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Additional Information

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IoT Non-Technical Supporting Capability Core Baseline

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U.S. Department of Commerce
Wilbur L. Ross, Jr., Secretary

National Institute of Standards and Technology
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65 publication is completed, current requirements, guidelines, and procedures, where they exist, remain operative. For
66 planning and transition purposes, federal agencies may wish to closely follow the development of these new
67 publications by NIST.

68 Organizations are encouraged to review all draft publications during public comment periods and provide feedback to
69 NIST. Many NIST cybersecurity publications, other than the ones noted above, are available at
70 <https://csrc.nist.gov/publications>.

71 **Public comment period: *December 15, 2020 through February 26 12, 2021***

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76 All comments are subject to release under the Freedom of Information Act (FOIA).

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Reports on Computer Systems Technology

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85 the cost-effective security and privacy of other than national security-related information in federal
86 information systems.

87

Abstract

88 Non-technical supporting capabilities are actions a manufacturer or third-party organization
89 performs in support of the cybersecurity of an IoT device. This publication defines an Internet of
90 Things (IoT) device manufacturers' *non-technical supporting capability core baseline*, which is
91 a set of non-technical supporting capabilities generally needed from manufacturers or other third-
92 parties to support common cybersecurity controls that protect an organization's devices as well
93 as device data, systems, and ecosystems. The purpose of this publication is to provide
94 organizations a starting point to use in identifying the non-technical supporting capabilities
95 needed in relation to IoT devices they will manufacture, integrate, or acquire. This publication is
96 intended to be used in conjunction with NISTIR 8259, *Foundational Cybersecurity Activities for*
97 *IoT Device Manufacturers* and NISTIR 8259A, *IoT Device Cybersecurity Capability Core*
98 *Baseline*.

99

Keywords

100 cybersecurity baseline; Internet of Things (IoT); securable computing devices.

101

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103 workshops and other interactive sessions; the individuals and organizations from the public and
104 private sectors, including manufacturers from various sectors as well as several manufacturer
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107 members Brad Hoehn and David Lemire and the NIST FISMA Implementation Project team for
108 their extensive help.

109

Audience

110 The main audience for this publication is IoT device manufacturers, especially with the emerging
111 role of product security officers. This publication may also help IoT device customers or
112 integrators.

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Note to Reviewers

116 NIST Cybersecurity for IoT Team has chosen a publication strategy of crafting separate
117 documents to address specific concerns within the IoT cybersecurity ecosystem. These
118 documents are part of a single family across the theme of providing guidance to IoT device
119 manufacturers. Industry encouraged this direction in the comments responding to the issuance of
120 Draft NISTIR 8259. The initial foundation documents in this series are as follows:

- 121 • [NISTIR 8259](#): *Foundational Cybersecurity Activities for IoT Device Manufacturers*
- 122 • [NISTIR 8259A](#): *IoT Device Cybersecurity Capability Core Baseline*

123

124 The new documents in the series that are being released as drafts for comment provide guidance
125 to IoT device manufacturers complementing the guidance. The three additional documents in the
126 NISTIR 8259 series are:

- 127 • ***NISTIR 8259B: IoT Non-technical and Supporting Capability Core Baseline*** – NISTIR
128 8259B complements the NISTIR 8259A device cybersecurity core baseline by detailing
129 what additional, non-technical support is typically needed from manufacturers. This non-
130 technical baseline makes explicit support capabilities like documentation, training
131 support, etc.
- 132 • ***NISTIR 8259C: Creating a Profile of the IoT Core Baseline and Non-Technical***
133 ***Baseline*** – NISTIR 8259C presents a method of profiling the core baseline in NISTIR
134 8259A and the non-technical baseline in NISTIR 8259B to create a more detailed set of
135 capabilities responding to the concerns of a specific sector, based on some authoritative
136 source such as a standard or other guidance. This is the method used to create the profile
137 meeting the requirements of the federal information system low baseline found in draft
138 NISTIR 8259D.
- 139 • ***NISTIR 8259D: Profile Using the IoT Core Baseline and Non-Technical Baseline for***
140 ***the Federal Government*** – NISTIR 8259D presents the profile defining the capabilities
141 needed from and related to IoT devices to incorporate those devices into a federal
142 information system implementing the low baseline controls of NIST SP 800-53.

143

144 In addition to the extensions to NISTIR 8259 listed above, the NIST Cybersecurity for IoT Team
145 is also working on **NIST SP 800-213: IoT Device Cybersecurity Guidance for the Federal**
146 ***Government: An Approach for Establishing IoT Device Cybersecurity Requirements*** which
147 explains from a *customer* organization's (i.e., federal agencies and other organizations)
148 perspective how to determine the technical and non-technical capabilities needed from and
149 related to devices to support the SP 800-53 controls they use on their system and in their
150 organization. SP 800-213 enables federal agencies and other organizations to identify needed
151 capabilities for unique situations and turn those selections into requirements for new IoT devices.

152 NIST appreciates all comments, concerns and identification of areas needing clarification.
153 Ongoing discussion with the stakeholder community is welcome as we work to improve the
154 cybersecurity of IoT devices. **Community input is specifically sought regarding the mapping**
155 **of specific reference document content to the items in Table 1, to populate the fourth**

156 **column, “IoT Reference Examples,” to strongly align the NISTIR 8259B baseline to the**
157 **existing body of cybersecurity guidance. Table 1 in NISTIR 8259A can be used as a model**
158 **for these informative reference mappings.**

159

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Call for Patent Claims

161 This public review includes a call for information on essential patent claims (claims whose use
162 would be required for compliance with the guidance or requirements in this ITL draft
163 publication). Such guidance and/or requirements may be directly stated in this ITL Publication or
164 by reference to another publication. This call also includes disclosure, where known, of the
165 existence of pending U.S. or foreign patent applications relating to this ITL draft publication and
166 of any relevant unexpired U.S. or foreign patents.

167

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172 and does not currently intend holding any essential patent claim(s); or

173

174 b) assurance that a license to such essential patent claim(s) will be made available to
175 applicants desiring to utilize the license for the purpose of complying with the guidance
176 or requirements in this ITL draft publication either:

177

178 i. under reasonable terms and conditions that are demonstrably free of any unfair
179 discrimination; or

180 ii. without compensation and under reasonable terms and conditions that are
181 demonstrably free of any unfair discrimination.

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183 Such assurance shall indicate that the patent holder (or third-party authorized to make assurances
184 on its behalf) will include in any documents transferring ownership of patents subject to the
185 assurance, provisions sufficient to ensure that the commitments in the assurance are binding on
186 the transferee, and that the transferee will similarly include appropriate provisions in the event of
187 future transfers with the goal of binding each successor-in-interest.

188

189 The assurance shall also indicate that it is intended to be binding on successors-in-interest
190 regardless of whether such provisions are included in the relevant transfer documents.

191

192 Such statements should be addressed to: iotsecurity@nist.gov

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1 Introduction

Internet of Things (IoT) devices often lack built-in device cybersecurity capabilities, as well as non-technical support relevant to cybersecurity. Examples of non-technical support include providing information about *software updates*, instructions for *configuration* settings, and supply chain information. Customers can use this type of information to help mitigate cybersecurity risks related to the IoT devices and their use. The wide range of connectivity possible for IoT devices, and the ability for these devices to interact with the physical world, means securing these devices often becomes a priority, but a challenge for customers when they are not adequately supported.

This publication describes four recommended, but often overlooked, non-technical supporting capabilities related to cybersecurity that manufacturers should consider implementing to support the IoT devices they make: 1) Documentation; 2) Information and Query Reception; 3) Information Dissemination; and 4) Education and Awareness. Potential customers need to know prior to purchase about the ways in which the IoT device, and associated data and systems, can be secured. This information (“Documentation”) will help customers make an informed purchase decision. After purchase, this type of information (“Information Dissemination” and “Education and Awareness”), along with information provided to customers to answer questions about securing the device (“Information and Query Reception”), continues to have an important role in securing the IoT device and meeting customers’ cybersecurity needs and goals after purchase. Non-technical supporting capabilities include the actions manufacturers or third parties take in support of initial and on-going security of IoT devices. Such actions make it easier for customers to understand and identify how IoT devices are built to meet their cybersecurity needs, as well as the manufacturers’ goals for how the IoT device should be securely used. The non-technical cybersecurity capabilities described can support cybersecurity-related customer efforts. By making customers more knowledgeable about how to secure the IoT devices, and how to most effectively use the device’s cybersecurity capabilities, manufacturers can help reduce the number of occurrences and related severity of IoT device compromises, thwart attacks against the devices, and reduce the number of vulnerabilities that are exploited and lead to compromised devices.

This publication should be used and understood within the context of NISTIR 8259, *Foundational Cybersecurity Activities for IoT Device Manufacturers* [1] and NISTIR 8259A, *IoT Device Cybersecurity Capability Core Baseline* [2]. NISTIR 8259 discusses considerations for manufacturers to help guide them in choosing and implementing the device cybersecurity capabilities their IoT devices will provide. For more information on how the non-technical supporting capabilities described can be incorporated into a manufacturer’s development processes, see Section 4 of NISTIR 8259. Organizations can use the IoT non-technical supporting capability core baseline in the context that is appropriate to them. NISTIR 8259A discusses device cybersecurity capabilities, which are cybersecurity features or functions that computing devices provide through their own technical means (i.e., device hardware and software), and establishes a core baseline of device cybersecurity capabilities needed by many IoT device customers.

To complement the core baseline from NISTIR 8259A, the IoT non-technical supporting

246 capability core baseline defined in this publication is a set of actions performed by manufacturers
247 and/or designated supporting third parties (called *supporting parties*) that will help customers use
248 the cybersecurity capabilities of IoT devices and support on-going cybersecurity of the IoT
249 device and the system and networks the device connects to. Providing such non-technical
250 cybersecurity support through educational materials or other types of non-technical tools and
251 actions can benefit IoT device customers, and allow manufacturers to better support the
252 cybersecurity of devices throughout the entire device lifecycle.

253 Both device cybersecurity capabilities and non-technical supporting capabilities are vital to
254 customers' abilities to achieve their needs and goals. Similar to the IoT *device cybersecurity*
255 *capability* core baseline in NISTIR 8259A, this IoT non-technical supporting capability core
256 baseline is intended to give organizations a starting point for establishing non-technical actions
257 to support IoT device cybersecurity risk management. Therefore, it is important to understand
258 that the implementation of all non-technical supporting capabilities is not considered mandatory.
259 The individual non-technical supporting capabilities in the baseline may be implemented in full,
260 in part, or not at all. Understanding customer organizations' needs to support risk management in
261 their unique risk environments which include the IoT device and the system within which it
262 operates is the challenge for manufacturers. Understanding this challenge will help
263 manufacturers understand how they implement the non-technical supporting capabilities to meet
264 customer organizations' needs.

265 This IoT non-technical supporting capability core baseline is not the only set of non-technical
266 supporting capabilities that exists. It represents a coordinated effort to produce a definition of
267 common capabilities, not an exhaustive list. Therefore, if additional supporting capabilities are
268 necessary to enable secure use of the device, organizations are encouraged to consider defining
269 additional supporting capabilities that better suit their use case(s). For more information on IoT
270 device security and privacy considerations, see NISTIR 8228, *Considerations for Managing*
271 *Internet of Things (IoT) Cybersecurity and Privacy Risks* [3]. For a more comprehensive catalog
272 of non-technical supporting capabilities, see [the IoT Device Cybersecurity Requirements](#)
273 [Catalogs](#) [4]. Device cybersecurity capabilities and non-technical supporting capabilities can be
274 derived or collected from many sources. These sources should be those most pertinent to the
275 organization and system into which the proposed IoT device will be integrated. NISTIR 8259C,
276 *Creating a Profile Using the IoT Core Baseline and Non-Technical Baseline* [5] provides
277 additional guidance on how other sources can be used to understand possible device
278 cybersecurity capabilities and non-technical supporting capabilities that may be needed.

279

280 **2 The IoT Non-Technical Supporting Capability Core Baseline**

281 Table 1 defines the IoT device non-technical supporting capability core baseline, which in combination with the core baseline of
282 NISTIR 8259A can make it possible to secure an IoT device. The table below follows from NISTIR 8259, drawing from the concepts
283 of Section 4, which highlights the importance of communication with customers about cybersecurity, and Section 3, which provides
284 many examples of information that customers may need to know about IoT devices or the design of the device.

285 Table 1 is a high-level starting point for IoT device manufacturers to understand how they may have to plan for and support the
286 customer's cybersecurity needs and goals in non-technical ways. The complexities of IoT device manufacturing may result in
287 organizations other than the device manufacturer providing critical cybersecurity support such as some or all of the non-technical
288 supporting capabilities described in this publication. Therefore, the target of this guidance is both manufacturers and supporting parties
289 (e.g., cloud service provider, contracted servicer) that may play a role in one or more of the actions in Table 1.

290 The target of non-technical supporting capabilities (i.e., those with whom the *communications* take place) is summarized in Table 1 as
291 the *customer*. This stems from an assumption that the customer of an IoT device will have cybersecurity needs, goals, and
292 responsibilities related to the IoT device. For a specific customer or use case, there may be other individuals or entities who may be
293 part of that communication. For example, an enterprise customer will have several individuals to whom the information described in
294 the table may need to be communicated. Alternatively, a building owner incorporating IoT devices will need to pass information to
295 building tenants using those IoT devices.

296 The specific actions listed in the table are meant to reflect the typical actions many customers expect manufacturers and supporting
297 parties to take around cybersecurity, with examples and rationales provided to give additional information about customer expectations
298 or why these actions are important. As with NISTIR 8259A, more context would be needed to articulate specific non-technical
299 supporting capabilities. Other types of non-technical supporting capabilities may be needed to best address the system context within
300 which the IoT device is used, and also in consideration of each IoT device user organization's¹ system cybersecurity risks.
301 Organizations that choose to adopt the core baseline non-technical capabilities for any of the IoT devices they produce, integrate, or
302 acquire have considerable flexibility in identifying the actions to implement those capabilities that can most effectively address an IoT

¹ Note that the "user organizations" could be different from the "customer organization." For example, a connected HVAC system may be purchased by the building owner (customer organization) but used by the building tenants (users).

303 device usage within the customers' own system, along with the goal and purpose for using the IoT device.

304 Each row in Table 1 covers one of the device non-technical supporting capabilities in the federal core baseline:

- 305 • The first column describes the non-technical supporting capability.
- 306 • The second column provides a numbered list of common actions within that supporting capability. These are actions that an
307 organization implementing the non-technical supporting capability often (but not always) would use to achieve the capability. It
308 is important to understand that the actions are not intended to be comprehensive, nor are they presented in any particular order.²
- 309 • The third column explains the rationale for needing the non-technical support capability.
- 310 • The last column will be used to list IoT reference examples that indicate existing sources of IoT device cybersecurity guidance
311 specifying a similar or related non-technical supporting capability. Because the table only covers the basics of the capabilities,
312 the references can be invaluable for understanding each non-technical supporting capability in more detail and learning how to
313 implement the corresponding action in a reasonable manner using existing standards. **Please Note:** this column is blank for the
314 Public Comment draft as NIST requests the public to submit recommended informative references for the proposed federal
315 profile.

² These common actions often mention typical data involved; however, the specific data elements involved in many of these actions can vary widely due to the range of IoT devices available.

Table 1: Non-Technical Supporting Capabilities

Non-Technical Supporting Capability	Common Actions	Rationale	IoT Reference Examples
<p>Documentation: The ability for the manufacturer and/or supporting entity to create, gather, and store information relevant to cybersecurity of the IoT device throughout the development of a device and its subsequent lifecycle.</p>	<ol style="list-style-type: none"> 1. Document assumptions made during the development process and other expectations related to the IoT device, such as: <ol style="list-style-type: none"> a. Expected customers and use cases b. Physical use and characteristics c. Network access and requirements d. Data created and handled by the device e. Assumed cybersecurity requirements for the IoT device f. Laws and regulations the IoT device and related support activities comply with g. Expected lifespan, anticipated cybersecurity costs related to the IoT device (e.g., price of maintenance), and term of support 2. Document the device cybersecurity capabilities, such as those detailed within NISTIR 8259A, that are implemented within the IoT device and how to configure and use them. 3. Document device design and support considerations related to the IoT device, such as:³ <ol style="list-style-type: none"> a. <u>IoT platform</u>⁴ used in the development of the IoT device, and related documentation b. Protection of software and hardware components of the IoT device c. Secure software development and supply chain practices used d. Accreditation, certification and/or evaluation results for cybersecurity-related practices 4. Document <i>maintenance</i> requirements for the device, such as: <ol style="list-style-type: none"> a. Cybersecurity maintenance expectations and associated instructions or procedures for the customer (e.g., account management, local and/or remote maintenance activities, vulnerability/patch management plan) b. When maintenance will be performed by supporting parties that will need access (remote or onsite) to customer's IoT devices, and their information security contract requirements 	<ul style="list-style-type: none"> • This capability supports Information Dissemination and Education and Awareness. • Documentation of cybersecurity information helps potential IoT device customers to make purchase decisions that support their organization's cybersecurity requirements for IoT device and/or systems where IoT devices are used within. • Documentation of important cybersecurity information helps enable secure use of the IoT device by customers since it serves as the source of information to be provided to customers. • Documentation may also be important for audits or other certifications that some customers may require for IoT devices they use. • Documentation about maintenance requirements especially regarding the supporting parties the manufacturer contracted by the manufacturer and vendor to perform maintenance, device changes, etc., supports the customer's need to adequately plan for maintenance activities. 	<ul style="list-style-type: none"> •

Non-Technical Supporting Capability	Common Actions	Rationale	IoT Reference Examples
<p>Information and Query Reception: The ability for the manufacturer and/or supporting entity to receive from the customer information and queries related to cybersecurity of the IoT device.</p>	<ol style="list-style-type: none"> 1. The ability for the manufacturer and/or supporting entity to receive maintenance and vulnerability information (e.g., bug reporting capabilities, bug bounty programs) from their customers and other types of entities 2. The ability for the manufacturer and/or supporting entity to respond to customer and third-party queries about cybersecurity of the IoT device (e.g., customer support) 	<ul style="list-style-type: none"> • This capability provides input for the manufacturer to in turn use in the Information Dissemination and Education and Awareness non-technical supporting capability. • Customer organizations and third-parties may want, or be required, to report vulnerabilities they identify in an IoT device. • Manufacturers can use reports of common queries and vulnerabilities to identify ways to improve the cybersecurity of the IoT device. • For broadly used IoT devices, some customers may need additional support to securely provision and use an IoT device. 	<ul style="list-style-type: none"> •

³ While this information would be provided by a Software Bill of Materials (SBOM). What is being discussed here is significantly less than what is normally meant by an SBOM.

⁴ An IoT platform is typically a third-party vendor provided/hosted SaaS-based tool that is used to support IoT device and endpoint management, connectivity and network management, data management, processing and analysis, application development, security, access control, monitoring, event processing and interfacing/integration. Documentation about such a third-party can provide important information about supply chain security practices and vulnerabilities to allow for the IoT user to more accurately determine risks related to the use of an IoT platform.

<p>Information Dissemination: The ability for the manufacturer and/or supporting entity to broadcast and distribute information related to cybersecurity of the IoT device.</p>	<ol style="list-style-type: none"> 1. The procedures to support the ability for the manufacturer and/or supporting entity to alert customers of the IoT device about cybersecurity relevant information such as: <ol style="list-style-type: none"> a. Software update availability or application b. End of term of support or functionality for the IoT device c. Needed maintenance operations d. Cybersecurity and vulnerabilities alerts 2. The procedures to support informing customers of activities and procedures used by the manufacturer and/or supporting entity to further consider and safeguard the cybersecurity of the device, such as: <ol style="list-style-type: none"> a. An overview of the information security practices and safeguards used by the manufacturer and/or supporting entity b. A risk assessment report or summary for the manufacturer's business environment risk posture 3. The procedures to support the ability for the manufacturer and/or supporting entity to notify customers of cybersecurity-related events and information related to an IoT device throughout the support lifecycle, such as: <ol style="list-style-type: none"> a. New IoT device vulnerabilities, associated details and mitigation actions b. Breach discovery related to an IoT device used by the customers and explanations of how to make any associated fixes or actions to prevent similar breaches of other devices. 	<ul style="list-style-type: none"> • This capability supports on-going cybersecurity of the device by keeping customers informed of developments and new information after the initial documentation was developed and provided. • Customer organizations may need to be informed about cybersecurity-related activities on the IoT device, especially if the IoT device is critical to their operations. • Customer organizations will want to stay informed about the cybersecurity of IoT devices to allow them to fine tune their mitigations and maintain an adequate level of risk assurance. • Customer organizations may need to know the security practices of the manufacturer and/or supporting entities that have made or will have occasional or ongoing access to the IoT devices to enable them to ensure the other parties do not unacceptably add to the customer's cybersecurity risk. • Customer organizations can use this information to gather insight about the commitment the manufacturer has to information security, and to determine the level of risk considered by the manufacturer related to the device. • Customer organizations can view security certifications, accreditations and evaluations for what is typically third-party assurance of acceptable information describing cyber, networking, applications, and related security practices. • Customer organizations can use the associated documentation to support their evaluation of the adequacy of the security provided by the manufacturer and/or supporting entity and related IoT device. • Customer organizations who must ensure IoT devices comply with the associated laws and regulations for which they are covered can 	<ul style="list-style-type: none"> •
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Non-Technical Supporting Capability	Common Actions	Rationale	IoT Reference Examples
		use the documentation to support their IoT purchase decisions and risk assessments.	
<p>Education and Awareness: The ability for the manufacturer and/or supporting entity to create awareness of and educate customers about cybersecurity-related information, considerations, features, etc. of the IoT device.</p>	<ol style="list-style-type: none"> 1. Educate customers of the IoT device about the presence and use of device cybersecurity capabilities. For example, it may be important to educate customers about: <ol style="list-style-type: none"> a. How to use <i>device identifiers</i> b. How to change configuration settings c. How to configure and use access control functionality d. How to use software update functionality, including aspects such as update validation that may be part of the device cybersecurity capability 2. Educate customers about how an IoT device can be securely reprovisioned or disposed of. 3. Make customers aware of their cybersecurity responsibilities related to the IoT device and how responsibilities may be shared between them and others, such as the IoT device manufacturer. (e.g., related to maintenance of the IoT device) 4. Make customers aware of key assumptions and expectations related to the cybersecurity of the IoT device. 5. Educate customers about how to back-up the data collected from or derived by the IoT device, and how to access such data that is stored in cloud storage, or other repositories. 6. Educate customers about vulnerability management options (e.g., anti-malware) available for the IoT device or associated system that could be used by customers. 	<ul style="list-style-type: none"> • This capability supports secure provisioning, and on-going cybersecurity support. • For IoT devices with a wide range of use cases, some customers may need more education than others to securely provision and use an IoT device. • The complexities of IoT systems, devices, and use cases means it is important for manufacturers to create awareness and educate customers about cybersecurity of their IoT devices. • Growing numbers of regulations and laws require manufacturer and/or supporting entities provide customers access to the data that manufacturer and/or supporting entities possess about them, and also to make such data portable so that customers can take that data and use it elsewhere. 	<ul style="list-style-type: none"> •

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321 Acronyms

322 Selected acronyms and abbreviations used in this paper are defined below.

323	ACD	Applied Cybersecurity Division
324	CNSS	Committee on National Security Systems
325	IoT	Internet of Things
326	ITL	Information Technology Laboratory
327	IR	Internal Report
328	MAC	Media Access Control
329	NIST	National Institute of Standards and Technology
330	SBOM	Software Bill of Materials
331	SP	Special Publication

332

333 **Glossary**

334 Selected terms used in this document are defined below.

Communications	The actions and associated activities that are used to exchange information, provide instructions, give details, etc. In the context of this paper, communications refers to the full range of activities involved with providing information to support the secure use of IoT devices. Communications include using such tools as phone calls, emails, user guides, in-person classes, instruction manuals, webinars, written instructions, videos, quizzes, frequently asked questions (FAQ) documents, and any other type of tool for such information exchanges.
Configuration [7, Adapted]	The possible conditions, parameters, and specifications with which an information system or system component can be described or arranged. The Device Configuration capability does not define which configuration settings should exist, simply that a mechanism to manage configuration settings exists.
Core Baseline	A set of technical device capabilities needed to support common cybersecurity controls that protect the customer's devices and device data, systems, and ecosystems.
Customer [12]	The organization or person that receives a product or service.
Device Cybersecurity Capability	Cybersecurity features or functions that computing devices provide through their own technical means (i.e., device hardware and software).
Device Identifier [10, Adapted]	A context-unique value—a value unique within a specific context—that is associated with a device (for example, a string consisting of a network address).
Entity	A person, device, service, network, domain, manufacturer, or other party who might interact with an IoT device.
IoT Platform	An IoT platform is typically a third-party vendor provided/hosted SaaS-based tool that is used to support IoT device and endpoint management, connectivity and network management, data management, processing and analysis, application development, security, access control, monitoring, event processing and interfacing/integration. Documentation about such a third-party can provide important information about supply chain security practices and vulnerabilities to allow for the IoT user to more accurately determine risks related to the use of an IoT platform.

Maintenance [11]	Any act that either prevents the failure or malfunction of IoT device and supporting equipment or restores its operating capability.
Non-Technical Supporting Capability	Non-technical supporting capabilities are actions an organization performs in support of the cybersecurity of an IoT device.
Non-Technical Supporting Capability Core Baseline	The non-technical supporting capability core baseline is a set of non-technical supporting capabilities generally needed from manufacturers or other third parties to support common cybersecurity controls that protect an organization's devices as well as device data, systems, and ecosystems.
Software	Computer programs and associated data that may be dynamically written or modified during the device's execution (e.g., application code, libraries).
Supporting Parties	Providers of external system services to the manufacturer through a variety of consumer-producer relationships including but not limited to: joint ventures; business partnerships; outsourcing arrangements (i.e., through contracts, interagency agreements, lines of business arrangements); licensing agreements; and/or supply chain exchanges. Supporting services include, for example, Telecommunications, engineering services, power, water, software, tech support, and security.
Term of Support	The length of time for which the device will be supported by the manufacturer or supporting parties for such actions and materials as part replacements, software updates, vulnerability notices, technical support questions, etc.
Training	Teaching people the knowledge and relevant and needed security skills and competencies by that will enable them to understand how to use and configure the IoT devices to enable them to most securely use the IoT devices.
Update [9]	A patch, upgrade, or other modification to code that corrects security and/or functionality problems in software.