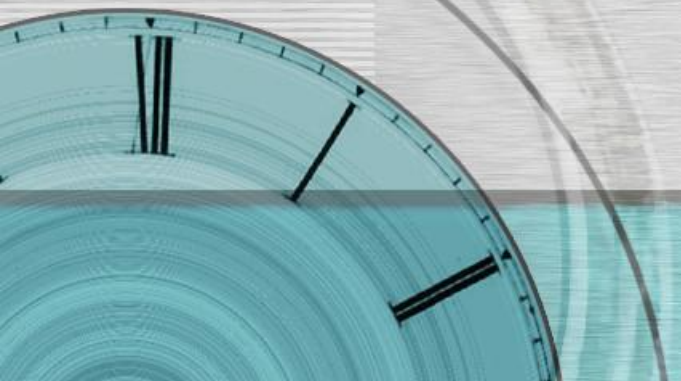
短距离无线系统与航空无线电系统攻击

UnicornTeam 无线电硬件实验室

演讲人：张婉桥



人体移植芯片

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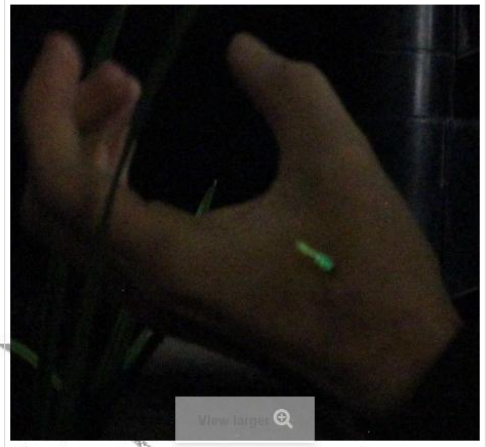
NFC and RFID implants › Firefly Tattoo - Green






Firefly Tattoo - Green

Model Firefly01

Condition New

An implantable subdermal light - Green.

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US $119.00

US $119.00 per 1

Quantity

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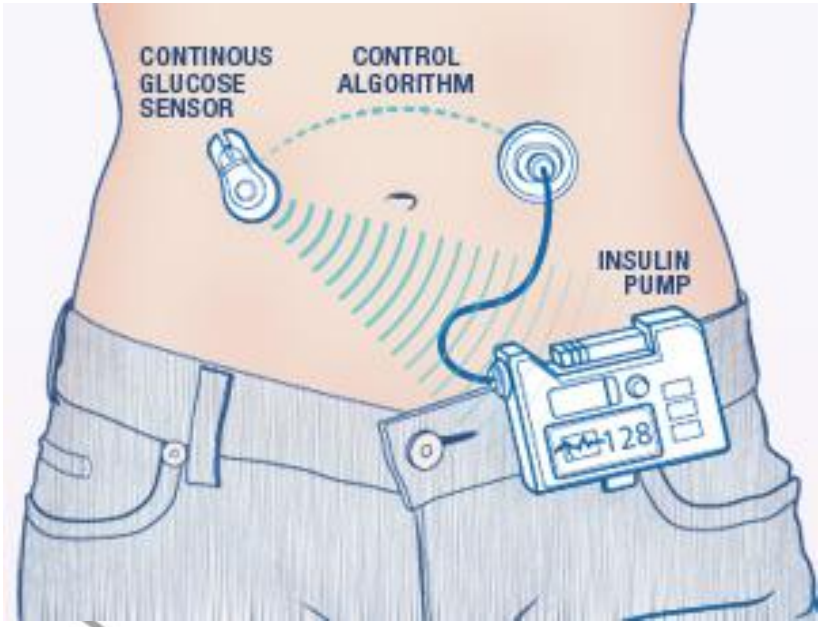
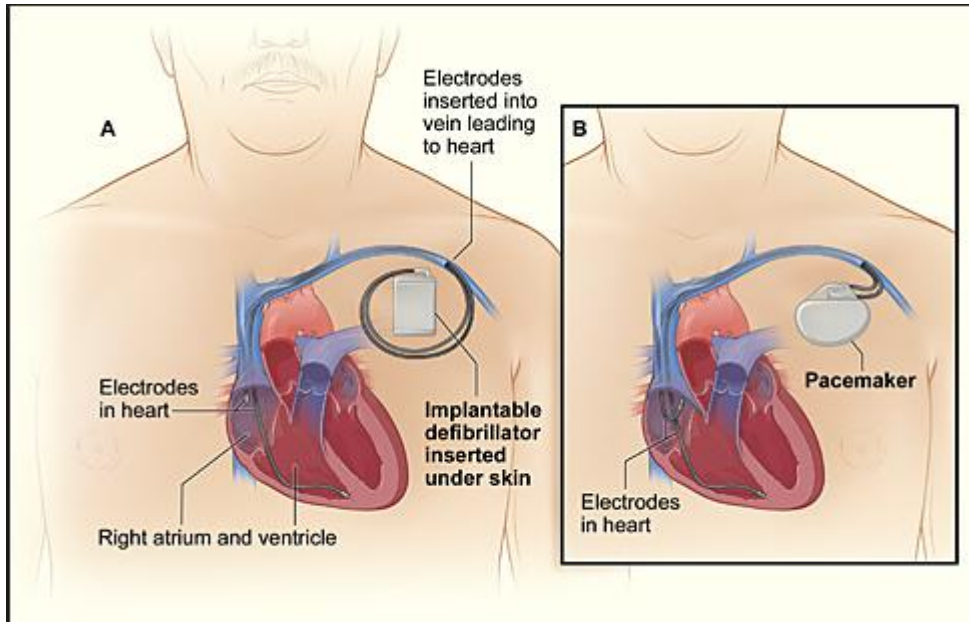
360UNICORNTEAM

人体移植设备



人造胰腺



植入型心率复除颤器

汽车无线控制

IC智能卡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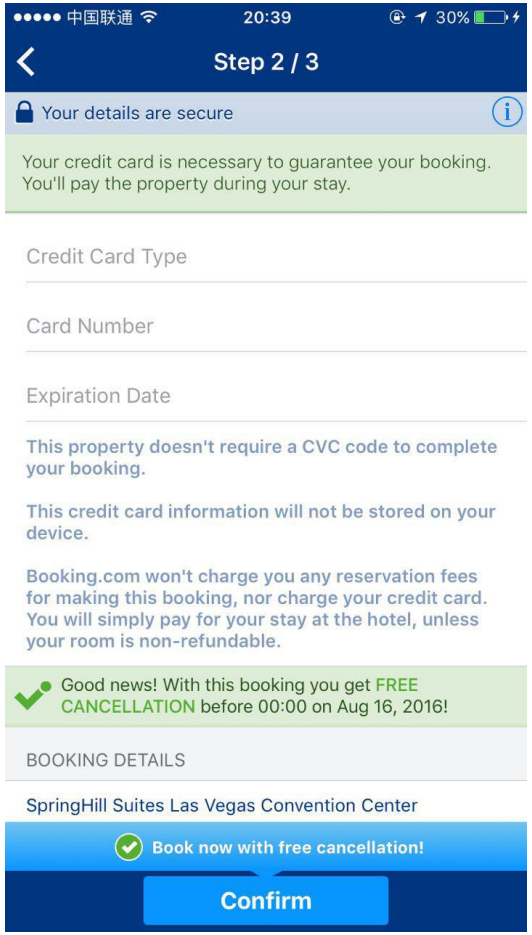
中国工商银行
白金卡
6222 0688 8888 8888
6222
月/年
有效期限 88/88
MU DAN KA
UnionPay
银联


优酷

IC智能卡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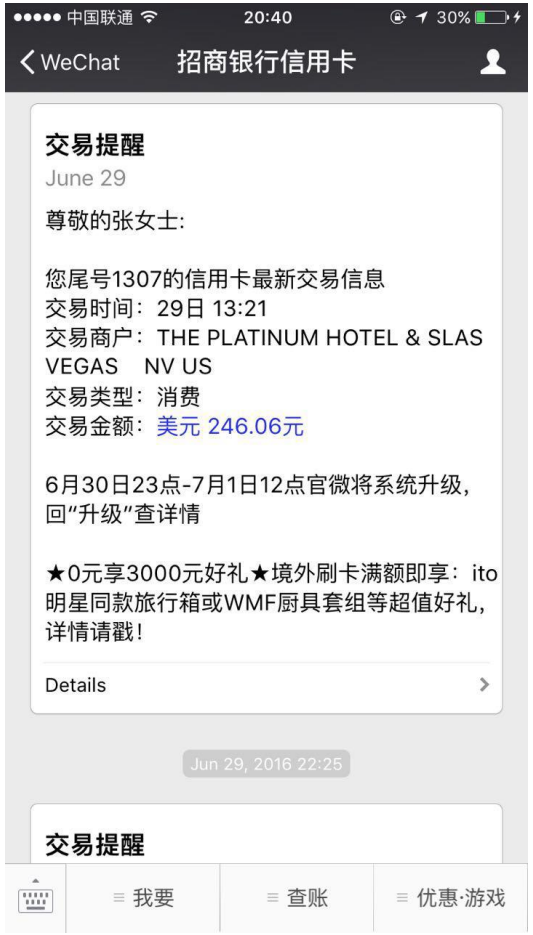
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交易金额：美元 246.06元
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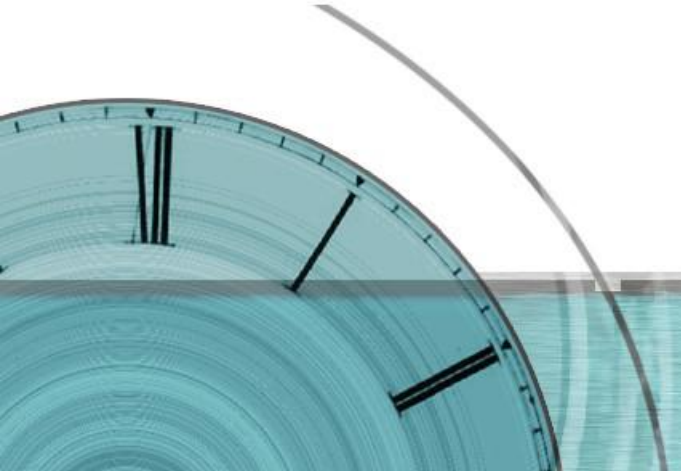
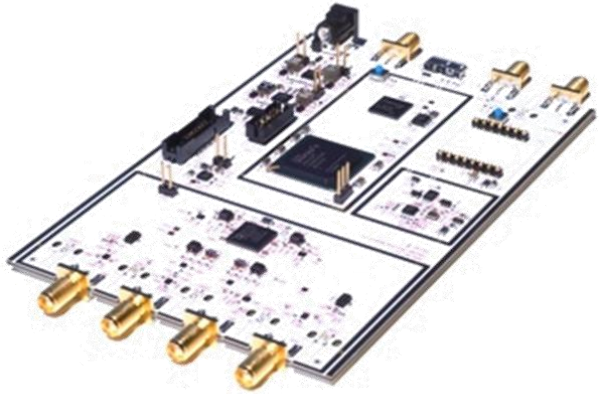
无线电逆向分析

- 短距离无线遥控系统
- 无线传感器
- 航空无线电ADS-B



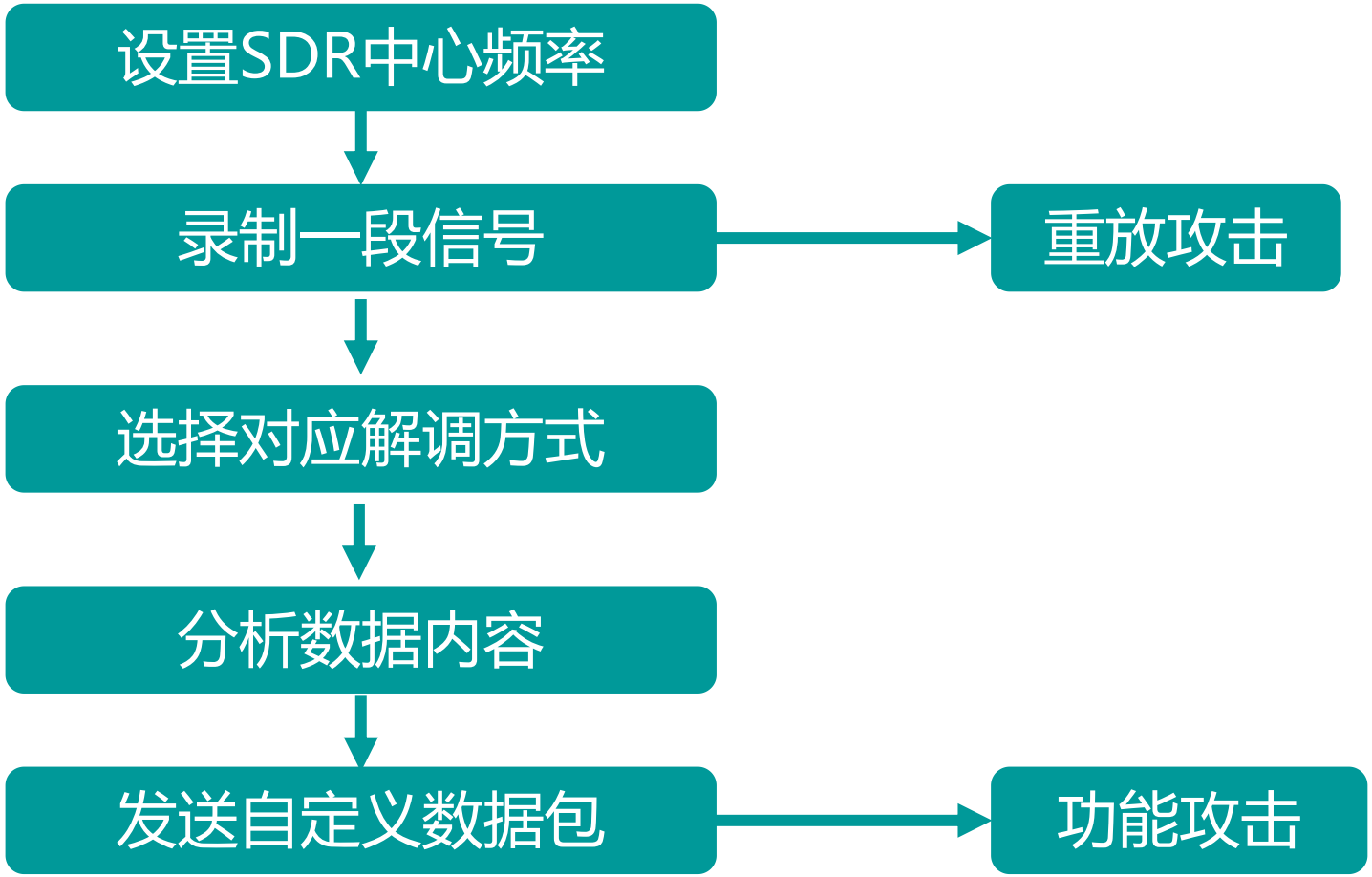
分析工具——SDR



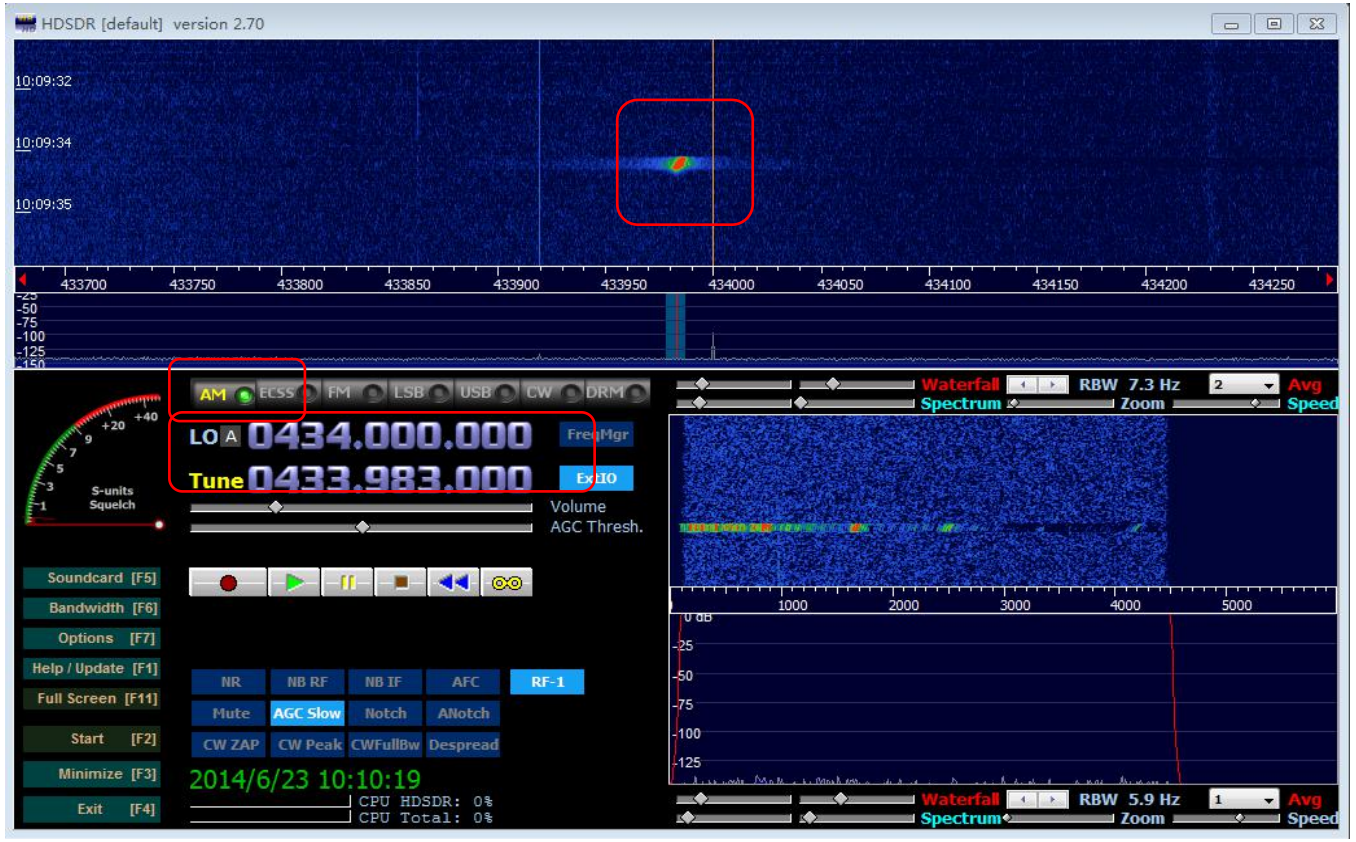
分析工具——SDR

	RTL-SDR	HackRF One	bladeRF x40	USRP B200mini
频段	52M – 2.2 GHz	1M – 6GHz	300M –3.8GHz	70M – 6GHz
带宽	2.56MS/s	20 MS/s	40MS/s	56MS/s
双工类型	只能接收	半双工	全双工	全双工
位宽	8-bit	8-bit	12-bit	12-bit
价格	$20	$300	$420	$675

无线电逆向分析流程

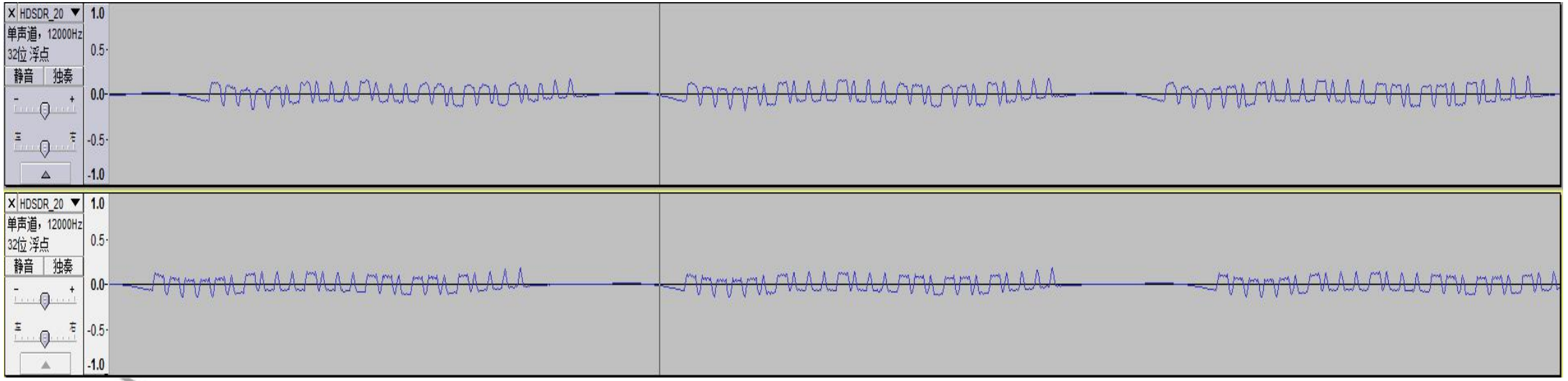


无线遥控信号



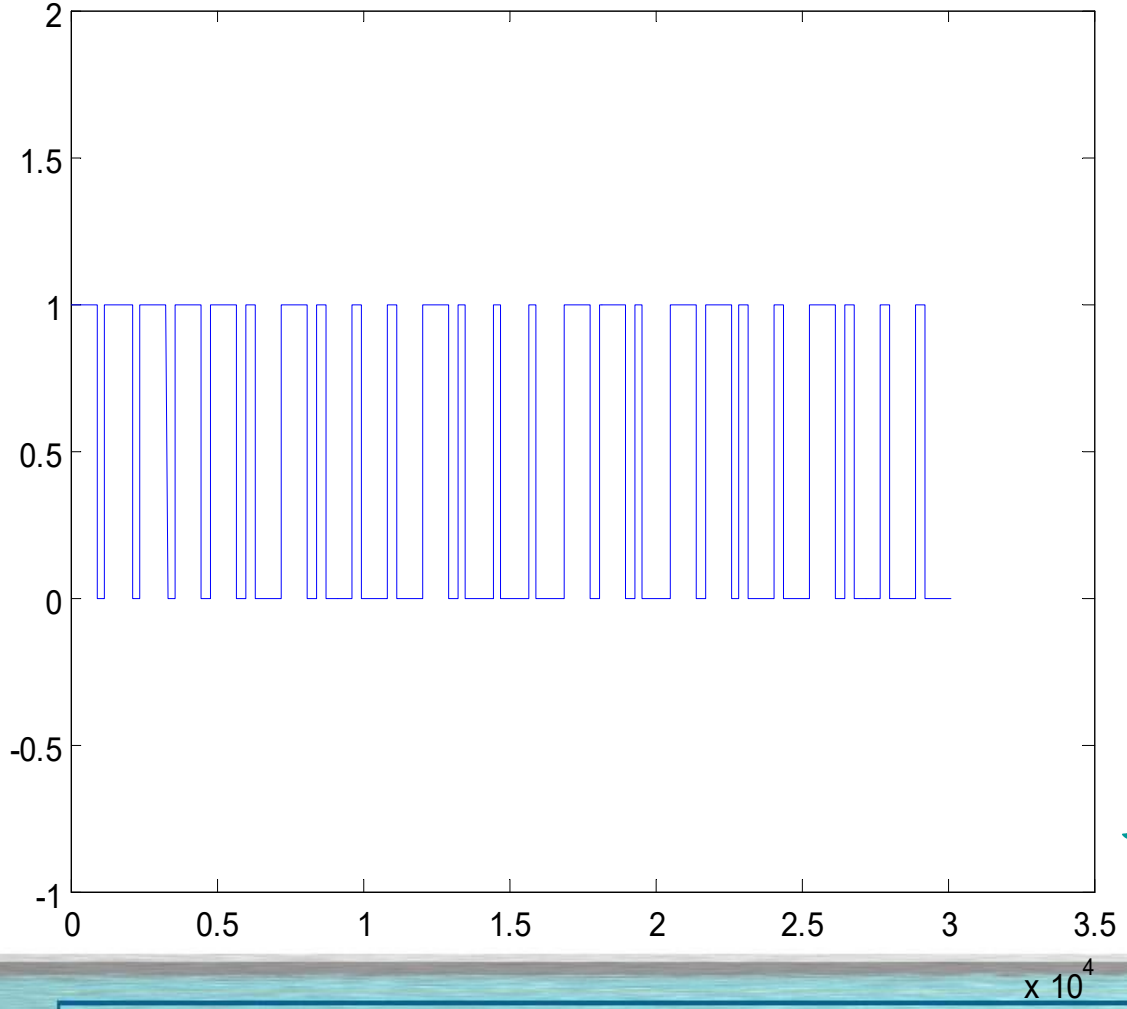
工具： 电视棒
软件： HDSDR

无线遥控信号解调后波形图



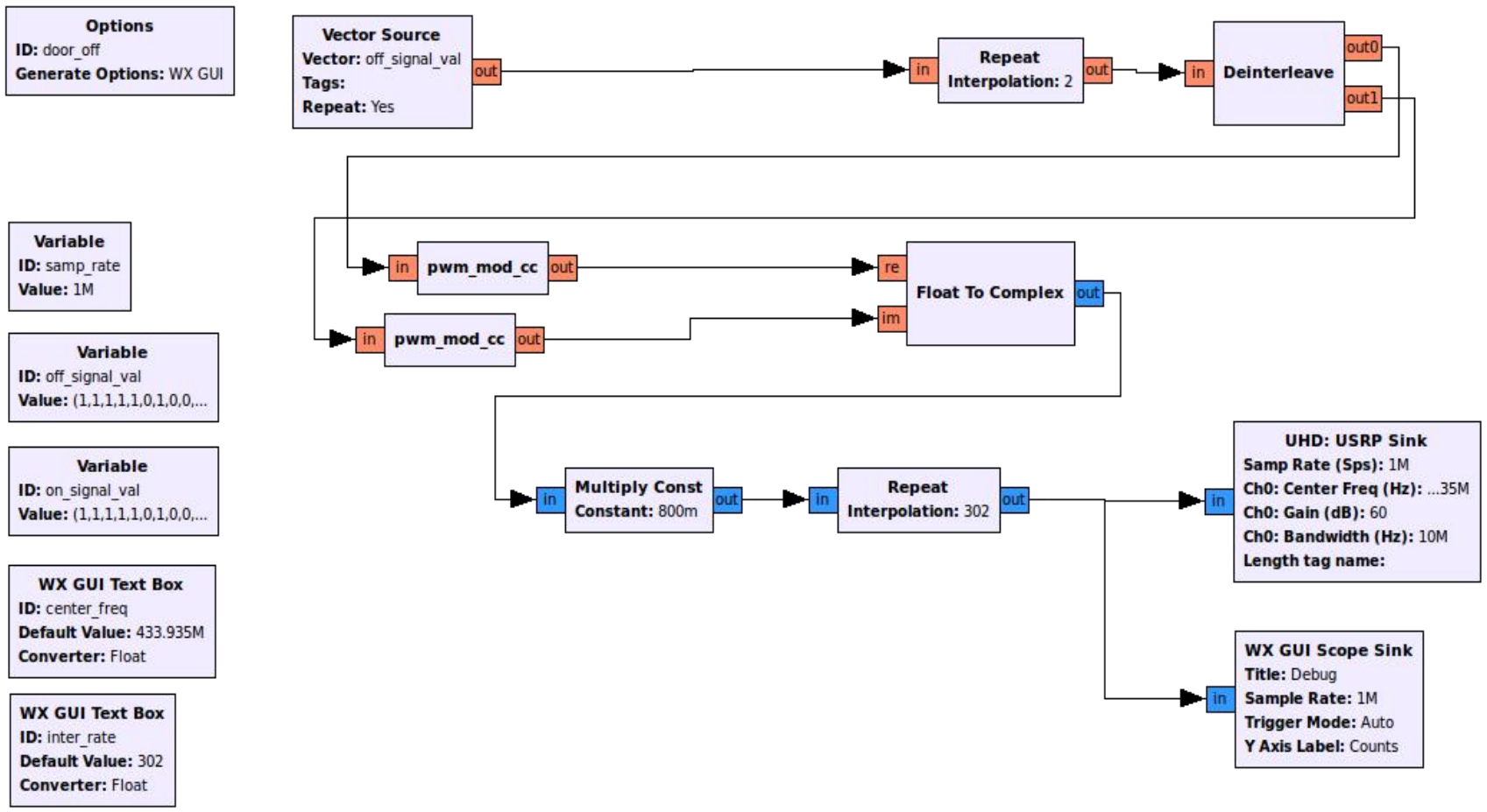
软件：Audacity

分析有效数据内容



软件：MATLAB

流图

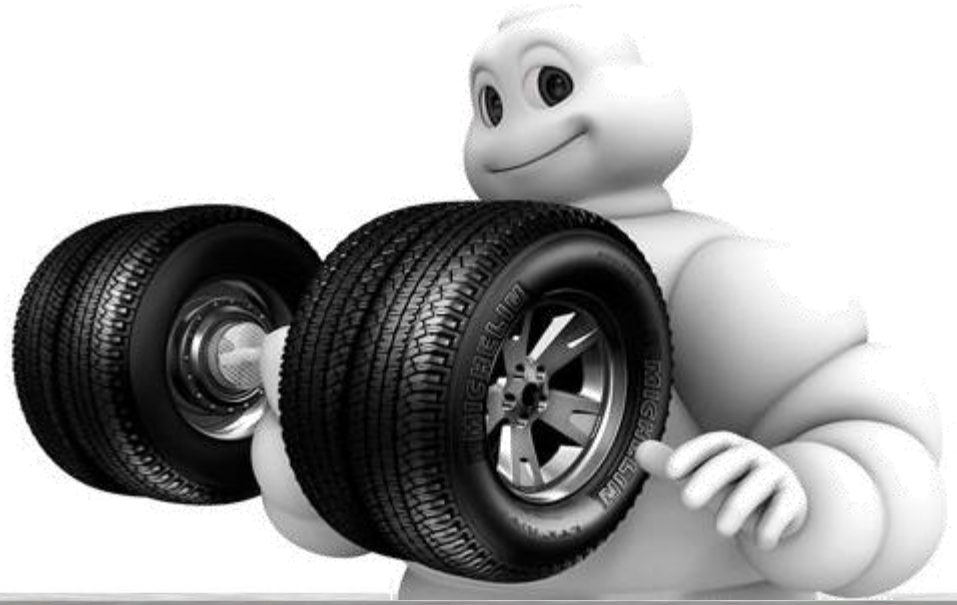


软件：Gnuradio

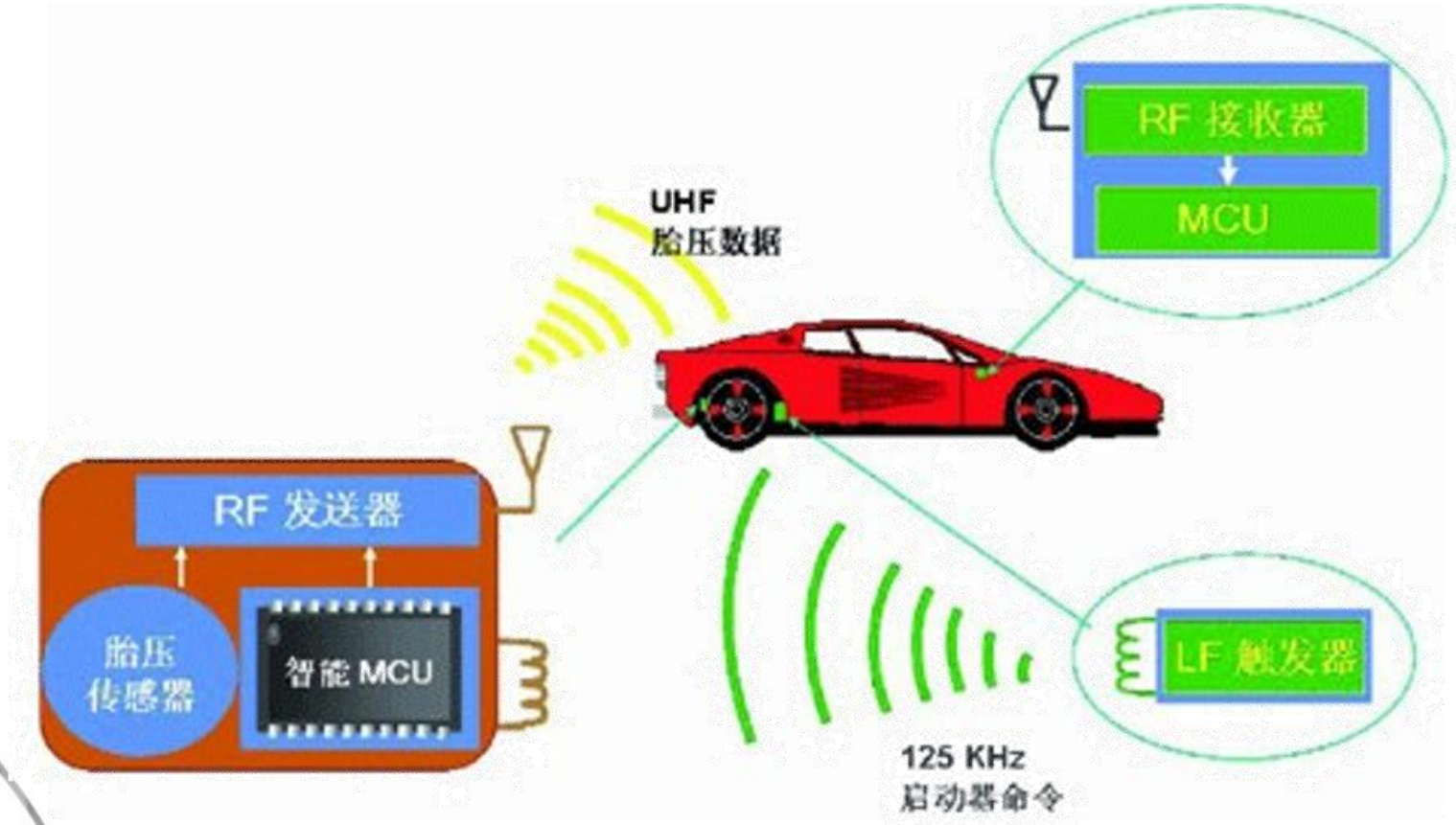
手表抬杆

硬件：Chronos手表

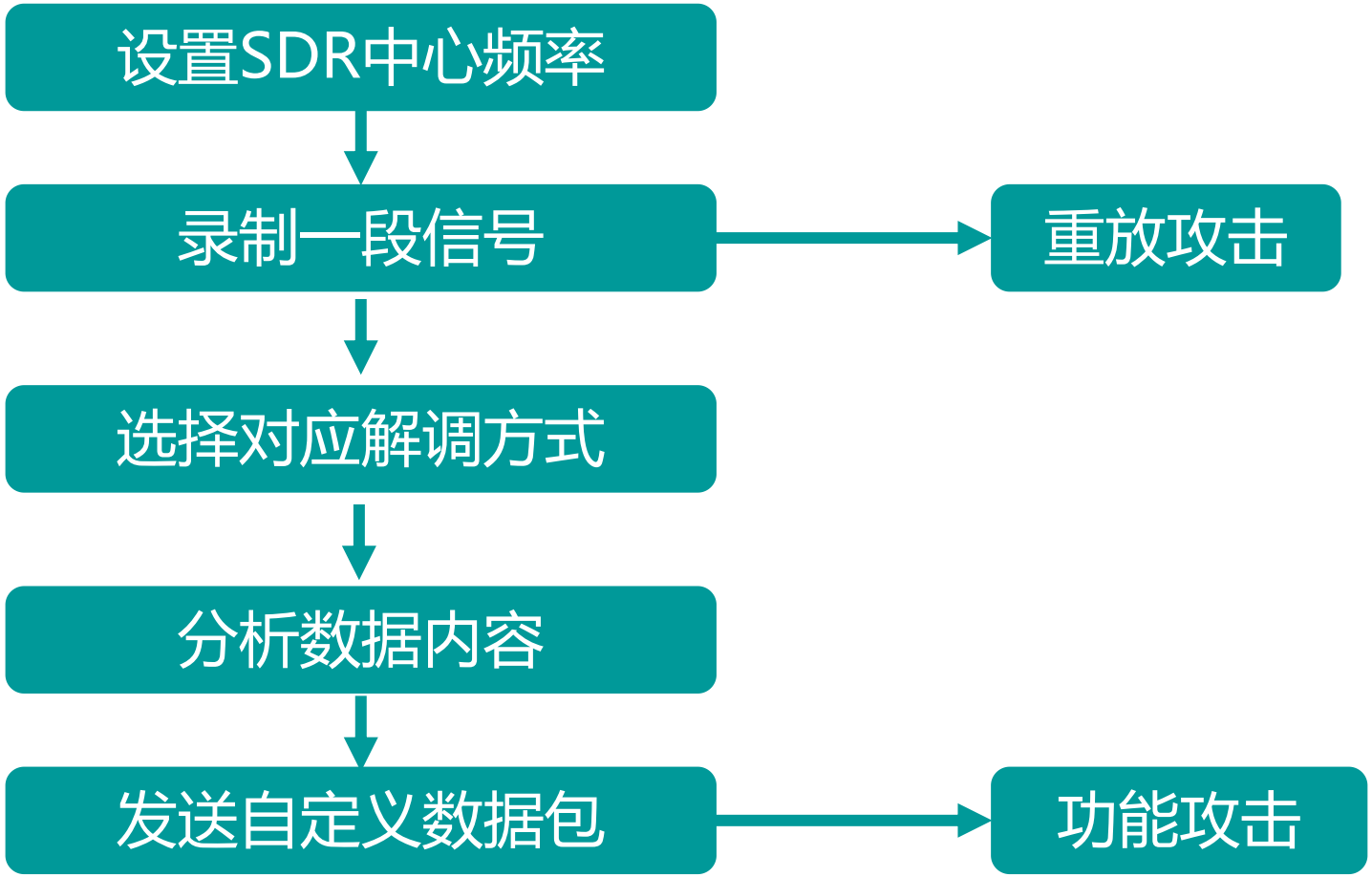
胎压报警器破解



胎压报警器工作原理

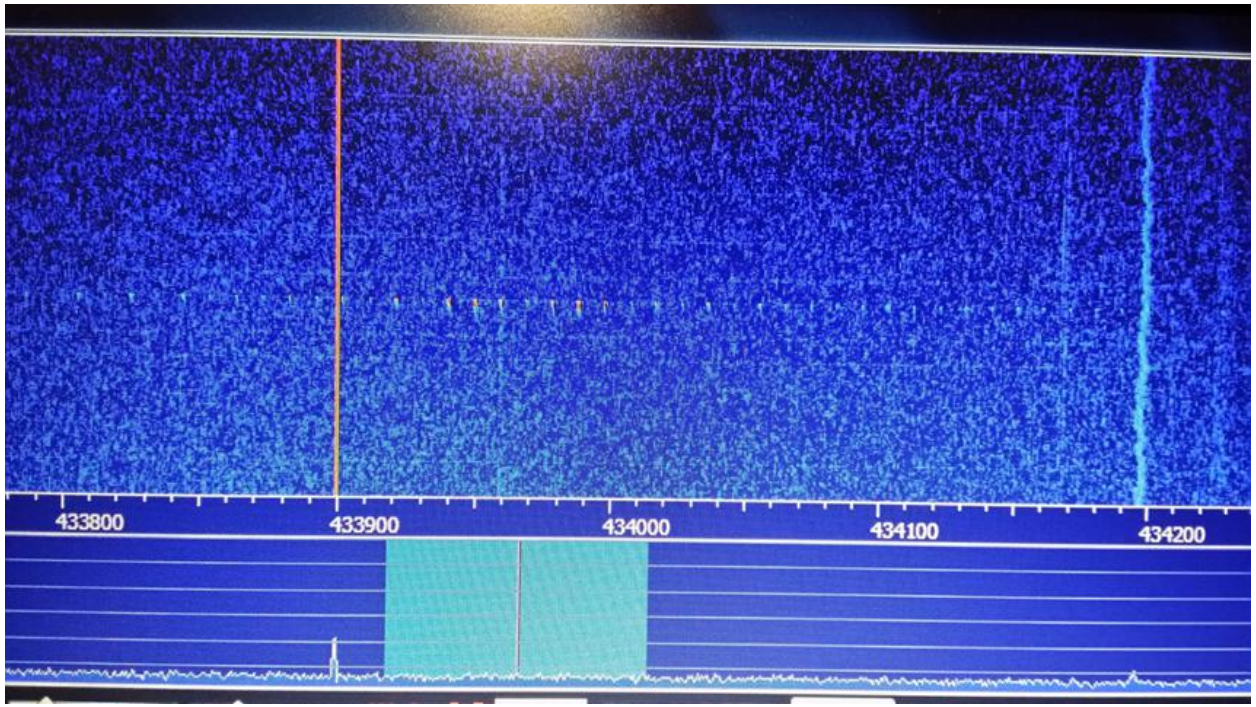


无线电逆向分析流程



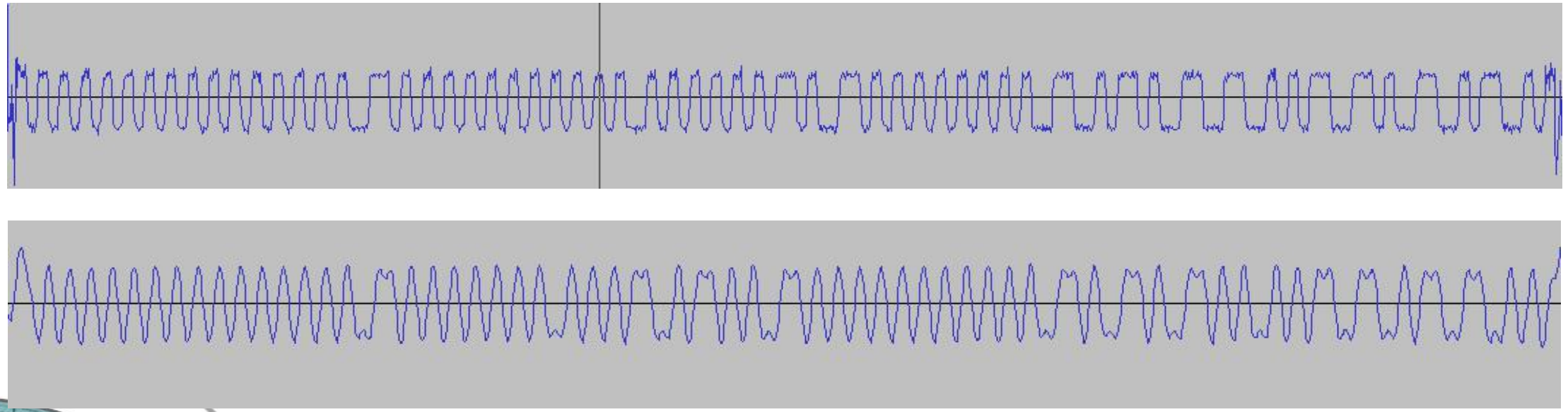
录制信号

- 中心频率 433.92MHz
- 解调： FM
- 比特率9.6Kbps

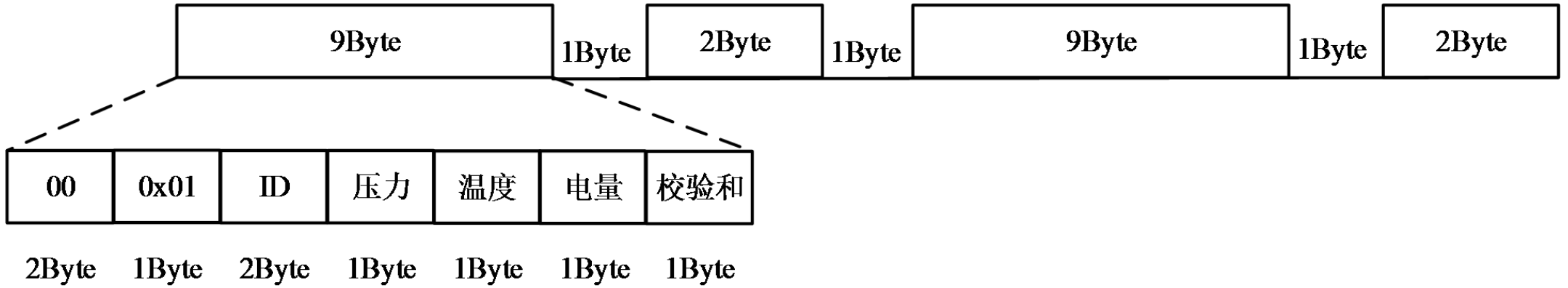


解调后的信号

- 前导码 + 有效码字



逆向分析数据包格式

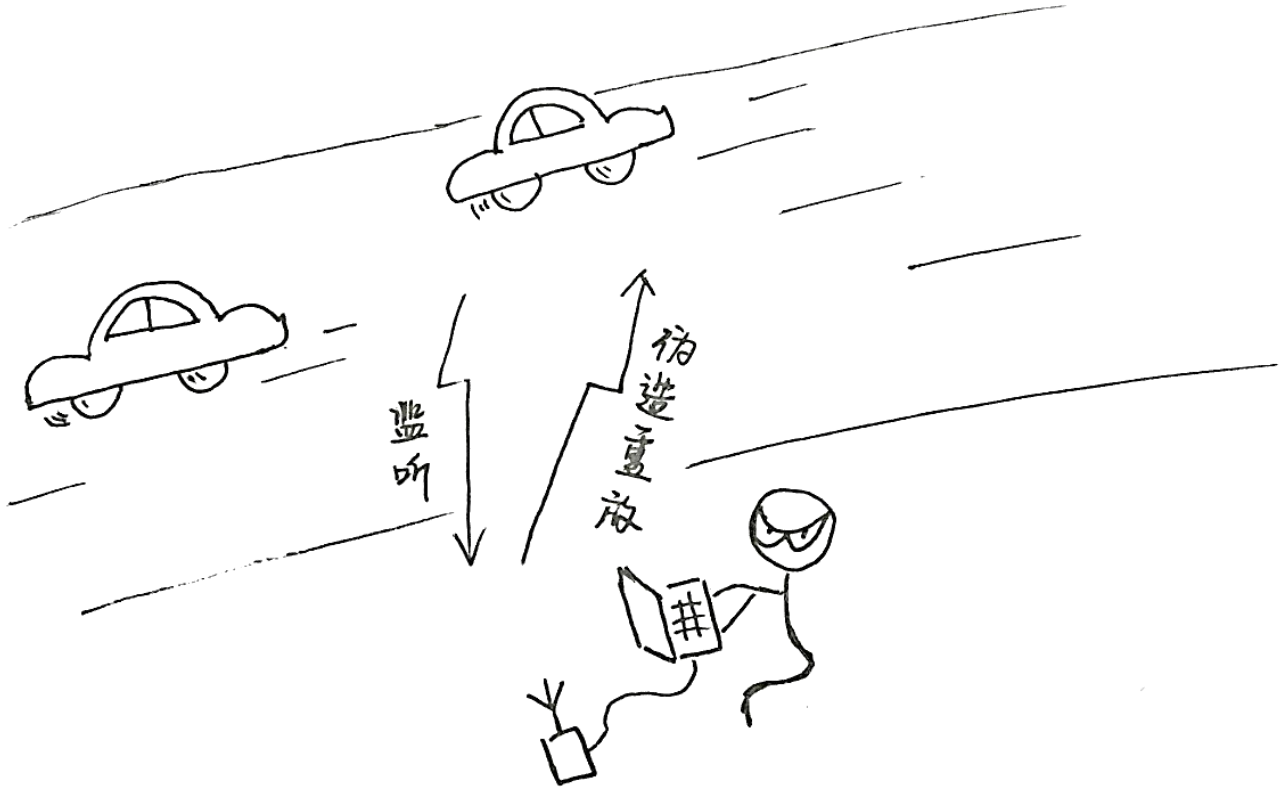


- 11位有效比特
- LSB模式
- CRC校验 = 前6字节相叠加取低8位

功能攻击效果

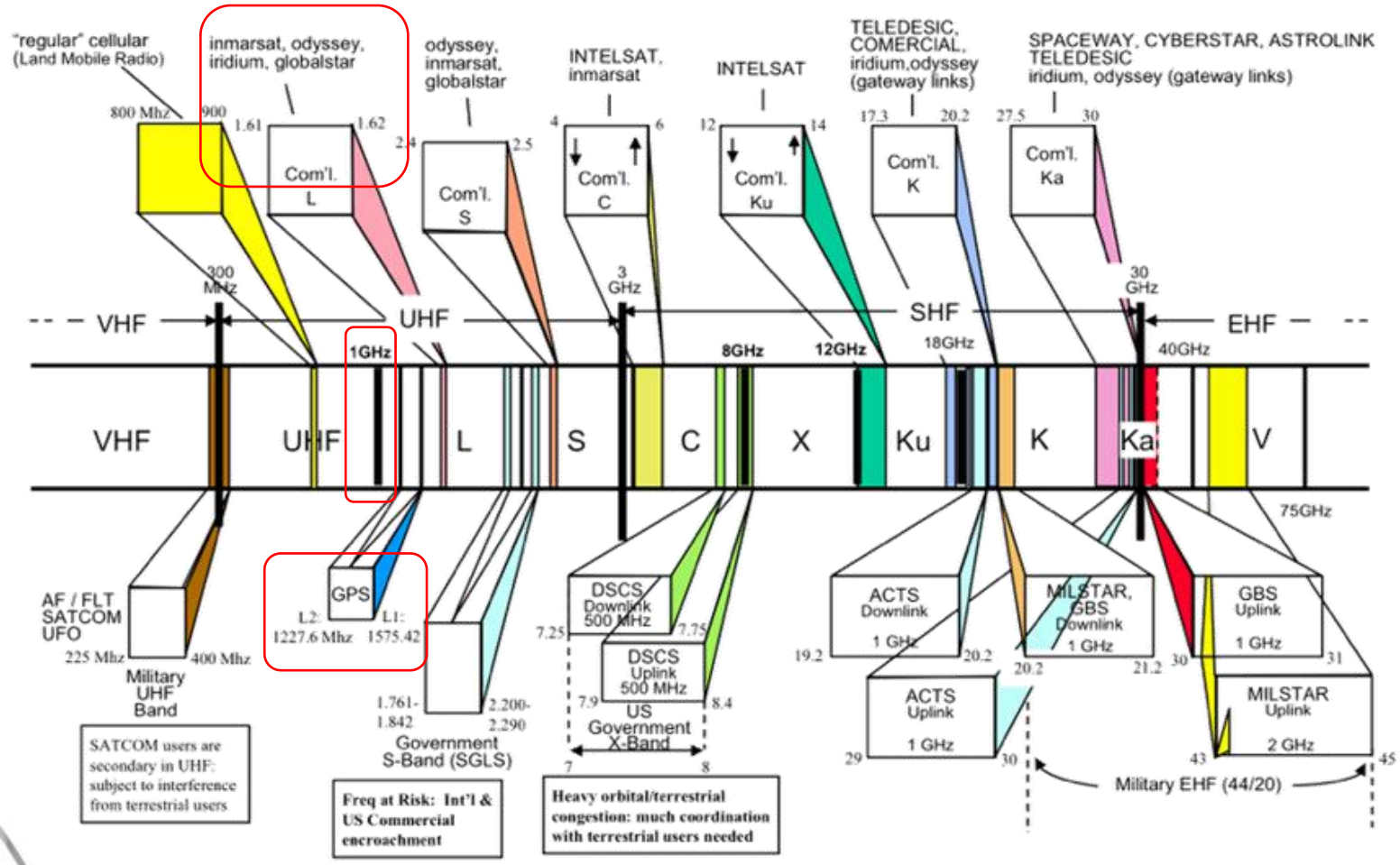
高压与低压攻击效果

现实中的攻击情况



远距离无线电导航攻击

航空无线电导航攻击

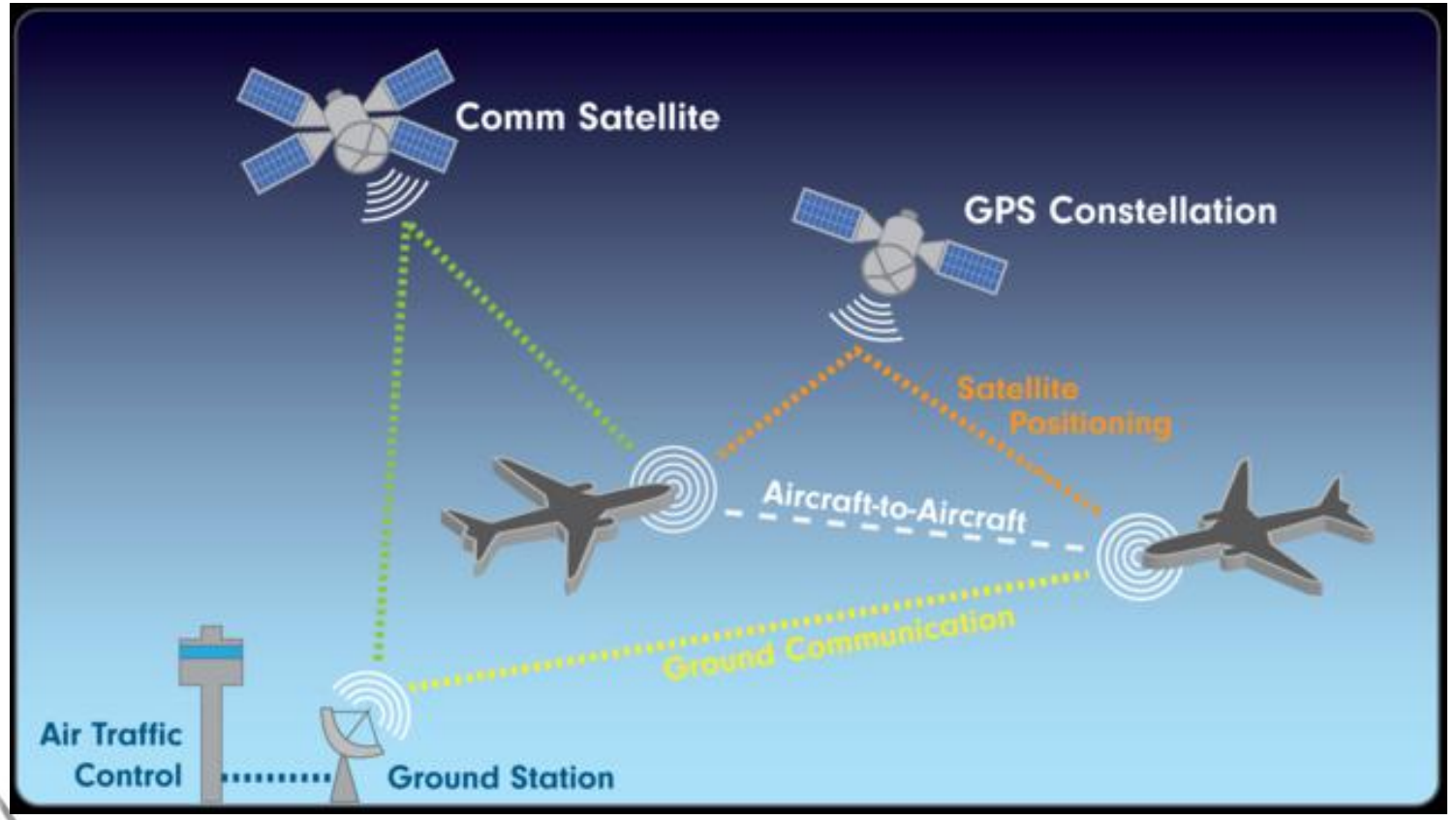


航空飞行涉及的无线电种类

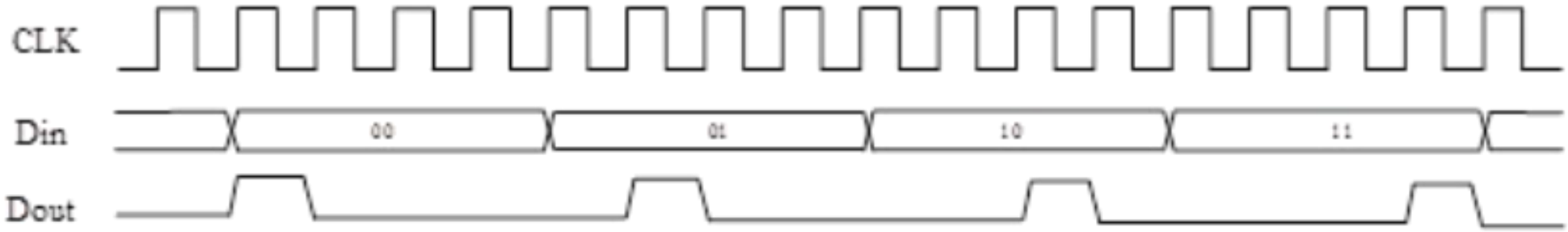
- 通信类：用于飞机与飞机之间，飞机与地面之间的通信

- 导航类：主要是卫星导航和地面信标导航

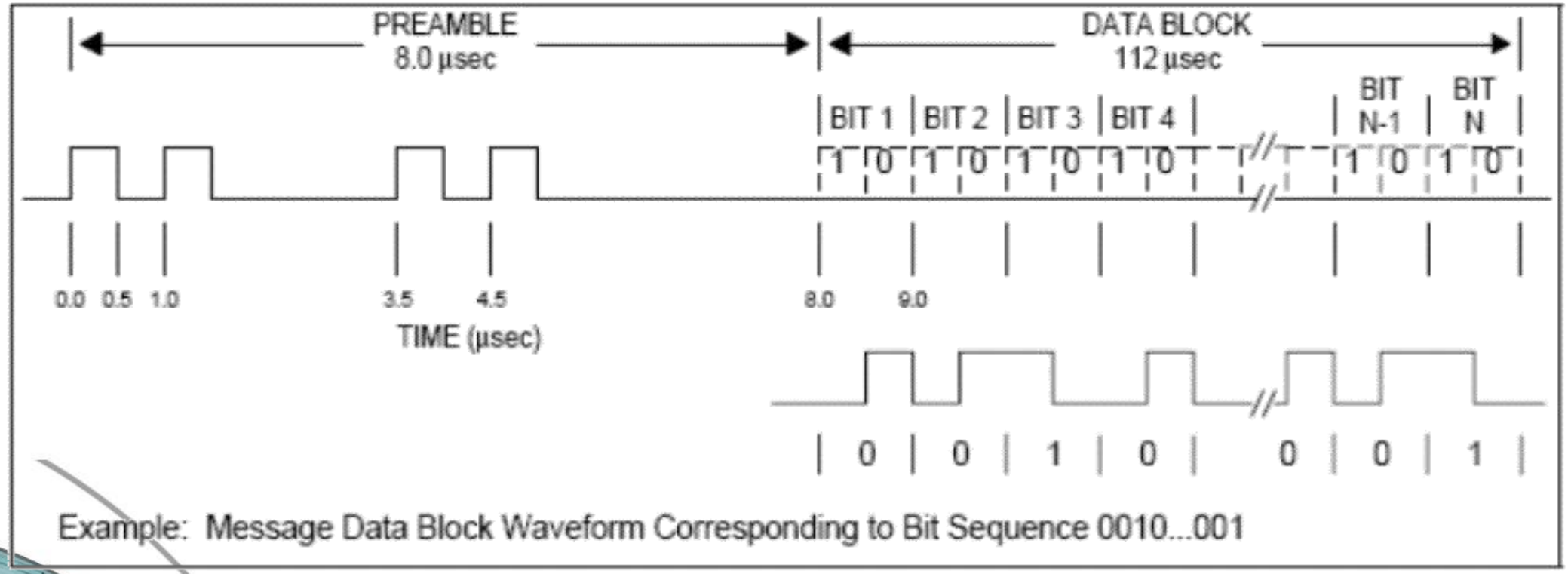
ADS-B自动相关监视广播



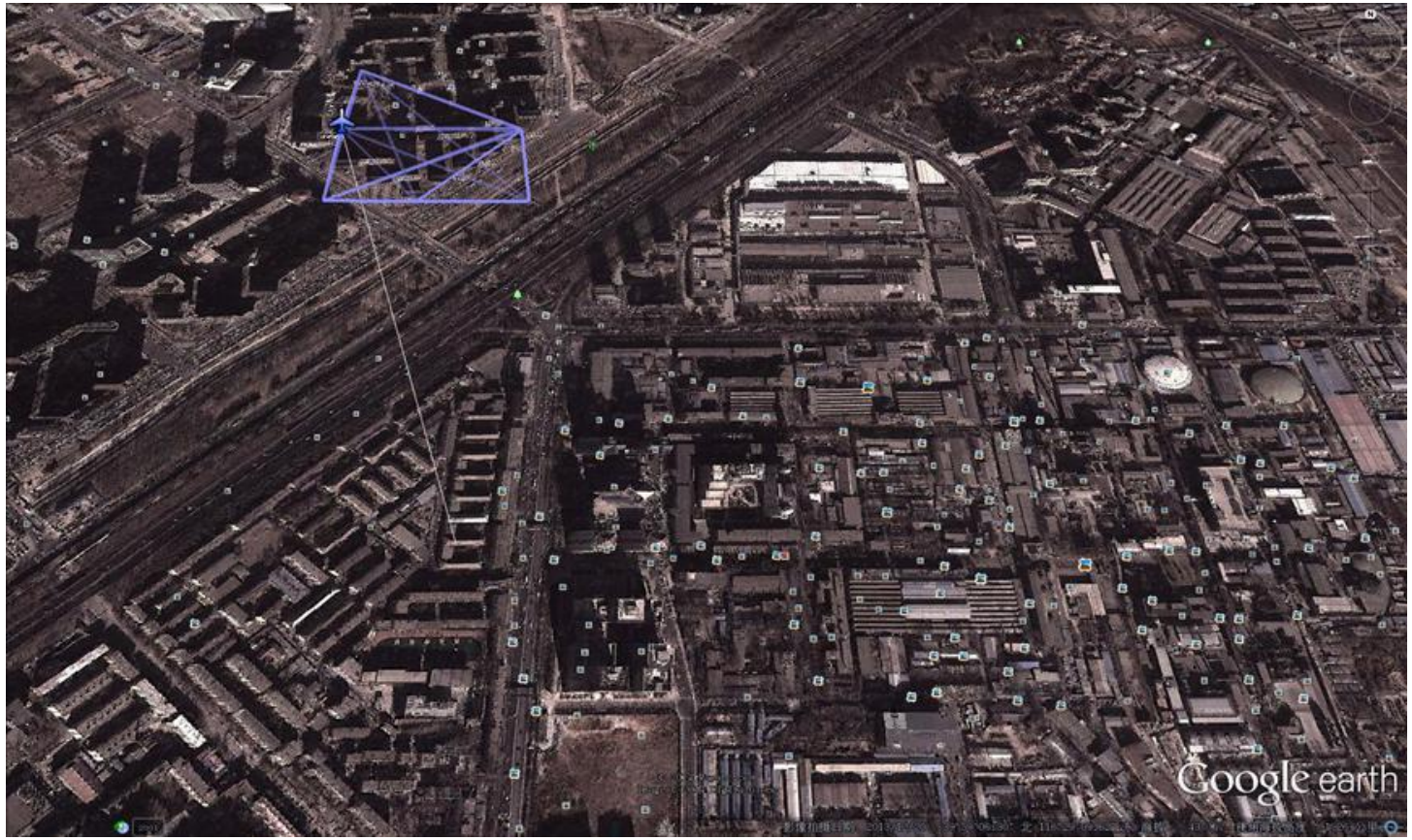
调制方式PPM



ADS-B报文格式


PREAMBLE
8.0 µsec
DATA BLOCK
112 µsec
BIT 1
BIT 2
BIT 3
BIT 4
BIT N-1
BIT N
1 0 1 0 1 0 1 0 1 0 1 0
0.0 0.5 1.0 3.5 4.5 8.0 9.0
TIME (µsec)
0 0 1 0 0 0 1
Example: Message Data Block Waveform Corresponding to Bit Sequence 0010...001

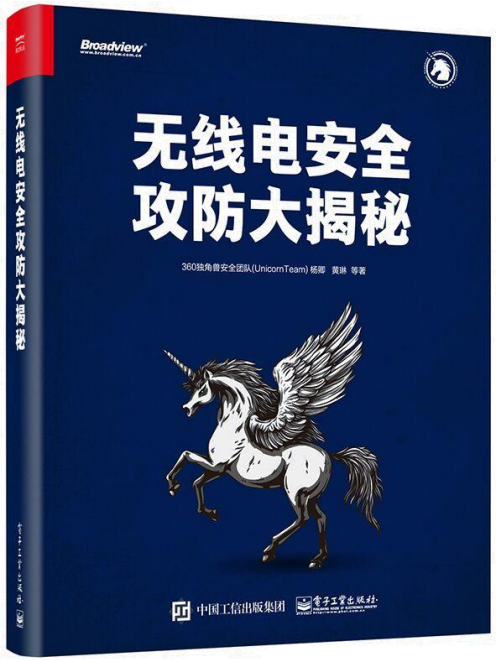
通过虚假的ADS-B信号构造出的飞机



攻防分析

http://www.flightradar24.com

更多无线电攻防案例请参考……



视频资料：www.ichunqiu.com

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