Privacy and Security Nutrition Labels to Inform IoT Consumers

Pardis Emami-Naeini

February 1, 2021
Toilets are getting smarter and more invasive

'Blink!': New Kohler toilet operates by voice command

Steve Jagler  USA TODAY
Published 3:22 p.m. ET Jan. 8, 2018 | Updated 5:24 p.m. ET Jan. 8, 2018

'Smart toilet' recognizes users and checks for signs of disease

• www.medicalnewstoday.com/articles/smart-toilet-recognizes-users-and-checks-for-signs-of-disease
People are concerned about losing their privacy

People say they care about privacy but they continue to buy devices that can spy on them

Experts explain why people are giving mixed signals about smart tech.

By Rani Molla | @ranimolla | May 13, 2019, 5:40pm EDT

Consumers concerned about connected home privacy, still few implement safety practices

Smart devices spark privacy concerns among consumers: study

*Sibele Marcellus
Reporter
Yahoo Finance December 14, 2018

* www.helpnetsecurity.com/2019/10/14/connected-home-consumer-attitudes/
* news.yahoo.com/smart-devices-spark-privacy-concerns-consumers-study-161851265.html
Smart devices are getting hacked

Smart devices are getting hacked

Access Control
IoT companies are sometimes forgetful

Google calls Nest's hidden microphone an 'error'

The tech giant didn't inform customers that the home security hub had a microphone.

BY ALFRED NG, MEGAN WOLLERTON | FEBRUARY 20, 2019 10:46 AM PST

IoT companies are sometimes forgetful

Sensor Type
There is still a lot that we don’t know

Amazon’s Alexa isn’t just AI — thousands of humans are listening

One of the only ways to improve Alexa is to have human beings check it for errors

By Nick Statt | @nickstatt | Apr 10, 2019, 8:25pm EDT

There is still a lot that we don’t know
How to effectively provide this information?
Multi-step path to label design

- Large-scale surveys
- Consumer interviews
- Expert interviews
- Consumer interviews
What privacy factors are people concerned about?

- Type of data
- Location
- Retention time

• Emami-Naeini et al., SOUPS’17
Context is more powerful than individual factors
How social influence impacts privacy decisions?

- **Level of expertise**
  - Friends
  - Experts

- **Consensus level**
  - Strong: >85%
  - Weak: >65%

- **Difference in opinion**
  - Consistent
  - Inconsistent

*Emami-Naeini et al., CSCW’18*
We designed the first version of our IoT label

**General information**

**Privacy information**

**Security information**

**General information**
Privacy information based on previous studies

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collected data</td>
<td>Video, device configuration, login info</td>
</tr>
<tr>
<td>Purpose</td>
<td>Security, maintenance, advertisement</td>
</tr>
<tr>
<td>Retention time</td>
<td>Forever</td>
</tr>
<tr>
<td>Shared with</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>Choices</td>
<td>None</td>
</tr>
<tr>
<td>Independent Privacy Lab Rating</td>
<td>★★★★★</td>
</tr>
<tr>
<td>Level of detail for the data that is being used</td>
<td>Identifiable</td>
</tr>
<tr>
<td>Level of detail for the data that is being collected</td>
<td>Identifiable</td>
</tr>
</tbody>
</table>
Security information based on security guidelines

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic updates</td>
<td>No</td>
</tr>
<tr>
<td>Updates lifetime</td>
<td>Until January 1, 2020</td>
</tr>
<tr>
<td>Choices</td>
<td>Configurable updates, purchase extended updates</td>
</tr>
<tr>
<td>Encrypted communication</td>
<td>Yes</td>
</tr>
<tr>
<td>Authentication method</td>
<td>Fingerprint</td>
</tr>
<tr>
<td>Internet connectivity</td>
<td>Required</td>
</tr>
</tbody>
</table>

Independent IT Security Institute Rating: ★★★★★
Positive attitude toward IoT labels

Almost all wanted to know about privacy and security before the purchase.

Almost all were willing to pay a premium for such information.

* Emami-Naeini et al., CHI’19
Privacy and security are latent concerns
Policy makers are also excited about IoT labels

'Cyber Shield Act' Aims To Establish Cybersecurity Standards for IoT Devices

The bill, introduced by Democratic legislators on Tuesday, would direct a committee to create standards for devices who meet those standards.

By Haley Samsel

Regulatory proposal on mandatory IoT security label

Retailers will only be able to sell items with an Internet of Things (IoT) security label which would tell consumers how secure a product is.

Singapore to introduce security label for smart home devices

The proposed Cybersecurity Labelling Scheme aims to improve consumer awareness around secured products.

Finland launches cybersecurity label for IoT devices

Catherine Chapman 27 November 2019 at 12:20 UTC
Updated 28 November 2019 at 10:12 UTC

- securitytoday.com/articles/2019/10/24/cyber-shield-act.aspx
- www.govtechleaders.com/2019/05/07/regulatory-proposal-on-mandatory-iot-security-label/
- www.zdnet.com/article/singapore-to-introduce-security-label-for-smart-home-devices/
- portswigger.net/daily-swig/finland-launches-cybersecurity-label-for-iot-devices
Policy makers are also excited about IoT labels

What should be on IoT privacy and security labels?
We interviewed privacy and security experts

“What's good about a label is that it empowers the consumer to make a more active decision about cybersecurity rather than just being completely helpless as to what the security of her device might be. Someone's gotta be looking out for consumers and giving the consumers this information.”

*Emami-Naeini et al., IEEE S&P’20*
We designed a layered label

**Primary layer - Version 2**

**Security & Privacy**

- Smart Security Camera, NS200
- Firmware version 2.5.8: updated on 9/15/2019

**Security Mechanisms**

- Security certification level: 
- Security updates will be available until 1/1/2019
- Automatic security updates
- No factory-set default password

**Data Practices**

- Device is equipped with:
  - camera: video, streaming, cloud, identifiable
  - microphone: voice, streaming, cloud, identifiable
  - presence sensor: motion, detecting activities, cloud, identical
- Other sensors to detect: temperature, carbon monoxide

**Privacy Statement**

- www.NS200privacyPolicy.com

**More Information**

- Scan the QR code or type the URL to see more information on security mechanisms and data practices.

**Secondary layer - Version 2**

**Security & Privacy**

- Security certification level: 
- Security updates will be available until 1/1/2019

**Security Mechanisms**

- User account for the device
- Biometric authentication
- Location services
- Fail-safe location
- Key management
- Wi-Fi secured
- Default privacy level: TOP 1100, 802.11

**Data Practices**

- Devices are equipped with:
  - For audio:
    - Microphone
    - Wi-Fi
    - Bluetooth
  - Other sensors:
  - Privacy Statement
- Other services:
  - Video sharing
  - Wi-Fi
  - Location services
- Data categories:
  - Internal service: shared
  - External service: used
  - Internal service: other services
  - External service: other services
  - Data sharing:
  - Wi-Fi
  - Bluetooth
  - Location services
  - Other services
  - Privacy Statement:
    - Personal information:
      - Personal information:
    - Data sharing:
      - Wi-Fi
      - Bluetooth
      - Location services
      - Other services
  - Data retention:
    - Personal information:
      - Personal information:
    - Data sharing:
      - Wi-Fi
      - Bluetooth
      - Location services
      - Other services
  - Data management:
    - Personal information:
      - Personal information:
    - Data sharing:
      - Wi-Fi
      - Bluetooth
      - Location services
      - Other services

**More Information**

- www.NS200privacyPolicy.com

- Contact us:
  - General information:
    - Tel: +852 2735 1234
  - Privacy information:
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  - General information:
    - Email: info@ns200.com
  - General information:
    - Email: support@ns200.com
  - Privacy information:
    - Email: privacy@ns200.com
  - General information:
    - Website: www.nS200.com

- Privacy Statement:
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  - Data sharing:
  - Data retention:
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  - Privacy information:
Semi-structured interviews with IoT consumers

Non-comparative

Comparative
I don’t know what TCP and UDP are. But it’s interesting to have this here, because then I could go to Reddit and ask on there what that means and what the capabilities are.
Label should work for both consumers and experts

"Labels are both for customers and experts such as tech journalists and consumer advocacy groups. If they see something that is questionable, they will raise it in the public press or will raise it with regulatory authorities. The label is not just for the consumer, but there’s another feedback process that works through experts."
Most recent version of our label

Primary layer - Version 3

Security & Privacy Overview
Smart Security Camera NS200
Firmware version: 2.5.1 - updated on 6/15/2019
The device was manufactured in United States

- Security updates: Automatic - Available until at least 1/1/2022
- Access control: Password - Factory default - User changeable, Multi-factor authentication, Multiple user accounts are allowed
- Primary layer - Version 3
- Secondary layer - Version 3

Security & Privacy Details
Casa

- Security updates: Automatic - Available until at least 1/1/2022
- Access control: Password - Factory default - User changeable, Multi-factor authentication, Multiple user accounts are allowed
- Security oversight: Auditors perform on-site and off-site security assessments
- Ports and protocols: www.n200.example.com/ports
- Hardware safety: www.n200.example.com/hardware_safety
- Software safety: www.n200.example.com/software_safety
- Personal safety: www.n200.example.com/personal_safety
- Vulnerability disclosure and management: www.n200.example.com/phishing
- Software and firmware version list: www.n200.example.com/versions
- Exception and key management: www.n200.example.com/exceptions

Data Practices

- Sensor data collection: 
  - Camera
  - microphone
  - audio
  - physiological
  - location
- Data stored on device
- Data stored on cloud
- Shared with
- Sold to
- Other sensor data collection
- Other collected data
- Account info, payment info, device setup info, device tech info, device usage info
- Privacy policy: www.n200.example.com/policy

Detailed Security & Privacy Label:
www.n200.securitypolicy.org/labels

More Information
www.n200.example.com/更多信息

Info Information

Call Casa with your question at 412-213-6750

Compatible platforms: Amazon Alexa
We need you on board!

Volunteer for label adoption

* IoT label generator: www.iotsecurityprivacy.org/generate
We need you on board!

Advocate for IoT labels
We need you on board!

Demand transparency from manufacturers
Thank you!

www.iotsecurityprivacy.org

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