

SECURE COMMUNICATIONS & STEGANOGRAPHY

Week 6 - Mike Wong

Week 7 - Alex Duarte

- ▶ SSL, Online Shopping
- ▶ Email/Messaging encryption
- ▶ SSH, SFTP, SCP
- ▶ VPN (Personal and Enterprise)
- ▶ VOIP
- ▶ RFID
- ▶ Mesh Networks

SECURE COMMUNICATIONS (EXAMPLES)

UNITED STATES FREQUENCY ALLOCATIONS THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

ACTIVITY CODE

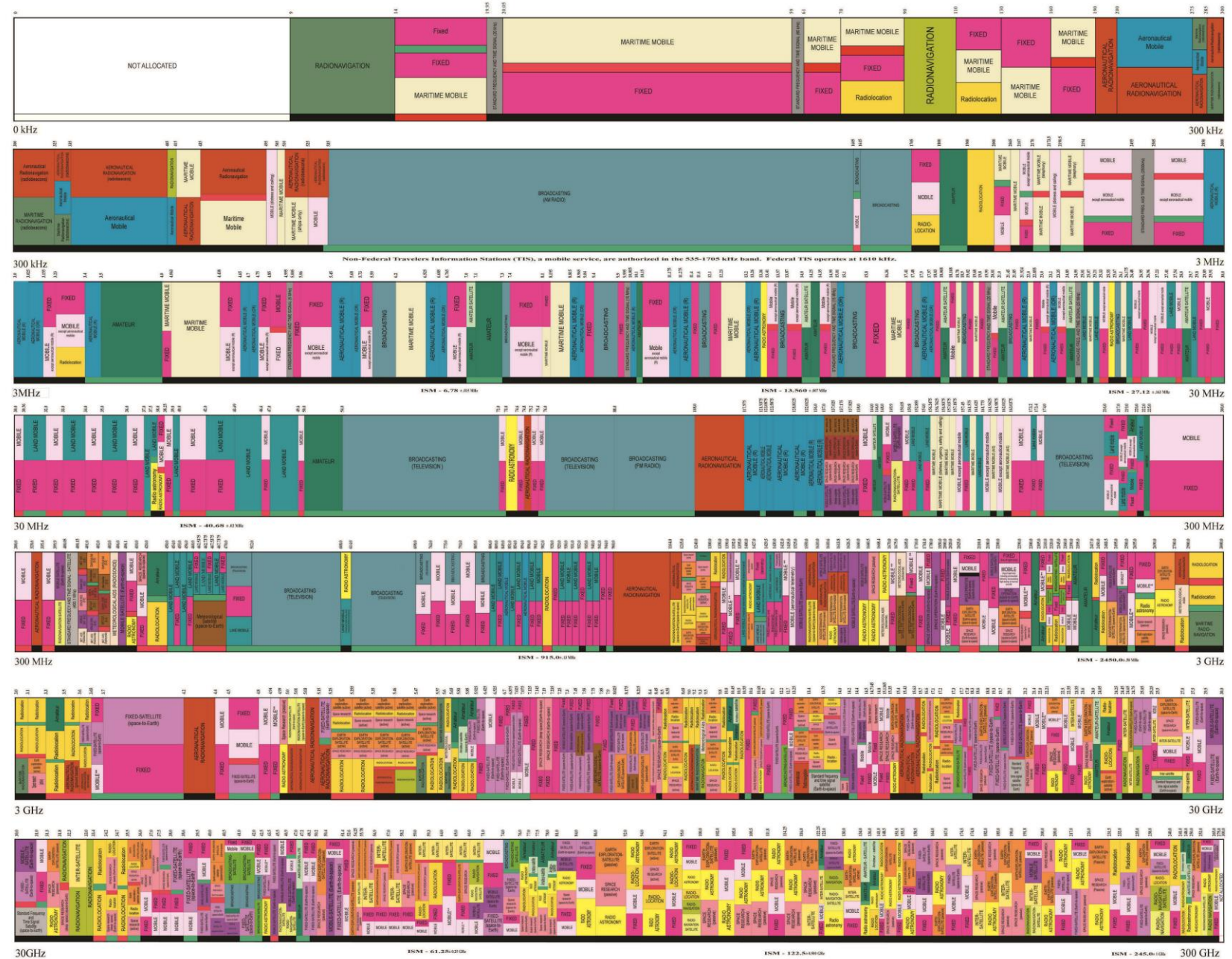
ALLOCATION USAGE DESIGNATION

SERVICE	EXAMPLE	DESCRIPTION
Primary	FIXED	Capitol Lobbies
Secondary	Mobile	1st Capitol with lower case letters

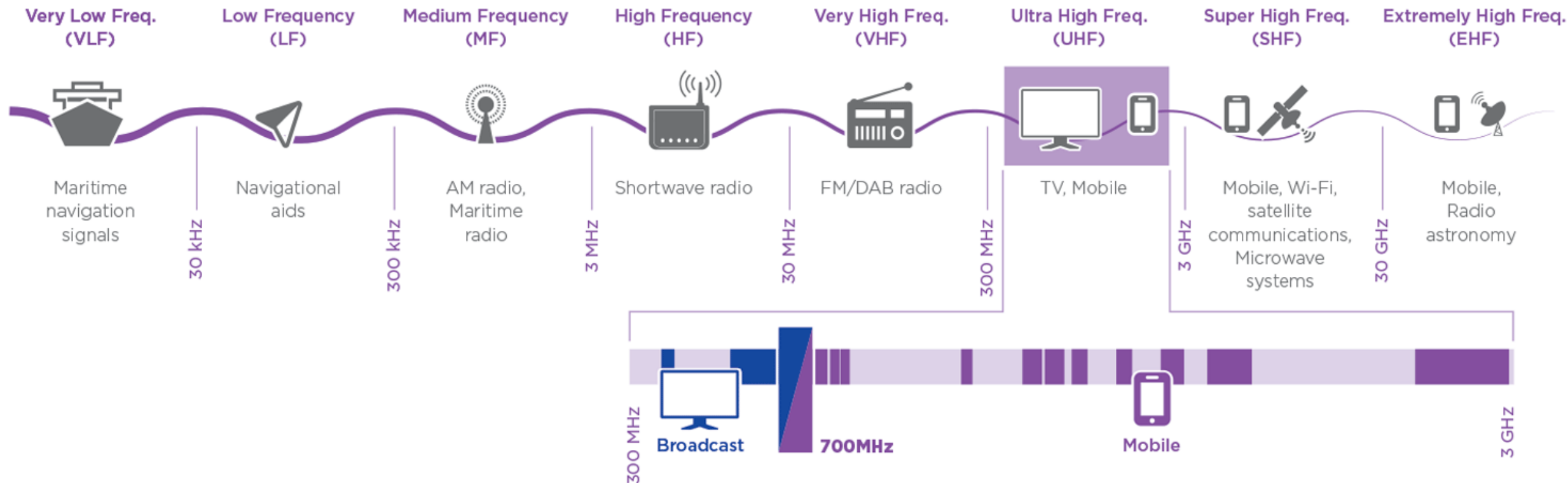
This chart is a graphic representation of the Table of Frequency Allocations used by the FCC and ICA. It is not a legal document and should not be used as a basis for legal action. The chart is intended to provide a visual overview of the radio spectrum and its allocation. For complete information, users should consult the Table of Frequency Allocations. Therefore, for complete information, users should consult the Table to determine the current status of U.S. allocations.

U.S. DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Office of Spectrum Management
JANUARY 2016

Revised by the Department of Commerce, U.S. Government Printing Office
National Telecommunications and Information Administration
Office of Spectrum Management
January 2016



PLEASE NOTE: THE SPECTRUM ALLOCATED SERVICE IN THE SPECTRUM
CHART IS SUBJECT TO ACTING ADMINISTRATIVE ACTION. ACTUAL ALLOCATION OF
SPECTRUM IS SUBJECT TO ACTING ADMINISTRATIVE ACTION.



The UHF band (470 to 862 MHz) is critical to the delivery of broadcast services, and is the only frequency range that can be used for TV broadcasting. Parts of the UHF band have already been freed up for mobile use, and there is increasing pressure from mobile operators to open the 700MHz band.

- ▶ Electronic Frontier Foundation
- ▶ VPN (Personal and Enterprise)
- ▶ Raspberry Pi Wireless Access Point/VPN Router
- ▶ Cracking Wireless w/ Kali
- ▶ RFID (POS Machines, P2PE, Physical Security)
- ▶ Transportation System Discussion (PTC)

FOCUSED RF SECURITY TOPICS

- ▶ Organization focused on personal privacy.
- ▶ Surveillance Self Defense Guide ([SSD.EFF.ORG](https://ssd.eff.org))
- ▶ Secure Communication Recommendations
- ▶ Metadata – Data Collection
- ▶ Mobile Phones – Location Tracking

ELECTRONIC FRONTIER FOUNDATION

Several white lines of varying lengths and angles are positioned in the bottom right corner of the slide, creating a modern, abstract graphic element.

End-to-End Encryption

- ▶ VOIP – Polycom & RSA Security Analytics
- ▶ Text & Instant Messaging – OTR Protocol
- ▶ Email

EFF COMMUNICATION
RECOMMENDATIONS

Several thin, parallel white lines of varying lengths and slopes are positioned in the bottom right corner of the slide, creating a modern, abstract graphic element.

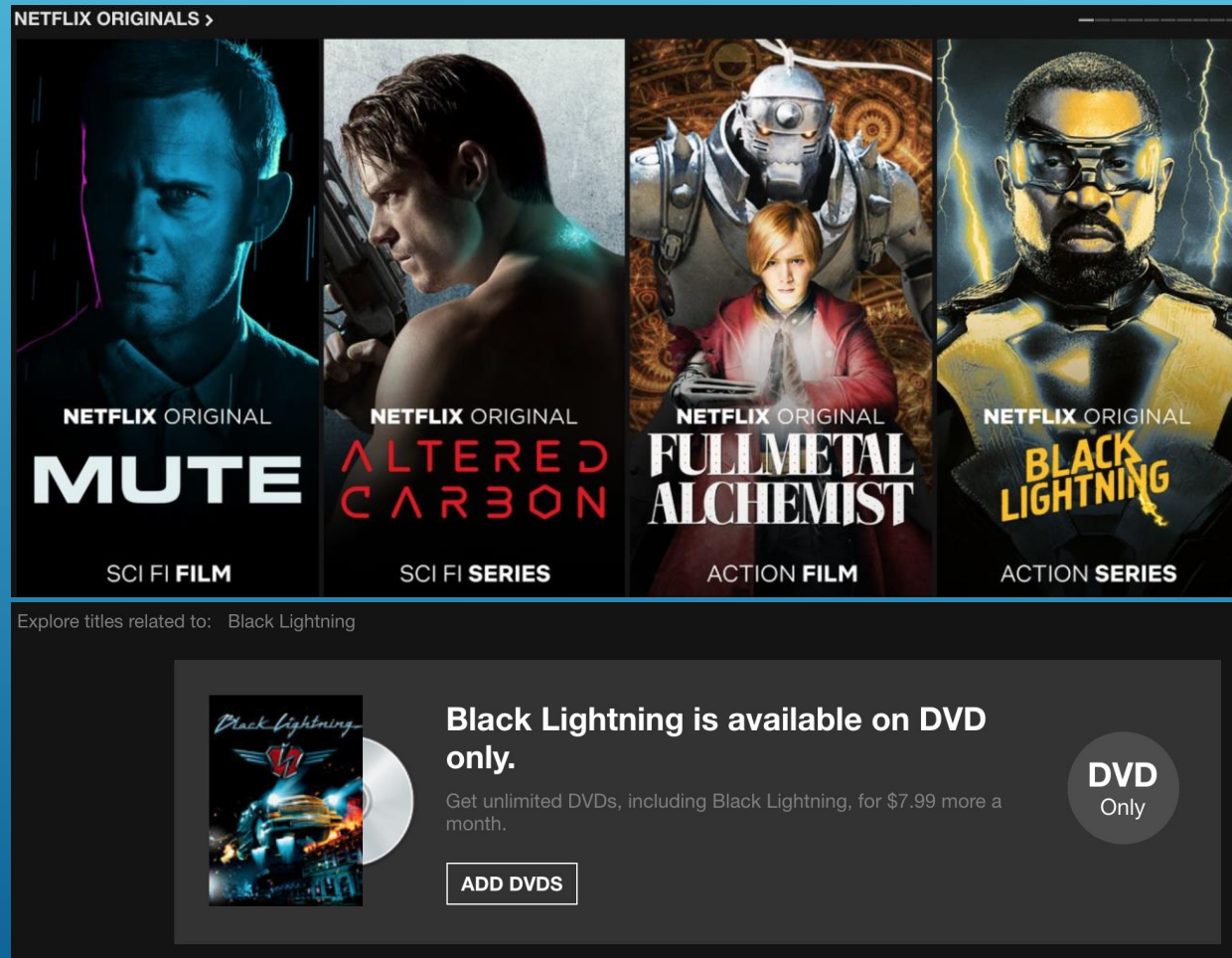
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FOCUSED RF SECURITY TOPICS

- ▶ Popularity Gained with Ruling on Net Neutrality
- ▶ Used for:
 - ▶ Reducing Exposure of Personal Data
 - ▶ Circumventing Censorship
 - ▶ Bypassing Geo-Blocked Services (e.g. Netflix)
 - ▶ Obscuring a Hacker's Network Trail (Geo-Spoofing)

PERSONAL VPNS

NETFLIX COMPARISON



VPN ON



VPN OFF

- ▶ Becoming More Difficult to Secure
- ▶ Used for:
 - ▶ Site to Site VPN (aka Branch VPN)
 - ▶ Remote Access
- ▶ Recommendations
 - ▶ Avoid Site to Site VPN if Possible
 - ▶ For Remote Access – Implement MFA, No Split Tunneling, AV Version Checking, No BYOD, Deploy Certificate Based System

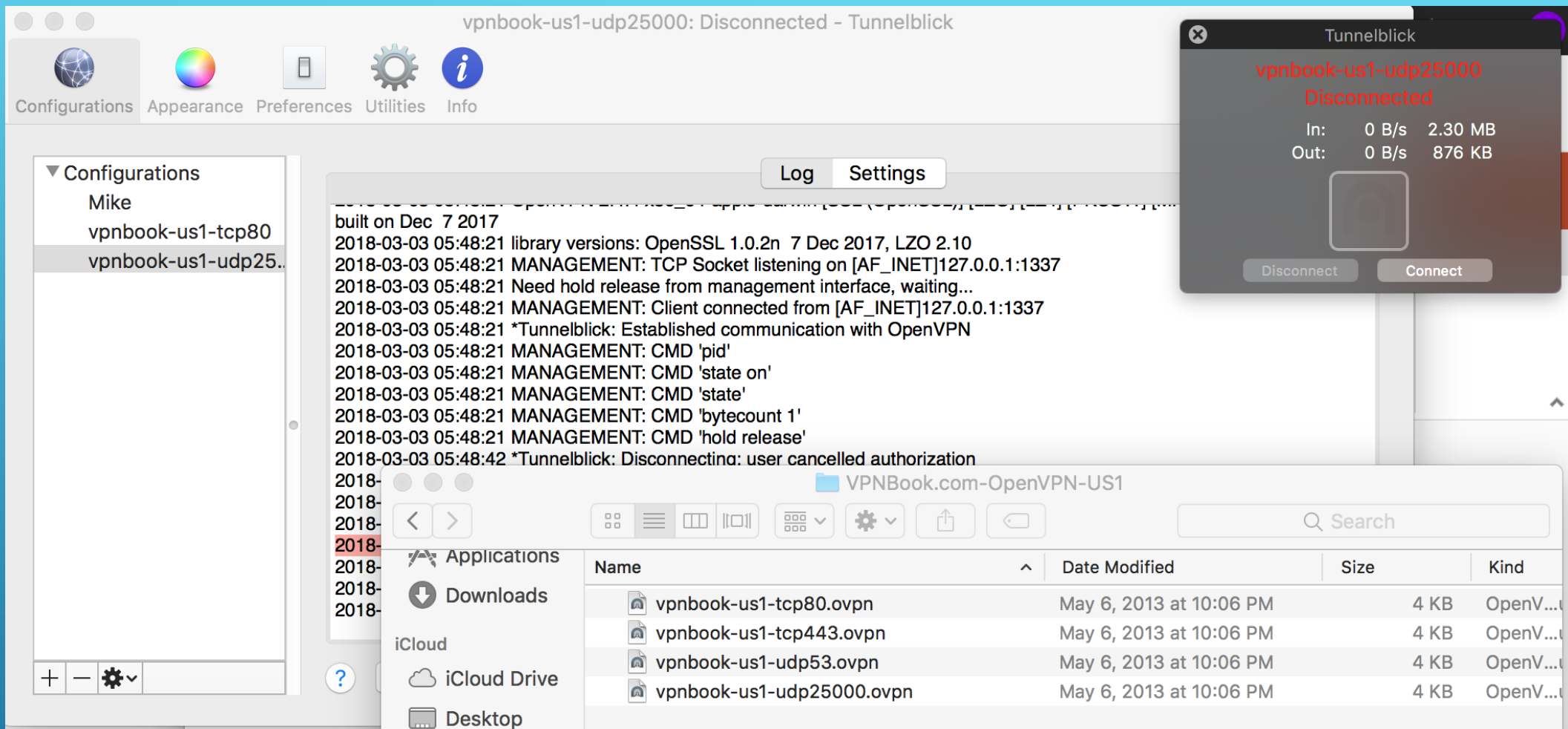
ENTERPRISE VPNS

- ▶ Electronic Frontier Foundation
- ▶ VPN (Personal and Enterprise)
- ▶ Raspberry Pi Wireless Access Point/VPN Router
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- ▶ RFID (POS Machines, P2PE, Physical Security)
- ▶ Transportation System Discussion (PTC)

FOCUSED RF SECURITY TOPICS

- ▶ Download Opera Browser (Built in VPN)
- ▶ Purchase VPN Product (Install Agents/Apps on Devices)
- ▶ Implement OpenVPN (Free)

PERSONAL VPN DEPLOYMENT

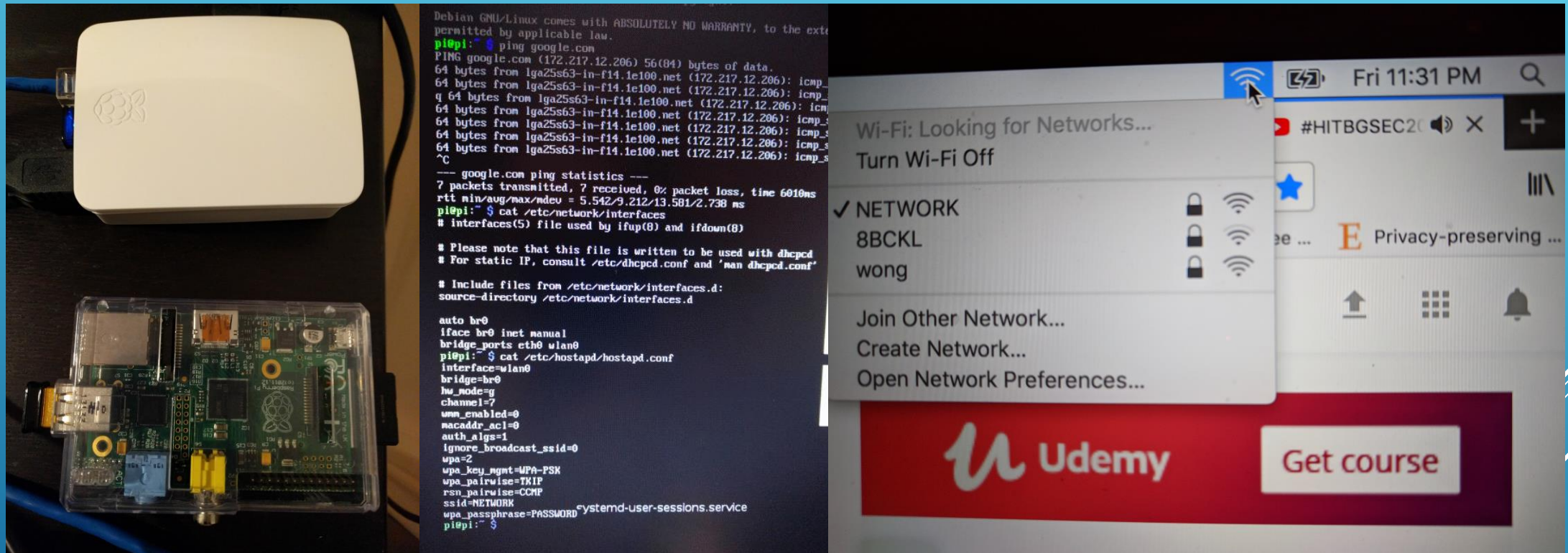


OPENVPN IMPLEMENTATION

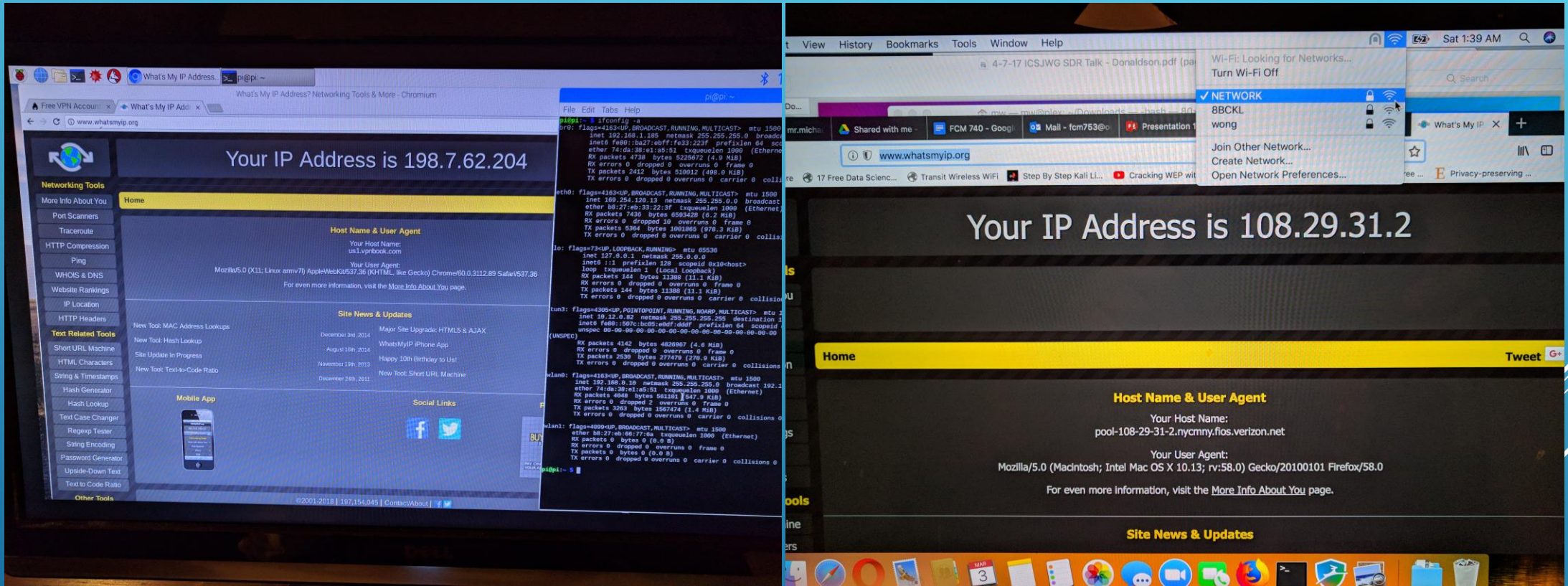
- ▶ Raspberry Pi 3 (Preferred)
- ▶ Monitor w/ HDMI
- ▶ RJ45 Internet Connection
- ▶ USB Keyboard Mouse
- ▶ Micro SD Card (Over 8Gb)
- ▶ Lots of Patience and Time

RASPBERRY PI PROJECT REQUIREMENTS

RASPBERRY PI PROJECT



RASPBERRY PI RESULTS



BREAK TIME



- ▶ Electronic Frontier Foundation
- ▶ VPN (Personal and Enterprise)
- ▶ Raspberry Pi Wireless Access Point/VPN Router
- ▶ Cracking Wireless w/ Kali
- ▶ RFID (POS Machines, P2PE, Physical Security)
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FOCUSED RF SECURITY TOPICS

► Live Demonstration...



CRACKING WIRELESS W/ KALI

- ▶ Electronic Frontier Foundation
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FOCUSED RF SECURITY TOPICS

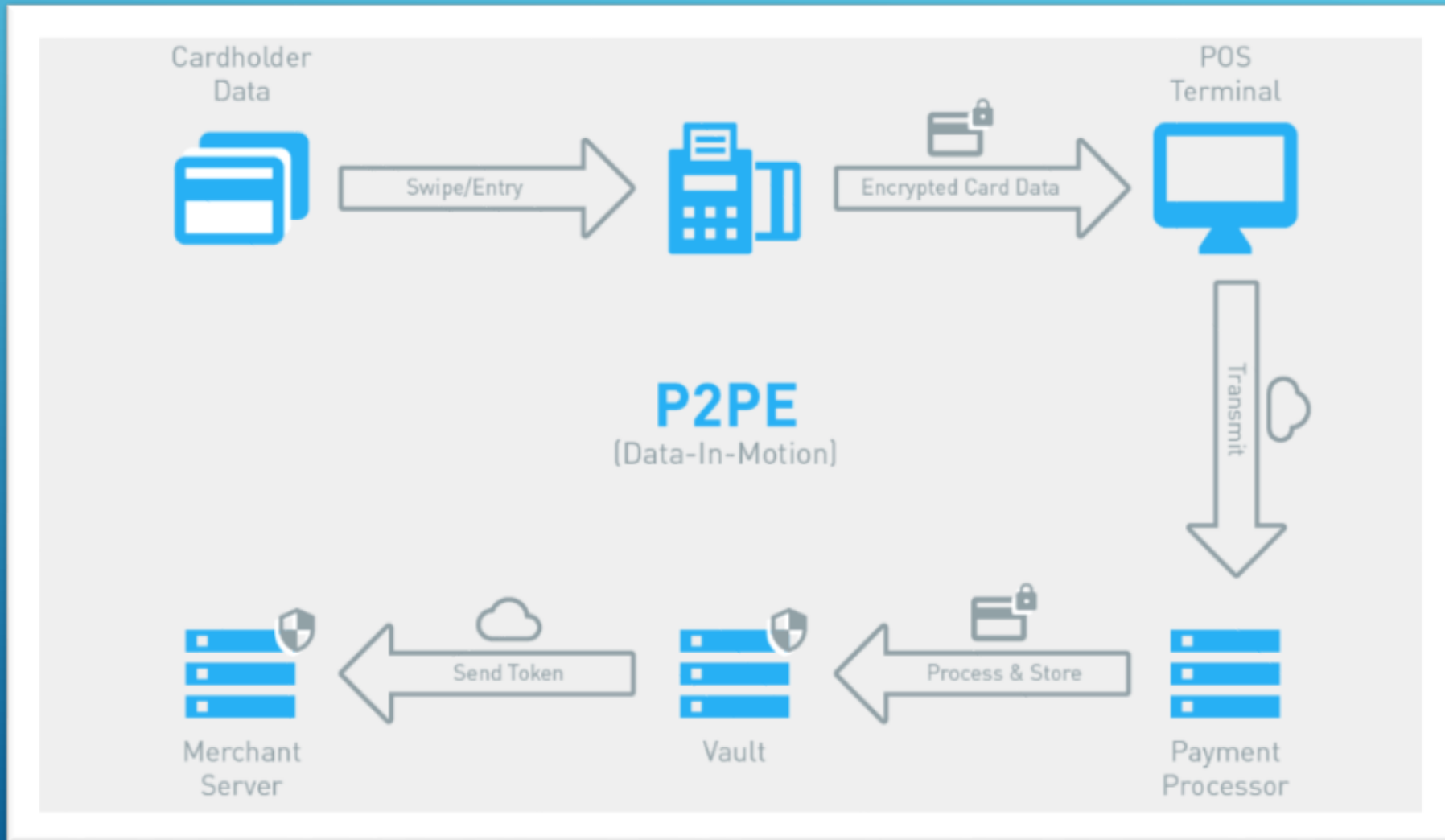
- ▶ Active
- ▶ Semi-Active
- ▶ Passive

RFID CARD TYPES



OCTOPUS CARD (HONG KONG)

POINT TO POINT ENCRYPTION



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FOCUSED RF SECURITY TOPICS

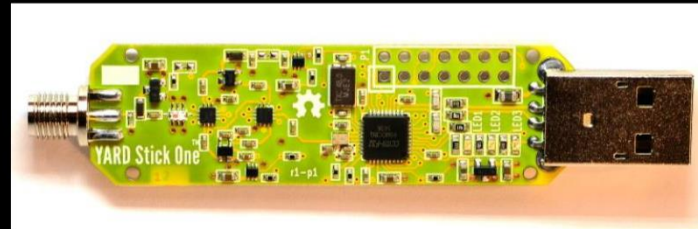
- ▶ FCC Licensed Frequency
- ▶ Dedicated for PTC
- ▶ Vulnerabilities
 - ▶ Jamming
 - ▶ Latency
 - ▶ Authentication
- ▶ Emerging Threat (SDR)



POSITIVE TRAIN CONTROL

SOFTWARE DEFINED RADIO HACKING TOOLS

Hardware



THANK YOU!

