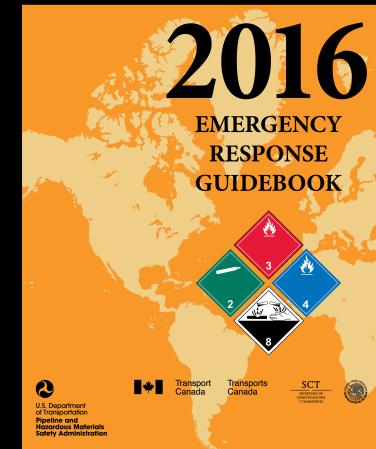


# Prepare for the worst

because that device is deadly



A guidebook intended for use by first responders during the initial phase of a transportation incident involving dangerous goods/hazardous materials

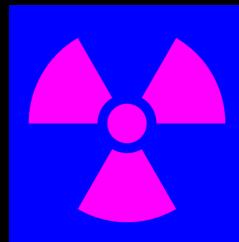


Sunny Fugate

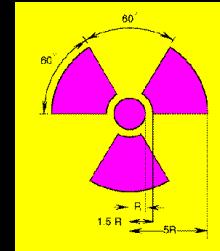
Cyber Research Scientist  
[sunny.fugate@gmail.com](mailto:sunny.fugate@gmail.com)

# Ionizing Radiation

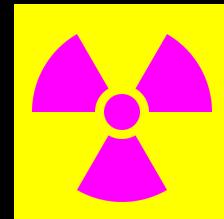
1946



1948



1950's



International  
symbol



2007



supplemental warning symbol to  
indicate sealed ionizing radiation source

# Biological

1966



"We tested the sample symbols across the country -- the marketing department had survey groups to test different labels for Dow products. There were half a dozen of our original symbols in this survey of 24 different symbols. The rest were recognizable, like the peanut man for Planter's peanuts, the Texaco star, the Shell Oil symbol, the Red Cross and the swastika. They were asked to look at them and then asked to guess at what each one meant. The biohazard symbol got the fewest guesses. Then we went back one week later to the same set of people and the same set of symbols, plus 36 more common ones, and asked them which of these did they remember the best. And they picked out the biohazard symbol." Charles Baldwin [1]



# Warning Signs

Common warning signs



Toxic



Harmful



Oxidizer



Explosive



Flammable



Corrosive

# Warning Signs

## Uncommon warning signs



Australia:  
Tasmanian devil  
crossing



Netherlands:  
quicksand



Finland:  
mosquito swarms



Greenland:  
dogsled crossing



# Pop-culture

## Dilution



“...I ran into a peculiar situation one time a couple years ago when someone was putting on a seminar on biohazards. As gifts for the participants, he devised a beautiful tie with little biohazard symbols all over it. This got me upset, and I sent him kind of a nasty letter saying this symbol was not designed to be used sartorially.”” Charles Baldwin [1]



# Pop-culture

Misuse



# Pop-culture

## Misuse



### Radioactive Baby Clothes

Baby > Radioactive

- Top departments for "radioactive"



Baby T-Shirts  
250 Products



Baby Bodysuits  
246 Products



Pacifiers  
29 Products



Baby Bibs  
8 Products

Display:

Show: 60

Sort: Popular

546 results

Related Searches: radiation symbol, radioactivity, periodically



Radioactive Sign 2 Pacifier



Danger Radioactive Materials Funny



Customizable Radiation Area Warning

# Pop-culture

Appropriate use in art, games, film can educate as well



# A cyber warning trefoil

## Why?

- Indirect harm
  - Loss of data
  - Loss of resources energy, money, respect
- Direct harm
  - Industrial control and SCADA systems
  - Computer controlled vehicles
  - Exploding batteries
  - Prosthetics — future sophisticated computer controlled/mediated limbs
  - Implants (pacemaker, cochlear implant, future artificial organs)
- Examples? — Science Fiction provides plenty

Informed by popular culture

and speculative science fiction

Today



Thumb-drives with malware

Tomorrow

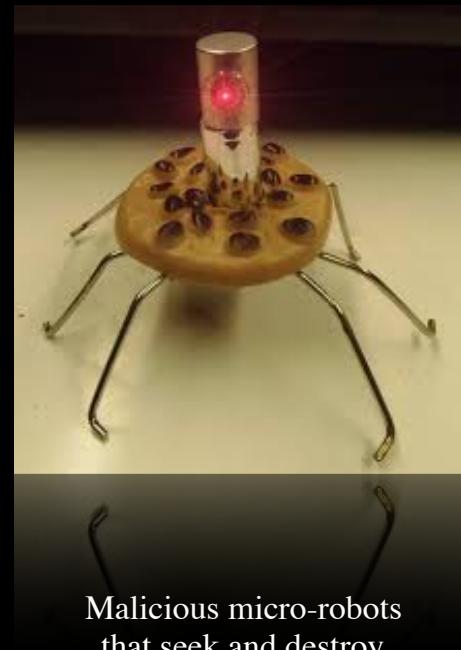
?

# Today



Thumb-drives with malware

# Tomorrow



Malicious micro-robots  
that seek and destroy

Today



Exploit development is hard

Tomorrow

?

Today



Exploit development is hard

Tomorrow



Exploit breeding and husbandry  
for fun and profit

Today



Quadcopters with firearms

Tomorrow

?

Today



Quadcopters with firearms

Tomorrow



ED-209 with firearms and bad software

Today



Self-driving cars

Tomorrow

?

Today



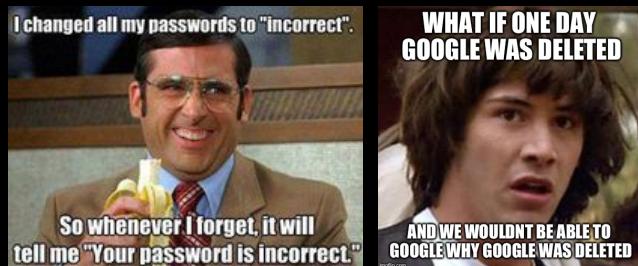
Self-driving cars

Tomorrow



the Model ST-800

# Today



# Tomorrow

?

Memes and thought vireo are fun and stupid

Today



I changed all my passwords to "incorrect".



# WHAT IF ONE DAY GOOGLE WAS DELETED



# Tomorrow



Today



Tomorrow

?

Love dolls are creepy

Today



Love dolls are creepy

Tomorrow



Androids and the uncanny abyss of  
malicious electric sheep

Today



Tomorrow

?

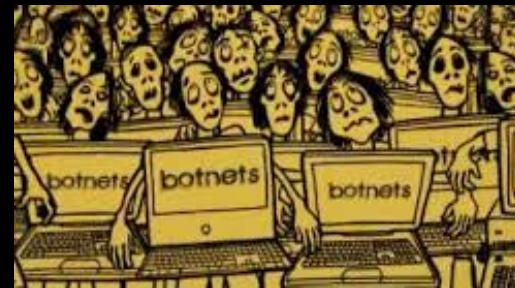
Zombies aren't real

Today



Zombies aren't real

Tomorrow



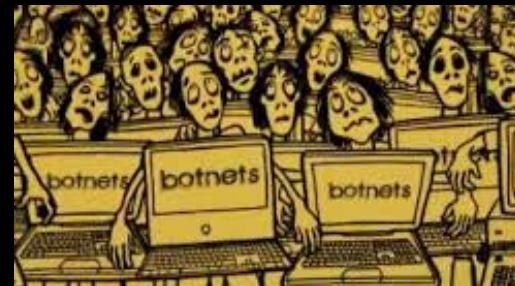
Zombies are real when they are robots

Today



Zombies aren't real

~~Tomorrow~~  
Today



Zombies are real when they are robots

So what do we have now?

# A cyber warning trefoil

So what do we have now?

— Just a hodgepodge of computer security warning icons and pop culture art



# A cyber warning trefoil

In what ways can I use the Internet while avoiding its risks?

by: [20schiffnor](#)

DISCUSSION Feb 25, 2015

keywords • [avoiding the dangers of the internet](#) • [cyber bullying](#) • [cyber safety](#)  
• [identity theft protection](#) • [malware protection](#)

channels • [from the middle \(6-8\)](#)



Most people use the Internet every day for either work or recreational reasons. However around 2 million people suffer of a cyber attack monthly whether it be Identity theft or an unresponsive computer. Malware verymuch plays a role in our daily lives our computers protections and firewalls encounter them almost daily, but from time to time our computers may not catch or stop the viruses that constantly bombard our computers. Therefore it is our responsibility to steer clear of these dangerous and/or annoying things. This malware can be found in a innocent thing like looking up the date a movie came out to something not as innocent like watching a illegally downloaded movie. No computers protection is perfect and a well made virus or trojan can bypass most and all security on your computer if you force download it or it finds a loophole.

Add new comment Share

Too close to  
biohazard trefoil



and related pop-art



# A cyber warning trefoil



Designed by the creators of DigiMon?



# A cyber warning trefoil

**DIGIMON WIKI**

On the Wiki General Anime Other Comm  
Wiki Activity Random page Videos Images

## Digital Hazard

[Edit this page](#) [Talk](#) 8

The **Digital Hazard** symbol appears on the bodies of certain Digimon. According to *Digimon Tamers*, the presence of this symbol means that the Digimon has the potential to be highly destructive, and, if corrupted, could threaten the very existence of both the **Digital World** and the **Human World**.<sup>[citation needed]</sup> The symbol bears a striking similarity to that which indicates a **biohazard**.



The **trefoil Digital Hazard** symbol.

# A cyber warning trefoil

## of cyber warning symbols



### Problems:

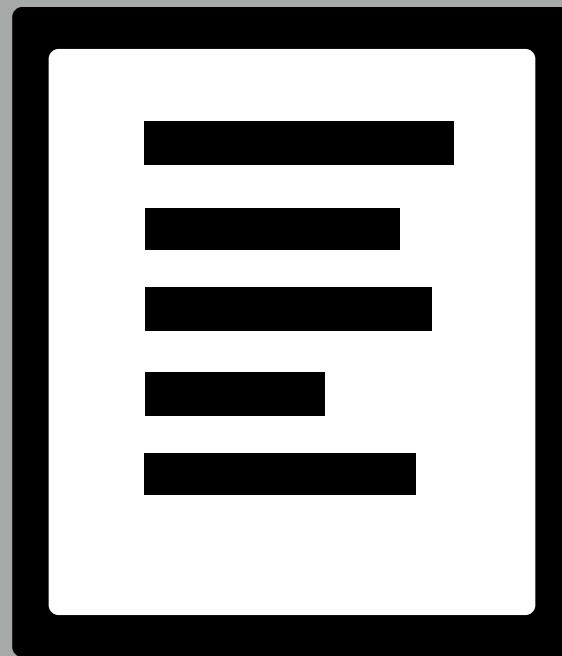
- Popular culture use
- It doesn't mean anything for our purposes
- Not culturally associated with our kinds of "digital monsters"
- Copyright

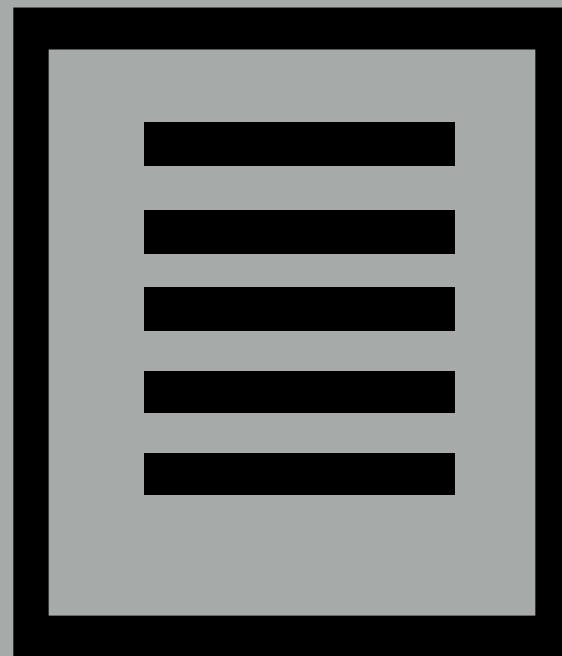
# Properties of a good warning symbol

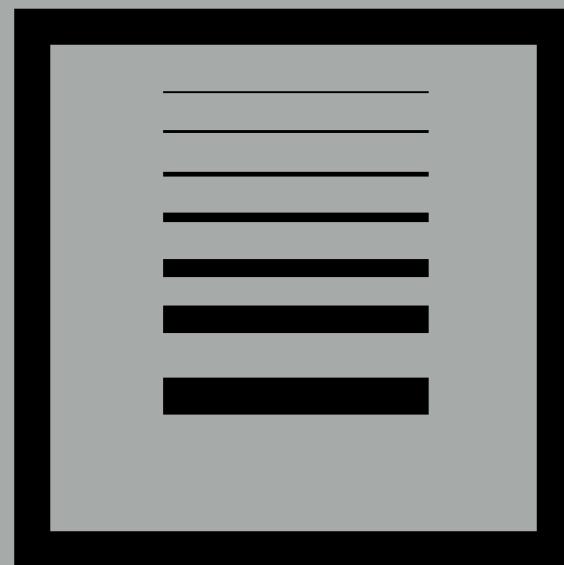
- Follows recognizable warning tre-foil pattern
- Visible at small and large scale
- Visible in many lighting conditions
- Recognizable after partial destruction
- Distinguishable from other warning symbols
- Easy to recreate, draw, stencil
- Accepted by the community
- Free use

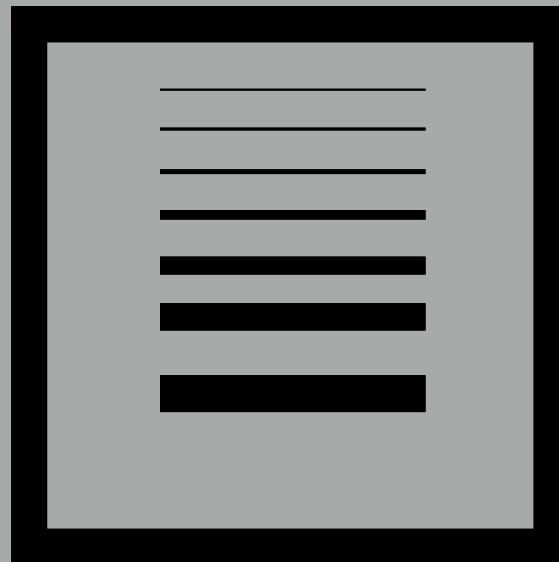
# Design























# Criteria for use?

For any device/data/software, ask the following:

**(A) Test of trust**

Do you trust the source and contents?

**(B) Test of intent**

Is it intended to cause harm?

**(C) Test of harm**

Will it cause harm? Can it cause harm?

**(D) Test of trial**

Could it be easily forced to cause harm?

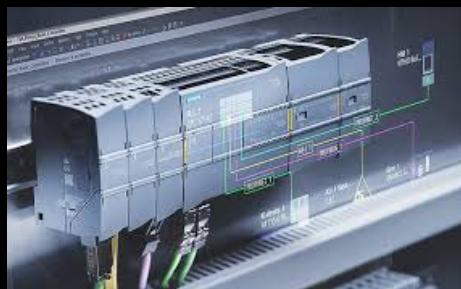
# Where to use

- In any situation in proper association with malicious data, algorithms, or devices.
  - Computing devices
  - Software
  - Data
  - Signals
  - Art, Media, Film depicting proper labeling of the above

# (potentially) Deadly Devices



USB Killer



WiFi Pineapple

# (potentially) Deadly Devices



USB Killer

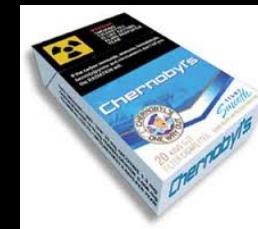


WiFi Pineapple



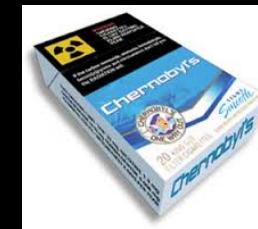
# Where absolutely not to use

- If you have to ask....
  - Can I put this on a t-shirt?
  - Use it to label my smokes?
  - On something that floats?
  - For a sick tattoo?



# Where absolutely not to use

- If you have to ask....
  - Can I put this on a t-shirt?
  - Use it to label my smokes?
  - On something that floats?
  - For a sick tattoo?



Sure

# Where absolutely not to use

- If you have to ask....
  - Can I put this on a t-shirt?
  - Use it to label my smokes?
  - On something that floats?
  - For a sick tattoo?



Surely not.

# What else?

- The symbol itself shouldn't be deadly or dangerous
  - Warning symbols are precursors to threats

# What else?

- The symbol itself shouldn't be deadly or dangerous
  - Warning symbols are precursors to threats

I shouldn't be infected by a biological agent just by viewing or coming into contact with the biohazard symbol itself.

# What else?

- The symbol itself shouldn't be deadly or dangerous

these guys are exceptions



# Example Uses

# Safe(r) Browsing

Bank Of America 3 STEP Verification

Our system has detected a change in your purchase behavior. In order to protect your Bank Card we need to verify your Identity in 3 Easy Steps.

STEP 1: To Start the Unlocking Process, please Enter your PHONE number and ZIP code below.

Please note that information submitted must match what we have on file.

Phone Number

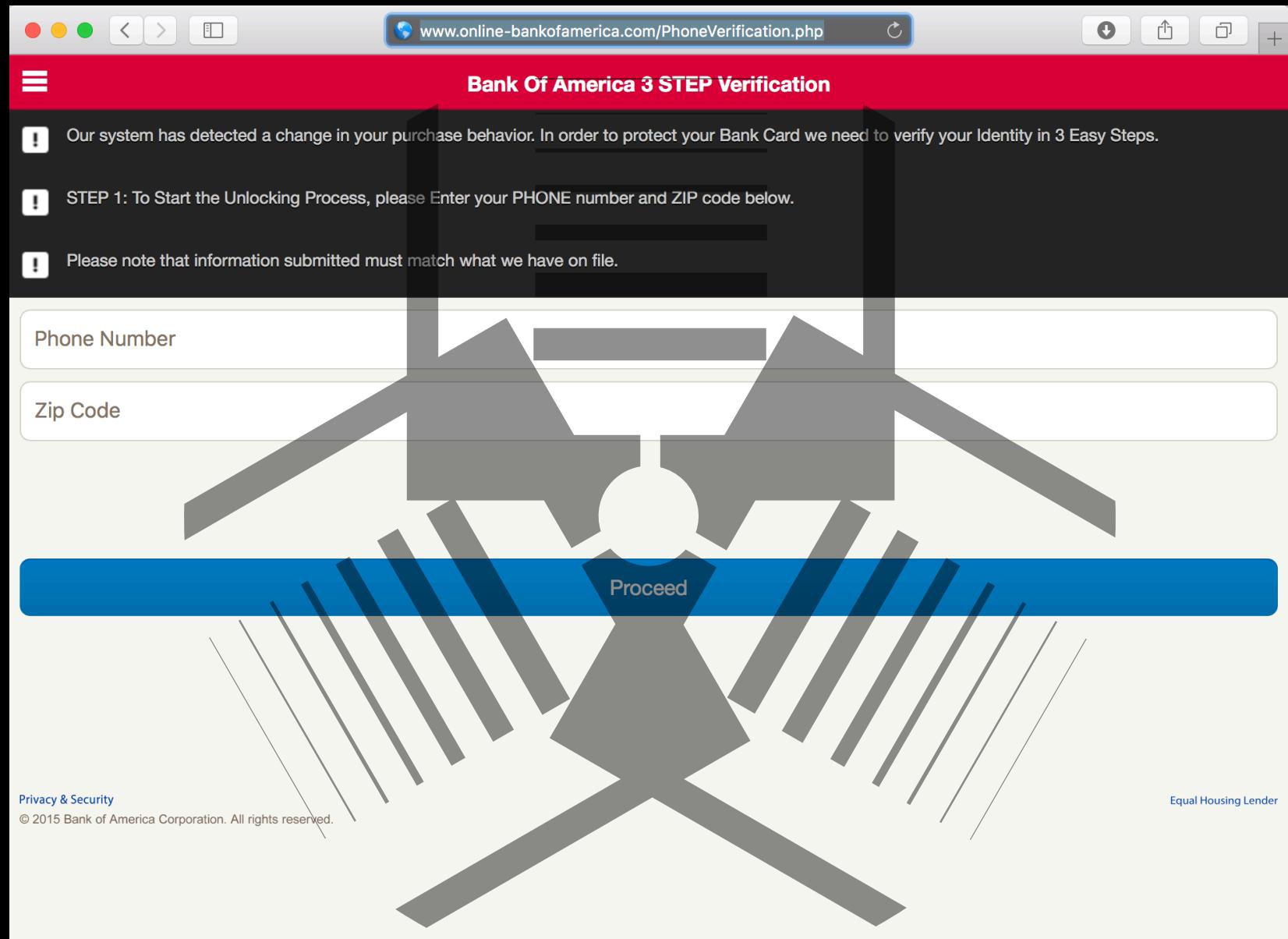
Zip Code

Proceed

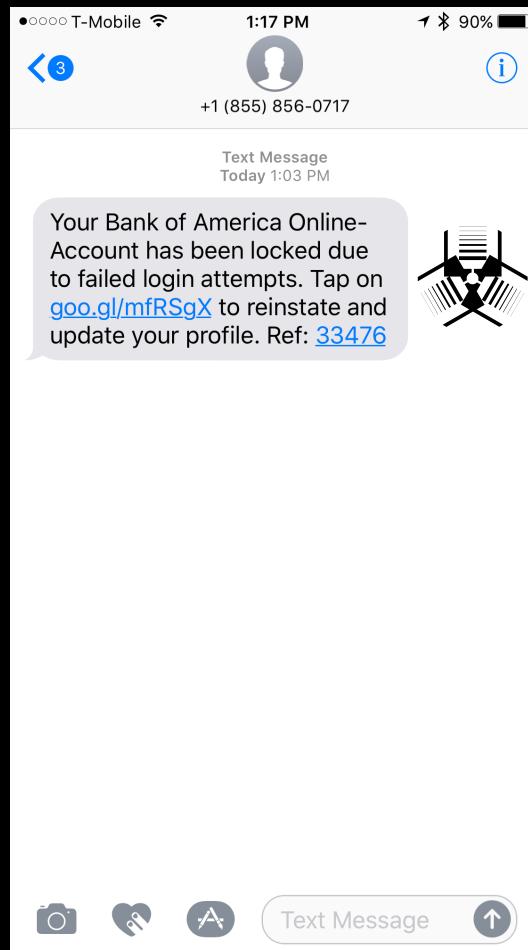
Privacy & Security  
© 2015 Bank of America Corporation. All rights reserved.

Equal Housing Lender

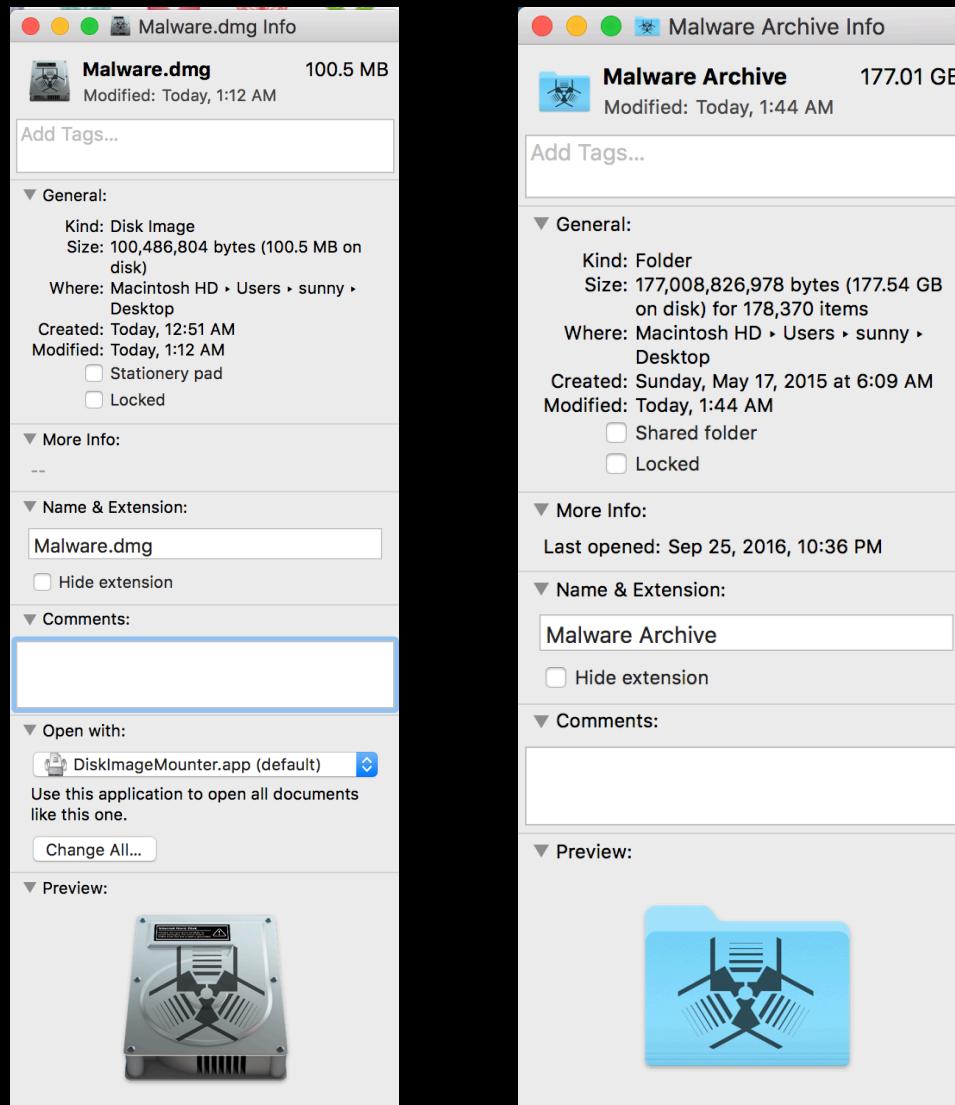
# Safe(r) Browsing



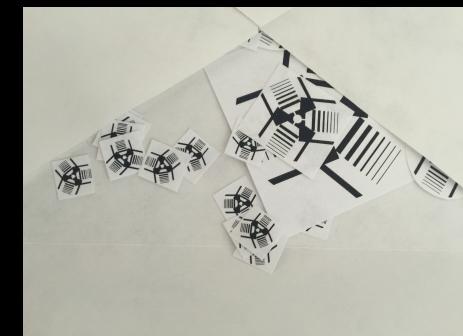
# SMSing with trefoils



# Files, folders, and disks with trefoils



# Labeling Devices



# Labeling Devices



Trefoil should be placed in a prominent location



Don't do this



It will confuse your kids



dad, what am I listening to?



Don't do this either



The stickers are really difficult to remove afterward



and it makes task switching impossible

# And this.....



# And this.....



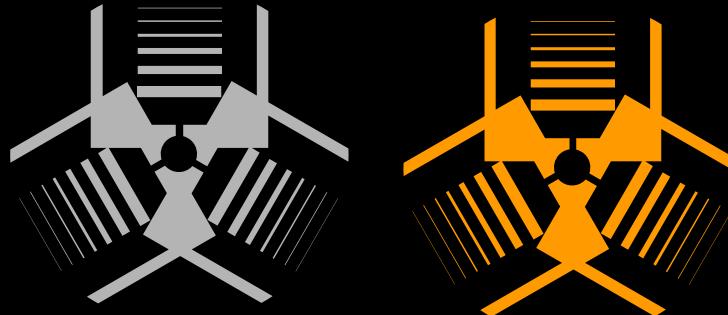
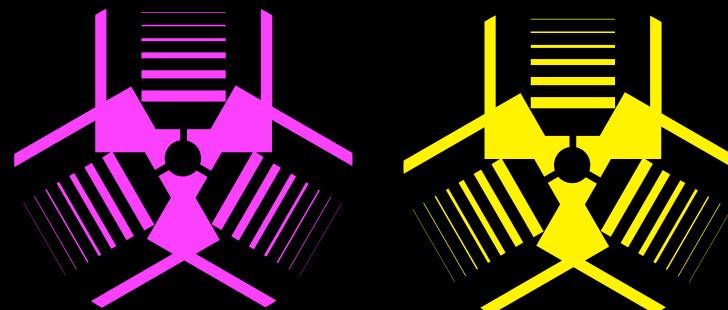
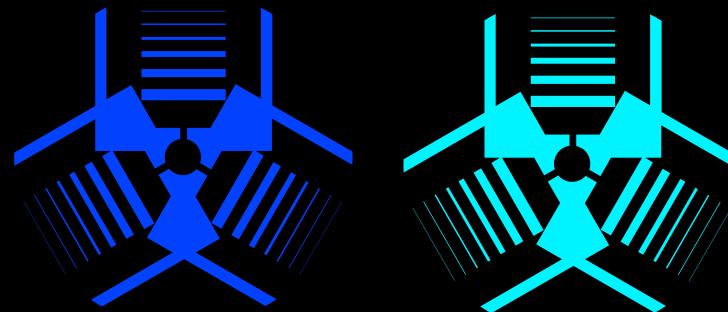
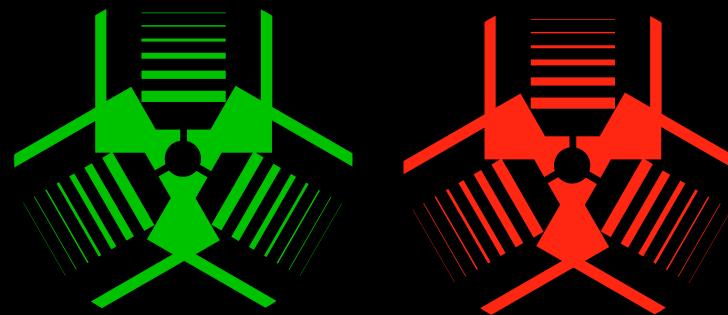
is like the opposite of a baby-on-board decal

# And this....

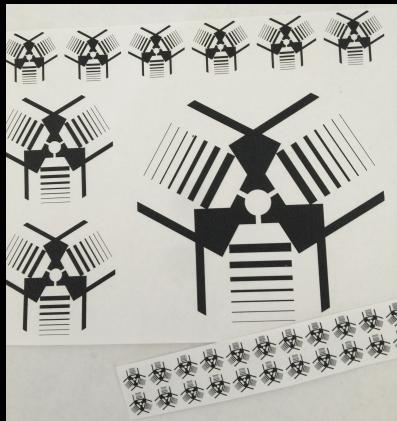


It will also confuse your kids

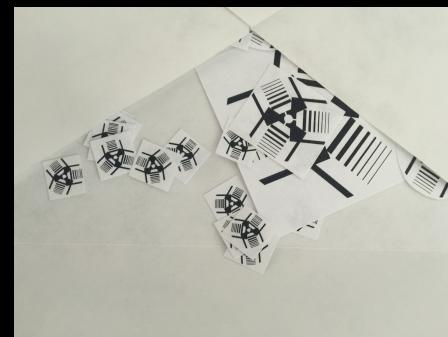
# Making Stickers



Print



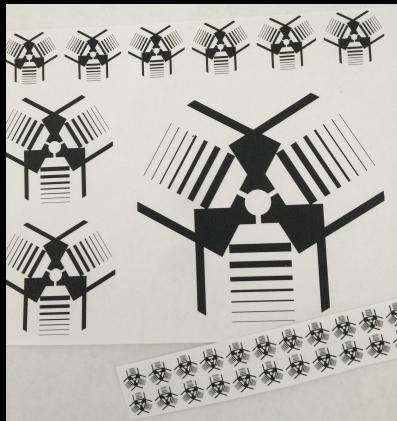
Cut



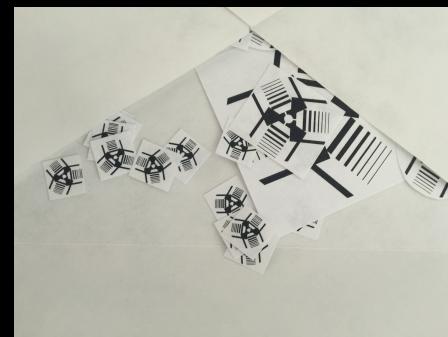
Paste



Print



Cut



Paste



Glue, scotch tape, mod podge, spit, ...

A small experiment



















What do we do when the threat is invisible?

Biological and radiological threats have taught us something crucial.

If we can't see it.... that doesn't mean it isn't there or can't have an effect.

Broadcast that its bad

Broadcast that its bad  
on a network  
in a packet

# RFC 3514

# just a bit of evil

Network Working Group Request for Comments: 3514 Category: Informational	S. Bellovin AT&T Labs Research 1 April 2003	Bellovin	Informational	[Page 1]												
<b>The Security Flag in the IPv4 Header</b>		RFC 3514	The Security Flag in the IPv4 Header	1 April 2003												
<b>Status of this Memo</b>																
<p>This memo provides information for the Internet community. It does not specify an Internet standard of any kind. Distribution of this memo is unlimited.</p>																
<b>Copyright Notice</b>																
Copyright (C) The Internet Society (2003). All Rights Reserved.																
<b>Abstract</b>																
<p>Firewalls, packet filters, intrusion detection systems, and the like often have difficulty distinguishing between packets that have malicious intent and those that are merely unusual. We define a security flag in the IPv4 header as a means of distinguishing the two cases.</p>																
<b>1. Introduction</b>																
<p>Firewalls [CBR03], packet filters, intrusion detection systems, and the like often have difficulty distinguishing between packets that have malicious intent and those that are merely unusual. The problem is that making such determinations is hard. To solve this problem, we define a security flag, known as the "evil" bit, in the IPv4 [RFC791] header. Benign packets have this bit set to 0; those that are used for an attack will have the bit set to 1.</p>																
<b>1.1. Terminology</b>																
<p>The bit field is laid out as follows:</p>																
<table border="0"><tr><td style="width: 10px;"></td><td style="width: 10px;">0</td><td style="width: 10px;"></td></tr><tr><td>++</td><td></td><td>++</td></tr><tr><td> </td><td>E</td><td> </td></tr><tr><td>++</td><td></td><td>++</td></tr></table>						0		++		++		E		++		++
	0															
++		++														
	E															
++		++														
<p>Currently-assigned values are defined as follows:</p>																
<p>0x0 If the bit is set to 0, the packet has no evil intent. Hosts, network elements, etc., SHOULD assume that the packet is harmless, and SHOULD NOT take any defensive measures. (We note that this part of the spec is already implemented by many common desktop operating systems.)</p>																
<p>0x1 If the bit is set to 1, the packet has evil intent. Secure systems SHOULD try to defend themselves against such packets. Insecure systems MAY chose to crash, be penetrated, etc.</p>																
<b>3. Setting the Evil Bit</b>																
<p>There are a number of ways in which the evil bit may be set. Attack applications may use a suitable API to request that it be set. Systems that do not have other mechanisms MUST provide such an API; attack programs MUST use it.</p>																
<p>Multi-level insecure operating systems may have special levels for attack programs; the evil bit MUST be set by default on packets emanating from programs running at such levels. However, the system MAY provide an API to allow it to be cleared for non-malicious activity by users who normally engage in attack behavior.</p>																
<p>Fragments that by themselves are dangerous MUST have the evil bit set. If a packet with the evil bit set is fragmented by an</p>																

# RFC 3514

just a bit of evil

If it isn't there, it might still be bad.

# RFC 3514

just a bit of evil

If it is there, it is going to be either evil

# RFC 3514

just a bit of evil

If it is there, it is going to be either evil  
or stupid

# RFC 3514

just a bit of evil

If it is there, it is going to be either evil  
or stupid  
or both.

Inside a packet isn't the only kind of invisible

Inside a packet isn't the only kind of invisible

What about RF maliciousness?

Maybe we can just broadcast that it's bad?

Maybe we can just broadcast that it's bad?

But where?

in the physical layer?

# Broadcast that its bad

Can we do this using signal modulation?

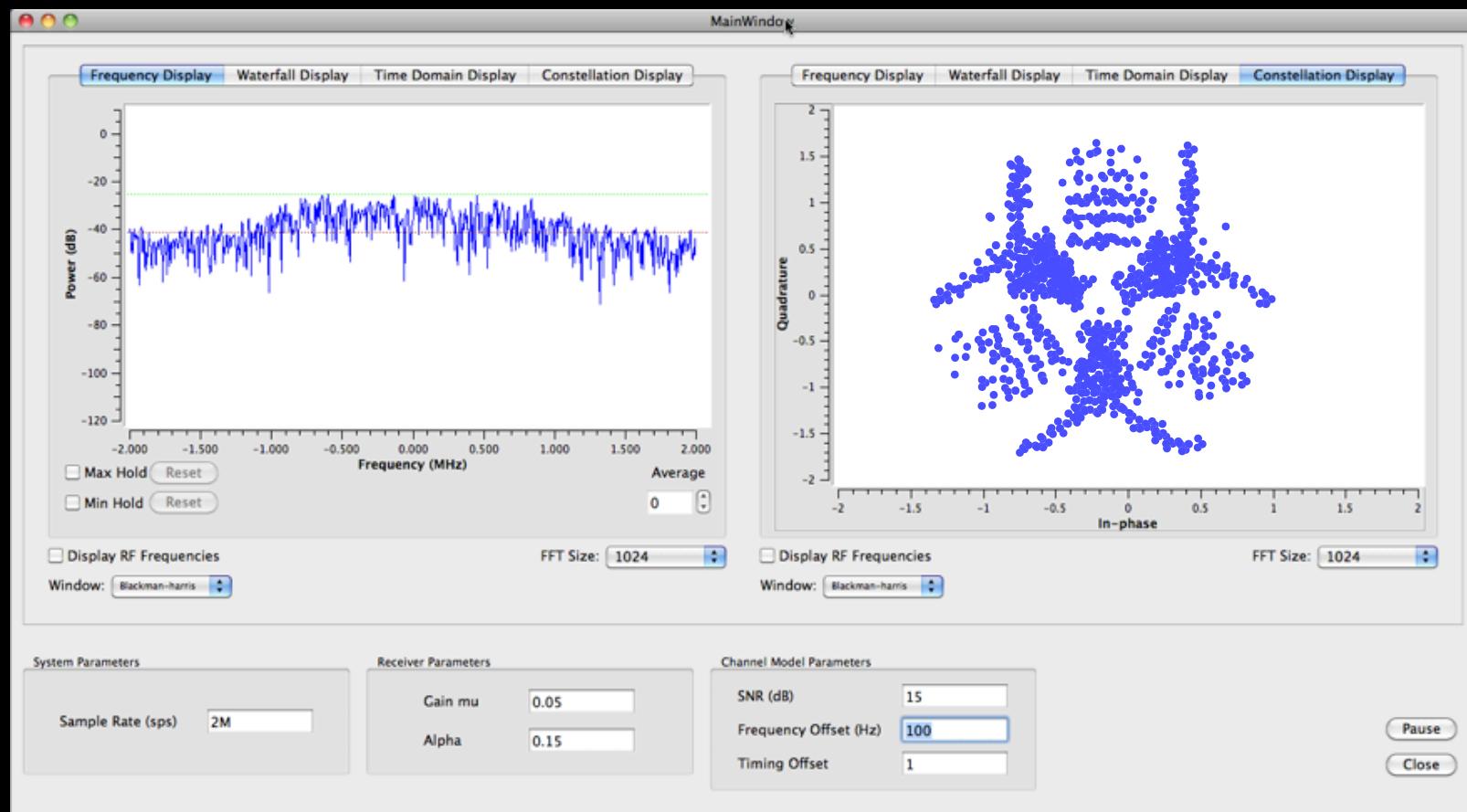
**On the transmitter** (Modulating the points onto a radio signal):

1. Make the X,Y coordinates a series where the series is normalized between -1 and +1
2. A digital radio can transmit a complex number, which is referred to as the in-phase and quadrature components, or I and Q. (how this is done is beyond the scope of this talk)
3. I and Q correspond to X,Y when viewed on a cartesian plot
4. Configure the radio (probably a software defined radio) to transmit raw I,Q values, as opposed to an actual modulation (such as QPSK or FSK)
5. Feed in the series of I,Q points to the radio

**On the receiver:**

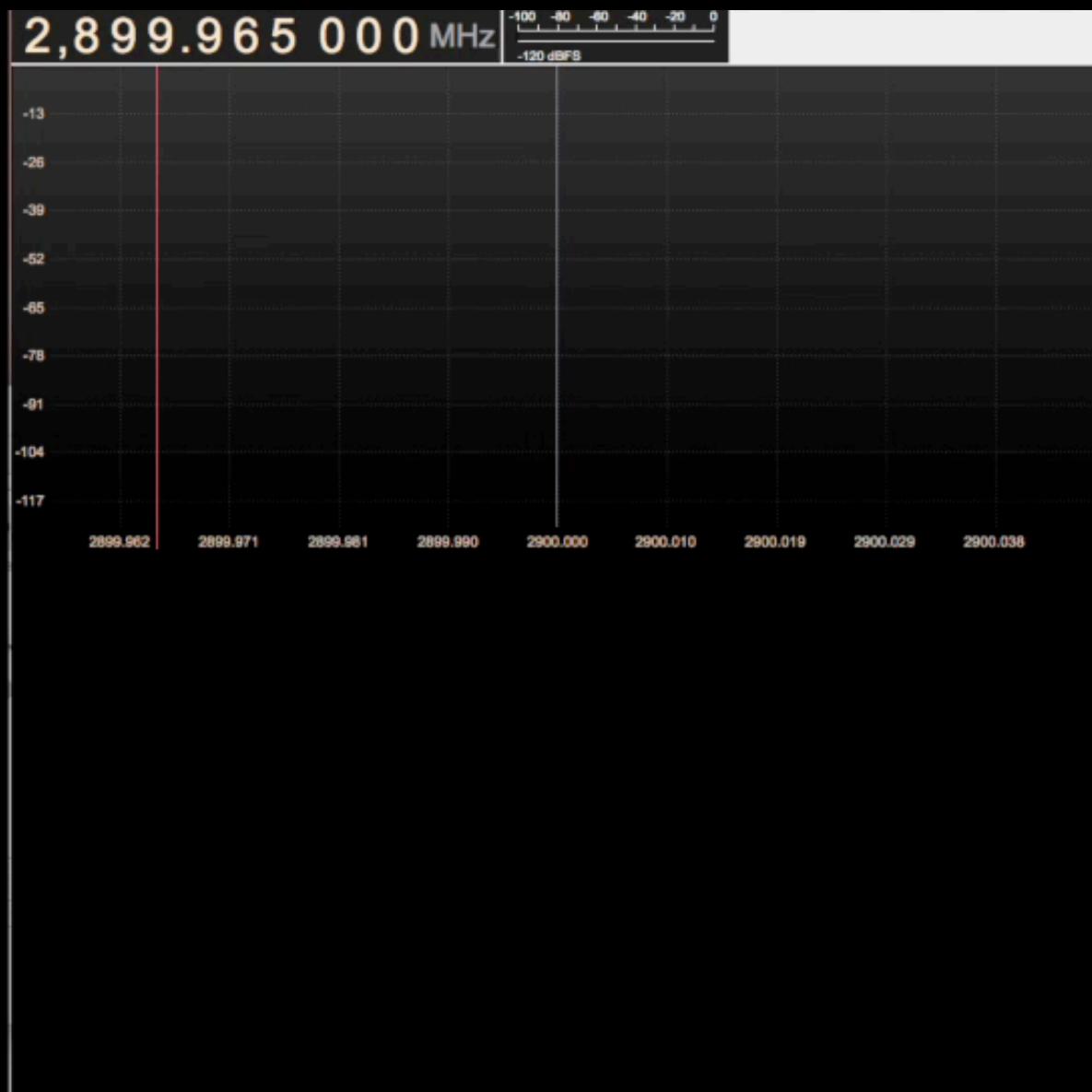
1. Configure the receiver to plot the I,Q values received, with a history of some number of points (the number of points that made up the original image)
2. Receiver will need to have its frequency and internal oscillator exactly match the transmitter
3. Show your boss the warning sign over the radio's physical layer

# Broadcast that its bad

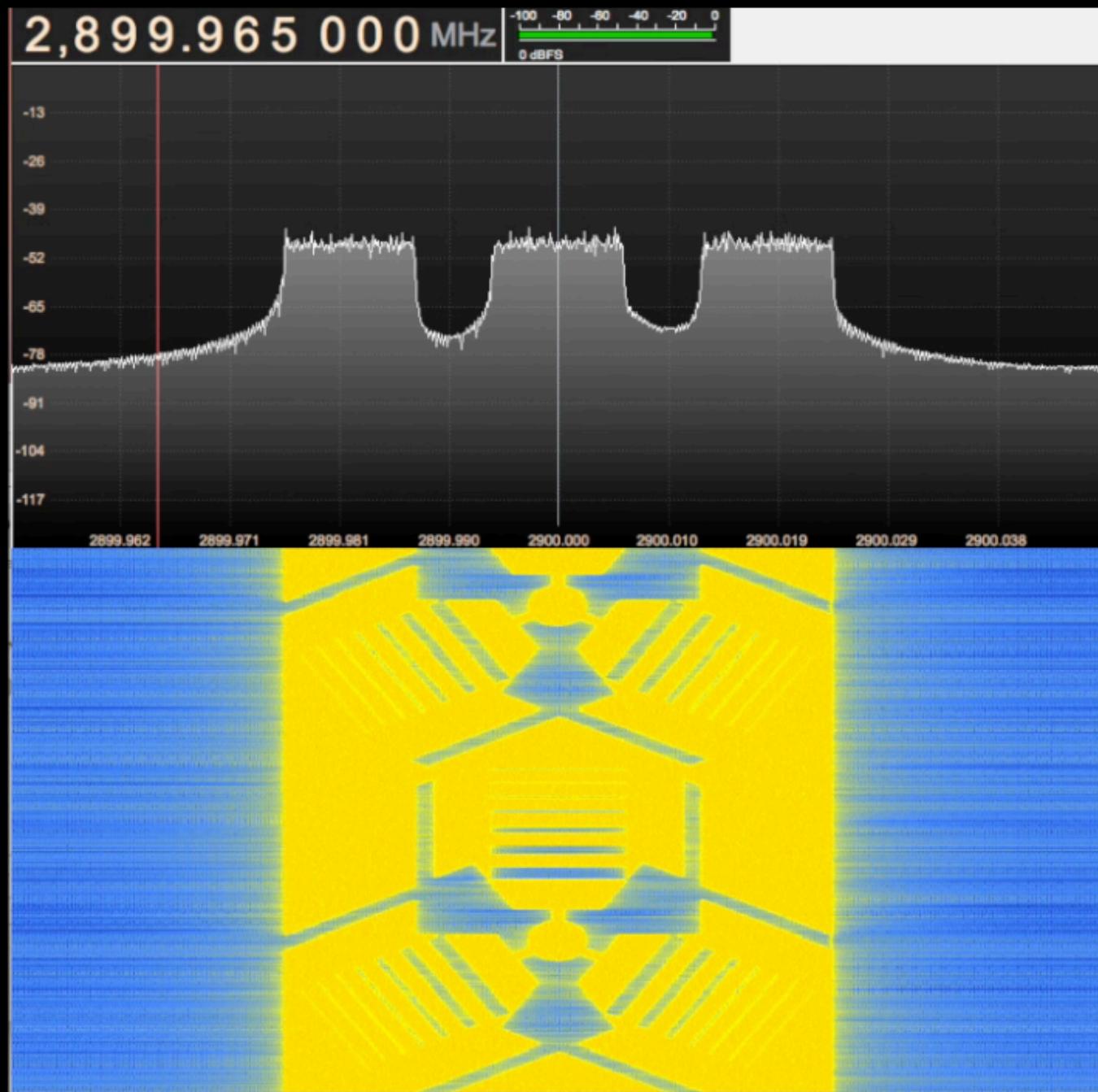


Evil-IQ?

# An even easier label for malicious RF

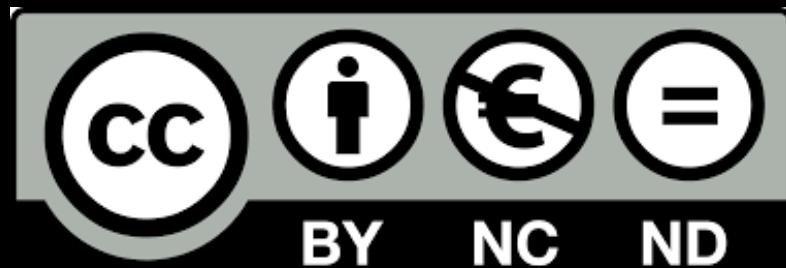


# An even easier label for malicious RF



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<http://creativecommons.org/licenses/by-nc-nd/4.0/>

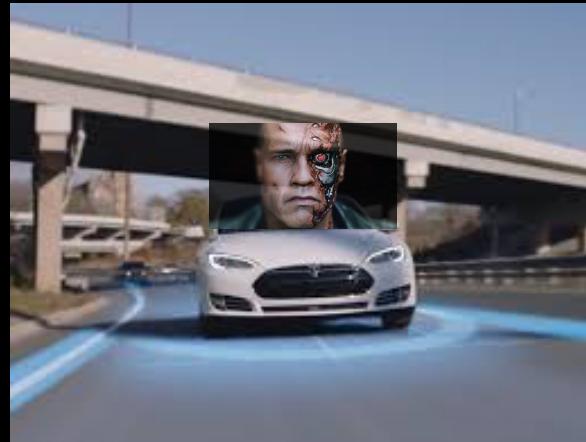
So....

Model T-800



because this guy

and these guys

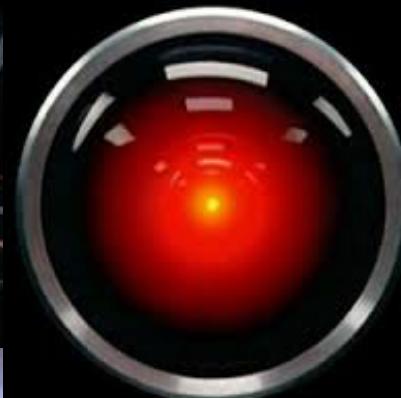


Model ST-800?



EduDrive-209?

and all of these



may be coming to a future near you

and all of these



are already here

Need a better label



for bad

# Thanks

