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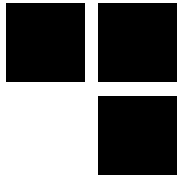


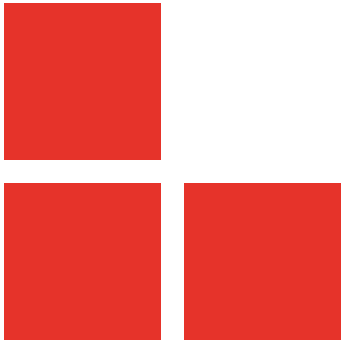
Modmobjam

Jam tomorrow, jam yesterday, but also jam today

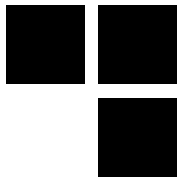
By Sébastien Dudek

SSTIC RUMP 2018

June 14th 2018



Introduction



- Following Modmobmap presented at BeeRump 2018
- Helps to produce downgrade attacks as shown in House Intercoms Attacks presentations
- Uses Modmobmap results to jam mobile cells in a DIY way!
- Cheapest and efficient tricks to jam

Jam yesterday

With a portable/chineese device

- cheap
- jam the whole 2G/3G/(4G?) bands but requires some modifications
- poor signal

Desktop jammers

Jam yesterday

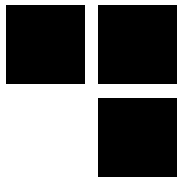
With a portable/chineese device

Desktop jammers

- heavy, cumbersome but powerfull
- also needs a disabling to conserve rogue cells

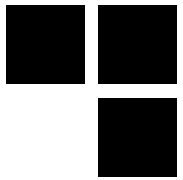
Modifications on radio devices?! In 2018?

Jam today



- With Software-Defined Radio
- Many devices could be used even the cheapest:
  - bladeRF;
  - HackRF;
  - ADALM-PLUTO;
  - and so on.

Jam today



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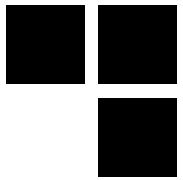
  - and so on.

The bandwidth

KTHX! But how do you cover all frequencies with your toys bro?

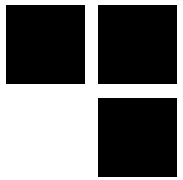
SDR specs



	HackRF	bladeRF		USRP		
		x40	x115	B100 Starter	B200	B210
Radio Spectrum	30 MHz – 6 GHz	300 MHz – 3.8 GHz		50 MHz – 2.2 GHz [1]	50MHz – 6 GHz	
Bandwidth	20 MHz	28 MHz		16 MHz [2]	61.44 MHz [3]	
Duplex	Half	Full		Full	Full	2x2 MIMO
Sample Size (ADC/DAC)	8 bit	12 bit		12 bit / 14 bit	12 bit	
Sample Rate (ADC/DAC)	20 Msps	40 Msps		64 Msps / 128 Msps	61.44 Msps	
Interface (Speed)	USB 2 HS (480 megabit)	USB 3 (5 gigabit)		USB 2 HS (480 megabit)	USB 3 (5 gigabit)	
FPGA Logic Elements	[4]	40k	115k	25k	75k	150k
Microcontroller	LPC43XX	Cypress FX3		Cypress FX2	Cypress FX3	
Open Source	Everything	HDL + Code Schematics		HDL + Code Schematics	Host Code [5]	
Availability	January 2014	Now		Now	Now	
Cost	$300 [6]	$420	$650	$675	$675	$1100

source: http://www.taylorkillian.com/2013/08/sdr-showdown-hackrf-vs-bladerf-vs-usrp.html

Solution: ”Smart” jamming



In 3 steps:

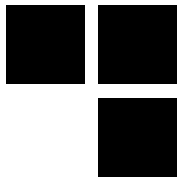
1. scan cells with Modmobmap;
2. target an operator;
3. and jam only targeted channels;

Scanning with Modmobmap

Modmobmap recovers 2G/3G/4G and more cells pretty much like OsmocomBB monitor mode for 2G only.

```
└─$ sudo python modmobmap.py -m servicemode                                    1 ↵
=> Requesting a list of MCC/MNC. Please wait, it may take a while...
[+] New cell detected [CellID/PCI-DL_freq  (83-6400)]
 Network type=4G
 PLMN=151515-1515
 Band=20
 Downlink EARFCN=6400
Found 5 operator(s)
{u'20810': u'F SFR', u'20820': u'F-Bouygues Telecom', u'20815': u'Free', u'20801': u'Orange F', u'20811'
: u'SFR Home 3G'}
[+] Unregistered from current PLMN
[+] New cell detected [CellID/PCI-DL_freq  (f0e02-10787)]
 Network type=3G
 PLMN=208-1
 Band=1
 Downlink UARFCN=10787
 Uplink UARFCN=9837
=> Changing MCC/MNC for: 20810
[+] New cell detected [CellID/PCI-DL_freq  (298-6400)]
 Network type=4G
 PLMN=208-10
 Band=20
 Downlink EARFCN=6400
[+] New cell detected [CellID/PCI-DL_freq  (298-6300)]
 Network type=4G
 PLMN=208-10
 Band=20
 Downlink EARFCN=6300
[+] New cell detected [CellID/PCI-DL_freq  (298-6200)]
 Network type=4G
 PLMN=208-10
```

Results

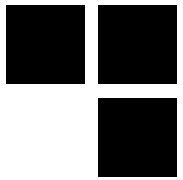


Unlike RE tools, it returns a JSON file with needed cells information to be reused with other tools ;)

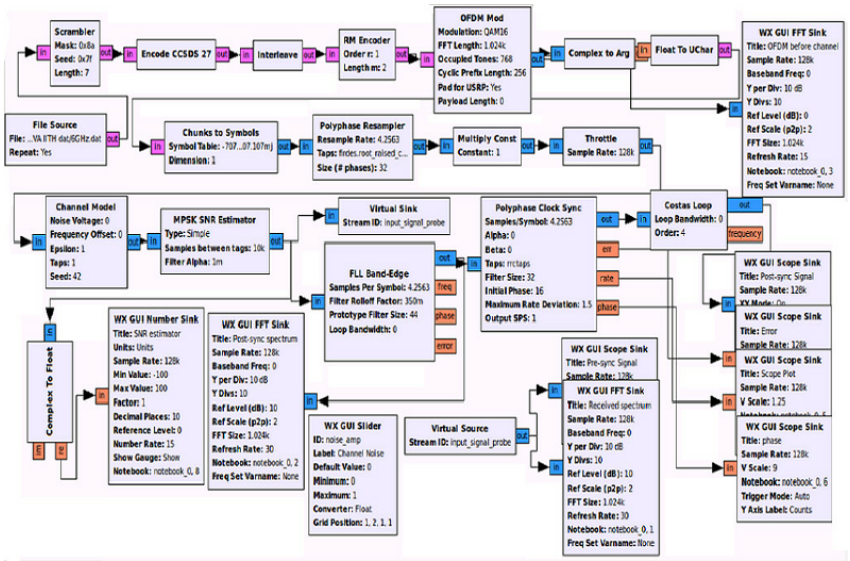
```
{
    "4b***-76": {
        "PLMN": "208-10",
        "arfcn": 76,
        "cid": "4b**",
        "type": "2G"
    },
    "60****-2950": {
        "PLMN": "208-20",
        "RX": 2950,
        "TX": 2725,
        "cid" : 60***,
        "band": 8,
        "type": "3G"
    },
[...]
}
```

XGold BaseBands? →requires xgoldmon Modmodmap's fork: https://github.com/FlUxIuS/xgoldmon

GnuRadio: playing with blocks



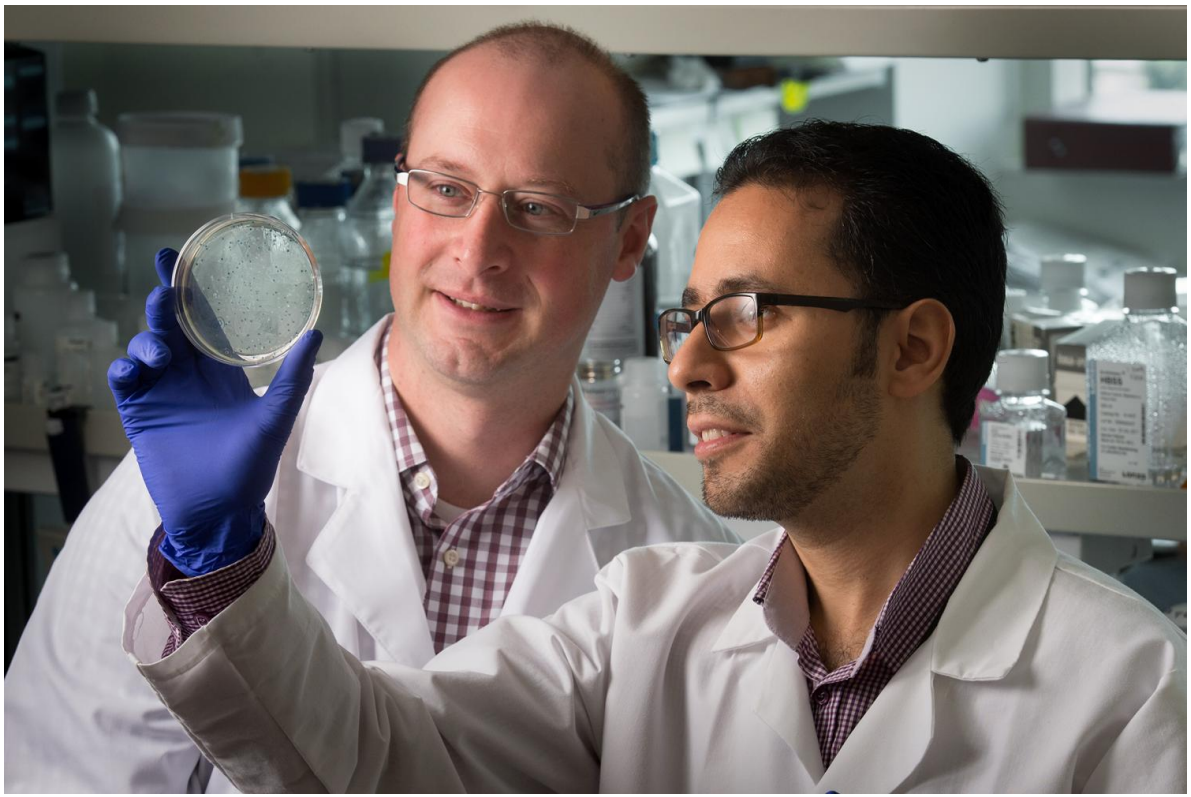
GnuRadio companion is really nice →can add, make, and remove blocks →generates Python code



Perfect to build the bases of our jammer. But we still need an idea of how to design the schema.

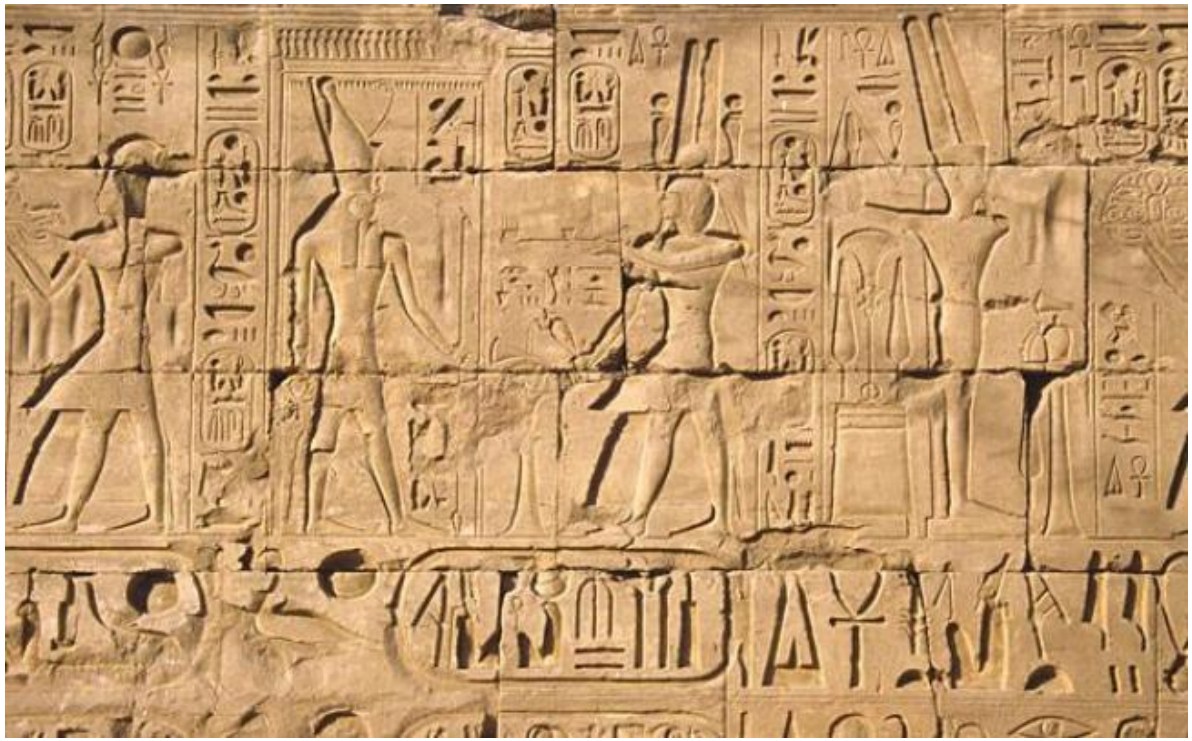
After many years of research...

Lot of experiments with #blockchains... and research and cool stuff WOW!



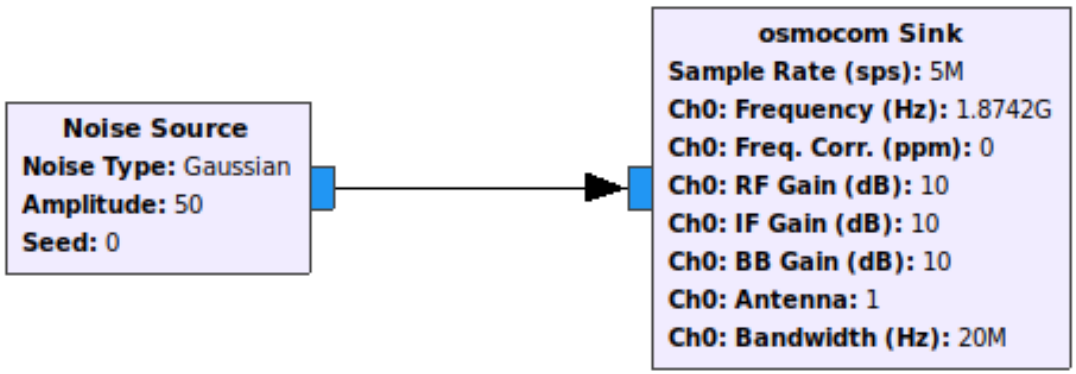
The formula

We have finally found THE formula!



And applied it on GnuRadio

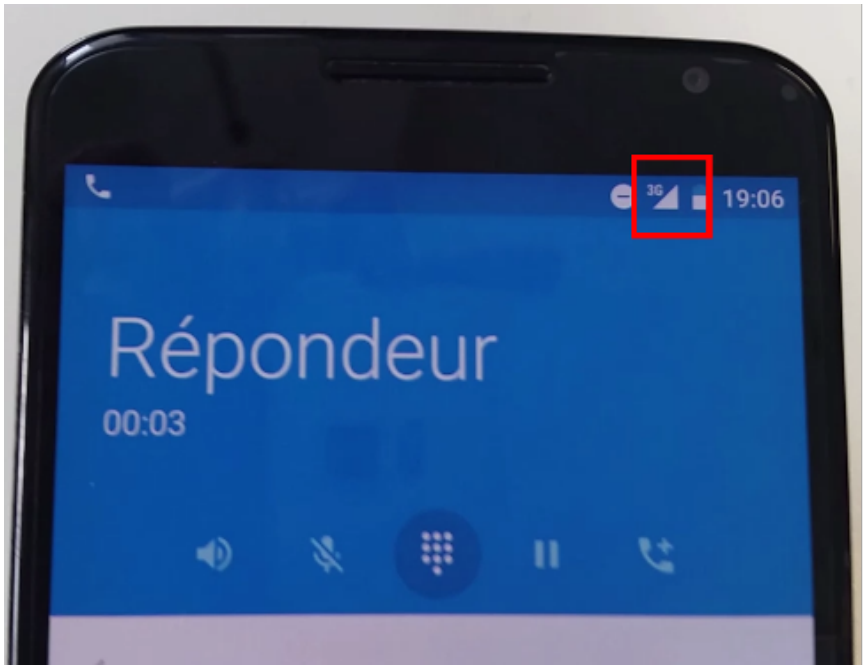
Here is the final schema:

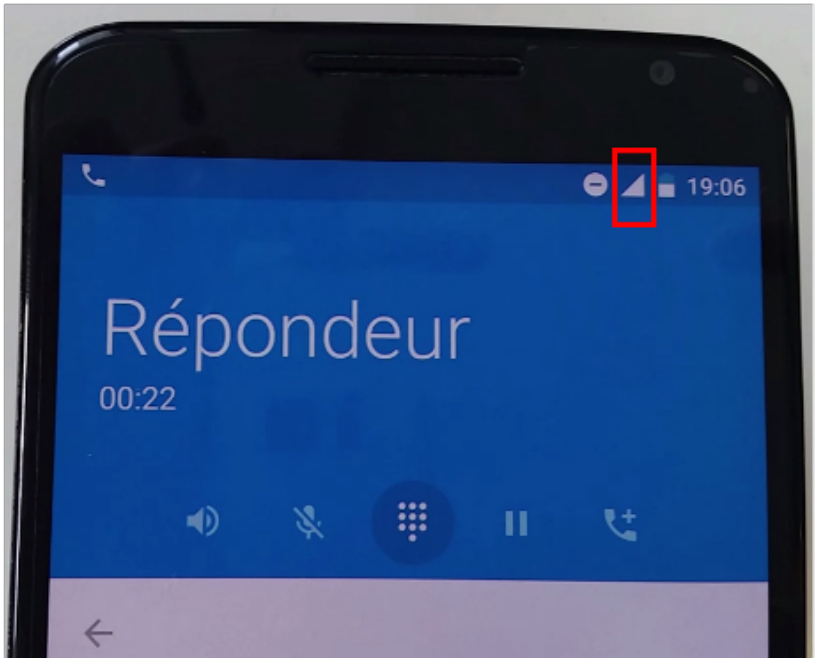


The generated Python code was then edited to support the JSON input.

Results with a simple HackRF

Works pretty well when downgrading a call from 3G to 2G





But the number of cells to jam could raise the number of needed SDR devices.

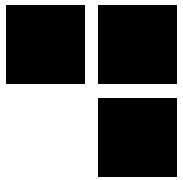
Jam tomorrow

Could also be cheaper using *OsmoFL2k*

TODO

Some work is required target specific frequencies →right sample rate, carrier frequency and harmonics

Conclusion



Modmobjam:

- is a cheap way to jam mobile cells with only a phone and a HackRF
- but if cells to jam are important more SDR devices are needed
- the code will be published soon (throw away code recycled to something clean)

The Osmo-FL2K will be tested to use it as a jammer too.

ANY QUESTIONS?

THANK YOU FOR YOUR ATTENTION,

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