

Smart Home Update Survey Questions

National Institute of Standards and Technology

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SMART HOME DEVICES

1) Which of the following smart home devices do you own? (Select all that apply.)

Remember: A smart home device is a network-connected device (connected via Wi-Fi, Bluetooth, or similar protocols) that is used to remotely and/or more effectively and efficiently control functions or physical aspects of the home.

- Virtual voice assistants and smart speakers (e.g., Amazon Echo/Alexa, Google Nest Home Hub, Apple HomePod)
- Thermostats (e.g., Nest, Ecobee)
- Home security devices (e.g., video doorbells, cameras, door locks, garage door openers)
- Home environment sensors (e.g., smoke and leak detectors)
- Lighting (e.g., lightbulbs, lighting systems)
- Appliances (e.g., refrigerators, washing machines/dryers, ovens, coffee makers/espresso machines)
- Entertainment (e.g., TVs, streaming devices such as AppleTV or Roku)
- Plugs or outlets (e.g., Wemo Mini, Wyze Plug)
- Domestic robots that do household chores (e.g., robot vacuums such as iRobot Roomba, smart lawn mowers)
- Smart home hubs (e.g., Samsung SmartThings, Hubitat Elevation)*
- Other (e.g., smart windows solutions, smart watering system, smart pet feeder) (please specify):

* Does not include voice assistants/smart speakers like Google Nest Hub or Amazon Echo. Those would be considered virtual voice assistants/smart speakers (#1).

2) Please indicate the number and types (including the brand) of smart home devices you own in each of the following categories. For example, if you own two smart entertainment devices, you would enter “2” in the “Number of Devices” column and might enter “Samsung TV, Apple TV” in the Device Type column. If you can’t recall all the brands/types, you can omit those.

[answer for each device category owned]

UPDATES

In the remainder of the survey, you will be asked about your opinions of smart home updates and your experiences with a subset of the devices you own. We are particularly interested in comparing your experiences between different categories of devices. Therefore, some questions will prompt you to answer separately for each category. If categories are not specified, please answer the question based on your general experiences with updates for all your smart home devices or for your most frequently used devices. For some questions, you may not have had any related experiences or are not sure about the answers to the questions. That is okay – just select the appropriate answer to indicate that.

3) What are the top four reasons you might want your smart home devices to be updated? (Select up to four reasons)

- Add new features/enhancements or remove outdated ones
- Ensure continued manufacturer support/meet warranty requirements
- Provide better device stability and reliability
- Increase device performance
- Improve security of the devices/fix security bugs
- Improve privacy of the devices
- Fix non-security bugs and errors related to the functionality of the device
- Other (please specify):
- I don’t want my devices to be updated

4) Rate your agreement with the following statement for each category of smart home device: It is important for smart home devices to be updated.

Strongly Disagree - Disagree - Neither Agree nor Disagree - Agree - Strongly Agree

[answer for each device category owned]

5) Rate your agreement with the following statement for each category of smart home device: It is urgent that my smart home devices be updated when updates are made available.

Strongly Disagree - Disagree - Neither Agree nor Disagree - Agree - Strongly Agree

[answer for each device category owned]

6) For each of the following statements, compare your attitudes regarding the importance of updates to your smart home devices to the importance of updates for other types of technology (e.g., smartphone, computer).

Less Important - Somewhat Less Important - Equally as Important - More Important - Does not apply (I don't own that technology)

Applying updates to my smart home devices is _____ than applying updates to my smartphone.

Applying updates to my smart home devices is _____ than applying updates to my laptop or desktop computer.

Applying updates to my smart home devices is _____ than applying updates to my tablet.

Applying updates to my smart home devices is _____ than applying updates to my fitness tracker.

7) Rate your agreement with the following statements about smart home device updates:

Strongly Disagree - Disagree - Neither Agree nor Disagree - Agree - Strongly Agree

Updates are unnecessary when my smart home devices are working just fine without them.

Updates are unnecessary when I don't use my smart home devices enough.

8) Based on your experience with smart home device updates, please rate how often each of the following statements has been true for

you. If you do not have experience with a statement, please select Not Applicable (N/A).

Never - Rarely - Sometimes - Often - Always - N/A

The purpose of updates is unclear.

Messages and notifications about updates are confusing.

Updates break or decrease the functionality of my smart home devices.

Updates cause compatibility issues with other devices or applications.

Updates slow down my smart home devices.

Updates slow down my home network.

Updates are a scam.

Updates contain malicious software.

Updates are disruptive to what I'm trying to do at that moment.

Updates weaken the security of my smart home devices.

Updates weaken the privacy of my smart home devices.

Updates change (add to or delete) smart home device features or my user interface in an undesirable way.

Updates fail to install properly.

9) How are updates *currently* handled for your smart home devices in each of the categories below? (If you have multiple home security devices and some have automatic updates while the others have manual updates, select "Both automatic and manual updates." Only select "I don't know" if you are not sure about any of the devices in the category.)

- Automatic - I don't have to take any action

- Manual - I initiate the installation
- Both automatic and manual updates
- I don't know/I'm not sure

[answer for each device category owned]

10) For manual smart home updates, which of the following statements is most true based on your own experience? *[Only display if Manual checked at least once for question 9]*

- I usually install updates as soon as they're available
- I eventually install updates but usually not as soon as they're available
- I rarely install updates
- I never install updates

11) Which update mode would you *prefer* for your smart home devices in each of the categories below?

- Automatic - I don't have to take any action
- Manual - I initiate the installation
- Automatic and manual updates are both available - I can choose what I prefer
- I don't have a preference

[answer for each device category owned]

12) How do you *currently* find out that there is an update *available* to install for your smart home device? (If you have multiple devices within a category and find out updates are available in different ways, select all that apply.)

- Message or notification in the device app
- Email from the manufacturer
- Text message from the manufacturer
- Going to the manufacturer website to check for updates

- Family member or friend tells me
- Another way (e.g., article, tech mailing list, social media)
- I am never notified
- I don't know/I'm not sure

[answer for each device category owned]

13) What method of notification from the manufacturer would you prefer for letting you know that a smart home device update is *available*? If you have multiple devices in each category, choose your answer based on your most frequently used device.

- Message or notification in the device app
- Email from the manufacturer
- Text message from the manufacturer
- Going to the manufacturer website to check for updates
- Family member or friend tells me
- Another way (e.g., article, tech mailing list, social media)
- I prefer not to be notified

[answer for each device category owned]

14) How do you *currently* find out that an update *has been installed* on your smart home device? (If you have multiple devices within a category and find out updates have been applied in different ways, select all that apply.)

- Message or notification in the device app
- Email from the manufacturer
- Text message from the manufacturer
- I never know that an update has been applied
- I don't know/I'm not sure

[answer for each device category owned]

15) What method of notification from the manufacturer would you prefer when a smart home device update *has been installed*? (If you have multiple devices in each category, select your answer based on your most frequently used device.)

- Message or notification in the device app
- Email from the manufacturer
- Text message from the manufacturer
- I prefer not to be notified

[answer for each device category owned]

16) Which of the following would you like to be able to do with updates for your smart home devices? (Select all that apply.)

- Uninstall an update if it causes an unanticipated problem
- Delay an update for a specified period of time
- Choose whether to do automatic or manual updates
- Choose how to receive update notifications (e.g., app notification, email, text)
- Choose how often to receive update notifications (e.g., as soon as available, weekly, monthly)
- Use an app where I could manage updates for all my smart home devices in one place
- Other (please specify):
- I would not care to do any of these

MANUFACTURER SUPPORT

17) Please rate your agreement with the following statement: I am concerned that the manufacturer will eventually stop supporting my smart home devices.

Strongly Disagree - Disagree - Neither Agree nor Disagree - Agree - Strongly Agree

[answer for each device category owned]

18) Which of the following would concern you if the manufacturer stopped supporting your smart home devices? (Select all that apply.)

- My devices eventually stop working
- Updates containing security bug fixes no longer being released
- Updates containing non-security bug fixes no longer being released
- New features no longer being added
- Parts or accessories no longer being available
- Losing online/call-in customer support from the manufacturer
- I would not be concerned

[answer for each device category owned]

19) What would you do if your smart home devices were no longer supported by the manufacturer?

- o Nothing - leave it as is
- o Replace it with a new or different device as soon as possible
- o Replace it with a new or different device eventually but not necessarily right away
- o Throw the device out without replacing it

[answer for each device category owned]

20) What would be your *preferred* method of notification from the manufacturer to inform you they were no longer supporting your smart home devices?

- o Email
- o Message/notification sent to the device app
- o Text message on my phone
- o Letter/postcard in the mail
- o I prefer not to be notified

- Other (please specify):

SECURITY AND PRIVACY

21) Please rate your level of concern with the security of your smart home devices for each category:

Not at all concerned - Slightly concerned - Somewhat concerned - Moderately concerned - Extremely concerned

[answer for each device category owned]

22) Please rate your agreement with the following statement for each category: I think that most smart home devices in this category are secure.

Strongly Disagree - Disagree - Neither Agree nor Disagree - Agree - Strongly Agree

[answer for each device category owned]

23) Please rate your level of concern with the privacy of your smart home devices for each category:

Not at all concerned - Slightly concerned - Somewhat concerned - Moderately concerned - Extremely concerned

[answer for each device category owned]

24) Please rate your agreement with the following statement for each category: I think that most smart home devices in this category protect my privacy.

Strongly Disagree - Disagree - Neither Agree nor Disagree - Agree - Strongly Agree

[answer for each device category owned]

25) If you have other ideas or comments about smart home updates, including how they should be handled, please list those here: _____

DEMOGRAPHICS

26) In which state or US territory do you live?

(drop down list of states and territories)

27) Do you own or rent your home?

- Own
- Rent
- Other (please specify):

28) In which type of area is your home?

- Rural
- Suburban
- Urban

29) Including yourself, how many people live in your home? _____

30) Including yourself, how many people living in your home use smart home devices? _____

31) How long have you been using smart home devices?

- Less than 1 year
- 1 - 2 years
- 3 - 5 years
- 6 or more years

32) What is your age range?

- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- 65+

33) What is your gender?

- Male
- Female
- Prefer to self-describe
- Prefer not to answer

34) What is your race?

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White
- Other
- Prefer not to answer

35) What is your ethnicity?

- Hispanic, Latino/a, or Spanish Origin
- Not Hispanic, Latino/a, or Spanish Origin
- Prefer not to answer

36) What is your highest level of education?

- Less than high school degree
- High school degree or equivalent
- Some college
- Associate degree
- Bachelor's degree
- Master's degree
- Doctoral or Juris Doctoral degree

- Other:
- Prefer not to answer

37) In which disciplines/fields are your degrees? _____

38) What is your occupation? _____

39) Have you ever worked in a field/job related to information technology (IT) (for example, a system or network administrator, IT help desk, cybersecurity professional)?

- Yes
- No

40) If yes, please specify the IT field or job: _____