINES

1. Agencies should consider encrypting all confidential information or data, regardless of the data's storage location, where a compromise of such information would have an adverse impact on the agency's services or functions.
2. Due to the greater likelihood for theft or loss, users should be instructed to avoid storing confidential information on portable media and devices whenever possible. If possible, agencies should consider encrypting all mobile communication devices regardless of the confidentiality of the information stored.
3. For satellite locations, or for locations where weaker physical access controls are present, agencies should strongly consider deploying full-disk encryption on desktops that store confidential information.
4. Since a virtual machine image file contains the entire virtual machine (server and all data), agencies should consider securing virtual machine image files using encryption technologies, particularly where the image file is backed up to another storage media outside of the agency's control.

ISO 27002 REFERENCES
10.9.1 Electronic commerce

030502 Managing Electronic Keys

Purpose: To ensure that electronic key systems are managed under proper controls.

POLICY

Agencies using key-based data encryption systems must implement a key escrow system to guarantee agency access to encrypted data when needed. Key escrow data shall be routinely backed up. Recovery procedures must be tested at least annually to ensure agency access and availability to encrypted data.

When an agency implements an electronic key system, it must establish proper controls to protect the key and the data encrypted. The system must be designed so that no single person has full knowledge of any single key. The system design must also ensure the following:

1. Separation of duties or dual control procedures are enforced.
2. Any theft or loss of electronic keys results in the notification of management.
3. All keys are protected against modification, substitution, and destruction, and secret/private keys are protected against unauthorized disclosure.
4. Cryptographic keys are replaced or retired when keys have reached the end of their life or the integrity of the key has been weakened or compromised.
5. Physical protection is employed to protect equipment used to synchronize, store and archive keys.
6. An electronic key management and recovery system, including all relevant key escrow procedures, is documented and in place. This shall be handled through key escrow procedures.
7. Custodians of cryptographic keys formally acknowledge they understand and accept their key-custodian responsibilities.
8. Encrypted data are recoverable, at any point in time, even when the person(s) who encrypted the data is no longer available.

Agencies shall use strong cryptographic keys when protecting confidential data. Agencies also must comply with the applicable regulations established by the North Carolina Secretary of State.

ISO 27002 REFERENCES
12.3.1 Policy on the use of cryptographic controls
12.3.5 Key management

Section 06 E-Commerce Issues

030601 Configuring E-Commerce Systems

Purpose: To protect State agency e-commerce sites by minimizing risks.

POLICY

An agency's e-commerce website(s) must be configured with technical controls that minimize the risk of misuse of the site and its supporting technology. The configuration shall ensure that if any confidential data are captured on the site, it is further secured against unauthorized access and/or disclosure.

The configuration of e-commerce Web sites shall include the following:

1. Removal of all sample files included with the default installation.
2. Disabling of unnecessary services and applications.
3. Application of current application and operating system patches, within business constraints.
4. Establishment of user accounts that are set to the least level of privilege that job duties require.
5. Maintenance of operating systems in accordance with approved agency information technology security requirements.
6. Restriction of the use of root/administrator privilege to only when required to perform duties.
7. Establishment of normal change controls and maintenance cycles for resources.
8. Logging of systems and protecting applications through access control methods.
9. Use of secure channels, such as VPN, for administrative purposes.
10. A secure physical environment for e-commerce servers.

GUIDELINES

When implementing e-commerce applications, agencies should consider using the following:

1. End-to-end encryption while data are in transit, if applicable.
2. Encryption while data are at rest.
3. Limited trust relationships between systems.

ISO 27002 REFERENCES
10.9.1 Electronic commerce

030602 Using External Service Providers for E-Commerce

Purpose: To protect the State's data when using external service providers for e-commerce solutions.

POLICY

1. When agencies contract with external service providers for e-commerce services, the services shall be governed by a formal agreement.
2. In order to support service delivery, the agreements shall contain, or incorporate by reference, all of the relevant security requirements necessary to ensure compliance with the statewide information security standards, the agency's record retention schedules, its security policies, and its business continuity requirements.

ISO 27002 REFERENCES
6.2.1 Identification of risks related to external parties
6.2.3 Addressing security in third party agreements
10.9.1 Electronic commerce
12.5.5 Outsourced software development

Section 07 Wireless Networks

030701 Wireless Networks

Purpose: To prevent unauthorized access to information and to State information technology systems through eavesdropping on electronic signals, specifically IEEE 802.11 wireless communications with the North Carolina State Network or its components.

POLICY

All Institutes for Electrical and Electronics Engineers (IEEE) 802.11 wireless network access points on the State Network shall have the following security measures implemented to prevent electronic eavesdropping by unauthorized personnel:

- **Physical access**
  - All network access points (APs) and related equipment such as base stations and cabling supporting wireless networks shall be secured with locking mechanisms or kept in an area where access is restricted to authorized personnel.
  - The reset function on APs shall be used only by and accessible only to authorized personnel.
- **Network access**

- APs shall be segmented from an agency's internal wired local area network (LAN) using a gateway device.
- The Service Set Identifier (SSID) shall be changed from the default value.
- The SSID may indicate the name of the agency. The SSID name should be communicated to agency employees utilizing the wireless network to ensure they are connecting to the agency network and not a rogue access point attempting to impersonate the official agency wireless network.
- A device must be prevented from connecting to a wireless network unless it can provide the correct SSID.

○ **System access**

- Every device used to access the State Network over an IEEE 802.11 wireless connection shall have a personal firewall (software or hardware) and up-to-date antivirus software. Devices incapable of running antivirus or personal firewall software, such as personal digital assistants (PDAs) and radio frequency identification (RFID) tags, shall be exempt from this requirement.
- All access points shall require a password to access its administrative features. This password shall be stored and transmitted in an encrypted format.
- The ad hoc mode for IEEE 802.11, also referred to as peer-to-peer mode or Independent Basic Service Set (IBSS), shall be disabled. The ad hoc mode shall be allowed in the narrow situation in which an emergency temporary network is required.
- Every device used to access the State Network over an 802.11 wireless connection shall, when not in use for short periods of time, be locked (via operating system safeguard features) and shall be turned off when not in use for extended periods of time, unless the device is designed to provide or utilize continuous network connectivity. Such items might include wireless cameras, RFID tag readers and other portable wireless devices.
- If supported, auditing features on wireless devices shall be enabled and the audits reviewed periodically by designated staff.

○ **Authentication**

- Except for agency approved guest access, all wireless access to the State Network via an 802.11 wireless network shall be authenticated by requiring the user to supply the appropriate credentials as supported by the Wi-Fi directly or via the Extensible Authentication Protocol (EAP) extensions.
- Where a documented business case exists, user devices may authenticate using compliant service accounts but must require a user to re-authenticate to the Wi-Fi once the user has authenticated to the device.
- Additional authentication shall also be performed through such technologies as Secure Sockets Layer (SSL), Secure Shell (SSH), or Virtual Private Network (VPN) when a LAN is extended or a wide area network (WAN) is created using 802.11 wireless technology.
- 802.1x credentials for individual users shall be deactivated in accordance with an agency's user management policy or within twenty-four (24) hours of notification of a status change (for example, employee termination or change in job function).
- Agency approved guest access shall give users access to only the Internet and shall use a captive portal that at least requires the guest users to agree to terms of service and states user activity on the wireless network is monitored.

○ **Encryption**

- Depending on the type of information traversing a wireless LAN, encryption is required at varying levels as noted in the section below on wireless LAN defense-in-depth architecture. At a minimum, public information requires Wi-Fi Protected Access (WPA) encryption and confidential data require

802.11i (WPA2)-compliant Advanced Encryption Standard (AES) encryption. End-to-end encryption is highly recommended for the confidential data classification.

- Wired Equivalent Privacy (WEP) shall not be used for wireless security. If WPA is used, the highest level of encryption supported on the device shall be enabled.
- If the Temporal Key Integrity Protocol (TKIP) is the highest level of encryption available for WPA, then WPA2 shall be used.
- When WPA2 is used, AES encryption shall be enabled and shall be no less than 128 bits.
- WPA2 (802.11i) encryption must use TKIP, Counter Mode CBC-MAC Protocol (CCMP), or other IEEE- or NIST-approved key exchange mechanism.
- When end-to-end encryption is required across both an 802.11 wireless and a wired network, then in addition to WPA2 (802.11i), data transmitted between any wireless devices shall be encrypted using a proven encryption protocol that ensures confidentiality. Such protocols include SSL, SSH, IP Security (IPSec) and VPN tunnels.
- Pre-shared keys shall be strong in nature, randomly generated and redistributed to users at least quarterly to protect against unauthorized shared-key distribution or other possible key exposure situations. Pre-shared keys sent by email shall be encrypted.

- **Wireless system management**
  - Simple Network Management Protocol (SNMP) shall be disabled if not required for network management purposes.
  - If required for network management purposes, SNMP shall be read-only, with appropriate access controls that prohibit wireless devices from requesting and retrieving information.
  - If SNMP is required for dynamic reconfiguration of access points to address AP failures and rogue AP's, the SNMP protocol used shall adhere to SNMP version 3 standards and take place only on the wired side of the network.
  - Predefined community strings such as *public* and *private* shall be removed.
  - The latest version of SNMP supported by both device and management software tools shall be implemented and support for earlier versions of SNMP disabled. Devices capable of using SNMP version 3 shall do so, SNMP version 2 may be used until devices are capable of running version 3.
- **WAN connections**
  - Authentication shall be performed when point-to-point wireless access points are used between routers to replace traditional common carrier lines.
- **Audit**
  - Agencies using 802.11 wireless LANs must enable rogue access point detection in the management software of the WLAN, if available. If automatic rogue access point detection is not available, the organization must search their sites using wireless sniffers or vulnerability assessment scans and operating system detection at least quarterly to ensure that only authorized wireless access points are in place.
  - The management system shall monitor the airspace in and around agency facilities for unauthorized access points and ad hoc networks that are attached to the agency's network. If unauthorized devices are found, the management system shall allow personnel to take appropriate steps toward containment.

- **Wireless LAN defense-in-depth architecture**

Access	Isolated WLAN	Credential Management	Rotating SSID/PSK	MAC ACL	WPA w/ Strong PSK	802.11i w/ Strong PSK	802.11i w/ 802.1x*	Encryption	VPN	Personal Firewall + AV **
Public Citizens										
Open WLAN for On-Site Citizen Use	Firewall***	SSID	Required	—	—	—	—	—	—	—
State Employees/Contractors										
Public Information	WLAN Gateway	PSK	Required	Optional	Minimum	Recommended	—	Required	—	Required
Confidential Information	WLAN Gateway	802.1x	—	Optional	—	—	Minimum	Required	Recommended	Required
Remote Access										
Access into Agency Network from Wi-Fi Hot Spot by State Employees/Contractors	—	VPN	—	—	—	—	—	—	Required	Required

* Third-party or vendor-specific WLAN security solutions that provide equivalent levels of authentication and encryption are acceptable.
** PDAs and other devices incapable of running personal firewall and antivirus software are exempt from this requirement.
*** Limit traffic from public WLAN to agency application needed by citizens, if Internet access is allowed—limit usage with proxy authentication (activity logging is required).

ISO 27002 REFERENCES

13.1.2 Reporting security weaknesses

Chapter 4 – Securing Systems

Section 01 Purchasing and Installing Software

040101 Selecting and Purchasing Software

Purpose: To help minimize security risks when purchasing and installing software.

POLICY

1. Agencies shall ensure that a formal selection process is used to purchase business-critical software necessary to deliver public services. The selection process shall include a review of security measures needed to protect the confidentiality, availability and integrity of the data.
2. Agencies shall ensure that software packages installed on agency computers comply with the agency's security requirements and meet business needs.
3. Agencies shall ensure that management-approved criteria for the selection of software packages are defined and documented.
4. Agencies shall avoid purchasing software for which minimum support for security patches and updates is not readily available.
5. Agencies shall ensure that all software is licensed and that users adhere to the terms of the end user license agreement. Such adherence is necessary to comply with legislation and to ensure continued vendor support, including vendor provision of patches and updates that address security flaws.
6. Agencies shall comply with State purchasing and contracting laws, standards and policies when negotiating software development contracts with third-party developers. All contracts with vendors for software development must meet the agency's functional requirements specification and offer appropriate product support.
7. Agencies shall initiate formal contracts defining third-party access to the organization's information-processing facilities. Such contracts shall include or refer to all security requirements and expected performance and support levels to ensure there is no misunderstanding between parties.
8. Agencies shall ensure that a business justification accompanies all requests for new application systems or software enhancements. The justification shall include the following:
   a) Documented business needs and expectations of the new system or enhancement.
   b) Preliminary risk assessment and cost analysis identifying the business value of the assets involved, the security requirements for the system and the compatibility with other system parts.
   c) Statement of agency management approval, prior to procurement.

GUIDELINES

When selecting software, agencies should consider the following:

1. Agencies should ensure that software under consideration for acquisition works with the majority of peripherals and systems currently in use.
2. Software that has been highly customized introduces higher risks.
3. Old or outdated software typically poses a higher security risk than updated software.
4. The standard office software package is more effective when universally used across State agencies to ensure compatibility among divisions and agencies.

ISO 27002 REFERENCES
6.1.4 Authorization process for information processing facilities
6.2.3 Addressing security in third party agreements
12.1.1 Security requirements analysis and specification
15.1.2 Intellectual property rights (IPR)

040102 Implementing New / Upgraded Software

Purpose: To control security risks involved when implementing new or upgraded software.

POLICY

1. Agencies shall design security into systems used for data processing so that the systems have the proper technical and procedural security controls.
2. Only standard approved software shall be installed on State owned assets with any deviations being pre-approved by agency management and review by an agency security administrator assigned to perform the review.
3. Agencies shall mitigate risks of exploitation of covert channels by obtaining third-party applications from reputable sources and by protecting the source code in custom developed applications.
4. Default settings for applications such as email calendar, and Internet access tools must be set to support a secure environment.
5. Vendor-supplied default and/or blank passwords shall be immediately identified and reset as soon as an information system is installed.
6. Configuration management regarding the installation of software/systems shall include the following:
    - Maintenance of reliable backups of critical data and programs.
    - Periodic review of overall controls to determine weaknesses.
    - Limiting use of software to that which can be verified to be free of harmful code or other destructive aspects.
    - Retention of complete information about the software, such as the vendor address and telephone number, the license number and version, and update information.
    - Retention of configuration reports of all installed software, including the operating system. This information will be necessary if the software must be reinstalled later.
    - Reinstalling software programs only from validated media.
    - Storing software in a secure, tamper-proof location.

GUIDELINES

New or upgraded software should not be made available to users until the risks are understood. Agencies should develop the following:

1. A step-by-step implementation plan.
2. A software implementation plan that follows change control procedures.
3. Management and user acceptance criteria, including the following:
    - Desired acceptance tests and their desired results.
    - Demonstration that computer capacity and performance requirements are not adversely affected.
    - Assurance that system security controls will remain effective.

- Amendments to system documentation and business continuity plans to reflect the software implemented.
- A rollback plan for use in the event the implementation has unacceptable ramifications.

4. Agencies should also consider the potential impact software upgrades may have on the following:
   - Interdependent systems that rely on some functionality of the upgraded system.
   - Overall information security throughout the agency's environment.
   - Training needs for business and technical users covering new features and security controls introduced by the upgrade.

ISO 27002 REFERENCES
12.5.1 Change control procedures

040103 Interfacing Applications Software / Systems

Purpose: To mitigate risks associated with linking various software programs or systems together.

POLICY

Agencies that develop interfacing systems shall ensure that the interfacing systems integrate appropriate security to ensure the confidentiality, as applicable, and the integrity and availability of data. When implementing interfacing applications software/systems, due-diligence measures shall include the following:

1. Utilizing risk management practices to align the business value of the information assets (*e.g.,* database programs to Web applications) being integrated and the potential loss or damage that might result from a security failure.
2. Meeting with developers to determine whether data will need to be reformatted or otherwise modified to meet the needs of the interfacing system.
3. Ensuring that software development procedures begin with planning and have adequate process and management controls.
4. Utilizing qualified software development staff experienced in interfacing systems.

GUIDELINES

Agencies should consider the following issues when analyzing or justifying interfacing system projects:

1. Developing interfacing systems is a technical task that is accompanied by high risks.
2. Application security is more efficient and more cost effective when implemented at the beginning of a project.
3. Prior permission should be secured for the reading of databases not normally under the control of the application that will read them.
4. Interfacing software/systems should be designed so that levels of authority among the software or systems are clearly defined to protect the integrity of data on the interfaced application/system.

ISO 27002 REFERENCES
12.1.1 Security requirements analysis and specification
12.2.1 Input data validation
12.5.2 Technical review of operating system changes

Section 02 Software Maintenance, Upgrade, and Disposal

040201 Technical Vulnerability Management

Purpose: To establish requirements for an ongoing program of vulnerability mitigation that includes information review and analysis, as well as metrics tracking and reporting.

POLICY

System administrators shall ensure that all current maintenance and security vulnerability patches are applied and that only essential application services and ports are enabled and opened in the system's firewall. Vulnerabilities that threaten the security of the state's network or IT assets shall be addressed through updates and patches based upon assigned vulnerability ratings.

Vulnerability Risk Ratings

The risk ratings assigned to a vulnerability are as follows:

- *High-level Risk:* A vulnerability that could cause grave consequences if not addressed and remediated immediately. This type of vulnerability is present within the most sensitive portions of the network or IT asset, as identified by the data owner. This vulnerability could cause functionality to cease or control of the network or IT asset to be gained by an intruder.
- *Medium-level Risk:* A vulnerability that should be addressed within the near future. Urgency in correcting this type of vulnerability still exists; however, the vulnerability may be either a more difficult exploit to perform or of lesser concern to the data owner.
- *Low-level Risk:* A vulnerability that should be fixed; however, it is unlikely that this vulnerability alone would allow the network or IT asset to be exploited and/or it is of little consequence to the data owner. Vulnerabilities of this nature are common among most networks and IT assets and usually involve a simple patch to remedy the problem. These patches can also be defined as enhancements to the network or IT asset.

Vulnerability Mitigation

1. Mitigation timeframes for identified or assessed vulnerabilities shall be based on the assigned Vulnerability Risk Rating:
   - "High-level risk" vulnerabilities must be mitigated as soon as possible. It is recommended that "High-level risk" vulnerabilities be mitigated within 7 days, but must be remediated within 21 days.
   - "Medium-level risk" vulnerabilities must be mitigated within thirty (30) days.
   - "Low-level risk" vulnerabilities must be mitigated within ninety (90) days.
2. Agency vulnerability mitigation plans must specify, at a minimum, the proposed resolution to address identified vulnerabilities, required tasks necessary to affect changes, and the assignment of the required tasks to appropriate personnel.
3. Vulnerability exceptions are permitted in documented cases where a vulnerability has been identified but a patch is not currently available. When a vulnerability risk is 'high-level' and no patch is available, steps must be taken to mitigate the risk through other methods (*e.g.*, workarounds, firewalls, router access control lists). A patch needs to be applied when it becomes available. When a 'high-level' risk vulnerability cannot be totally mitigated within the requisite time frame, agencies need to notify agency management and the State Chief Information Officer of the condition.

4. Appropriate testing and assessment activities shall be performed after vulnerability mitigation plans have been executed to verify and validate that the vulnerabilities have been successfully addressed.
5. Appropriate notification shall be provided after vulnerability mitigation plans have been executed.
6. In the event of a zero-day vulnerability, a situation where an exploit is used before the developer of the software knows about the vulnerability, agencies shall mitigate the vulnerability immediately, if possible, and apply patches as soon as possible after the vendor provides them.

Vulnerability Information Review and Analysis

1. Relevant vulnerability information from appropriate vendors, third party research, and public domain resources shall be reviewed on a regular basis, per the agency's policies and procedures.
2. Relevant vulnerability information, as discovered, shall be distributed to the appropriate agency employees, including Information Security.
3. Appropriate agency personnel shall be alerted or notified in near real-time about warnings or announcements involving "High-risk" vulnerabilities.

Requirements for Compliance

1. Agencies must develop procedures to ensure the timely and consistent use of security patches and use a consistent vulnerability naming scheme to mitigate the impact of vulnerabilities in systems.
2. Agencies shall have an explicit and documented patching and vulnerability policy, as well as a systematic, accountable, and documented set of processes and procedures for handling patches.
3. The patching and vulnerability policy shall specify techniques an organization will use to monitor for new patches and vulnerabilities and personnel who will be responsible for such monitoring.
4. An organization's patching process shall define a method for deciding which systems are patched and which patches are installed first, as well as the method for testing and safely installing patches.
5. An agency process for handling patches shall include the following:
   - Using organizational inventories
   - Using the Common Vulnerabilities and Exposures vulnerability naming scheme for vulnerability and patch monitoring (See http://cve.mitre.org)
   - Patch prioritization techniques
   - Organizational patch databases
   - Patch testing, patch distribution, patch application verification, patch training, automated patch deployment, and automatic updating of applications.
6. Agencies shall develop and maintain a list of sources of information about security problems and software updates for the system and application software.
7. Agencies shall establish a procedure for monitoring those information sources.
8. Agencies shall evaluate updates for applicability to the systems.
9. Agencies shall plan the installation of applicable updates.
10. Agencies shall install updates using a documented plan.
11. Agencies shall deploy new computers with up-to-date software.
12. After making any changes in a system's configuration or its information content, agencies shall create new cryptographic checksums or other integrity-checking baseline information for the system.

ISO 27002 REFERENCES
12.6.1 Control of technical vulnerabilities

040202 Applying Patches to Software

Purpose: To protect from risks associated with software patches.

POLICY

Agencies shall develop procedures to ensure the timely and consistent use of security patches. A consistent vulnerability-naming scheme to mitigate the impact of vulnerabilities in computer systems must be used across the agency and State. Agencies shall ensure the following:

1. System and application bug fixes or patches shall accepted only from highly reliable sources, such as the software vendor.
2. Software patches addressing significant security vulnerabilities are prioritized, evaluated, tested, documented, approved and applied promptly to minimize the exposure of unpatched resources.
3. The patch application process follows formal change control procedures that include the following controls prior to installation:
    - Verification of the source of the patch.
    - Verification of the need for the patch.
    - Testing of the patch.
    - Documenting of the processes and procedures.

GUIDELINES

When applying software patches, agencies should consider the following:

1. Ignored and unpatched software vulnerabilities can represent a great risk to the security of State information assets.
2. Patch application is no different than introducing a new or updated program into the system and carries the same potential for damage and system compromise.
3. Appropriate updates should be made to both system documentation and business continuity plans.

ISO 27002 REFERENCES
12.5.1 Change control procedures

040203 Upgrading Software

Purpose: To protect against the security risks associated with software upgrades.

POLICY

1. Agencies shall implement vendor-recommended upgrades for use in a production environment only after the following conditions are met:
    - Security is not compromised by any upgrade and security controls are in place.
    - There is a business justification that warrants software upgrades.
    - Qualified agency staff members validate the technical need for a vendor-recommended upgrade.
2. Software upgrades shall not be installed in a production environment (mainframes, servers and desktop computers) until the following conditions are met:
    - Qualified personnel certify that the upgrade has passed acceptance testing.

- System security controls remain effective.
- Computer capacity and performance requirements are not adversely affected.
- System documentation and business continuity plans are amended to reflect upgrade.
- A rollback plan has been developed in the event the upgrade has unacceptable ramifications.
- Management has agreed that the desired acceptance criteria have been met.

GUIDELINES

1. Agencies should consider the potential impact that vendor-recommended upgrades may have on the following:
   - The potential for information security vulnerabilities inherent in new or upgraded software.
   - Increased technical requirements and costs associated with a software upgrade.
   - The balance between the need to continue current operations and the understanding that certain levels of software currency must be maintained to receive continued vendor support for the software.
   - The possibility that systems that rely on functionality provided by the system that is being upgraded may prove to be incompatible with the upgrade.
   - Additional training necessary for business and technical users to cover new features and security controls introduced by the upgrade.
2. Agencies should remember that software upgrades may have impacts on other systems. The change control process should not be classified as complete until team members can verify the following:
   - There are not any additional risks imposed on information security throughout the agency's environment.
   - There are not any interdependent systems that have had loss of functionality due to the upgraded software.

ISO 27002 REFERENCES
10.3.2 System acceptance
12.5.1 Change control procedures

040204 Supporting Application Software

Purpose: To protect application software by providing adequate technical support.

POLICY

Agencies shall provide adequate levels of technical support necessary to support business processes, which includes appropriate vendor support for purchased software. Levels of technical support shall require the following:

- Security measures are used to mitigate risks and security vulnerabilities.
- Software issues are handled efficiently.
- Software problems are resolved in a timely fashion.

GUIDELINES

If one is available, an agency's primary avenue for user software support should be a help desk. The help desk should have formal software problem resolution procedures that promote the following best practices:

- Tracking problems from initial reporting through to resolution.
- Monitoring status of reported problems and confirming that satisfactory resolutions have been achieved.
- Providing reports and metrics for system development and software support management (*i.e.,* for trend analysis, lessons learned, etc.)
- Maintaining a pool of software technicians with the appropriate skill sets to assist with software problem resolution.
- Building a database of institutional knowledge that reflects trends, common problems, etc., and sharing it with other State agencies.

ISO 27002 REFERENCES
6.2.3 Addressing security in third party agreements
12.1 Security requirements of information systems
12.5 Security in development and support processes

040205 Operating System Software Upgrades

Purpose: To mitigate risks associated with upgrading operating systems.

POLICY

Operating system (OS) upgrades shall be carefully planned, executed and documented as a project. Agencies involved in operating system software upgrades to systems shall perform the following steps before commencement of the upgrade project:

1. Document that system security controls will remain effective or will be modified to appropriately respond to the OS upgrade.
2. Locate change control processes and procedures.
3. Document agreement of technical staff and management to acceptance criteria.
4. Document that qualified personnel have certified the upgrade and that it has passed user acceptance testing.
5. Establish a rollback plan in the event the upgrade has unacceptable ramifications.

GUIDELINES

Agencies should consider the following security issues when upgrading an OS:

1. An OS failure can have a cascading adverse effect on other systems and perhaps even the network.
2. System documentation and business continuity plans should be amended to reflect the OS upgrade.
3. Since OS upgrades typically affect many systems within an agency, such upgrades should be part of the annual maintenance plan/budget. OS upgrade testing and review cycles should also be included in this budget.

ISO 27002 REFERENCES
12.5.2 Technical review of applications after operating system changes

040206 Support for Operating Systems

Purpose: To provide maximum availability, security and stability of operating systems.

POLICY

Each agency shall ensure that the operating systems used to run the production environment are regularly monitored for security risks and maintained in approved secure configurations to support business operations.

GUIDELINES

Agencies should consider the following issues when supporting operating systems:

1. New security risks and vulnerabilities are discovered from time to time that may require the operating system configuration to be updated to mitigate the identified risks and vulnerabilities.
2. Periodic maintenance improves the performance of operating systems (*e.g.,* hard drive defragmentation).
3. The operating systems on servers, minicomputers and mainframes usually require daily maintenance tasks and routines that may be initiated manually as a result of an alert or logged event or may be scripted to run automatically when a certain threshold or limit is exceeded.
4. Logs of operating system maintenance should be regularly reviewed and compared to other system logs to ensure that:
    - Maintenance tasks continue to function as expected.
    - Operating systems continue to operate within accepted thresholds.
    - System security is not being compromised by maintenance tasks.
    - Maintenance tasks do not adversely affect computer capacity or performance.

ISO 27002 REFERENCES
12.5.2 Technical review of applications after operating system changes

040207 Recording and Reporting Software Faults

Purpose: To identify and correct software faults efficiently and effectively.

POLICY

1. Each agency shall ensure that software faults or bugs are formally recorded and reported to those responsible for software support and maintenance.
2. Software faults that pose a security risk shall be prioritized and addressed promptly to minimize the exposure resulting from the security vulnerability.
3. Agencies shall include the following security issues when establishing or reviewing software support procedures:
    - Software fault-reporting procedures shall be taught and encouraged through security training and awareness programs.
    - Agencies shall designate a quality control team that consistently checks for faults and that is responsible for reporting them to software support.
    - Agencies shall use a formal recording system for the following:
        - Tracks faults from initial reporting through to resolution.
        - Monitors the status of reported faults and confirms that satisfactory resolutions have been achieved.
        - Provides reports and metrics for system development and software support management.

4. While faults are being tracked through to resolution, research shall also be conducted to ensure no IT security controls have been compromised and resolution activities have been appropriately authorized.

ISO 27002 REFERENCES
10.10.5 Fault logging

040208 Disposing of Software

Purpose: To protect information by using secure software disposal techniques.

POLICY

Software removal and disposal may be initiated only after a formal decision to stop using the software has been made by senior management and steps have been taken to protect the information contained in the software application. Before disposal of software, agencies shall protect information developed using the software by doing the following:

1. Following orderly termination procedures to avoid disruption of business operations.
2. Migrating data to another system or archiving data in accordance with applicable records management regulations and policies for potential future access.
3. Using a State-approved technique to ensure that no data remain on the media (*e.g.,* by incineration, shredding, degaussing or sanitizing of data for use by another application within the organization).
4. Logging the disposal of media containing confidential information to maintain an audit trail.

GUIDELINES

Agencies should consider the following issues and controls when involved in software disposal:

1. Emphasis should be given to the proper preservation of the data processed by the system so that:
   - Sufficient vital information about the system is preserved so that some or all of the system may be reactivated in the future.
   - The backup strategy that is utilized is able to recover the actual program and program files to enable retrieval or access of data stored in the application.
2. Software media storage and disposal should follow industry best practices and vendor and manufacturer specifications.

ISO 27002 REFERENCES
10.7.2 Disposal of media

Section 03 Controlling Software Code

040301 Managing Operational Program Libraries

Purpose: To protect agency software by restricting access to operational program libraries.

POLICY

Managing the directories or locations used to store production (live) software and configuration files is an integral part of risk management. To prevent the corruption of information systems or the disruption of business operations, agencies shall ensure that their program libraries are adequately protected. Agencies shall restrict access to operating system and operational or production application software/program libraries to designated staff only.

GUIDELINES

Appropriate technical controls and procedures for protecting program libraries should be designed to prevent unauthorized use (intentional and unintentional). Agencies should consider processes, controls or best practices. Refer to the guidelines in 040405 - Managing Change Control Procedures.

ISO 27002 REFERENCES
12.4.1 Control of operational software
12.5.1 Change control procedures

040302 Managing Program Source Libraries

Purpose: To protect the integrity of business operations software by managing source code libraries.

POLICY

Agencies shall exercise strict control over program source libraries by implementing the following:

1. A combination of technical access controls and robust procedures to restrict access to source program libraries to authorized personnel only.
2. A system to keep production source code and development source code libraries separate and backed up.
3. Formal change control procedures
4. Comprehensive audit trails

GUIDELINES

Formal change control procedures can aid in the investigation of changes made to agency program source libraries. Agencies should establish a regular review of audit reports and event logs to ensure that incidents that have potentially compromised program source libraries are detected.

ISO 27002 REFERENCES
12.4.3 Access control to program source code
12.5.1 Change control procedures

040303 Controlling Software Code during Software Development

Purpose: To protect information systems from corruption by controlling software change.

POLICY

When developing or modifying software, agencies shall establish a change control management process that implements the following rules:

1. Authorization is required to initiate or make changes to software.
2. Change control procedures that govern changes to system software are defined and utilized.
3. All changes must be tested in a test environment and must pass acceptance testing prior to moving into a live or production environment.
4. Senior management may only authorize emergency exceptions to this policy to avoid imminent failure of business operations.
5. Agencies shall maintain and control current electronic and hard copy listings of application/program source code that runs on agency systems.

- Program listings are the primary tool for identifying system problems. Loss or unavailability of a listing could delay problem identification and resolution, the consequence of which could put agency services at risk.
- Unauthorized access to program listings compromises system security by making exact logic and system routines available for exploitation.

GUIDELINES

1. Many System Development Lifecycle (SDLC) models exist that can be used by an organization in developing an information system. A traditional SDLC is a linear sequential model. This model assumes that the system will be delivered near the end of its life cycle.
2. A general SDLC should include the following phases:
   - Initiation
   - Acquisition / Development
   - Implementation / Assessment
   - Operations / Maintenance
   - Sunset (disposition)

   Each of these five phases should include a minimum set of tasks to incorporate security in the system development process. Including security early in the SDLC will usually result in less expensive and more effective security than retrofitting security into an operational system.[8]
3. The following questions should be addressed in determining the security controls that will be required for a system:
   - How critical is the system in meeting the organization's mission?
   - What are the security objectives required by the system, *e.g.,* integrity, confidentiality, and availability?
   - What regulations, statutes, and policies are applicable in determining what is to be protected?
   - What are the threats that are applicable in the environment where the system will be operational?

ISO 27002 REFERENCES
10.7.4 Security of system documentation
12.4.3 Access control of program source code
12.5.1 Change control procedures
12.5.3 Restrictions on changes to software packages

040304 Controlling Old Versions of Programs

Purpose: To protect system integrity with software version control.

POLICY

Agencies shall control old versions of programs by establishing the following:

1. Comprehensive procedures for auditing removals or updates to program libraries.
2. Formal change control procedures to process the application code used to write programs within agency systems when that code has been superseded or discontinued.

[8] More information regarding the Software Development Life Cycle (SDLC) may be found in the NIST publication "Information Security in the SDLC Brochure."

GUIDELINES

The following information security issues should be considered when implementing an agency policy in regards to old versions of programs:

1. When application code within agency systems has been superseded or discontinued, agencies should be prepared to roll back or access the superseded or discontinued code if required, because decommissioned code must often be resurrected if major bugs are found in the newer version.
2. Version control is essential because there is a real danger of losing the latest program enhancements or of causing the failure of other systems that depend on recently added features if an older version of a program is confused with a newer version.

ISO 27002 REFERENCES
12.4.1 Control of operational software
12.5.1 Change control procedures

Section 04 Software and System Development

040401 Software Development

Purpose: To protect production/operational software during all phases of the development process.

POLICY

Each agency shall follow and manage a formal development process when it develops software. Safeguards shall include the following:

1. A Standard Software Development Life Cycle (SDLC) that is managed by a project office/team.
2. A combination of appropriate:
   - Technical access controls.
   - Restricted privilege allocations.
   - Robust procedures which include security checkpoints in each cycle.

GUIDELINES

Agencies should address the following issues when updating or formalizing development processes:

1. Potential compromise to production systems.
2. The threat of insertion of malicious code within software.
3. Disruption of live operations.
4. Confidentiality, criticality and value of the systems and data to the agency and public.

ISO 27002 REFERENCES
10.1.4 Separation of development, test, and operational facilities
12.1.1 Security requirements analysis and specifications
12.5.1 Change control procedures

040402 Making Emergency Amendments to Software

Purpose: To protect production software during emergency modifications.

POLICY

1. Agency personnel must fully justify their requests for emergency modifications to software and must obtain senior management authorization.
2. Agency personnel making emergency modifications must not deviate from the agency's change control procedures.

GUIDELINES

1. Each agency should establish an emergency procedure that personnel agree to follow if it becomes necessary to amend the live software environment quickly. The procedure should include management approval.
2. When developing emergency change control procedures, agencies should consider how these procedures will deviate from normal everyday change control procedures and best practices. Refer to the guidelines in 040405 - Managing Change Control Procedures.

ISO 27002 REFERENCES
12.5.1 Change control procedures

040403 Establishing Ownership for System Enhancements

Purpose: To protect systems by defining responsibilities and authority levels required for system change.

POLICY

1. Agencies shall establish custodians for each system who will have responsibility for all system enhancements.
2. All proposed system enhancements must be driven by the business needs of the agency and supported by a business case that has both user and management acceptance.
3. Ownership for any such system enhancements ultimately lies with the system custodian and requires his/her commitment and personal involvement.

GUIDELINES

Allocation of information security responsibilities should be an integral part of each agency's information security program. Information security policy and job descriptions should provide general guidance on the various security roles and responsibilities within the agency. However, in the case of individual systems, the system custodian and a designated alternate manager should have more detailed guidelines governing enhancements to the system(s) for which they are ultimately responsible.

Agencies should consider the following areas when they are defining security job responsibilities for system custodians and other managers with focused security positions (*e.g.,* security analysts and business continuity planners):

1. Identifying and clearly defining the various assets and security processes associated with each individual system for which the position holder will be held responsible.
2. Clearly defining and documenting the agreed-upon authorization levels that the position holder will have to make enhancements, modify source code, promote updated code, etc.
3. Documenting the following for each asset:
    - Management's assignment of system responsibility to a specific manager/custodian.
    - Manager/custodian acceptance of responsibility for the system.

- Detailed description of manager/custodian responsibilities.

ISO 27002 REFERENCES
6.1.3 Allocation of Information Security responsibilities

040404 Justifying New System Development

Purpose: To require business case justification of custom system development projects.

POLICY

When proposing the development of custom software, agencies shall make a strong business case that:

1. Supports the rationale for not enhancing current systems;
2. Demonstrates the inadequacies of packaged solutions; and
3. Justifies the creation of custom software.

Agencies shall consider custom software development only when the following conditions are met:

1. A strong business case demonstrates that business requirements can be met only with the proposed software.
2. Existing software cannot be economically updated to fulfill these business requirements.
3. No suitable packaged solution can be found.
4. The development is supported by agency management.
5. The agency has adequate resources to support the estimated project timeline.
6. The agency can support and maintain the product during its required lifetime.

GUIDELINES

Developing a system to meet a business need is a major decision that frequently carries significant risk. Agencies should consider the following issues when weighing the decision to outsource a major system development effort:

1. High risk of failure - Signing a contract with a vendor for outsourced development can be high risk and may pose a substantial risk to the agency.
2. Senior management support and financial backing - When projects last more than 12 months, there is an increased potential for a reduction in both commitment and financial support that could have an impact not only on the project but on business operations as well.

ISO 27002 REFERENCES
12.1.1 Security requirements analysis and specifications

040405 Managing Change Control Procedures

Purpose: To safeguard production systems during modification.

POLICY

Each agency shall manage changes to its systems and application programs to protect the systems and programs from failure as well as security breaches. Adequate management of system change control processes shall require the following:

1. Enforcement of formal change control procedures.
2. Proper authorization and approvals at all levels.
3. Successful testing of updates and new programs prior to their being moved into a live environment.
4. Updates addressing significant security vulnerabilities shall be prioritized, evaluated, tested, documented, approved and applied promptly to minimize the exposure of unpatched resources.
5. Whenever an update is implemented, the application system the update affects shall be tested to ensure that business operations and security controls perform as expected.

GUIDELINES

Managing change control procedures is an integral part of risk management.

Each agency should enforce strict change control procedures because application software fundamentally affects the agency's ability to do its work and deliver services. Inadequate or poorly managed change control procedures can result in compromises and failures not only in the operational system being modified, but also in other systems that are dependent on the new functionality provided by the updated system.

When possible, agencies should integrate application change control and operational change control procedures. This effort should include the following processes, controls, and best practices:

1. Controls and approval levels for updating libraries.
2. Requiring formal agreement and approval for any changes.
3. Restricting library content.
4. Restricting programmers' access to only those parts of the system necessary for their work.
5. Version control for each application.
6. Tying program documentation updates to source code updates.
7. Audit logs that track all:
    - Accesses to libraries.
    - Change requests.
    - Copying and use of source code.
    - Updates posted to libraries.
    - Defining job responsibilities/restrictions and establishing authority levels for the following:
        - Program librarian(s).
        - Developers (*i.e.,* should neither test their own code nor promote it into production).
        - Other IT staff.
8. Personnel authorized to make or submit changes to the source library (*i.e.,* a program librarian should be appointed for each major application to control check-in/check-out).
9. Rollback procedures designed to recover to old, stable version of programs.

ISO 27002 REFERENCES
12.5.1 Change control procedures

040406 Separating System Development and Operations

Purpose: To reduce the risk of agency system misuse and fraud by segregation of duties

POLICY

Separation of duties is an integral part of a successful information security program that reduces the risk of accidental or deliberate system misuse. Separation of duties reduces opportunities for unauthorized modification or misuse of information by segregating the management and execution of certain duties or areas of responsibility. Although smaller agencies without the manpower to staff separate sections or groups will find this method of control more challenging to implement, the principle should be applied to the extent possible. Agency management must ensure that there is proper segregation of duties to reduce the risk of agency system misuse and fraud.

1. System administration and system auditing shall be performed by different personnel.
2. System development and system change management shall be performed by different personnel.
3. System operations and system security administration shall be performed by different personnel.
4. Insofar as is possible, security administration and security audit shall be performed by different personnel.
5. Administrators of multi-user system must have at least two user credentials. One of these user credentials must provide privileged access, with all activities logged; the other must be a normal user credential for performing the day-to-day work of an ordinary user.

GUIDELINES

Agencies should consider taking the following actions in regard to information security issues when implementing a separation-of-duties policy:

1. When separation of duties is difficult, consider other controls such as:
   a. Monitoring of activities
   b. Audit trails
   c. Management supervision
2. Keep the responsibility for security audit separate from other audit powers.
3. Identify and segregate activities that require collusion to defraud (*e.g.,* exercising a purchase order and verifying receipt of goods).
4. Consider dual control in instances in which collusion might allow the agency to be defrauded.
5. Prohibit development staffs (who have powerful privileges in the development environment) from extending their administrative privileges to the operational environment.

ISO 27002 REFERENCES
10.1.3 Segregation of duties
10.1.4 Separation of development, test, and operational facilities

040407 Systems Documentation

Purpose: To protect information technology assets by maintaining comprehensive system documentation.

POLICY

1. Whether the system is developed or updated by in-house staff or by a third-party vendor, agencies shall ensure that each new or updated system includes adequate system documentation.
2. Agencies shall create, manage and secure system documentation libraries or data stores that are available at all times but shall restrict access to authorized personnel only.

3. Agencies shall ensure that system documentation is readily available to support the staff responsible for operating, securing and maintaining new and updated systems.
4. Agencies shall control system documentation to ensure that it is current and available for purposes such as auditing, troubleshooting and staff turnover. Examples of system documentation include descriptions of applications processes, procedures, data structures and authorization processes.
5. The following controls must be considered to protect and maintain system documentation:
    - Internal system documentation must be stored securely and in an area known by management.
    - Access to internal system documentation must be limited and be authorized by management.
    - Documentation and user procedures shall be updated to reflect changes based on the modification of applications, data structures and/or authorization processes.

GUIDELINES

Agencies should consider the following information security issues as they define their system documentation management strategies:

1. A lack of adequate documentation, whether because the documentation is missing, out of date, or simply unavailable, can:
    - Greatly increase the risk of a serious incident.
    - Compromise performance of routine maintenance, especially as the complexity of the system increases.
    - Increase the likelihood that errors and omissions will slip through peer reviews of source code into system testing and perhaps beyond into user acceptance testing.
2. System documentation should be a required component of the system's inventory of assets (along with the physical and software assets that constitute the system).
3. System documentation should be protected from unauthorized access by keeping it stored securely and by utilizing an access list limited to a small number of staff, all of whom have been authorized by the system custodian.
4. A copy of system documentation should be maintained for disaster recovery and business continuity and stored off site.

ISO 27002 REFERENCES
7.1.1 Inventory of assets
10.7.4 Security of system documentation
12.5.1 Change control procedures

Section 05 Software and Systems Operations

040501 Managing System Operations and System Administration

Purpose: To ensure that agency systems are operated and administered using documented procedures that are efficient and effective in protecting the agency's data.

POLICY

1. For IT transaction records, which include access and audit logs related to the activities of IT systems, agencies must establish and maintain an adequate system of controls.

2. For financial transactions and accounting records the standard is addressed by the North Carolina Office of the State Controller.
3. Agencies shall employ and document controls to provide for the management of system operations and system administration. To minimize the risk of corruption to operating systems or integrated applications, the controls shall include, but not necessarily be limited to, the following:
    - Develop and document daily operational security procedures.
    - Assigned staff shall perform the updating of the operating systems and program/application backups.
    - Operating system software patches shall be applied only after reasonable testing verifies full functionality.
    - Physical or logical access shall be given to suppliers for support purposes only when necessary and with documented management approval. The suppliers' activities shall be continuously monitored.
    - Vendor-supplied software used in operating systems shall be maintained at a level supported by the vendor.
4. Agencies must clearly define security responsibilities for system administrators, who shall protect their assigned information technology resources and the information contained on those resources.
5. Agencies must also provide appropriate training for their system administrators.
6. System administrators shall do the following:
    - Ensure that user access rights and privileges are clearly defined, documented and reviewed for appropriateness.
    - Consider the risk of exposure when administering system resources.
    - Take reasonable actions to ensure the authorized and acceptable use of data, networks and communications transiting the system or network.

ISO 27002 REFERENCES
6.1.3 Allocation of Information Security responsibilities
10.10.4 Administrator and operator logs
12.2.2 Control of internal processing
12.4.1 Control of operational software

040503 Log-on Procedures

Purpose: To reduce the risk of unauthorized system access.

POLICY

1. Agencies shall develop secure log-on procedures to be applied to all network components, operating systems, applications, and databases that implement a user identification and authentication mechanism. These procedures shall be designed to minimize the risk of unauthorized access.
2. Agencies shall follow the security policies for Managing User Access (020102) and Managing Passwords (020106).
3. Agencies shall display a message to users before or while they are prompted for their user identification and authentication credentials that warns against unauthorized or unlawful use.
4. Agencies shall configure systems to limit the number of consecutive unsuccessful log-on attempts. If the number of consecutive unsuccessful log-on attempts exceeds the established limit, the configuration shall either force a time delay before further log-on attempts are allowed or shall disable

the user account such that it can only be reactivated by a system or security administrator or an authorized service desk staff member.

5. Information about the system or services shall not be displayed until the log-on process has successfully completed.
6. Log on windows should display a minimal amount of information.
7. The log-on process should not be validated until all log-on data is input. Failing the process as each input field is completed will provide an attacker with information to further the attack.
8. Only generic “log-on failed” messages should be displayed if the user does not complete the log-on process successfully. Do not identify in the message whether the user identification, password, or other information is incorrect.

ISO 27002 REFERENCES
11.5.1 Secure log-on procedures

040504 System Utilities

Purpose: To control the use of system utilities that can bypass or override security controls.

POLICY

1. Access to system utilities that are run with elevated privileges capable of bypassing or overriding system or application controls shall be strictly limited to users and administrators with a recurring need to run or use those utilities. Other uses of and access to those utilities shall only be granted on a temporary basis.
2. These system utilities shall be segregated from other applications and software such that they can only be accessed by authorized users.

GUIDELINES

1. Agencies should develop procedures for granting and documenting authorization for specific individuals to use powerful system utilities, whether or not such use is temporary.
2. Use of system utilities should be audited or logged.
3. Agencies should remove or disable system utilities that are not needed.
4. Agencies should consider whether granting authorization for an individual to use a system utility may violate segregation of duties if the utility allows bypassing or overriding of segregation controls. If granting authorization to use a system utility could potentially violate segregation controls, the agency shall enact precautions to ensure that this violation does not occur. Detailed auditing or two-person control could provide assurance that segregation of duties is maintained.

ISO 27002 REFERENCES
11.5.4 Use of system utilities

040505 Data Validation Controls[9]

Purpose: To minimize and detect corruption or loss of information in applications.

[9] Original section title was “Cryptographic Keys”

POLICY

The design of applications shall ensure that data validation controls are implemented to minimize the risk of processing failures leading to a loss of integrity and to detect any corruption of information through processing errors or deliberate acts.

GUIDELINES

Examples of controls that could be used to ensure data validation are:

1. Carefully controlled add, modify, and delete functions.
2. Implementation of automatic reconciling of balances from run-to-run or system-to-system in systems to compare opening balances against previous closing balances.
3. Requiring that processes fail securely such that no further processing will occur. For example, internal controls in processes should be designed to detect if a process is running out of order or without the proper input and fail without further processing.
4. The maintenance of running hash totals of records or files and the comparison of those records and files to hash totals of backups or recovered records or files. They could also be compared run-to-run or system-to-system to ensure that the end of one transaction period is the same as the beginning of the next.

ISO 27002 REFERENCES
12.3.2 Key management

040506 Data Recovery Controls[10]

Purpose: To correct corrupted data and prevent corruption or loss of data in applications when recovering from system or processing failure.

POLICY

The design of applications shall ensure that data validation controls are implemented such that agencies can correct corrupted data. These controls shall also ensure the correct processing of data in the event of recovery from system or processing failure.

GUIDELINES

An example of a method to rebuild corrupted records or files from a last known good state is a transaction log or log of activities. Agencies should take precautions to ensure that the transaction or activity log does not contain the action that corrupted the data in the first place.

ISO 27002 REFERENCES
12.3.2 Key management

040507 Corruption of Data

Purpose: To minimize and detect corruption or loss of information in applications.

POLICY

The design of applications shall ensure that data validation controls are implemented to minimize the risk of processing failures leading to a loss of integrity and to detect and correct any corruption of information

[10] Original section title was “Key Management Procedures”

through processing errors or deliberate acts. Agencies shall develop clear policies, standards, and/or procedures to detect, correct, and manage corrupted data files.

GUIDELINES

Examples of controls that could be used to ensure data validation are:

1. Add, modify, and delete functions should be carefully controlled.
2. Automatic reconciling of balances from run-to-run or system-to-system can be implemented in systems to compare opening balances against previous closing balances.
3. Processes should fail securely such that no further processing will occur. For example, internal controls in processes should be designed to detect if a process is running out of order or without the proper input and fail without further processing.
4. Running hash totals of records or files can be maintained and compared to hash totals of backups or recovered records or files. They could also be compared run-to-run or system-to-system to ensure that the end of one transaction period is the same as the beginning of the next.
5. An example of a method to rebuild corrupted records or files from a last known good state is a transaction log or log of activities. Agencies should take precautions to ensure that the transaction or activity log does not contain the action that corrupted the data in the first place.

ISO 27002 REFERENCES
12.2.2 Control of internal processing

040508 Monitoring Error Logs

Purpose: To protect agency information technology assets from unintentional and malicious attacks.

POLICY

Error logs generated by information technology systems shall be regularly monitored and reviewed for abnormalities and shall be:

1. Cross-checked for known security events based on network, size, system type and logical and physical location.
2. Enabled on each device or system on the network, such as servers, firewalls, routers, switches, cache engines, intrusion detection systems (IDSs) and applications, as long as performance requirements are not affected.
3. Monitored on a weekly basis at a minimum.
4. Routinely checked for time and date accuracy. See Policy 030212, Synchronizing System Clocks, for more on clock synchronization.
5. Retained as required under the agency records retention policy or the General Schedule for State Agency Records, Information Technology Records.
6. Checked against baselines to effectively verify variations from normal work-related activities.

ISO 27002 REFERENCES
10.10.1 Audit logging
10.10.2 Monitoring system use
10.10.3 Protection of log information

040509 Scheduling System Operations

Purpose: To ensure that modifications to information system operations are implemented and maintained properly.

POLICY

1. To maintain the highest level of system availability and protect the agency's infrastructure, maintenance operations must be performed at predetermined, authorized times or on an approved, as-needed basis. Documented operational procedures must be created, implemented and maintained during system operations and take into consideration the following:
    - Computer start up, shutdown, and recovery procedures.
    - Scheduling requirements (length, time frame, etc.).
    - Processes for handling errors and unforeseen issues that may arise during job execution.
    - Contact lists.
    - System restrictions.
    - Instructions for handling output, including failed jobs.
    - Proper media handling and storage.
    - Incident handling and escalation procedures.
    - Configuration management.
    - Patch management.
    - General system hardware and software maintenance.
    - All documentation of operational procedures must be approved by management and reviewed at least annually for accuracy and relevancy.
    - When special or emergency situations make it necessary to perform maintenance operations outside of the normal system operations schedule, these situations must be documented, management must be notified, and the operation processes used must be recorded.
2. Agencies shall develop change control procedures to accommodate resources or events that require changes to system operations.
3. Changes to system baselines require effective communication to ensure that information systems maintain secure operations and avoid lag due to processing consumption and to minimize downtime due to unforeseen problems during such changes.
4. Change control procedures must be documented and followed during the scheduled maintenance windows and take into consideration:
    - Periods of maximum and minimum workflow.
    - The approval and notification process.
    - Interfaces with other applications, systems or processes.
    - External agency and departmental interdependencies.
    - Change categories, risk and type.
    - The change request process.
    - Rollback plans and the point of no return.
    - Modifications to change control procedures for special or emergency circumstances.

5. All documentation shall be approved by management and reviewed on an annual basis for accuracy and relevancy.
6. Upon the completion of a baseline change, the audit change logs must be retained in accordance with the General Schedule for State Agency Records, Information Technology Records as established by the Government Records Section of the Department of Cultural Resources.

ISO 27002 REFERENCES
10.1.1 Documented operating procedures
10.1.2 Change management

040510 Monitoring Operational Audit Logs

Purpose: To detect unauthorized activity and to protect the integrity and availability of information systems by monitoring operational audit logs.

POLICY

1. Agencies shall implement a program for continuous monitoring and auditing of system use to detect unauthorized activity.
2. All network components and computer systems used for agency operations must have the audit mechanism enabled and shall include logs to record specified audit events.
3. Agencies shall designate staff to regularly review operational audit logs, including system, application and user event logs, for abnormalities.
4. Audit logs of high risk information systems, such as those that process credit card data, shall be reviewed on a daily basis.
5. Any abnormalities and/or discrepancies between the logs and the baseline that are discovered shall be reported to agency management.
6. Access to audit logs shall be restricted to only those authorized to view them and the logs shall be protected from unauthorized modifications, and if possible, through the use of file-integrity monitoring or change-detection software.
7. Audit files shall be written to a log server on the internal network and subsequently backed up to a secure location.
8. To the extent possible, audit logs shall include at least the following information when recording system events:
    - User identification
    - Type of event
    - Date and time
    - Success or failure indication
    - Origination of event
    - Identity or name of affected data, system component, or resource
9. Personnel responsible for audit logs must ensure the following:
    - That the agency has established a current, reliable baseline that can be compared to audit logs to determine whether any abnormalities are present.

- That all operational audit logs are retained in accordance with the General Schedule for State Agency Records, Information Technology Records as established by the Government Records Section of the Department of Cultural Resources.

10. For audit logs on internal agency systems and network components, agencies shall record, at a minimum, the following types of security-related events:
    - User login activity, both failed and successful, including user IDs, log-in date/time, log-out date/time.
    - Unauthorized access attempts to network or system resources, including audit files.
    - Changes to critical application system files.
    - Changes to system security parameters.
    - System start-ups and shut-downs.
    - Application start up, restart and/or shutdown.
    - Attempts to initialize, remove, enable or disable accounts or services.
    - Changes to the auditing function, including enabling or disabling auditing and changing events to be audited.
    - User credential creation and deletion.
    - Attempts to create, remove or set passwords or change system privileges.
    - All uses of special system privileges.
    - System errors and corrective action(s) taken.
    - Failed read-and-write operations on the system directory.
    - All actions taken with administrative privileges.
11. Agencies shall ensure that processing and storage capacity requirements are sufficient to capture and store the events cited above without adversely impacting operations.
12. Agencies shall also ensure that on-line audit logs are backed-up to protected media well before the on-line logs are filled to capacity so that no audit information is lost or overwritten.

ISO 27002 REFERENCES
10.10.2 Monitoring system use
10.10.4 Administrator and operator logs
15.3.1 Information systems audit controls

040511 Responding to System Faults

Purpose: To properly respond to faults and take corrective action.

POLICY

1. All users and system administrators shall be responsible for reporting system faults (*i.e.,* problems, errors and incidents) that affect routine operations to the appropriate authorized staff or third-party technician(s).
2. Staff shall describe the fault as clearly and completely as possible, and provide a reason for the fault, if known.
3. Agency staff shall request that authorized staff or third-party technician(s) log the fault, provide agency staff with a tracking or ticket number and implement clear procedures for handling the reported fault(s).

ISO 27002 REFERENCES
10.10.5 Fault logging

Section 06 Testing & Training

040601 Using Live Data for Testing

Purpose: To protect the integrity and confidentiality of data during system development and testing.

POLICY

1. Agencies shall permit the use of production data during the testing of new systems or systems changes only when no other alternative allows for the validation of the functions and when permitted by other regulations and policies.
2. Confidential data shall not be used for testing purposes.

If production data is used for testing, the same level of security controls required for a production system shall be used.

ISO 27002 REFERENCES
12.4.2 Protection of system test data

040602 Testing Software before Transferring to a Live Environment

Purpose: To protect agency systems by testing software prior to transferring it to the production environment.

POLICY

1. To maintain the integrity of agency information technology systems, software shall be evaluated and certified for functionality in a test environment before it is used in an operational/production environment.
2. Test data and accounts shall be removed from an application or system prior to being deployed into a production environment if the application or system does not have a dedicated testing environment.

ISO 27002 REFERENCES
10.3.2 System acceptance
12.5.1 Change control procedures

040603 Capacity Planning and Testing of New Systems

Purpose: To safeguard new system investments by projecting capacity demands and conducting load acceptance testing.

POLICY

1. New system purchases shall meet, at a minimum, current operational specifications and have scalability to accommodate for growth projected by the agency.
2. To understand current specifications, agencies shall establish a baseline of current operational systems, including peak loads and stress levels and power, bandwidth and storage requirements.
3. Agencies must also test to demonstrate that the new system's performance meets or exceeds the agency's documented technical requirements and business needs.

GUIDELINES

Agency capacity plans should consider new business, security and system requirements and any trends in the agency's information processing. The agency's system-testing process should verify that new or amended systems have:

1. Sufficient capabilities to process the expected transaction volumes (actual and peak).
2. Acceptable performance and resilience.
3. Reasonable scalability for growth of system.

ISO 27002 REFERENCES
10.3.1 Capacity management
10.3.2 System acceptance

040604 Parallel Running

Purpose: To safely demonstrate the reliability and capability of new or updated systems.

POLICY

If agencies test new or updated applications by running parallel tests, the agencies shall incorporate a period of parallel processing into system-testing procedures that demonstrates that the new or updated system performs as expected and does not adversely affect existing systems, particularly those systems that depend on the new or updated system's functionality.

GUIDELINES

Agencies should use parallel processing as the final stage of acceptance testing and should consider the following issues and controls when developing acceptance criteria and acceptance test plans for the parallel testing of new or updated systems:

1. Capacity requirements - both for performance and for the computer hardware needed.
2. Error response - recovery and restart procedures and contingency plans.
3. Routine operating procedures - prepared and tested according to defined agency policies.
4. Security controls - agreed to and put in place.
5. Manual procedures - effective and available where feasible and appropriate.
6. Business continuity - meets the requirements defined in the agency's business continuity plan.
7. Impact on production environment - able to demonstrate that installation of new system will not adversely affect agency's current production systems (particularly at peak processing times).
8. Training - of operators, administrators and users of the new or updated system.
9. Logs - logs of results should be kept for a period of time once testing is completed.

ISO 27002 REFERENCES
10.3.2 System acceptance
12.5.1 Change control procedures

040605 Training in New Systems

Purpose: To ensure that personnel are adequately trained on new and updated systems.

POLICY

Agencies shall provide training to users and technical staff in the operation and security of all new and updated systems.

GUIDELINES

Agencies should consider the following issues and training requirements when developing plans for training on new and updated systems:

1. When administrative training is inadequate, small problems can unnecessarily escalate as a result of lack of knowledge of new functions or security controls.
2. When user training is inadequate, work production often drops because of frustration or because of adjustments that must be made as users learn how to use the new system.
3. Changes in information security processes, features and controls are inherent in new systems.

ISO 27002 REFERENCES
8.2.2 Information security awareness, education, and training

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Section 07 Web Site Development and Maintenance

040701 Developing a Web Site

Purpose: To provide protection of information technology resources when developing Web sites.

POLICY

1. Agencies shall use only qualified personnel to develop Web sites.
2. Web site development shall incorporate secure-development best practices.
3. Development Web sites shall be isolated from production networks to prevent remote compromise while the server is being built and the Web application developed.
4. Development servers/applications shall be developed and tested with input validation to protect against data validation weaknesses in the Web application's design.
5. Web sites that accept citizen or public input through a web form shall automatically collect the submitter's known/received IP address along with a current timestamp, for example web server logs.
6. Information collected must be stored with data collected and provided in any email or other generated output as a result of the web form submission.
7. Information collected shall be kept in accordance with state and agency retention policies and shall be mentioned in agency privacy statements.
8. Agencies shall follow 040201, the Technical Vulnerability Management policy, for web server operating systems and its related applications in order to reduce the risk of known patch-related vulnerabilities.
9. Any accounts used by a server, Web server, Web application, or any other related applications (considered service accounts) need to meet appropriate password management standards as established in 020106 - Managing Passwords.

GUIDELINES

Industry standards for securing operating systems and Web server software, such as National Institute for Technology and Standards (NIST), the Open Web Application Security Project (OWASP), and SANS Institute guidelines, should be used for guidance in securely configuring and hardening Web sites. Agencies should consider the following:

1. Network and application (Web/database) vulnerability scans should be run against development servers during and after the development process to ensure that a server/Web application is built securely.
2. Completed Web sites should be periodically searched with a Web search engine by development staff to ensure that there is no access to Web information beyond what is intended.
3. Because of the public nature of Web servers, the use of file-integrity-checking software to detect the modification of static or critical files on the server is strongly recommended.
4. Web applications should be developed to use a minimum number of ports to allow for easy integration in traditional demilitarized zone (DMZ—filtered subnet) environments.
5. It is strongly recommended that network access web servers, both development and test; require a VPN connection to prevent exploitation of potential vulnerabilities that may exist in these environments.

ISO 27002 REFERENCES
10.9.1 Electronic commerce

040702 Maintaining a Web Site

Purpose: To protect and maintain the State's Web sites.

POLICY

Agencies shall designate qualified individuals to administer and maintain their Web sites. Agency management and agency system administrators shall ensure the following:

1. Agency Web sites are kept up to date and secure and the information they present is accurate.
2. Public Web sites are hardened and standard security configurations, based on industry guidelines and State policies, are followed.
3. Secure authentication is used to protect the security of Web servers that have access to confidential information or that perform critical functions.
4. Web sites have the latest operating system and application patches.
5. Web site logs are periodically reviewed.
6. The number of personnel with administrative access is limited to only qualified individuals.
7. The sites are available to the appropriate users (public and private).
8. Unauthorized modification of the Web site information is quickly discovered and resolved.
9. All sites that an agency is responsible for are periodically tested for vulnerabilities.
10. All sites comply with all applicable laws and regulations.

ISO 27002 REFERENCES
10.9.1 Electronic commerce

Section 08 Purchasing and Installing Hardware

040801 Specifying Requirements for New Hardware

Purpose: To ensure that security requirements are a part of the hardware acquisition process.

POLICY

1. Agencies shall ensure that new hardware purchases are supported by documented operational, technical and security requirements.
2. Agencies shall follow State procurement policies when acquiring hardware to ensure that the purchase meets specified functional needs. Agencies shall include specific requirements for performance, reliability, cost, capacity, security, support and compatibility in Requests for Proposals (RFPs) to properly evaluate quotes.
3. Prior to hardware purchase, the agency shall formally document, at a minimum, how the new hardware acquisition meets the following evaluation criterion:
   - Proposed vendor hardware design complies with information security and other State policies and standard security and technical specifications, such as the following:
     - The vendor has configured the system with adequate capacity to fulfill the functional requirements stated in the agency's design document.
     - The vendor has configured hardware security controls to adequately protect data. (Optionally, the vendor may assist the agency with the configuration of software security controls to provide adequate data protection on the vendor's hardware.)
   - The vendor shall provide system availability data to demonstrate that the proposed hardware meets minimum downtime requirements.

GUIDELINES

Agencies should develop a process to define hardware functionality prior to purchasing. Other requirements to consider and include in RFPs are the following:

1. If hardware will support a critical function: replacement availability and times.
2. If hardware will be used outside of a permanent facility (such as mobile equipment): requirements for survivability (*i.e.,* extreme conditions such as temperature, dust, humidity, etc.)
3. If data confidentiality, criticality and integrity needs dictate: hardware-based encryption or other applicable security requirements.

ISO 27002 REFERENCES
12.1.1 Security requirements analysis and specification

040802 Installing New Hardware

Purpose: To ensure new hardware is subjected to operational and security review prior to installation.

POLICY

1. Agencies involved with the installation of new hardware shall establish a formal review process that allows entities affected by the new hardware to review and comment on the implementation plans and operational and security requirements.

2. The review process shall include the following:
   - Notification of all impacted parties prior to the installation of new hardware.
   - Circulation to appropriate individuals of planned changes or disruptions to operational status or information security for the new installation.
   - Installation of equipment in an appropriately secured and environmentally controlled environment.
   - Restricting access to the proposed changes (*i.e.,* network diagrams, security features, locations, configurations, etc.) to those who require the information to perform their job duties.
3. Security reviews shall be performed internally on a regular basis to ensure compliance with the standard requirements.
4. Agencies shall develop a process to ensure that new systems and equipment are fully tested against operational and security requirements and formally accepted by users before management accepts the systems and places equipment into the operational environment.

GUIDELINES

Full and comprehensive testing of systems and equipment should entail following a written test plan that includes, but is not limited to, the following:

1. Approval from the manager responsible for the correct functioning of the information system to ensure that all relevant security policies and requirements are met and the system provides an acceptable level of risk.
2. Assessment of compatibility with other system components.
3. Determination that technical and functional specifications are met.
4. Beta testing from cross-sections of users in different departments of the agency**.**

ISO 27002 REFERENCES
12.1.1 Security requirements analysis and specification

Section 09 Cabling, UPS, Printers and Modems

040901 Supplying Continuous Power to Critical Equipment

Purpose: To minimize the risks of critical equipment downtime and data loss caused by power outages or electrical anomalies.

POLICY

Agencies shall protect critical information technology systems from damage and data loss by installing and routinely testing a source of continuous power that ensures that the systems continue to perform during power outages and electrical anomalies (*e.g.,* brownouts and power spikes).

GUIDELINES

1. The three primary methods for providing continuous power are as follows:
   - Multiple electric feeds to avoid a single point of failure in the power supply.
   - Backup generator(s).
   - Uninterruptible power supply (UPS).

2. Each agency should examine the availability requirements for critical equipment and determine which combination of these three methods best meets the needs of the agency. Most scenarios will require at least two of these methods.
3. When analyzing the power requirements of critical systems, agencies should consider the following best practices:
    - Both power and communication lines should be protected.
    - Multiple power feeds should not enter a building in proximity to each other.
    - Use of a UPS is usually required to avoid abnormal shutdowns or to provide a clean power source during brownouts or surges. Because most UPS batteries do not last for more than four (4) hours without a continuous supply of power, the following actions should be taken:
        - Development of contingency plans that include procedures to follow if the UPS fails.
        - Inspections of UPS equipment to ensure that the equipment has the ability to sustain, for a predefined period, the power load of the systems and equipment it supports, and is serviced according to the manufacturer's specifications.
    - A backup generator should be used when requirements demand continuous processing in the event of a prolonged power failure. Agencies that require a backup generator should ensure that:
    - The generator is serviced regularly in accordance with the manufacturer's specifications.
    - An adequate supply of fuel is available to ensure that the generator can perform for a prolonged period.
4. Other practices that help mitigate the risk of power outages include the following:
    - Locating emergency power switches near emergency exits in equipment rooms to facilitate rapid power down in case of an emergency.
    - Providing emergency lighting in case of a main power failure.
    - Installing lightning protection in all buildings.
    - Fitting all external communications lines with lightning protection filters.
    - Utilizing alternate fuel sources such as solar energy, fuel cell electricity, biogas, or geothermal electricity.

ISO 27002 REFERENCES
9.2.2 Supporting utilities

040902 Managing and Maintaining Backup Power Generators

Purpose: To ensure continuity of backup power during power outages.

POLICY

Agencies with business requirements that demand uninterrupted information processing during power outages shall deploy backup power generators. When a backup generator is employed, agencies shall do the following:

1. Regularly inspect the generator to ensure it remains compliant with both safety and manufacturer maintenance requirements and has an adequate supply of fuel.
2. Ensure the generator has the capacity to sustain the power load required by supported equipment for a prolonged period of time.
3. Ensure the generator is tested at least quarterly according to the manufacturer's specifications.

GUIDELINES

- Backup generators are usually combined with an uninterruptible power supply to protect critical information technology systems that demand high availability. Such a combination both supports an orderly shutdown if the generator fails, minimizing potential for equipment damage or data loss, and can also provide continuous business operations if the cutover to the generator is too slow to provide power immediately with no interruption.
- Contingency plans should include procedures to be followed in the event the backup generator fails.

ISO 27002 REFERENCES
9.2.2 Supporting utilities

040903 Using Fax Machines/Fax Modems

Purpose: To protect confidential information transmitted via facsimile machines or facsimile modems.

POLICY

1. Agencies may transmit confidential information using facsimile machines or facsimile modems only when security is in place to protect the information being sent.
2. Where receiving facsimile machines are in open areas, personnel using facsimiles to transmit confidential information shall notify the intended recipient when the information is being sent and the number of pages to expect, so that facsimiles containing confidential information are not left unattended on a facsimile machine.

GUIDELINES

1. Agencies should implement formal procedures that require both the sender of the information and the intended recipient to authorize the facsimile transmission and recipient facsimile phone number before the transmission occurs and to verify successful transmission upon receipt.
2. Agencies should incorporate reminders and education about the security issues that surround the use of facsimile machines and facsimile modems into their ongoing information security training and awareness programs.

ISO 27002 REFERENCES
10.8.5 Business information systems

040904 Using Modems and Broadband Connections[11]

Purpose: To protect confidential information being transmitted over public networks.[12]

POLICY

1. Agency management shall set policies and procedures for approved modem and broadband connection usage.

[11] Original section title was “Using Modems and ISDN/DSL Connections”
[12] For the purpose of this policy, a public network includes the State Network. It does not apply to internal agency networks. Internal agency networks are considered private networks.

2. Agencies using modem (cable or telephone)/broadband (*i.e.* ISDN, DSL, etc.) connections to transmit confidential information over public networks shall implement the following security measures to prevent disclosure of the confidential information:
   - The agency shall require personnel to encrypt or transmit through a secure connection such as VPN or SSL all confidential information, including user passwords and Social Security numbers, to protect the confidentiality and integrity of the information.
   - The agency shall require those who transmit information via these types of connections to notify the intended recipient that the information is being sent.

ISO 27002 REFERENCES
10.8.5 Business information systems

040905 Installing and Maintaining Network Cabling

Purpose: To ensure the availability and integrity of data by protecting network cabling.

POLICY

In addition to complying with the NC Electrical Code[13], agencies that install and/or maintain network cabling shall use only qualified personnel to perform tasks involving this cabling. Agencies shall implement safeguards to protect network cabling from being damaged and to reduce the possibility of unauthorized interception of data transmissions that take place across such cabling.

GUIDELINES

Agencies installing or maintaining network cabling should consider the following practices to increase the security and physical protection of cabling where appropriate:

1. Using underground cabling, where possible, or providing lines with adequate alternative protection.
2. Running network cabling through overhead cable troughs, pipes or similar conduits.
3. Limiting the amount of exposed cabling within public areas.
4. Eliminating interference by segregating power cables from communications cables.
5. Installing fiber-optic cabling.

ISO 27002 REFERENCES
9.2.3 Cabling security

Section 10 Using Portable Computing and Storage Devices

041001 Using Removable Storage Media, Including Diskettes and CDs

Purpose: To protect the State's data contained on removable storage media from unauthorized disclosure and modification.

POLICY

Security controls shall be put in place to protect the confidentiality and integrity of data contained on removable storage media throughout the life of those storage media, including disposal. Access controls

[13] Chapter 8, Article 830 of the code addresses "Network Powered Broadband Systems." Other provisions apply as well.

shall include physical protection of and accountability for removable media to minimize the risk of damage to data stored on the removable storage media, theft, unauthorized access of data stored on the media, and software licensing violations.

ISO 27002 REFERENCES
10.7 Media handling

041002 Using Laptop/Portable Computers

Purpose: To protect data on laptop/portable computers and other handheld computing devices.

POLICY

1. Agencies shall authorize the assignment of portable personal computers to employees and require that users comply with all information technology security policies when using the portable devices, including the agency and statewide acceptable use policies, as applicable.
2. Portable devices covered by this policy are those that connect to agency and State networks and/or store agency data and include the following:
   - Laptop, notebook, netbook and tablet computers.
   - Mobile computing devices and portable computing devices such as personal digital assistants (PDAs), electronic organizers, smart phones, cellular phones, and pagers.
   - Portable storage devices such as compact disks (CDs), digital video disks (DVDs), media players (MP3 players), flash drives, thumb drives, or other similar devices.
3. Agencies shall implement appropriate safeguards to ensure the security of laptops and other portable computing devices. Specifically, portable computing devices shall:
   - Be physically secured when the users have taken them out of a secure area.
   - Be labeled with tamper-resistant tags identifying the device as property of the State, or a permanently engraved serial number or both.
   - Comply with all applicable security requirements for desktops.
   - If not protected by encryption software, the BIOS password on such devices must be enabled if technically possible.
   - Use current antivirus software to scan for malware.
   - Have regular backups.
   - Have firewalls configured to comply with State and agency policies.
4. When a laptop is outside a secure area, data on the laptop must be backed up, and the backup must be kept separate from the laptop. (The agency shall define the policies and procedures for backing up mobile computing data, which shall include a classification of what data will be backed up.)
5. Personnel who use an agency laptop/portable computer shall ensure that the laptop/portable computer and the information it contains are suitably protected at all times.
6. Agencies shall periodically audit these devices to ensure compliance with these requirements.

GUIDELINES

Agency management should consider using the following additional security controls, as appropriate:

1. Check-in procedures for portable devices that verify the device is free of unauthorized software, viruses, or any other malicious code prior to reissue or reconnection to the network.

2. Training to raise user awareness of the additional risks that accompany mobile computing and the controls with which users must comply.
3. The small size and mobility of portable computing devices are the primary causes of the attendant security risks. Information security controls that agencies should consider include the following:
    - Procedures governing appropriate use of portable devices in unprotected areas (meeting rooms and off-site locations).
    - Restricting use of such devices via a wireless connection that originates from anywhere other than State- or agency-approved networks.
    - Training on how to physically secure devices against theft when left in cars or other forms of transport, hotel rooms, conference centers and meeting places.
    - Training to raise user awareness of the additional risks that accompany mobile computing and the controls that should be implemented.

ISO 27002 REFERENCES
9.2.5 Security of equipment off-premises
11.7.1 Mobile computing and communications

041003 Working from Home or Other Off-Site Location (Teleworking)

Purpose: To secure and protect communications with agency information resources while personnel are working at off-site locations.

POLICY

1. Agencies shall define policies for authorized personnel to securely access systems from off-site. Policies shall include the following:
    - Use of agency-approved virus prevention and detection software.
    - Use of personal firewalls that are configured to block unauthorized incoming connections.
    - Securing home wireless networks, and properly using other non-State Wi-Fi connections.
    - Protecting mobile computing devices and portable computing devices such as personal digital assistants (PDAs), smart phones, and portable storage devices such as compact disks (CDs), digital video disks (DVDs), media players (MP3 players), flash drives, or other similar devices that are used to conduct the public's business.
    - Use of virtual private networking (VPN) software or other technologies for protecting communications between off-site systems and agency information resources.
    - Use of two-factor authentication products (such as one-time password tokens or biometric devices) to authenticate users, if applicable or if required by statute or industry standard.
    - Use of encryption products to protect data stored on off-site systems, if applicable. Agencies shall follow the statewide information security standard for encryption.
2. Agencies shall provide training to personnel for properly accessing systems from off-site and for keeping antivirus software and personal firewall software up to date with the latest signature files and patches.
3. Agencies shall also provide instructions and training for protecting confidential information transferred to, processed on or stored on non-State-issued systems, such as personal computers at home.
4. Agencies shall document and retain evidence of training provided to a user during the time that the individual is authorized to access systems remotely.

5. Agency employees who are authorized to work from home shall ensure that the agency-defined policies for off-site work are strictly followed. Personnel shall take extra precautions to ensure that confidential information stored on personal computers or electronic devices is not divulged to unauthorized persons, including family members.

GUIDELINES

When working from public wireless networks, (*i.e.,* Hotspots), users should consider the following:

- When possible, use access points that require a key and which encrypt the wireless communication.
- Configure wireless LAN settings to not allow automatic joining of any wireless network. Make sure the mobile device allows you to choose whether to connect to a WLAN access point and which one.
- Disable file and print sharing.
- Access only web based resources that utilize secure connections, such as SSL.

ISO 27002 REFERENCES
9.2.5 Security of equipment off-premises
11.7.2 Teleworking

041004 Using Mobile Communication Devices

Purpose: To protect state resources and information during mobile communication device use.

POLICY

For purposes of this policy, “mobile communication devices” includes mobile phones, IP phones, pagers, BlackBerry devices, iPhones, smart phones, tablets, etc. Some of these devices are multifunctional and may be used for voice calls, text messages, email, Internet access, and may allow access to computers and/or networks.

1. Confidential State information transmitted, accessed, and/or stored on mobile communication devices shall be appropriately secured.
2. The amount of personal conversations and/or personal business on agency-provided mobile communication devices shall be controlled in accordance with State and agency policies. Agencies that allow mobile communication devices (personal or business owned) to connect to state systems, such as email, shall require the following:
    - A minimum 4-digit numeric, user defined, personal identification number (PIN) that is changed every 90 days.
    - A time out of inactivity that is 10 minutes or less.
    - If technically possible, the ability to remotely erase the contents of the device, at the user’s request, management request via a help desk service request, or by the user’s own action. Agencies shall make end users aware that they are accepting the risk of personal data being lost.
    - Users shall report lost or stolen mobile communication devices to an agency’s service desk or to agency management within 24 hours of confirmation.
3. Personnel using agency-provided mobile communication devices shall do the following:
    - Adhere to State and agency acceptable use standards and policies.
    - Adhere to the statewide encryption standard, if applicable.
    - Adhere to statewide information security policies for removing all data before disposing the device.

- Change the default password for connecting to a wireless enabled device (*i.e.,* Wi-Fi or Bluetooth) on applicable mobile communication devices.
- Disable wireless functionality (*i.e.,* Wi-Fi or Bluetooth) on appropriate devices with wireless functionality (*i.e.,* Wi-Fi or Bluetooth) if it is not in use.

GUIDELINES

Agencies that issue mobile communication devices to personnel and/or permit personnel to use their own mobile communication devices to conduct state business should make them aware of the following:

1. The risk of others eavesdropping physically and electronically in both private and public areas.
2. The risk of storing and/or transmitting confidential information on calendars, address books, etc.
3. Their responsibility for the safekeeping of mobile communication devices.

The following measures should be used to protect mobile communication devices used to conduct state business whenever possible.

1. If possible, agencies should consider encrypting all mobile communication devices regardless of the confidentiality of the information stored on a device.
2. Users should not open attachments from untrusted sources.
3. Users should not follow links from untrusted sources, such as from unsolicited email or text messages.
4. Users should utilize a remote wipe feature, if available, to remotely set the device to factory defaults if it is lost or stolen.
5. Users should report lost devices immediately to the carrier and/or organization.
6. Users should review the mobile device security settings to ensure appropriate protection.
7. For Bluetooth enabled devices, consider the following[14]:
    - Choose PIN codes that are sufficiently random and long.
    - Disable the ability for the Bluetooth device to be discovered, except when needed for pairing.
    - Pair devices only in a secure area.
    - When possible, enable encryption to secure data transmissions.
    - When possible, enable device mutual authentication.
    - Set the Bluetooth device to the lowest necessary and sufficient power level.
    - Do not accept transmissions from unknown or suspicious devices.
    - In the event a Bluetooth enabled device is lost or stolen, immediately unpair the device.

ISO 27002 REFERENCES
9.2.5 Security of equipment off-premises
10.8.5 Business information systems

041005 Using Business Center Facilities

Purpose: To establish appropriate use requirements when information is processed in external business centers or facilities.

[14] For additional guidance on Bluetooth Security, refer to the NIST document SP 800-121 “Guide to Bluetooth Security” located on the NIST Special Publications web page.

POLICY

1. Agency employees using external business centers to conduct business shall not process confidential information, including transmitting confidential information via email(s) or fax(es).
2. When agency employees use business center facilities for processing other government information (*i.e.,* information that is not confidential), they shall do the following:
   - Refrain from using auto-save features on the facility's equipment and delete, prior to leaving the facility, any files that were temporarily saved to the hard disk of the equipment they were using.
   - Clear history and cache memory and delete cookies prior to leaving the facility.
   - Never leave the computer on which they are working unattended.
   - Clear the facility's printer(s) of all documents they have printed.

ISO 27002 REFERENCES
11.7.1 Mobile computing and communications

Section 11 Other Hardware Issues

041101 Managing and Using Hardware Documentation

Purpose: To effectively manage hardware assets and their documentation.

POLICY

1. Agencies shall retain user documentation and technical specifications of information technology hardware.
2. Documentation shall be secured from unauthorized use and made readily available to support system maintenance and system support staff. Each agency shall identify and record its information technology (IT) hardware assets in a formal hardware inventory/register.
3. Each agency shall develop a process to ensure that IT hardware is identified with agency-unique physical asset tags and that the inventory/register is kept up to date.

GUIDELINES

1. Agencies should develop and maintain additional documentation that details hardware placement and configuration, provides flowcharts, etc.
2. The formal hardware inventory should include only information that is available for public inspection.

ISO 27002 REFERENCES
7.1.1 Inventory of assets
10.7.4 Security of system documentation

041102 Moving Hardware from One Location to Another

Purpose: To protect hardware during moves.

POLICY

To protect agency hardware and the data residing on the hardware, only authorized personnel shall be allowed to move hardware from one location to another. Equipment can be damaged if handled improperly and the confidentiality and integrity of data can be compromised if unauthorized persons gain possession of the hardware.

ISO 27002 REFERENCES
9.2 Equipment security

041103 Disposing of Obsolete Equipment

Purpose: To protect data confidentiality and integrity through proper disposal of obsolete equipment.

POLICY

1. Agencies shall establish a procedure for certifying that data have been properly removed from information technology equipment before it is transferred, surplused or donated.
2. The data contained on information technology equipment must be permanently removed by destroying, purging, or clearing. The method chosen must be appropriate for the media used and approved by the National Institute of Standards and Technology (NIST) or comply with approved Department of Defense standards so that previously recorded information is not recoverable. The method of data removal shall be based on what is reasonable and practical.[15]
3. Agencies must ensure that all State/agency information is fully removed from obsolete information technology equipment and not recoverable before the equipment is released to the State Office of Surplus Property or a third-party disposal facility.
4. Agencies involved in the disposal of obsolete material shall utilize only companies that specialize in secure waste disposal and that can comply with service level agreements established by the agency.
5. Service level agreements with external firms/third parties shall include the following:
    - Stipulations to ensure compliance with the agency's security policies and standards, enforceable by suit for breach of contract and the right to monitor compliance.
    - Development of procedure(s) for certifying that data have been properly removed from government-controlled equipment before it is transferred, resold, donated, or disposed of.
    - Removal of data from floppy disks, CD-ROMs, magnetic tapes and all other electronic storage media or subsequent destruction (*e.g.,* degaussing, shredding, etc.).
    - Scheduled disposal periods and/or processes involved in waste collection.

ISO 27002 REFERENCES
6.2.3 Addressing Security in third party agreements
9.2.6 Secure disposal or re-use of equipment
10.7.2 Disposal of media

041104 Recording and Reporting Hardware Faults

Purpose: To maximize hardware availability and integrity through fault recording/reporting.

[15] Additional information regarding the secure disposal of obsolete equipment may be found in the NIST publication 800-88 titled "Guidelines for Media Sanitization."

POLICY

1. Users who identify a hardware fault or information-system-processing problem shall promptly report the problem and the details to the appropriate support staff.
2. Each agency shall establish procedures to record and track equipment faults.

ISO 27002 REFERENCES
9.2.4 Equipment maintenance
10.10.5 Fault logging

041105 Dealing with Answering Machines/Voice Mail

Purpose: To prevent confidential information from being disclosed in messages left on telephone answering machines and voice mail.

POLICY

1. Users shall not record or leave messages containing confidential information on answering machines or voice mail systems.
2. Agencies shall communicate in their training for personnel that confidential information is not to be left on answering machines or voice mail systems.

ISO 27002 REFERENCES
10.8.1 Information exchange policies and procedures
10.8.5 Business information systems

041106 Taking Equipment off the Premises

Purpose: To safeguard and maintain accountability for equipment.

POLICY

1. Agency personnel must have approval from an authorized agency employee before they remove State information technology equipment from agency facilities.
2. Personnel removing equipment shall be responsible for the security of the equipment at all times.
3. Agencies shall establish procedures for the removal and return of agency equipment.
4. Where appropriate, logging procedures shall be established to track the removal (sign-out) of equipment from and return (sign-in) of equipment to the agency.

ISO 27002 REFERENCES
9.2.5 Security of equipment off-premises
9.2.7 Removal of property

041107 Maintaining Hardware (On-Site or Off-Site Support)

Purpose: To maintain hardware availability and integrity.

POLICY

1. Each agency shall provide or arrange maintenance support for all equipment that is owned, leased or licensed by the agency.

2. The agency must arrange support services through appropriate maintenance agreements or with qualified technical support staff.
3. When maintenance support is provided by a third party, nondisclosure statements shall be signed by authorized representatives of the third party before any maintenance support is performed.
4. Records of all maintenance activities shall be maintained.

ISO 27002 REFERENCES
9.2.4 Equipment maintenance

041108 Damage to Equipment

Purpose: To improve confidentiality, integrity and availability of data by requiring the reporting of property damage.

POLICY

Each user shall report deliberate or accidental damage to agency equipment or property to his or her manager as soon as it is noticed.

GUIDELINES

Damage to equipment or property that performs a security function may create a weak link in the agency's security architecture and leave confidential data exposed. Agencies should refer to their business impact analyses or risk analyses to determine the level of urgency in repairing or replacing damaged equipment.

ISO 27002 REFERENCES
9.2.4 Equipment maintenance
10.10.5 Fault logging

Section 12 Data Management

041201 Managing Data Storage

Purpose: To protect the State's information resident on electronic data storage

POLICY

1. Agencies shall ensure the proper storage of data and information files for which they are responsible.
2. Stored data shall be protected and backed up so that a restoration can occur in the event of accidental or unauthorized deletion or misuse.
3. Agencies shall also meet all applicable statutory and regulatory requirements for data retention, destruction, and protection.
4. Agencies shall protect the State's information and comply with the agency records retention policy or the General Schedule for State Agency Records, Information Technology Records.
5. Agencies shall ensure encryption keys are properly stored (separate from data) and available, if needed, for later decryption. When using encryption to protect data, agencies shall follow the statewide information security standard for encryption.
6. Agencies shall establish change management procedures for the emergency amendment of data that occurs outside normal software functions and procedures.

7. All emergency amendments or changes shall be properly documented and approved and shall meet all applicable statutory and regulatory requirements.

GUIDELINES

Agencies should keep stored public data to a minimum of what is necessary to adequately perform their business functions. Sensitive or confidential data that is not needed for normal business functions, such as the full contents of a credit card magnetic strip or a credit card PIN, should not be stored. Agencies should consider implementing a process (automatic or manual) to remove, at least quarterly, stored confidential data, like cardholder data, that exceeds the requirements defined in the agency's data retention policy.

ISO 27002 REFERENCES
10.5.1 Information back-up
10.7.3 Information handling procedures
12.5.1 Change control procedures
15.1.3 Protection of organizational records

041202 Managing Databases

Purpose: To protect the State's information databases.

POLICY

1. Agencies shall properly safeguard the confidentiality (where applicable), integrity and availability of their databases.
2. Data from these databases shall be protected from unauthorized deletion, modification or misuse and shall meet all applicable statutory and regulatory requirements.
3. Critical data files shall be backed up, and if confidential data is backed up, the backup media shall receive appropriate security controls.
4. To maintain the reliability of databases maintenance must be performed on the operating system of the system that hosts the databases, or there is a greater possibility that the database itself will fail.
5. Databases that store critical, confidential information such as client records, accounting data, medical history data and data on sales and purchases require more stringent mean time between failures (MTBF) and mean time to repair (MTTR) configurations.

GUIDELINES

To mitigate security issues with spreadsheets, agencies should do the following:

1. Validate the formulas in the spreadsheet.
2. Implement read, write and deletion controls on access to the spreadsheet.
3. Control the spreadsheet's distribution.
4. Maintain retention and version control.
5. Save the spreadsheet in a directory that is backed up regularly.

To mitigate security issues with databases, agencies should do the following:

1. Fully test any database before making it operational.
2. Control access levels (read, write, modify) to the database.
3. Validate all data before they are entered into the database.
4. Maintain retention and version control.

5. Control database reports distribution.

ISO 27002 REFERENCES
10.1.2 Change management
10.3.2 System acceptance
12.2 Correct processing in applications
15.1.3 Protection of organizational records

041203 Managing Folders/Directories

Purpose: To provide directory-level protection for the State's information resources.

POLICY

1. Agencies shall establish policies and procedures for creating and managing access to directory structures based on the most restrictive set of privileges needed to perform authorized tasks.
2. New directory/folder structures shall be designed with the appropriate access controls to restrict access to authorized personnel only.
3. New folders/directories shall prohibit the modification or deletion of files and folders from personnel other than the data creator/owner or system administrators.
4. New folders/directories designed for holding confidential information shall be password protected.
5. Agencies shall establish and manage access controls governing the modification or amendment of the directory structures on network or shared drives.

ISO 27002 REFERENCES
11.11.1 Access control policy

041204 Sharing Data on Software and Information Systems

Purpose: To protect the State's confidential information while utilizing software or information systems.

POLICY

1. Software or information systems that allow the sharing of files and data containing confidential information shall be used to share data only if the appropriate security controls are properly configured and implemented.
2. Appropriate security controls shall include the following:
   - Authentication controls to ensure that authorized users are identified.
   - Access controls to limit an individual's access to only the confidential information necessary for that person to perform his/her role.
   - Authorization controls to enforce version control and record retention requirements such that only designated individuals are able to modify or delete sensitive or critical records.
   - Audit controls that record individual actions on files and records, such as when a file is modified. Audit logs shall be retained in accordance with the agency records retention policy or the General Schedule for State Agency Records, Information Technology Records.
3. These controls may be supplemented by operating-system-level controls (*e.g.,* file and directory access control lists and system audit logs).

ISO 27002 REFERENCES
11.1.1 Access control policy

041205 Updating Citizen and Business Information

Purpose: To protect the confidentiality and integrity of the State's electronic information on citizens and businesses.

POLICY

1. Only authorized individuals shall perform updates to citizen and business databases.
2. When changing information, State employees must be diligent in protecting confidential information and shall adhere to all applicable laws and regulations.
3. Access to citizen and business or agency confidential data shall be controlled through various appropriate access control mechanisms.

GUIDELINES

Agencies should provide the appropriate management structure and control to foster compliance with data protection legislation. Agencies may need to write the responsibility for data protection into one or more job descriptions to reach compliance.

ISO 27002 REFERENCES
8.1.1 Roles and responsibilities
15.1.4 Data protection and privacy of personal information

Section 13 Backup, Recovery and Archiving

041301 Backup and Recovery of Systems

Purpose: To ensure proper backup and restore procedures for agency information technology systems.

POLICY

1. Agencies shall establish procedures for the adequate backup and the restarting or recovery of their information technology systems.
2. Procedures for the restarting of information technology systems shall be properly tested and documented. These procedures shall include the following:
   - Documented backup frequencies and schedules.
   - Documented storage location for the correct system information backup medium.
   - An approved process for restoring the system.
   - Compliance with agency change management procedures.
   - Testing on a regular basis, as established by agency management.
   - Guidance for restart documentation.
3. Agencies shall manage the backup and recovery procedures of their information technology systems according to their business continuity plans. These plans must be properly documented, implemented and tested to ensure operational viability and their adherence to N.C.G.S. §147-33.89.
4. Agencies shall ensure the proper recovery and restoration of data files from their information technology systems according to their business continuity plans. These business continuity plans, procedures and media must be properly documented, implemented, stored and tested to ensure operational viability, reliable retrieval and adherence to N.C.G.S. §147-33.89.

5. Data recovery must be conducted by authorized parties and recovered data must be tested for potential corruption.
6. When recovering data, a test set of the data is selected as the data exist at a specific point in time. The recovered data are then compared to the test set and reviewed for their integrity.

GUIDELINES

1. In managing backup and recovery procedures, agencies should ensure the following:
    - Backup schedules meet business system requirements.
    - Backup and restoration processes are tested on a regular basis.
    - Backup facilities are adequate for minimum levels of operation.
    - Retention periods of various data are based on operations, laws and regulations.
    - Backup and recovery procedures are periodically reviewed and updated, as necessary.
    - Validation of the integrity of the backup or image file through file hashes for backups, restores, and virtual machine migrations.
    - Classification of the backup media so the sensitivity of the data can be determined.
    - Secure storage of media back-ups in a secure location, preferably an off-site facility.
    - All backup media are physically secured from theft and destruction.
    - Media are transported by secured courier or other delivery method that can be accurately tracked.
    - Management approval for any media moved from a secure area.
    - Proper maintenance of inventory logs of all media, including media inventories at least annually.
2. Agencies should consult with the North Carolina Department of Cultural Resources, Government Records Section, to select archival media that will protect the integrity of the data stored on those media for as long as the data are archived.
3. When archiving data associated with legacy systems, agencies should plan to provide a method of accessing those data.

ISO 27002 REFERENCES
10.5.1 Information back-up
10.7.3 Information handling procedures

041302 Backing Up Data on Portable Computers

Purpose: To protect the State's data stored on mobile/portable computers via regular backup plans.

POLICY

1. Agencies shall define the policies and procedures for backing up mobile computing data, which shall include a classification of what data shall be backed up.
2. Agencies shall ensure that all appropriate data stored on mobile/portable computing devices is regularly and properly backed up.
3. Data stored on any mobile/portable computing device shall be backed up according to the schedule specified in the agencies' business continuity plans.
4. When a mobile/portable computer is outside of a secure area, the backup medium must be kept separate from the mobile/portable computer.

5. Backup media shall be properly stored in a secure, environmentally controlled location with access control to protect data from unauthorized loss or access.

ISO 27002 REFERENCES
11.7.1 Mobile computing and communications

Section 14 Using Outsourced Processing and Third Party Services

041401 Contracting or Using Outsourced Processing

Purpose: To ensure that outsourced processing achieves acceptable service levels.

POLICY

1. Agencies that outsource their information processing must ensure that the service provider demonstrates compliance with industry quality standards.
2. Outsourcing agreements shall include a contract that, at a minimum, meets State information technology security requirements.
3. Outsourcing agreements shall include the following:
   - The agency's course of action and remedy if the vendor's security controls are inadequate such that the confidentiality, integrity or availability of the agency's data cannot be assured.
   - The vendor's ability to provide an acceptable level of processing and information security during contingencies or disasters.
   - The vendor's ability to provide processing in the event of failure(s).

ISO 27002 REFERENCES
6.2.1 Identification of risks related to external parties
12.5.5 Outsourced software development

041402 Third Party Service Management

Purpose: To ensure management of contracts with third parties.

POLICY

1. Agencies shall manage third parties to meet or exceed mutually agreed upon signed contracts.
2. Agencies shall also ensure third parties meet or exceed all State policies, standards and procedures.
3. Services, outputs and products provided by third parties shall be reviewed and checked regularly.
4. To monitor third party deliverables, agencies shall do the following:
   - Monitor third party service performance to ensure service levels meet contract requirements.
   - Review reports provided by third parties and arrange regular meetings as required by contract(s).
   - Review third party reports including audit logs, operational problems, failures, and fault analysis (including security events) as they relate to services being delivered.
   - Resolve and manage any identified problem areas.
5. Any changes to services provided by a third party must be approved by agency management prior to implementation.

6. Contracts should be updated to reflect changes. Examples may include the following:
    - Service improvements.
    - New or updated applications.
    - New controls.
    - Changes to network design.
    - New technologies, products or tools.
    - Changes in agency policies and procedures.
    - Resolve discovered exposures and changes that would improve the security posture of the agency.
    - Change of vendors.
    - Services that are moved to a new or different location by the third party.

ISO 27002 REFERENCES
10.2.1 Service delivery
10.2.2 Monitoring and review of third party services
10.2.3 Managing changes to third party services

041403 Third Party Service Delivery

Purpose: To define, monitor, and manage service levels from third party service providers.

POLICY

1. When agencies contract with external service providers, service definitions, delivery levels and security requirements shall be documented in a formal service level agreement (SLA) or other documented agreement.
2. Agencies shall develop a process for engaging service providers and maintain a list of all service providers who store or share confidential data.
3. Agencies shall ensure that the SLA includes requirements for regular monitoring, review, and auditing of the service levels and security requirements as well as incident response and reporting requirements. The SLA shall state how the service provider is responsible for data stored or shared with the provider.
4. Agencies shall perform the monitoring, review, and auditing of services to monitor adherence to the SLA and identify new vulnerabilities that may present unreasonable risk. Agencies shall enforce compliance with the SLA and must be proactive with third parties to mitigate risk to a reasonable level.
5. Changes to the SLA and services provided shall be controlled through a formal change management process.

ISO 27002 REFERENCES
6.2.3 Addressing security in third party agreements
10.2 Third party service delivery management

Chapter 5 – Physical Security

Section 01 Premises Security

050101 Securing Premises to Site Computers and Data Centers

Purpose: To protect equipment through secure site selection and preparation.

POLICY

1. Agencies shall carefully evaluate sites and facilities that will be staffed and will house information technology equipment to identify and implement suitable controls to protect staff and agency resources from environmental threats, physical intrusion and other hazards and threats.
2. Each agency shall safeguard sites, buildings and locations housing its information technology assets.

GUIDELINES

When evaluating or preparing sites for hardware installation, agencies should consider the following:

1. Sites and locations for installation of information technology equipment should be carefully selected because of the difficulty of relocating hardware once it is in place.
2. Security threats may expand from neighboring premises or adjacent properties.
3. Requirements for size and location will vary according to the amount of hardware being housed.
4. Physical security measures adopted should reflect the:
   - Value of the hardware.
   - Sensitivity of the system's data.
   - Required level of availability or fault tolerance.
5. Agencies should conduct a risk assessment to calculate perceived risks and the total costs involved to mitigate threats to acceptable levels. Risk assessments may reveal that security controls are needed for natural, structural and human threats such as the following:
   - Explosion.
   - Fire.
   - Smoke.
   - Water (or a failure to supply water).
   - Chemicals.
   - Wind.
   - Seismic activity.
   - Dust.
   - Vibration.
   - Electromagnetic radiation.
   - Electrical supply interference.
6. Business operations, business continuity plans and applicable contracts should ensure that natural, structural and human threats have been accurately assessed and that controls are employed to minimize unauthorized physical entry to sites, buildings and locations housing information technology assets.

7. Access to loading docks and warehouses shall be restricted to authorized personnel. Items that are received via loading areas shall be signed for and inspected for hazardous materials before being distributed for use.
8. Duress alarms shall be used in areas where the safety of personnel is a concern. Alarms shall be provisioned to alert others such as staff, the police department, the fire department, etc.
9. Security measures agencies should consider include the following:
    - Clearly defined, layered security perimeters to establish multiple barriers:
        - Walls (of solid construction and extending from real ceiling to real floor where necessary).
        - Card-controlled gates and doors.
        - Bars, alarms, locks, etc.
        - Bollards.
        - Lighting controls.
        - Video cameras and intrusion security system.
        - Staffed reception desk.
    - Fire doors on a security perimeter shall be equipped with alarms as well as devices that close and lock the doors automatically.

ISO 27002 REFERENCES
9.1.1 Physical security perimeter
9.1.4 Protecting against external and environmental threats
9.1.5 Working in secure areas
9.1.6 Public access, delivery, and loading areas
9.2.1 Equipment siting and protection

050102 Ensuring Suitable Environmental Conditions

Purpose: To ensure that environmental conditions are suitable for State agency computing resources.

POLICY

When locating information technology assets, agencies shall implement appropriate controls to protect the assets from environmental threats, such as fire, flooding and extreme temperatures.

GUIDELINES

Agencies should consider exposed vulnerabilities to environmental risks that could hinder or make it impossible for the agency to continue business operations in the event of:

1. Fire or smoke damage.
2. Flooding (pipes bursting, fire suppression system or other overhead water conduits malfunctioning, etc.)
3. Heating, ventilation or air conditioning (HVAC) failures.
4. Dust or other contaminants.
5. Relevant health and safety standards.
6. Threats that may expand from neighboring premises.

ISO 27002 REFERENCES
9.1.3 Securing offices, rooms, and facilities

050103 Physical Access Control to Secure Areas

Purpose: To protect computer equipment by controlling physical access.

POLICY

1. Agencies shall ensure areas housing information technology assets have appropriate physical access controls.
2. Authorized individuals may include State employees, contractors, vendors and customers.
3. Agencies shall develop access policies for authorized individuals as well as visitors to these areas.
4. An audit trail of access for all individuals to data centers shall be maintained.
5. Publicly accessible network jacks in data centers shall provide only Internet access by default, unless additional functionality is explicitly authorized.
6. Physical access to networking equipment and cabling shall be restricted to authorized personnel.

GUIDELINES

Agencies should control the number of people who have physical access to areas housing computer equipment to reduce the threats of theft, vandalism and unauthorized system access. When implementing physical access controls, agencies should consider the following measures to control and restrict access:

1. The access control system should address the following categories of personnel, each with different access needs:
    - System operators and administrators who regularly work in the computer area.
    - Support staff and maintenance engineers who require periodic access to the computer area.
    - Other staff who rarely need access to the area.
2. Physical access controls should include some form of visible identification such as an ID badge.
3. An audit trail of physical access to the computer area should be maintained.
4. Computing facilities require additional controls for visitor access, including the following:
    - Access should be restricted to people with authorized purposes for visiting the computer area.
    - Instructions should be issued to visitors explaining security requirements and emergency procedures.
    - Entry and exit dates and times should be logged.
    - Visitors should be escorted and should wear visible identification that clearly draws attention to their restricted status.

ISO 27002 REFERENCES
9.1.2 Physical entry controls

050104 Challenging Strangers on Agency Premises

Purpose: To increase the security of areas housing information technology equipment.

POLICY

1. Each agency shall educate employees to appropriately challenge strangers in areas containing information technology equipment to verify the stranger's authority to be in the controlled area.

2. Employees and visitors shall be properly badged and visitors shall be escorted at all times.
3. Where entrance to an area requires a badge or a similar controlled-access method, authorized individuals shall not allow unauthorized individuals to follow them into the controlled-access area.

ISO 27002 REFERENCES
1.1.3 Securing offices, rooms, and facilities

050105 High Security Locations

Purpose: To protect information and assets in high security locations.

POLICY

1. Locations that contain confidential information shall be designed and secured in accordance to the information being protected.
2. Video cameras and/or access control mechanisms shall be used to monitor individual physical access to sensitive areas.
3. The use of personal cameras, video recorders and handheld devices (cell phones, PDAs, pocket PCs), shall be restricted from high security locations to protect the information being stored.

ISO 27002 REFERENCES
9.1.5 Working in secure areas

050106 Fire Risks to the State's Information

Purpose: To reduce the fire risks to the State's information.

POLICY

1. Agencies shall take proper care to manage the risks of fire to the State's data and information technology resources.
2. Risk assessments shall be performed at all sites where agency information is processed or stored to determine the effectiveness of current controls and the risk from fire and other environmental threats.

GUIDELINES

1 Agencies should consider storing duplicate copies of information at alternate locations.

2 Most file cabinets are not fire-, smoke- or water-safe and a fire-proof safe may not be water-safe.

3 Agencies should consider a dry pipe sprinkler system to protect documents from destruction in cases in which the building's sprinkler system is triggered.

ISO 27002 REFERENCES
9.2.2 Supporting utilities

Section 02 Other Premises Issues

050201 Managing On-Site Data Stores

Purpose: To protect confidential information maintained in on-site data stores.

POLICY

1. Agencies shall ensure that on-site data storage locations have adequate access controls to minimize the risk of data loss or damage.
2. Each agency shall maintain duplicate copies of critical data on removable media in data stores.

GUIDELINES

Agencies should consider the following information security issues when planning or implementing on-site data stores:

1 The survivability of the data store in the face of man-made or natural disasters.

2 The need for periodic testing of backup and restore procedures to verify strengths and identify areas for improvement.

3 The importance of maintaining a low profile for the facility or its information-processing functions.

ISO 27002 REFERENCES
9.1.2 Physical entry controls
9.1.3 Securing offices, rooms, and facilities

050202 Managing Remote Data Stores

Purpose: To protect confidential information that is stored remotely.

POLICY

1 Agencies shall ensure that remote data storage locations have adequate access controls to minimize the risk of data loss or damage.

2 If the agency does not have direct control over the remote location, the agency shall enter into a contract with the owner of the remote location that stipulates the access controls and protection the owner must implement. The remote data store contract shall also include the following:

- The perimeter security and physical access controls to the site and to the agency's data store.
- Design requirements for secure data storage (*i.e.,* fire suppression and detection equipment, heating, ventilation, and air conditioning [HVAC], measures to prevent water damage, etc.).
- Transportation of removable media to and from the agency.

GUIDELINES

Agencies may wish to consider both direction and distance when choosing a remote data store location. The distance between the main computing site and the remote site should be great enough to minimize the risk of both facilities being affected by the same disaster (*e.g.,* fire, hurricane, explosion, etc.).

ISO 27002 REFERENCES
9.1.1 Physical security perimeter
9.1.2 Physical entry controls
9.1.3 Securing offices, rooms, and facilities

050203 Using Lockable Storage Cupboards and Filing Cabinets

Purpose: To secure valuable material or equipment within lockable storage compartments.

POLICY

1. Agencies shall store valuable equipment and confidential information securely, according to its classification status.
2. Where appropriate, agencies shall store resources in lockable storage cupboards where the physical security controls are sufficient to protect the equipment from theft.
3. Agencies shall use lockable file cabinets to store confidential information such as paper documents and computer media in a manner that is commensurate with the information's classification status.
4. Where appropriate, agencies shall provide fire-resistant storage for documents and media containing information critical to their business function.

GUIDELINES

Agencies should consider the following physical security issues:

1 Securing critical information in fire-resistant storage should be part of an agency's clear desk policy.

2 Regardless of the rated capacity of a fire-resistant container, events surrounding a fire (heat, smoke, water, chemicals) may render any information that is stored in the container unusable; therefore, off-site backups of critical information remain essential.

ISO 27002 REFERENCES

9.1.3 Securing offices, room and facilities
11.3.3 Clear desk and clear screen policy

Chapter 6 – Cyber Security Incident Response

Section 01 Combating Cyber Crime

060101 Defending Against Cyber Attacks

Purpose: To protect agency networks from a premeditated cyber attack.

POLICY

1. Agencies must identify all network access points and verify that the safeguards for the network and individual systems are adequate and operational. These systems include wireless access points, network ingress and egress points, and network-attached devices.
2. Agencies shall have security incident management and response plans that address steps to be taken during and after cyber attacks.
3. Incident response plans shall incorporate information from intrusion detection/prevention systems (IDS/IPS), and other monitoring systems.
4. Agencies shall also develop contingency plans for the continuation of business processes while under a cyber attack and/or the recovery of any data damaged or lost during such an attack.
5. The security incident management and response plans shall be integrated with the business continuity and disaster recovery plans.
6. Both plans shall be developed for use when threats result in loss, corruption, or theft of data or interruption of service due to a cyber attack.
7. These plans shall be developed and tested in accordance with the statewide information security standards for Business Continuity Planning and Testing.
8. Agencies shall develop a process to modify plans according to lessons learned and industry developments.
9. Agencies shall deploy controls to ensure that the State's resources do not contribute to outside-party attacks. These controls include the following:
    - Securing interfaces between agency-controlled and non-agency-controlled or public networks.
    - Standardizing authentication mechanisms in place for both users and equipment.
    - Controlling users' access to information resources.
    - Monitoring for anomalies or known signatures via intrusion detection systems (IDS) and/or intrusion prevention systems (IPS). IDS/IPS signatures shall be up to date.

ISO 27002 REFERENCES
11.4 Network access control
14.1.2 Business continuity and risk assessment

060102 Defending Against Cyber Attacks

Purpose: To limit the potential damage caused by internal attacks.

POLICY

To defend against cyber attacks on agency networks and to prevent damage, access rights to files shall be controlled to maximize file integrity and to enforce separation of duties.

1. Access to files shall be granted only as required for the performance of job duties.
2. Networks that serve different agencies or departments shall be controlled through the use of VLANs, routers, firewalls, etc.
3. Access badges shall be programmed to allow entry only into assigned places of duty.
4. Separation of duties in programming shall be enforced to eliminate trapdoors, software hooks, covert channels, and Trojan code.
5. Users' activities on systems shall be monitored to ensure that users are performing only those tasks that are authorized and to provide an appropriate audit trail.
6. Authorization levels shall be reviewed regularly to prevent disclosure of information through unauthorized access.
7. Vulnerability assessments and penetration tests are tools that can minimize opportunities for cyber-crime and are part of a defense-in-depth strategy. When an agency determines that an assessment of information system security or network vulnerability is needed, it shall receive approval from the State CIO, as required by N.C.G.S. §147-33.111(c).

ISO 27002 REFERENCES
10.10.2 Monitoring system use
11.1.1 Access control
11.4 Network access control
11.6.1 Information access restriction

060103 Safeguarding Against Malicious Denial of Service Attacks

Purpose: To safeguard network resources from denial of service and distributed denial of service attacks.

POLICY

Each agency shall have the following responsibilities:

1. To appropriately secure all hosts that could be a potential target for a denial of service (DoS) or distributed denial of service (DDoS) attack based on the agency's ability to accept the risk for a possible disruption in service.
2. To deny all inbound traffic by default, thus limiting the channels of network attacks.
3. To periodically scan network and devices for bots (software robots) and Trojan horse programs.
4. To deploy authentication mechanisms wherever possible.
5. To design and implement networks for maximum availability.
6. To develop specific plans for responding to DoS and DDoS attacks in the agency incident management plan and the business continuity plan.

ISO 27002 REFERENCES
9.4 Network access control
13.2.1 Responsibilities and procedures

060104 Defending Against Hackers, Stealth- and Techno-Vandalism

Purpose: To defend the State from cyber-crime-related activities.

POLICY

To defend the State's assets against hackers, stealth data-gathering software (such as spyware, adware and bots) and techno-vandalism, it is critical to limit potential exploits within the network infrastructure. The following duties shall be performed by system administrators or security personnel:

1. Periodic scanning for spyware, adware and bots (software robots) with one or more anti-spyware programs that detect these malicious programs and help inoculate the system against infection.
2. Denial of all inbound traffic by default through the perimeter defense. Exceptions for traffic essential for daily business must be requested through network security.
3. Configuration of public facing systems in accordance with statewide information security standards.
4. Provision of security awareness training to personnel on an annual basis that, in part, cautions against downloading software programs from the Internet without appropriate agency approval and outlines the process for addressing virus or other malicious threats to the network. This training shall also stress the potential exposure that email attachments present to the agency and employee.
5. Deployment of intrusion detection and/or intrusion prevention systems, as appropriate.

ISO 27002 REFERENCES

7.1 Responsibility for assets
8.1.1 Roles and responsibilities
8.2.2 Information security awareness, education and training
11.4 Network access control

060105 Defending Against Malware Attacks

Purpose: To minimize malware attacks.

POLICY

1. Agencies shall install robust antivirus software on all LAN servers and workstations, including those used for remote access to the State network.
2. All files downloaded to the State network might potentially contain malicious software (malware), such as viruses, Trojan horses, worms or other destructive programs; therefore, all downloaded files must be scanned for such malware.
3. All malware scanning software shall be current, actively running on deployed workstations and servers, and capable of generating audit logs of virus events.
4. Malware detection programs and practices shall be implemented throughout agencies. Training must take place to ensure that all computer users know and understand safe computing practices.
5. Malware controls, procedures, education and training shall include information on the following:
    - Use of up-to-date antivirus software.
    - Performing frequent backups on data files.
    - Use of write-protected program media, such as CD-ROMs or DVD-ROMs.
    - Validating the source of software before installing it.
    - Scanning for malware on files that are downloaded from the Internet or any other outside source, including all external media, such as flash drives, CDs, etc.
    - Requirements that users first obtain management approval before directly adding any software to the system, whether from public software repositories, other systems or their home systems.

ISO 27002 REFERENCES
10.4.1 Controls against malicious code

Section 02 Reporting Information Security Incidents

060201 Reporting Information Security Incidents

Purpose: To increase effectiveness in assessing threat levels and detecting patterns or trends in regard to information technology security incidents through proper documentation.

POLICY

1. The State's workforce has the responsibility to report information technology security incidents to agency management in accordance with statewide information security standards and agency standards, policies, and procedures.
2. Agency management shall ensure that all information technology security incidents occurring within the agency are reported to the Enterprise Security and Risk Management Office (ESRMO), acting on behalf of the State Chief Information Officer, within twenty-four (24) hours of incident confirmation, as required by N.C.G.S. §147-33.113.
3. All reported information technology security incidents must include the information required on the enterprise Incident Reporting form (see below), incorporated by reference.
4. Individuals who witness a breach in an agency's information technology security or suspect fraudulent activity shall document the event and notify their management in accordance with state and agency standards, policies and procedures.
5. All agency personnel have the responsibility to report any discovered security weaknesses to their agency management in accordance with State and agency standards, policies and procedures. The notification shall be made as soon as possible after the weakness is discovered.
6. Personnel who discover or perceive that there may be a software error or weakness must report it immediately to agency management. Management shall notify the responsible individual/or organization and perform a risk analysis of the perceived threats.
7. When responding to a malware threat, perform the following tasks:
   - Verify threats to rule out the possibility of a hoax before notifying others.
   - Identify personnel responsible for mitigation of malware threats.
   - Provide internal escalation procedures and severity levels.
   - Have processes to identify, contain, eradicate, and recover from malware events.
   - Have a contact list of antivirus software vendors.
   - After an information technology security incident, review with staff the lessons learned from the incident, with any changes subsequently made to the agency incident management plan.
8. Individuals who are aware of software errors or weaknesses shall not attempt proof-of-concept actions unless otherwise authorized.
9. Recipients/end users must report lost or stolen State computer equipment (for example, workstations, laptops, mobile communication devices, etc.) immediately to their agency management. Their agency management shall then notify the responsible individual/organization of the security event.
10. Agencies shall report incidents to the ESRMO by one of the following methods:
    - Contact OITS Customer Support Center 800-722-3946.
    - Use the incident reporting website https://incident.its.state.nc.us.

- Contact a member of the Security and Risk Management Services staff directly.

GUIDELINES

Information technology security incidents are divided into five levels of severity based on their potential to negatively impact North Carolina agency operations, finances, and/or public image. The characteristics in the table below are intended to serve as general guidelines only, and should not be interpreted as absolutes.

Incident Severity	Incident Characteristics
5 GENERAL ATTACK(S) **SEVERE**	▪ Successful penetration or denial-of-service attack(s) detected with significant impact on North Carolina state network operations: ○ Very successful, difficult to control or counteract ○ Large number of systems compromised ○ Significant loss of confidential data ○ Loss of mission-critical systems or applications ▪ Significant risk of negative financial or public relations impact
4 LIMITED ATTACK(S) **HIGH**	▪ Penetration or denial-of-service attack(s) detected with limited impact on North Carolina state network operations: ○ Minimally successful, easy to control or counteract ○ Small number of systems compromised ○ Little or no loss of confidential data ○ No loss of mission-critical systems or applications ▪ Widespread instances of a new computer virus or worm that cannot be handled by deployed anti-virus software ▪ Small risk of negative financial or public relations impact
3 SPECIFIC RISK OF ATTACK **ELEVATED**	▪ Significant level of network probes, scans and similar activities detected indicating a pattern of concentrated reconnaissance ▪ Widespread instances of a known computer virus or worm, easily handled by deployed anti-virus software ▪ Isolated instances of a new computer virus or worm that cannot be handled by deployed anti-virus software
2 INCREASED RISK OF ATTACK **GUARDED**	▪ Small numbers of system probes, scans, and similar activities detected on internal systems ▪ External penetration or denial of service attack(s) attempted with no impact to North Carolina state network operations ▪ Intelligence received concerning threats to which North Carolina ITS systems may be vulnerable
1 **LOW**	▪ Small numbers of system probes, scans, and similar activities detected on internal and external systems ▪ Isolated instances of known computer viruses or worms, easily handled by deployed anti-virus software

ISO 27002 REFERENCES
8.2.2 Information security awareness, education, and training
13.1.1 Reporting information security events
13.1.2 Reporting security weaknesses

060202 Reporting Information Security Incidents to Outside Authorities

Purpose: To ensure agency awareness of the State's authority to determine when confirmed security incidents shall be reported to appropriate third parties.

POLICY

1. The Enterprise Security and Risk Management Office (ESRMO), acting on behalf of the State Chief Information Officer, shall determine what, if any, outside authorities should be contacted in regard to confirmed information technology security incidents in accordance with applicable laws and procedures, any Memorandum of Understanding between OITS, the Department of Justice, the State Bureau of Investigation, and the Office of the State Auditor as well as in accordance with federal requirements.
2. Agencies shall notify the ESRMO of information technology security incidents. The ESRMO shall notify authorities, regulatory and law enforcement agencies about information technology security incidents in accordance with the State's Incident Management Plan, unless the agency is required to notify the authorities or has already notified the authorities.
3. If/or when an agency notifies authorities directly, regulatory and/or law enforcement agencies, the agency shall also report the incident to the ESRMO.
4. If an information security incident involves the unauthorized disclosure of Social Security data, the agency must then notify the Social Security Administration (SSA) Regional Office and their SSA Systems Security Contact within one (1) hour of suspecting such loss.
5. If an information security incident involves the possible breach of Federal Tax Information (FTI), the agency must contact the appropriate special agent-in-charge, the Treasury Inspector General for Tax Administration (TIGTA), and the IRS Office of Safeguards immediately, but no later than twenty-four (24) hours after identification.

ISO 27002 REFERENCES
6.1.6 Contact with authorities
13.1.1 Reporting information security events

060203 Investigating the Cause and Impact of Information Security Incidents

Purpose: To protect the State's technology resources by conducting proper investigations.

POLICY

1. The Enterprise Security and Risk Management Office (ESRMO), acting on behalf of the State Chief Information Officer, shall evaluate the proper response to all information technology security incidents reported to the agency.
2. The ESRMO shall work with agencies to decide what resources, including law enforcement, are required to best respond to and mitigate the incident.
3. An investigation into an information technology security incident must identify its cause, if possible, and appraise its impact on systems and data.
4. Agencies shall investigate information system failures to determine whether the failure was caused by malicious activity or by some other means (*i.e.,* hardware or software failure).
5. Qualified technicians shall perform the investigations, which shall include the following:
   - Checking system logs, application logs, event logs, audit trails and log files.
   - Continuing to closely monitor the specified system to establish trends or patterns.

- Researching for known failures resulting from software bugs.
- Contacting appropriate third parties, such as vendor-specific technicians, for assistance.

6. Agencies shall utilize trained personnel to perform investigations and shall restrict others from attempting to gather evidence on their own.
7. Evidence of or relating to an information technology security breach shall be collected and preserved in a manner that is in accordance with State and federal requirements.
8. The collection process shall include a document trail, the chain of custody for items collected, and logs of all evidence-collecting activities to ensure the evidence is properly preserved for any legal actions that may ensue as a result of the incident.
9. In the event of an active cyber crime, management has the authority to decide whether to continue collecting evidence or to lock down the system involved in the suspected crime.
10. When dealing with a suspected cyber crime, agencies shall do the following:

- Make an image of the system (including volatile memory, if possible) so that original evidence may be preserved.
- Make copies of all audit trail information such as system logs, network connections (including IP addresses, TCP/UDP ports, length, and number), super user history files, etc.
- Take steps to preserve and secure the trail of evidence.

11. All agencies shall ensure the integrity of information systems incident investigations by having the records of such investigations audited by qualified individuals as determined by agency management.
12. All agencies shall maintain records of information security breaches and the remedies used for resolution as references for evaluating any future security breaches. The information shall be logged and maintained in such a location that it cannot be altered by others. The recorded events shall be studied and reviewed regularly as a reminder of the lessons learned.
13. Agencies shall establish controls to protect data integrity and confidentiality during investigations of information technology security incidents.
14. Controls shall either include dual-control procedures or segregation of duties to ensure that fraudulent activities requiring collusion do not occur.
15. If any suspicious activities are detected, responsible personnel within the affected agency shall be notified to ensure that proper action is taken.

GUIDELINES

Information recorded in regard to information technology security breaches should cover the following:

1. The nature of the breach and the number of systems affected.
2. The services that were affected and the resources needed to implement a timely resolution.
3. The time at which the breach was discovered and the time at which corrective actions were implemented.
4. How the breach was detected and the immediate response after detection.
5. The escalation used to resolve the breach.

ISO 27002 REFERENCES

10.1.3 Segregation of duties
10.10.2 Monitoring system use
13.2.1 Responsibilities and procedures
13.2.2 Learning from information security incidents

13.2.3 Collection of evidence
15.3.1 Information systems audit controls
15.3.2 Protection of information systems audit tools

060204 Monitoring Confidentiality and Reporting Breaches

Purpose: To develop a method for identifying and reporting breaches of confidentiality.

POLICY

1. Agencies shall monitor and control the release of confidential security information during the course of a security incident or investigation to ensure that only appropriate individuals have access to the information, such as law enforcement officials, legal counsel or human resources.
2. Agency staff shall report breaches of confidentiality to agency management as soon as possible. Confirmed incidents of confidentiality breaches shall follow the required reporting requirements.
3. Breaches of confidentiality include: the compromise or improper disclosure of confidential information such as Social Security numbers, medical records, credit card numbers and tax data.

ISO 27002 REFERENCES
6.1.5 Confidentiality agreements
6.2.3 Addressing security in third party agreements
13.2.1 Responsibilities and procedures

Chapter 7 – Business Continuity and Risk Management

Section 01 Business Continuity Management

070101 Initiating the Business Continuity Plan (BCP)

Purpose: To establish the appropriate level of business continuity management to sustain the operation of critical business services following a disaster or adverse event.

POLICY

1. Agencies must maintain a business and disaster recovery plan with respect to information technology. Business and disaster recovery plans shall be provided to the Office of the State CIO.
2. Agencies, through their management, must implement and support an appropriate information technology business continuity program to ensure the timely delivery of critical automated business services to the State's citizens.
3. A management team composed of representatives from all the agency organizational areas has primary leadership responsibility to identify information technology risks and to determine what impact these risks have on business operations.
4. Management must also plan for business continuity, including disaster recovery, based on these risks and document continuity and recovery strategies and procedures in a defined business continuity plan that is reviewed, approved, tested and updated on an annual basis.

ISO 27002 REFERENCES
14.1.04 Business continuity planning framework

070102 Assessing the BCP Risk

Purpose: To require that State agencies manage information technology risks appropriately as required in GS 147-33.89.

POLICY

1. Agencies shall identify the potential risks that may adversely impact their business in order to develop continuity and recovery strategies and justify the financial and human resources required to provide the appropriate level of continuity initiatives and programs.
2. Agencies shall conduct business risk impact analysis activities that include the following:
   - Define the agency's critical functions and services.
   - Define the resources (technology, staff and facilities) that support each critical function or service.
   - Identify key relationships and interdependencies among the agency's critical resources, functions and services.
   - Estimate the maximum elapsed time that a critical function or service can be inoperable without a catastrophic impact. (See also Statewide Glossary for Recovery Time Objective)
   - Estimate the maximum amount of information or data that can be lost without a catastrophic impact to a critical function or service. (See also Statewide Glossary for Recovery Point Objective)
   - Document any critical events or services that are time-sensitive or predictable and require a higher-than-normal priority (for example, tax filing dates, reporting deadlines, etc.).

- Identify any critical non-electronic media required to support the agency's critical functions or services.
- Identify any interim or workaround procedures that exist for the agency's critical functions or services.

GUIDELINES

The following items should be considered:

- Estimate the decline in effectiveness over time of each critical function or service.
- Estimate financial losses over time resulting from the inoperability of each critical function or service.
- Estimate tangible (non-financial) impacts over time resulting from the inoperability of each critical function or service.
- Estimate intangible impacts over time resulting from the inoperability of each critical function or service.

ISO 27002 REFERENCES
14.1.02 Business continuity and risk assessment
14.1.04 Business continuity planning framework

070103 Developing the BCP

Purpose: To require that the appropriate level of information technology business continuity management is in place to sustain the operation of critical information technology services to support the continuity of vital business functions.

POLICY

1. Management shall develop a business continuity plan (BCP) that covers all of the agency's essential and critical business activities and that includes references to procedures to be used for the recovery of systems that perform the agency's essential and critical business activities.
2. At a minimum, an agency's business continuity plan must:
    - Help protect the health and safety of the employees of the State of North Carolina.
    - Protect the assets of the State and minimize financial, legal and/or regulatory exposure.
    - Minimize the impact and reduce the likelihood of business disruptions.
    - Create crisis teams and response plans for threats and incidents.
    - Include communication tools and processes.
    - Require that employees are aware of their roles and responsibilities in the BCP and in plan execution.
    - Include training and awareness programs.
    - Require simulations and tabletop exercises.
    - Have a documented policy statement outlining:
        - Framework and requirements for developing, documenting, and maintaining the plans.
        - Requirements for testing and exercising.
        - Review, sign-off and update cycles.

- Require senior management oversight and approval.
- Assess the professional capability of third parties and ensure that they provide adequate contact with the agencies.
- Review dependence on third parties and take actions to mitigate risk associated with dealing with third parties.
- Provide direction on synchronization between any manual work data and the automated systems that occur during a recovery period.
- Set forth procedures to be followed for restoring critical systems to production.

3. Training and awareness programs shall be undertaken to ensure that the entire agency is confident, competent and capable and understands the roles each individual within the agency must perform in a disaster/or adverse situation.
4. The person(s) designated as the agency business continuity plan (BCP) coordinator(s) has the responsibility of overseeing the individual plans and files that constitute the BCP and ensuring that they are current, meet these standards and are consistent with the agency's overall plan. At the direction of the State Chief Information Officer, an agency's BCP shall be reviewed annually by the Office of Information Technology Services and recommendations shall be made for improvement, if necessary.
5. The agency business continuity plan shall be tested annually, at a minimum. All critical applications shall be tested annually.

GUIDELINES

The following methods are recommended:

- Tabletop testing (walk-through of business recovery arrangements using example interruptions).
- Simulations (especially for post-incident / post-crisis management roles).
- Technical recovery testing.
- Testing recovery at an alternate site.
- Testing of hot-site arrangements, complete rehearsal (testing organization, personnel, equipment, facilities and processes).
- Updating of plan as necessary.

Additional steps that may be taken include the repetition of the test to validate any updated procedure(s) and the addition or removal of application backup procedures. Agency management should define, document, and approve what type of testing methodology to use.

ISO 27002 REFERENCES
14.1.03 Developing and implementing continuity plans including information security
14.1.04 Business continuity planning framework
14.1.05 Testing, maintaining and re-assessing business continuity plans

070104 Disaster Recovery and/or Restoration

Purpose: To restore the operability of the systems supporting critical business processes and return to normal agency operations as soon as possible.

POLICY

The agency is responsible for maintaining its ability to recover in the event of an outage. Agencies must ensure that business continuity and/or disaster recovery plans are developed, maintained, tested on a prescribed basis and subjected to a continual update and improvement process. Agencies shall conduct the following disaster recovery and/or restoration activities:

1. Define the agency's critical operating facilities and mission essential service(s) or function(s).

2. Define the resources (facilities, infrastructure, and essential systems) that support each mission critical service or function.
3. Define explicit test objectives and success criteria to enable an adequate assessment of the Disaster Recovery and/or Restoration.

ISO 27002 REFERENCES
14.1.3 Developing and implementing continuity plans including information security

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Section 02 Information Technology Risk Management Program

070101 Implementing a Risk Management Program

Purpose: To ensure that state agencies manage risks appropriately. Risk management includes the identification, analysis, and management of risks associated with an agency's business, information technology infrastructure, the information itself, and physical security to protect the state's information technology assets and vital business functions.

POLICY

1. The State of North Carolina recognizes that each agency, through its management, must implement an appropriate Information Technology (IT) Risk Management Program to ensure the timely delivery of critical automated business services to the state's citizens.
2. The risk management program must identify and classify risks and implement risk mitigation as appropriate.
3. The program must include the identification, classification, prioritization and mitigation processes necessary to sustain the operational continuity of mission critical information technology systems and resources.
4. In general, "risk" is defined as a condition or action that may adversely affect the outcome of a planned activity. Some types of risk are as follows:
    - Business Risk – The cost and/or lost revenue associated with an interruption to normal business operations.
    - Organizational Risk – The direct or indirect loss resulting from one or more of the following:
        - Inadequate or failed internal processes
        - People
        - Systems
        - External events
    - Information Technology Risk - The loss of an automated system, network or other critical information technology resource that would adversely affect business processes.
    - Legal – Parameters established by legislative mandates, federal and state regulations, policy directives and executive orders that impact delivery of program services.
    - Reputation – General estimation, by the public, on how state services are delivered (integrity, credibility, trust, customer satisfaction, image, media relations, political involvement.)
    - Citizen Services - Program services mandated by charter, legislation, or policy that provides for the delivery of the state's business (education, human services, highways, law enforcement, health and safety, unemployment benefits, vital records, etc.)

GUIDELINES

Agencies are encouraged to select and use guidelines that support industry best practices for risk management relative to business continuity planning and security as appropriate. Some suggested guidelines are listed below.

Risk Management Program Activities:

Agency risk management programs at a minimum should focus on the following four types of activities:

- **Identification of Risks:** A continuous effort to identify which risks are likely to affect business continuity and security functions and documenting their characteristics.
- **Analysis of Risks:** An estimation of the probability, impact, and timeframe of the risks, classification into sets of related risks, and prioritization of risks relative to each other.
- **Mitigation Planning:** Decisions and actions that will reduce the impact of risks, limit the probability of their occurrence, or improve the response to a risk occurrence. For moderate or high rated risks, mitigation plans should be developed, documented and assigned to managers. Plans should include assigned manager's signatures.
- **Tracking and Controlling Risks:** Collection and reporting of status information about risks and their mitigation plans, response to changes in risks over time, and management oversight of corrective measures taken in accordance with the mitigation plan.

Business Continuity Risk Management Processes:

For business continuity risk management, the focus of risk management is an impact analysis for those risk outcomes that disrupt agency business. Agencies should identify the potential impacts in order to develop the strategies and justify the resources required to provide the appropriate level of continuity initiatives and programs.

Agencies should conduct business risk impact analysis activities that include the following:

- Define the agency's critical functions and services.
- Define the resources (technology, staff, and facilities) that support each critical function or service.
- Identify key relationships and interdependencies among the agency's critical resources, functions, and services.
- Estimate the decline in effectiveness over time of each critical function or service.
- Estimate the maximum elapsed time that a critical function or service can be inoperable without a catastrophic impact.
- Estimate the maximum amount of information or data that can be lost without a catastrophic impact to a critical function or service.
- Estimate financial losses over time of each critical function or service.
- Estimate tangible (non-financial) impacts over time of each critical function or service.
- Estimate intangible impacts over time of each critical function or service.
- Document any critical events or services that are time-sensitive or predictable and require a higher-than-normal priority. (For example - tax filing dates, reporting deadlines, etc.)
- Identify any critical non-electronic media required to support the agency's critical functions or services.
- Identify any interim or workaround procedures that exist for the agency's critical functions or services.

Security Risk Process:

The focus of security risk management is an assessment of those security risk outcomes that may jeopardize agency assets and vital business functions or services. Agencies should identify those impacts in order to develop the strategies and justify the resources required to provide the appropriate level of prevention and response. It is important to use the results of risk assessment to protect critical agency functions and services in the event of a security incident. The lack of appropriate security measures would jeopardize agency critical functions and services.

Security risk impact analysis activities include the following:

- Identification of the Federal, State, and Local regulatory or legal requirements that address the security, confidentiality, and privacy requirements for agency functions or services.
- Identification of confidential information stored in the agency's files and the potential for fraud, misuse, or other illegal activity.
- Identification of essential access control mechanisms used for requests, authorization, and access approval in support of critical agency functions and services.
- Identification of the processes used to monitor and report to management on whatever applications, tools and technologies the agency has implemented to adequately manage the risk as defined by the agency (*i.e.,* baseline security reviews, review of logs, use of IDs, logging events for forensics, etc.).
- Identification of the agency's IT Change Management and Vulnerability Assessment processes.
- Identification of what security mechanisms are in place to conceal agency data (Encryption, PKI, etc.).

For more information on implementing a risk management program, including the Risk Management Guide and the Risk Assessment Questionnaire, please refer to the Risk Management Services page found on the Enterprise Security and Risk Management Office (ESRMO) web site:

http://www.esrmo.scio.nc.gov/riskManagement/default.aspx

ISO 27002 REFERENCES

4.1 Assessing security risks
4.2 Treating security risks