A Privacy Protection System for HbbTV in Smart TVs

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What is a Smart TV?
What is a Smart TV?

- It is a TV ;)
- Network interfaces like Wi-Fi and/or LAN
- Often as powerful as desktop computers
- Cameras, Microphones, Motion Sensors, …

In this talk

**Smart TVs with HbbTV support**
What is HbbTV and how does it work?
What is HbbTV?

- **HbbTV** *(Hybrid broadcast broadband TV)*
  - European Standard for the presentation of Internet content on a Smart TV *(Internet technologies like HTML, CSS and JavaScript)*
  - Approved by ETSI in Version 1.2.1 in November 2012
  - Approx. 5.2 millions (13%; 2016: 35%) households having at least one HbbTV supporting device in Germany

- **Long Term: Replacement for Teletext**

- **Many manufacturers are selling devices with HbbTV support:** Philips, Samsung, Sony, Panasonic, LG, …
The way from a conventional TV to a Smart TV

- **Digital Video Broadcast**
  - Cable, terrestrial, satellite
  - One direction
  - Start signal for HbbTV

- **Internet**
  - Bidirectional
  - HbbTV Red Button
  - HbbTV application
What about Privacy?
What about Privacy?

Start of an HbbTV Channel

Showing the „Red Button“

Start of an HbbTV application

User Interaction

Already published on a German national conference in May 2013.

### Start-Up Requests
- Scripts like (ext.) tracking services
- Images (channel logos)
- HTML, JS, CSS for HbbTV

### Periodic Requests
- Preloading of content, tracking and (pers.) advertisements
- Time period 1s – 15 min

Not in scope
What can be done with the collected data?
What can be done with this data?

- We do **not know** if this data is processed
  - Assumption: Tracking services are not used **just for fun**!

- Data is sent **before the User** uses the HbbTV application

- User can be **tracked on the Smart TV by broadcasting stations and other third parties**

- If a broadcasting station operates **more than one channel**, the user profile can be even better
What can be done with this data?

- Possibility to show personalized ads to user
  - On one channel we saw this already.

- Change the running program in (almost) real time
  - We are not aware if any broadcasting station is using this data for changing the program.
What can a user do?
What can a User do?

- **Deactivate** data services or **disconnect** your TV
  - No Smart TV anymore

- **We have developed a method to protect users’ privacy**
  - Will be published soon on our website.

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What can be done by manufactures or broadcasting stations?

**Short Term:**
- Modification of HbbTV applications

**Long Term:**
- Modification of the HbbTV standard
Raspberry Pi as Protection System

- Small, cheap, easy to install
- Compatible with the HbbTV standard
Which Software is used on the Raspberry Pi?

- Linux based: Mitmproxy
- In the publication, we had a hard coded HbbTV list,
  - in the current implementation dynamic detection of HbbTV requests
- HbbTV is a very interesting functionality and a great value-add for users
- Most of the HbbTV applications are sending data to the stations before the user wants to use it.
- The methods and techniques used should be more privacy-friendly
- Simple Protection System with Raspberry Pi
Next Tasks / Future Work

- **Guidelines** for privacy friendly HbbTV applications

- Development of a system that can measure the *viewing behavior* with PET (*Privacy Enhancing Technologies*)

- The number of **Smart Devices** are increasing! More research for *the right level of protection* is required.

- Long Term: **Security Gateway for the Smart Home**

- Questions?
Contact

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Appendix
Appendix

- The references can be found in the publication „A Privacy Protection System for HbbTV in Smart TVs“ and are not listed here.

- List of Photographers/Source of Pictures
  - Slide 1: Erik Tews/CASED
  - Slide 5: Teletext/Wikipedia EN
  - Slide 6,7,8,11,14,15,16: Marco Ghiglieri/CASED