The attacks aren't alright: Large-Scale Simulation of Fake Base Station Attacks and Detections

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August 13, 2024

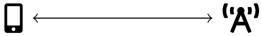
Simulation of Fake Base Station Attacks and Detections

Simulation of $\underbrace{\text{Fake Base Station}}_{①}$ Attacks and Detections

$\underbrace{\text{Simulation}}_{\textcircled{2}}$ of $\underbrace{\text{Fake Base Station}}_{\textcircled{1}}$ Attacks and Detections

$$\underbrace{\text{Simulation}}_{②}\text{ of }\underbrace{\text{Fake Base Station}}_{①}\text{ Attacks and }\underbrace{\text{Detections}}_{③}$$

Mobile networks



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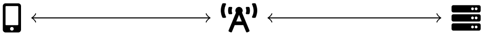

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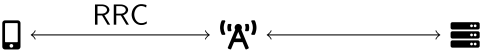

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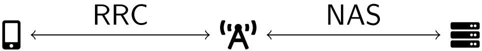

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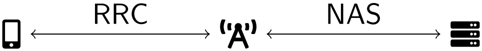
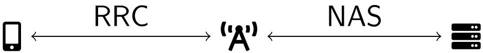


- RRC: Control radio connection

Mobile networks



- RRC: Control radio connection
- NAS: Control network connection (mobile and data)

Idle and connected modes

Two modes for being ”in” the mobile network:

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Connected:

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- Configuration is sent directly

(re)selection

When do you get a new cell?

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Selection: find a suitable cell initially (idle)

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Reselection: find a suitable cell if necessary (idle)

(re)selection

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Reselection: find a suitable cell if necessary (idle)

Handover: transfer your active connection (connected)

Fake base stations

An attacker-operated base station with:

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1. The same country/operator code

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Various attacks

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Solution in 5G!

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Real-life tests are illegal/unethical...

Complications

- Specification → Implementation

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- Signal propagation is hard
- Define success?

Simulation results

Transmission power:

Simulation results

Transmission power:

- Large effect
- COTS: 15-30%
- "real": 75%+

Simulation results

Placement:

Simulation results

Placement:

- Large variance
- Trend: 7-13%
- Hard to get right

Detection

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- Simulation!

Detection methods

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- "Hard" problem

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