Evaluation of the Privacy and Security Aspects of Connected Televisions
Summary of TV findings

• Investigated 5 TVs:
  – LG, Samsung, Vizio, Sony, and TCL/Roku
• In partnership with Ranking Digital Rights and Disconnect
• Looked at policies, consent flows, data flows, security vulnerabilities
Summary of TV findings

• All models want to watch what you’re watching
  – Via “automatic content recognition”
• Could limit data collection, but compromised functionality
• Security vulnerabilities in some of the TVs
Context: Vizio settlement

- FTC settled with Vizio for $1.5 million in February 2017
- Collection of viewing activity without consent deemed an “unfair practice”
- Commr. Ohlhausen concurrence: Viewing is considered “sensitive” information under US law
What does consent look like?
Privacy Policy

Enjoy Sony applications and services. For your use of some applications and services, etc., this TV will need to send certain unique number and information on your use and viewing history of this TV to Sony Corporation's servers.

When this TV is connected to the internet, certain information will be sent to Sony Corporation's global servers. This information is sent for the purposes of:

- providing you with software updates, applications, services, content and advertising,
- helping you find content more easily, and
- improving our products, applications and services.
Your use of the Smart TV is governed by the Terms & Conditions and Privacy Policy. You will need to agree and acknowledge your understanding to proceed with setup.

Terms and Conditions

SAMSUNG GLOBAL PRIVACY POLICY HIGHLIGHTS

- Viewing Information Services
- Interest Based Advertisement
- Voice Recognition Services

Click 'I Agree to all' if you agree to the Terms & Conditions, read and understood the Privacy Policy, and want to enable ALL of the Additional Services above. You can also individually choose a specific Additional Service. If you do not wish to enable any of the Additional Services at this time, please click the "OK" to proceed with setup.

- I Agree to all
- OK
Loss of functionality

• You could always control collection of viewing data, but with a cost to functionality
USER AGREEMENTS

Additional Services

Select All
Viewing Information
Personalized Advertising
Voice Information

Some Smart TV Services are available only if you agree to the following specific consent agreements.

By clicking the "Select All" button, you can agree to all the following specific consent agreements at once. Please read each specific consent agreement carefully before you agree.
Using and sharing viewing info from your antenna and devices connected to this TV (including using ACR technology), Roku can suggest streaming content and personalize ads. This choice does not affect info collected through Roku’s streaming service. (* for more information)
Post set-up controls

• All of the televisions offered controls in Settings to limit data collection
  – All gave you the ability to stop collection of viewing data
  – BUT, controls were usually hard to find
Post set-up controls

- LG: ☀ → All Settings → General → About This TV → User Agreements
- Vizio: Settings → System → Reset and Admin
- Roku: Settings → Privacy → Smart TV Experience
How much control?

- Scope of controls and data collection was sometimes unclear
Please visit the “settings” menu of your Smart TV for choices that may be available to you if you do not wish to continue to receive personalized recommendations or certain enhanced features on your Smart TV. If you disable such personalized recommendations or additional features, then the information and content displayed on your Smart TV may not be as relevant to you. But please bear in mind that Samsung may still collect information about your usage of the Smart TV for other purposes as described in the main body of this Privacy Policy.
Terms of Service & Privacy Policy

By continuing, you agree to the Google Terms of Service, the Google Privacy Policy, and the Google Play Terms of Service.

This device may also receive and install updates and apps from Google and your device’s manufacturer. Some apps may be downloaded and installed if you continue, and you can remove them or adjust their permissions at any time.

Accept

View Google Terms of Service

View Google Privacy Policy

View Google Play Terms of Service
Help improve Android TV

Help improve your Android TV by automatically sending diagnostic and usage data to Google. This information won't be used to identify you and helps teams working on things like app performance and new Google features. Learn more at http://g.co/AndroidUsageHelp.
Security vulnerabilities

• Discovered vulnerabilities in the Roku OS and Samsung API’s that allowed hackers to manipulate the television
  – Change channel or volume, disconnect from internet
  – No evidence that information was vulnerable, or that hackers could leverage holes to access other devices
Future work

• More detailed findings about Smart TVs
• Similar investigations into other products
• Incorporate into standard ratings process where appropriate
• Other criteria: interoperability, repairability