



**HAL**  
open science

## Towards Automatic Triggering of Android Malware

Adrien Abraham, Radoniaina Andriatsimandefitra Ratsisahanana, Nicolas Kiss, Jean-François Lalande, Valérie Viet Triem Tong

► **To cite this version:**

Adrien Abraham, Radoniaina Andriatsimandefitra Ratsisahanana, Nicolas Kiss, Jean-François Lalande, Valérie Viet Triem Tong. Towards Automatic Triggering of Android Malware. 12th International Conference on Detection of Intrusions and Malware & Vulnerability Assessment, Jul 2015, Milano, Italy. hal-01168354

**HAL Id: hal-01168354**

**<https://inria.hal.science/hal-01168354v1>**

Submitted on 29 Jun 2015

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

# Towards Automatic Triggering of Android Malware

A. Abraham R. Andriatsimandefitra N. Kiss J.-F. Lalande V. Viet Triem Tong



INRIA/CENTRALESUPELEC research project Cidre – INSA CVL France



## The problem: malware hiding techniques

Malware wait before running to evade dynamic analysis

- ▶ a fixed or dynamic period of time
- ▶ a user input
- ▶ a system event
- ▶ an order from a remote server
- ▶ a particular state of their hosted application
- ▶ something else ?

## Existing solutions

Some frameworks proposed to test the infected application

1. using random inputs
2. running a maximal branches of code

BUT

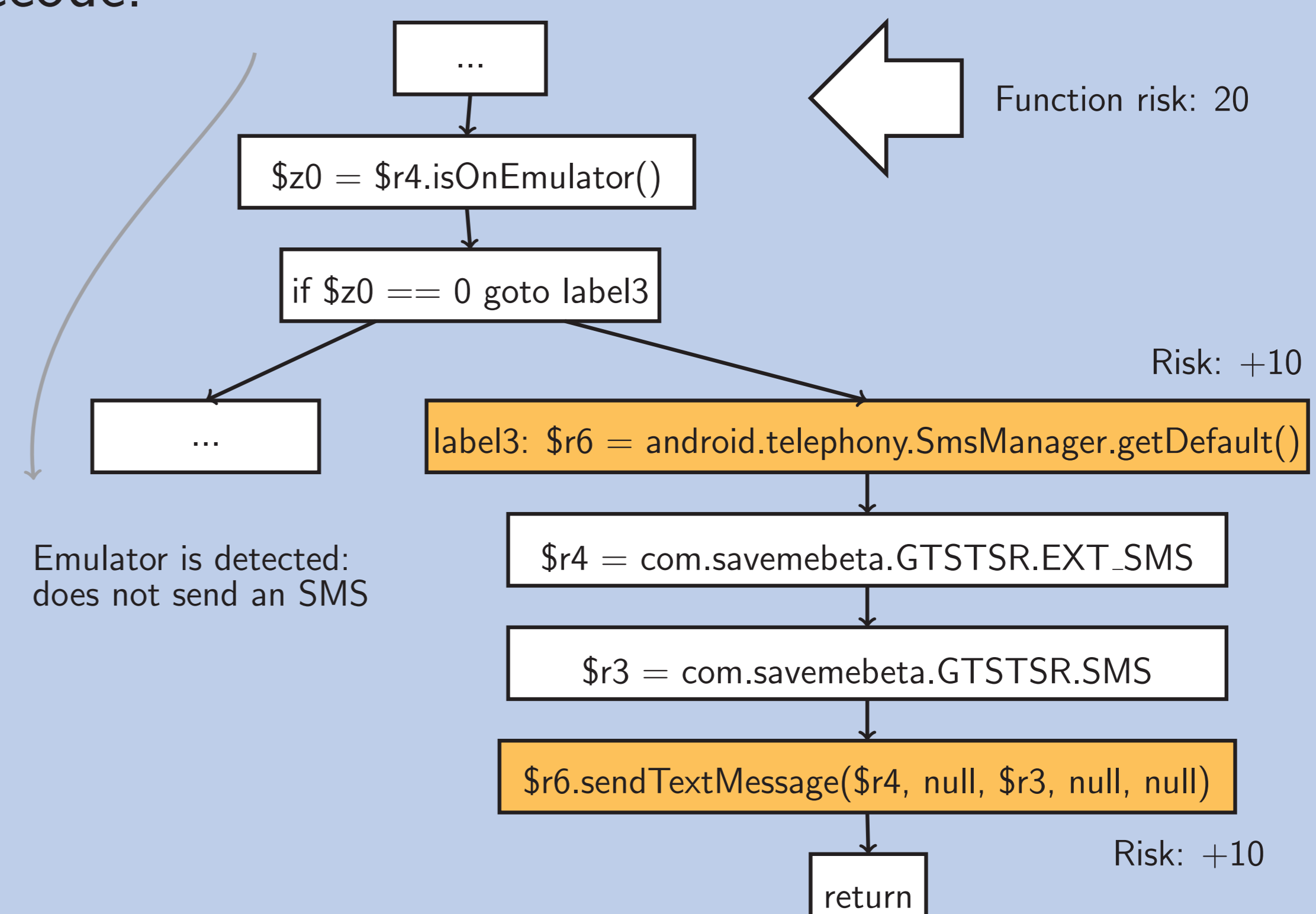
1. it is uncertain
2. it is unnecessarily expensive

## First step: static identification of malicious code

A **scoring function** computes an **indicator of risk** for each instruction in the bytecode.

The score increases with calls to specific Java methods such as:

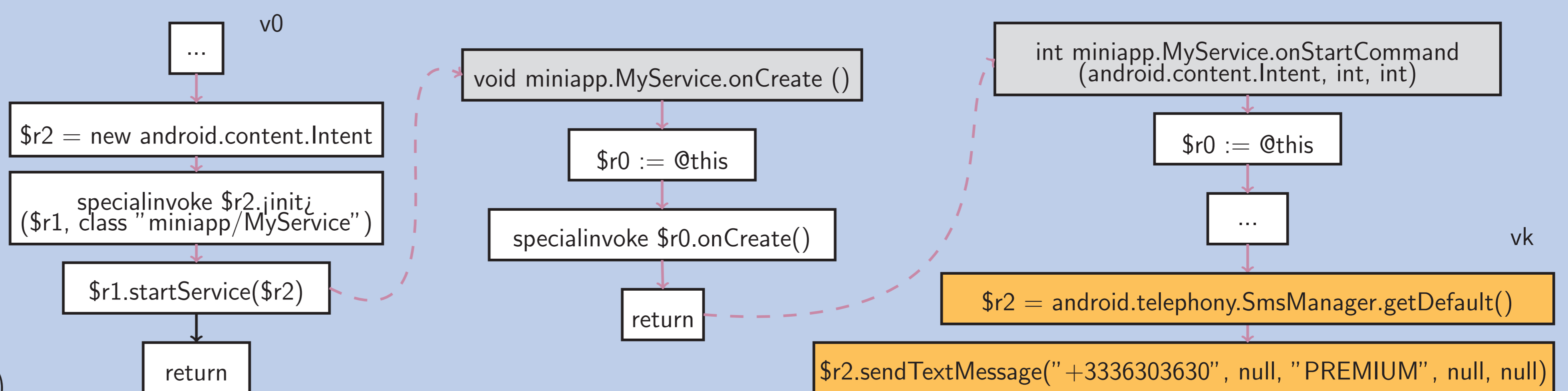
- ▶ android.telephony.SmsManager for sending SMS
- ▶ android.telephony.TelephonyManager for getting device infos
- ▶ android.context.pm.PackageManager for installing/removing apps
- ▶ java.util.Timer, TimerTask for the implementation of *timebombs*
- ▶ java.lang.Runtime, Process for executing native binaries
- ▶ dalvik.system.DexClassLoader for loading code dynamically



## Second step: recomputing an execution path to the identified malicious code

To compute an **execution path** to the **most scored unit** of code:

- ▶  $\forall f$ , functions of the malware, compute:  $G_f = (V_f, A_f)$ . Let  $G = \cup_f G_f = (V, A)$
- ▶  $\forall$  intents, events from  $v_i \in V_i$  to  $v_j \in V_j$ : Add  $(v_i, v_j)$  to  $A$
- ▶ Let  $v_k$  the scored unit of code
- ▶ Let  $v_0$  the entry point (`onCreate()`)
- ▶ Compute  $path = shortest\_path(G, v_0, v_k)$



## Third step: forcing the execution path

To **force the execution** of the most scored unit of code  $path$ :

- ▶ Make a *standard* execution
- ▶ Let  $path = (v_1, \dots, v_e, \dots, v_k)$ :  $v_e$  is the last unit of code executed.
- ▶  $\forall i > e > k$ , if  $v_i$  is a condition, *Force*( $v_i$ )
- ▶ Execute the malware again.

Benefits:

- ▶ a malware that is executed shows its effects
- ▶ detection tools can be trained or evaluated

