



## Towards Automatic Triggering of Android Malware

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

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# 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
- ▶ an order from a remote server
- ▶ a user input
- ▶ a particular state of their hosted application
- ▶ something else ?

▶ a system event

## 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

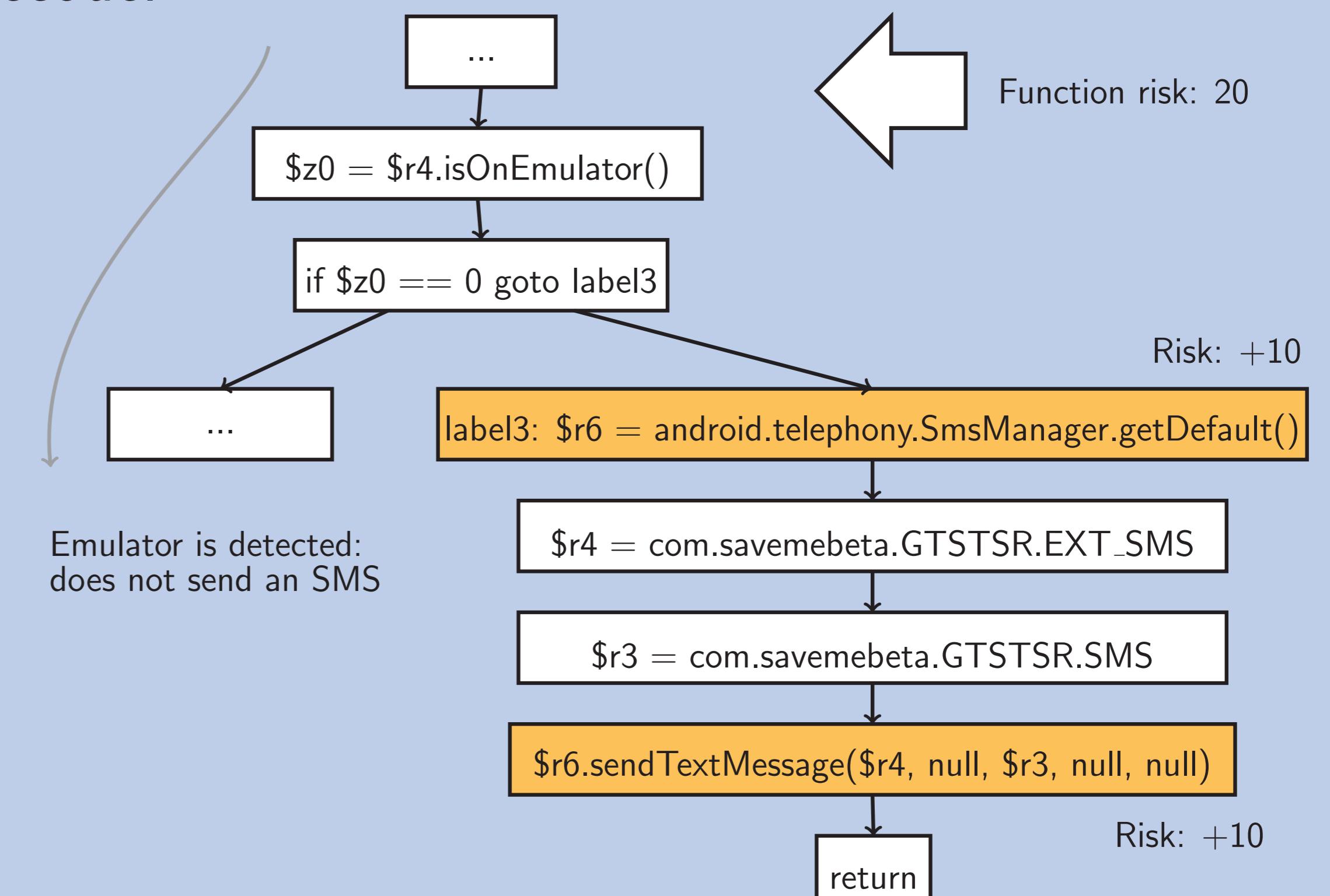
2. it is unnecessarily expensive

## 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:

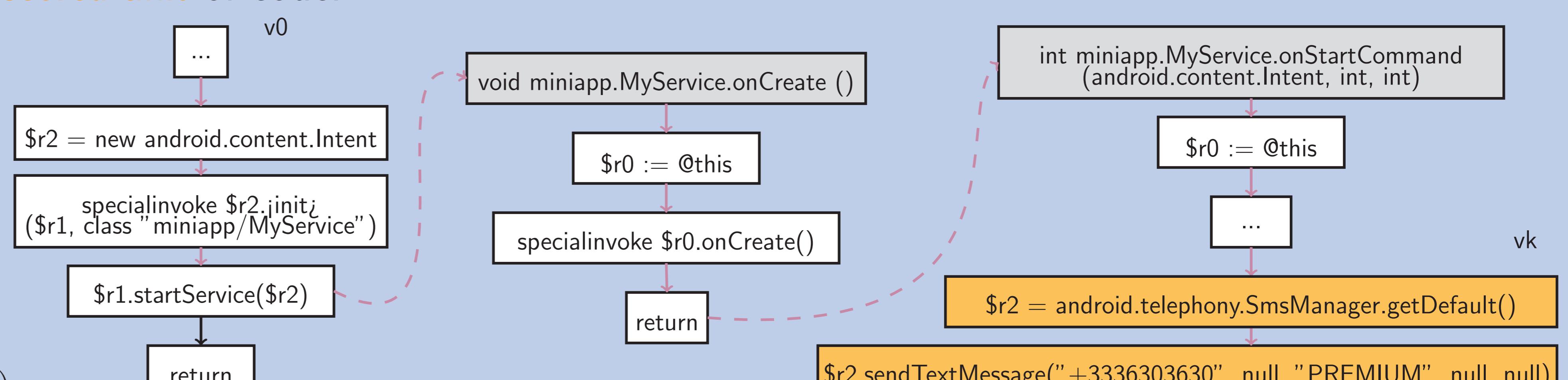
- ▶ android.telephony.SmsManager for sending SMS
- ▶ android.telephony.TelephonyManager for getting device infos
- ▶ android.context.pm.PackageManager for installing/removing apps
- ▶ java.util.Timer, TimerTask for the implementation of *timebombs*
- ▶ java.lang.Runtime, Process for executing native 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  $G = \bigcup_f G_f = (V, A)$
- ▶  $\forall$  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  $path = \text{shortest\_path}(G, v_0, v_k)$



## 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,  $\text{Force}(v_i)$
- ▶ Execute the malware again.

Benefits:

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

