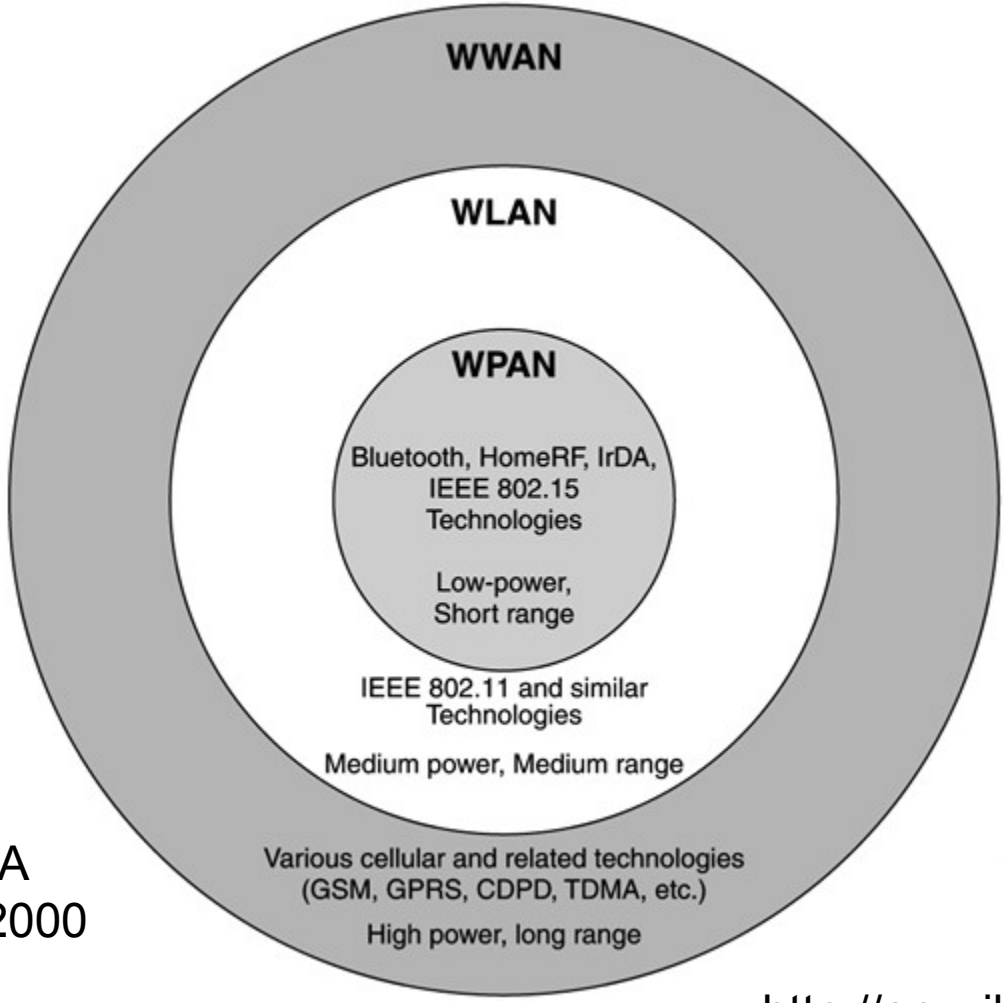
The golden age of hacking

War Driving

War Dialing

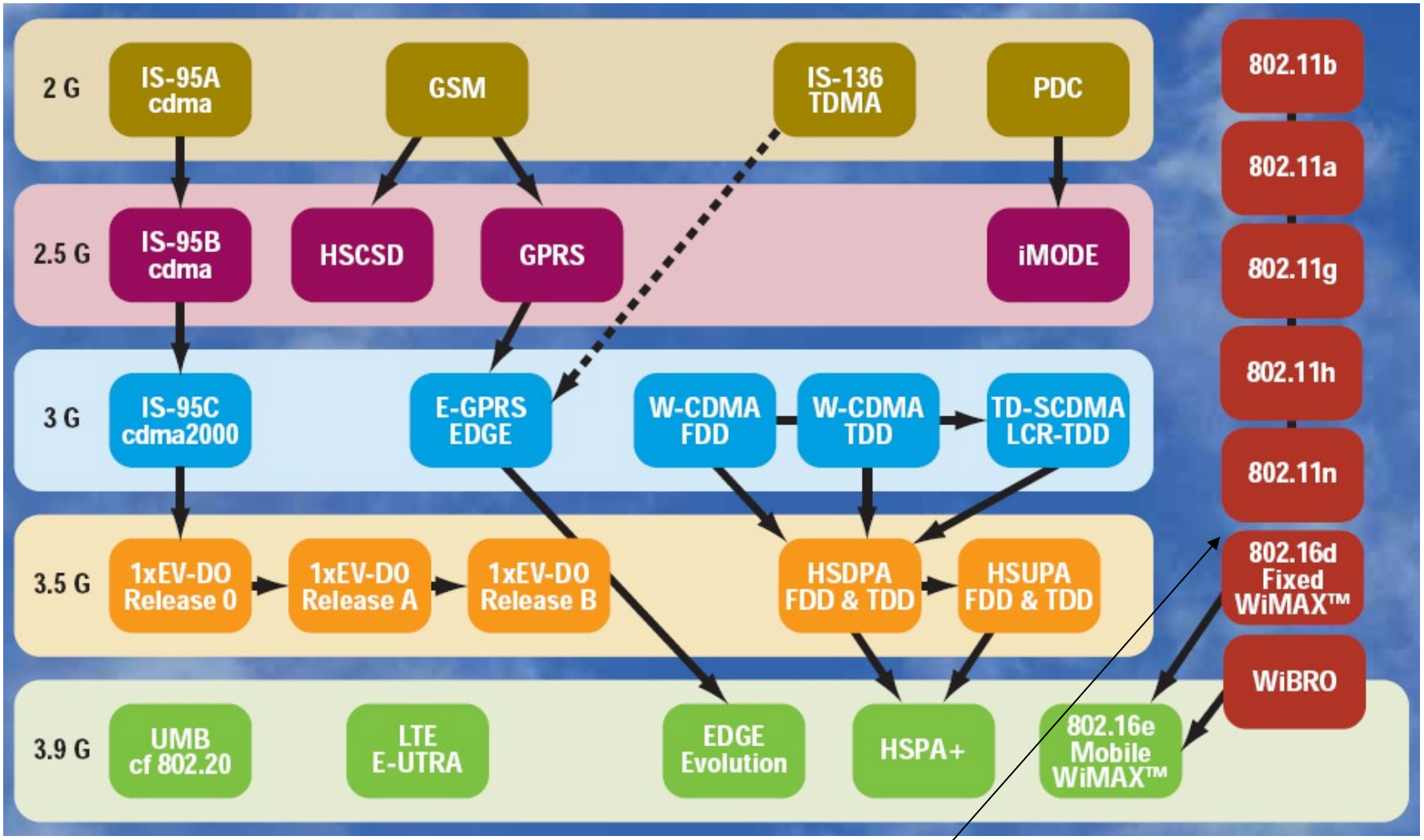
An overview of modern wireless networks



- 3G
  - W-CDMA
  - CDMA 2000
- 4G
  - WiMAX
  - LTE

http://en.wikipedia.org/wiki/4G

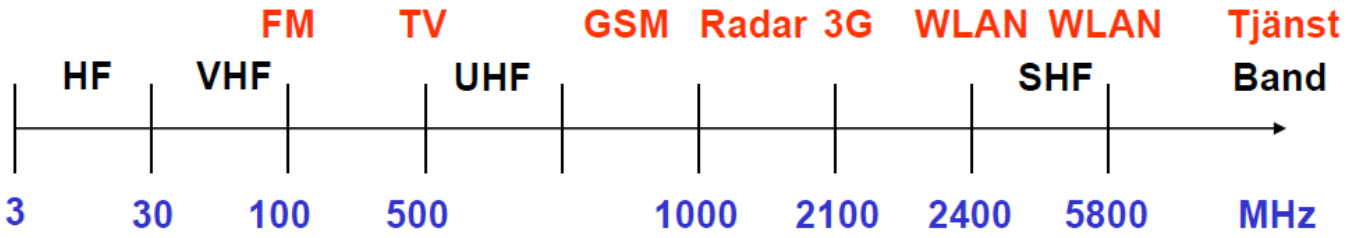
Evolution of wireless protocols



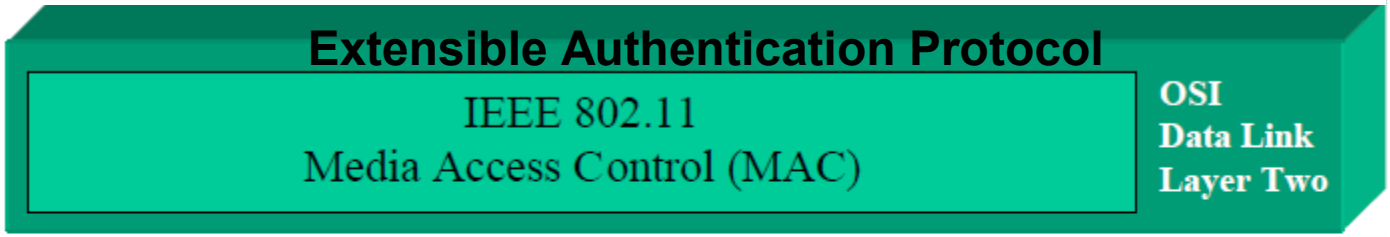
http://en.wikipedia.org/wiki/IEEE_802.11ac

OSI model according to IEEE 802.11

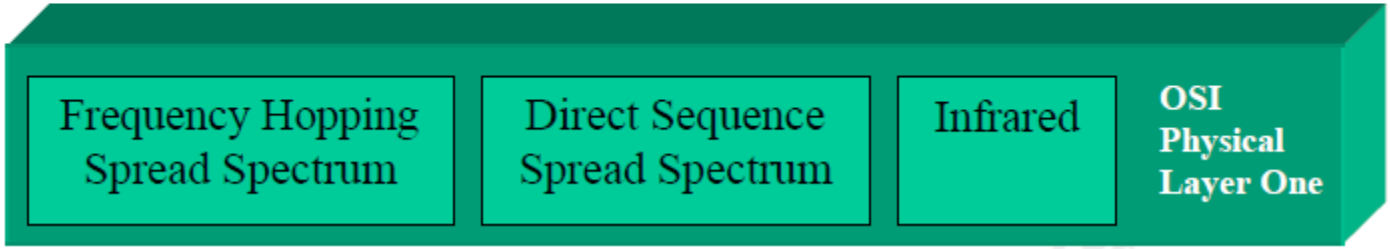
- The MAC layer provides a set of services e.g. data transfer, association, re-association, authentication, privacy, and power management that control the communications between the wireless stations (STA) and access points (AP) over a shared medium
- 802.11a/g/n/ac uses OFDM (Orthogonal Frequency-Division Multiplexing)
  - Same as in ADSL, VDSL, WiMAX, DVB-T(2), LTE etc...



EAP



OFDM



Worlds largests hotspots ☺

- War Driving is the act of moving around a specific area, mapping the population of wireless access points for statistical purposes
- Laptop setup (could also be a PDA)
  - A laptop computer
  - A wireless network interface card (NIC) Card
  - An external antenna
  - A pigtail to connect the external antenna to the wireless NIC
  - A handheld global positioning system (GPS) unit
  - A GPS data cable
  - A War Driving software program
  - A cigarette lighter or AC adapter power inverter

- Mobile phone with built in GPS and Wi-Fi
  - A War Driving software program, no additional equipment needed!

NIC:s, software etc.

http://www.aircrack-ng.org/doku.php?id=compatibility_drivers

- ESSID (Extended Service Set IDentifier)
  - Default: Netgear, Linksys, Belkin, Dlink etc.
- BSSID (Basic Service Set IDentifier)
  - MAC address of the AP or client
- Before purchasing a wireless card, you should determine the software and configuration you plan to use
- Chipset software support
  - Atheros, Ralink, RTL818*...
  - AirPcap (Windows)
- External antenna?
- Connectors?

Gigabyte GN-WB01GS
Ralink RT73

USB works in VMware!

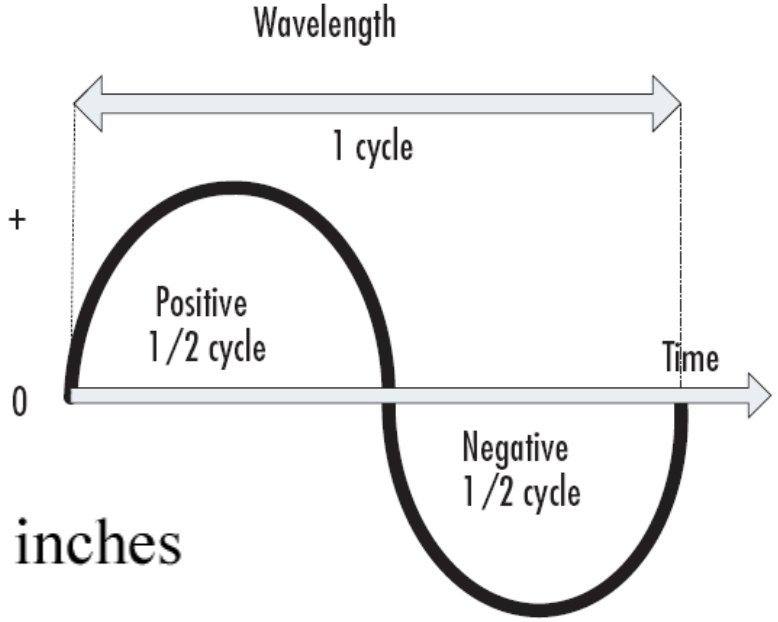
- Support for rfmon/monitor mode (passive/sniff scan with no AP connection)
  - rfmon/monitor mode = promiscuous mode ++ (listen on all WLANs)
  - Linux ok
  - Windows - usually not

RF (Radio Frequency)

- There are 11 channels used in the U.S. and Canada and 13 channels in Europe on the 2.4 GHz spectrum starting with Channel 1 at 2.412 GHz and incremented by 0.005 GHz (5 MHz) for each channel
- The Relationship of Wavelength and Cycle with a Radio Wave

$$\lambda = \frac{300{,}000}{f} \quad \text{km/s}$$

- λ = wavelength in meters
- *f = frequency in kilohertz*
- For 2.45 GHz - 802.11g



$$\lambda = \frac{0.3}{2.45} = 0.124\text{m} = 12.4\text{cm} = 4.88 \text{ inches}$$

RF Terminology 1

- Radio Signal
  - RF wave that has been changed to carry some information, modulated
    - Direct Sequence Spread Spectrum (DSSS), Frequency Hopping Spread, Spectrum (FHSS), Orthogonal Frequency-Division Multiplexing (OFDM) etc.
- Noise
  - Is the measurement of how many stray RF signals are in the same frequency area
- Noise Floor
  - The level of background RF noise, *typical* noise floor for 802.11b/g signals is usually about -90 dBm to -100 dBm
- RSSI (Received Signal Strength Indication)
  - 0 to RSSI_Max (-100 to -50 dBm) , or just Signal Strength

RF Terminology 2

- Decibels (radio waves)
  - Magnitude of power decrease over distance
  - Ratio of power levels is used – Bel, dB (1/10 Bel)
- The equation for decibels is:

$$\mathrm{dB} = 10 * \log_{10}(\mathrm{p})$$

  - where *p = the power reference*
- Usually for wireless it (p) is to one milliWatt (mW) (1/1000 Watt)

$$\mathrm{dBm} = 10 * \log_{10}(1\,\mathrm{mw})$$

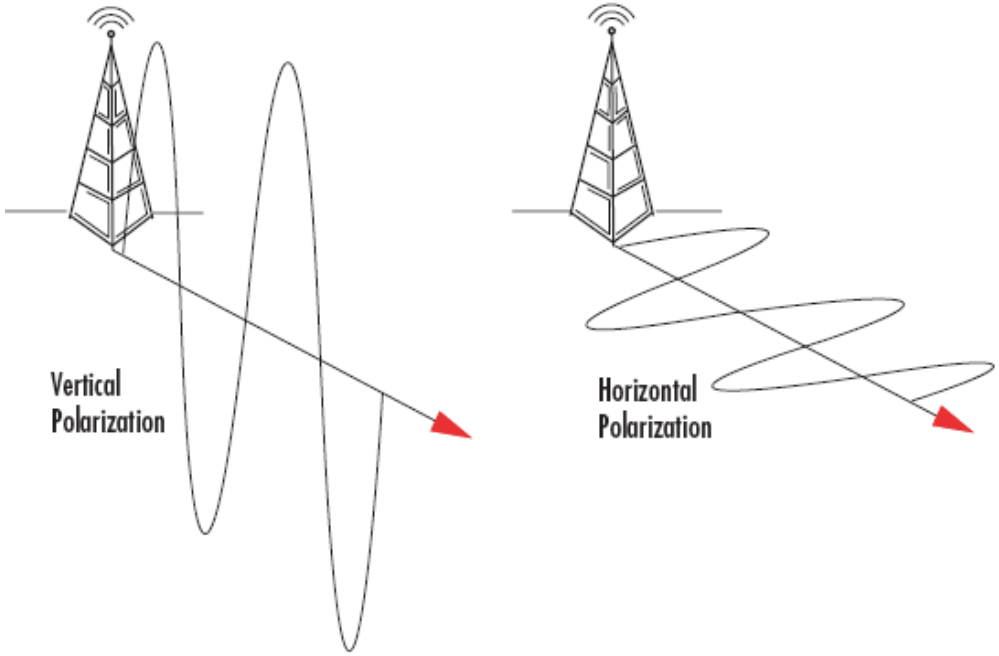
- A radio transmitting a 0 dBm signal sends with p = 1mW, 10 dBm sends 10 mW and 20 dBm sends 100 mW ... 30 dBm sends with? -20 dBm sends with?
- It is typical to se negative numbers to show decibels of a received signal which represent a gradual loss, or *attenuation* of a signal
- Positive numbers indicate a signal addition or *gain*

RF Terminology 3

- Signal strength - typical AP
  - 100 – 500 mW (20 - 27 dBm)
- Signal strength - typical Client Adapter
  - 30 – 200 mW (13 - 23 dBm)
- Estimated loss
  - Plasterboard (gipsskiva) at 4 dBm, brick wall at 8 dBm, and concrete wall at 10 - 15 dBm
- S - N = SNR (Signal-to-Noise Ratio)
  - S is Signal Strength in dBm and N is Noise in dBm
  - Ex: Wi-Fi HW shows a signal of -82dBm and a noise floor of -96dBm which gives SNR = 14dBm (-82dBm - -96dBm)
- Multipath (reflections)
  - Can be good and bad (out of sync gives interference)
  - MIMO (Multiple Input Multiple Output) - interference as advantage
- Diversity
  - Equipment got more than one antenna - uses the one with best signal minimize multi-path fading

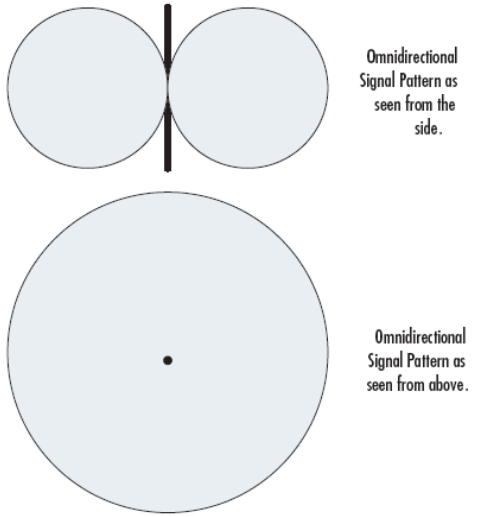
RF Terminology 4

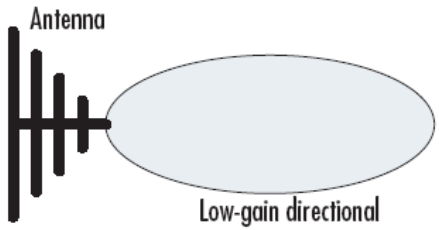
- Impedance (usually 50 ohm)
  - Is the electrical load on an antenna circuit, wrong ohm (Ω) can give high attenuation (dämpning) which kills the signal
  - Cables and other components
- Polarization
  - Vertical is most common

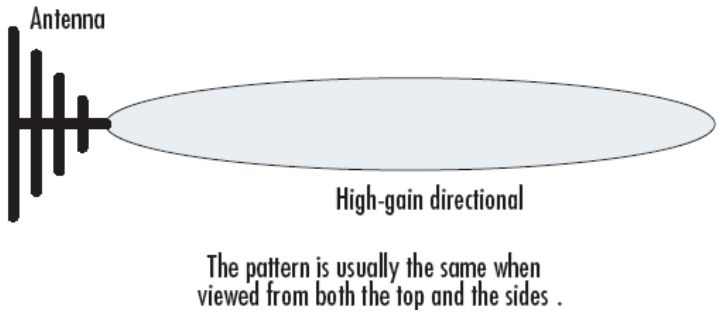


Passive antenna types

- Gain in
  - dBi (isotropic), dBd (dipole)
  - dBd = dBi - 2,15 dB
- Omnidirectional antennas
  - Typical 4 - 5 dBi
- Directional antennas
  - Grid, typical 21 - 24 dBi
  - Panel
  - Pringles ☺
- Yagi
  - Typical 10 - 17 dBi
- Non-distorting the waveform
  - RF Amplifiers
  - Attenuators (reduce power)







http://www.educypedia.be/electronics/rfwlan.htm

Wireless Penetration Testing Tools

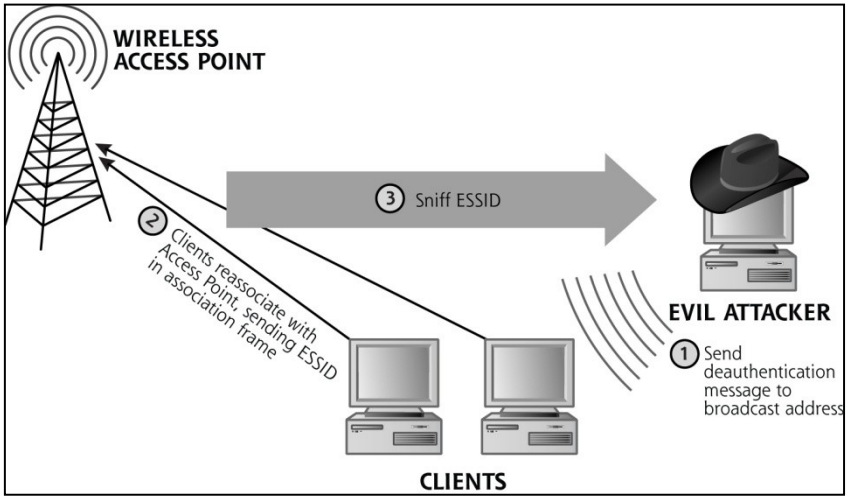
- Aircrack-ng - http://www.aircrack-ng.org
- AirPcap – CACE/Riverbed Technology - http://www.cacetech.com/
  - The ONLY equipment that works in Windows!
- List with Wi-Fi attacks and tools (Wireless attacks, A to Z)
- http://searchsecurity.techtarget.com/generic/0,295582,sid14_gci1167611,00.html
- http://wirelessdefence.org
- A bit outdated below!

2011: http://www.tech-faq.com/wi-fi-software-tools.html

Tool	Functionality	Operating System(s)	Link
Kismet	WLAN Discovery	Linux	www.kismetwireless.net
NetStumbler	WLAN Discovery	Windows	www.stumbler.net
Kismac	WLAN Discover, Full Suite of Penetration Test Tools	MAC OS	http://kismac.de
AirSnort	WEP Cracker, WLAN Discovery	Linux/Windows	http://airsnort.shmoo.com
WEPCrack	WEP Cracker	Linux (Windows with Cygwin)	http://wepcrack.sourceforge.net
AirCrack Suite	WEP Cracker, Packet Generator	Linux	www.personalwireless.org/tools/aircrack
Asleap	LEAP Cracker	Linux	http://asleap.sourceforge.net
CoWPAtty	WPA Cracker	Linux	www.personalwireless.org/tools/cowpatty

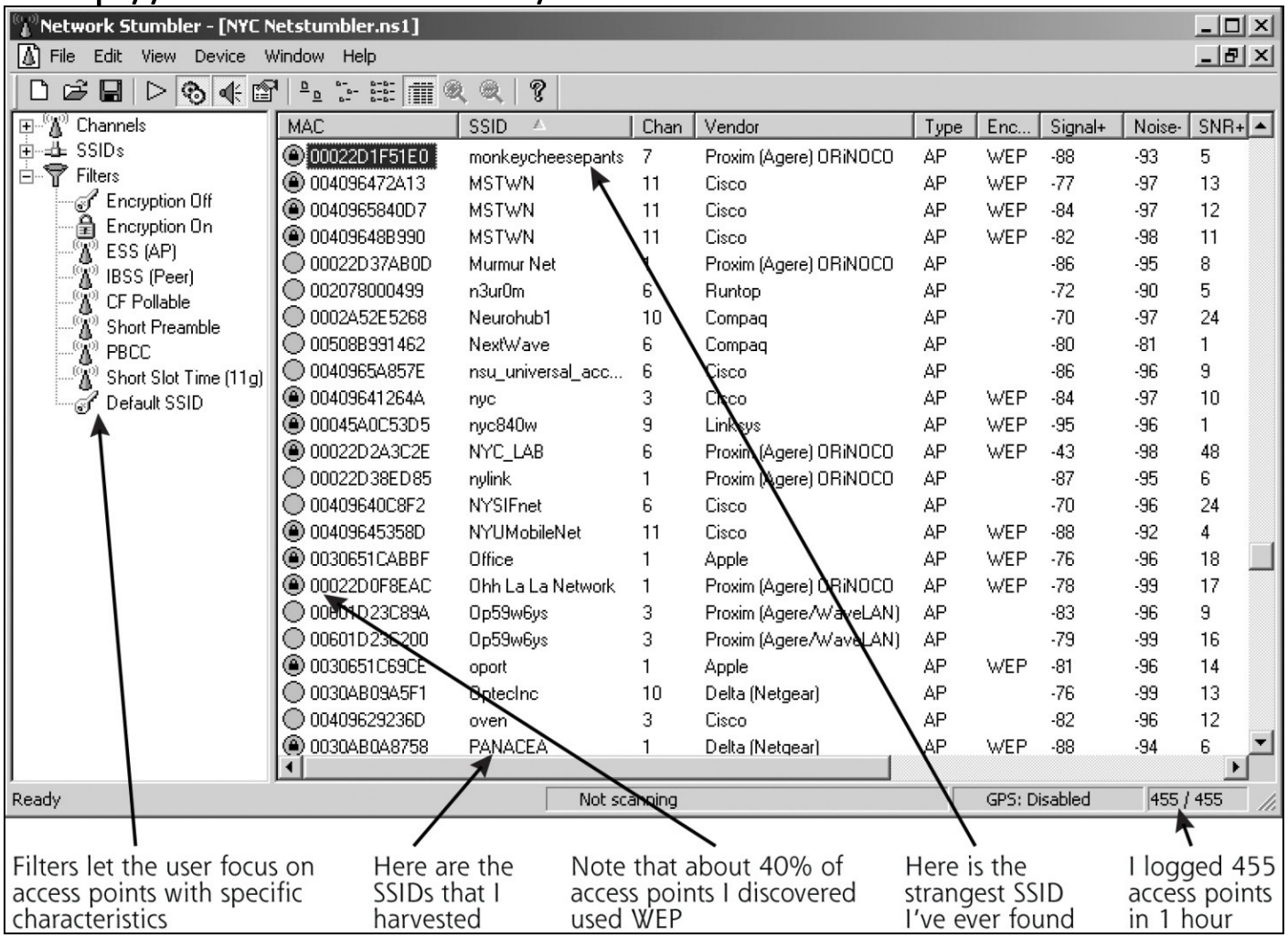
Understanding WLAN Vulnerabilities

- Vulnerabilities can be broken down into two basic types
  - Vulnerabilities due to poor configuration
  - Vulnerabilities due to poor encryption
- Attacks usually use one of these three techniques
  - Active scanning
  - Passive scanning
  - Forcing deauthentication
- Pen-testing WLAN
  - Target Identification
    - ESSID : Name of the WLAN
    - BSSID : MAC address of AP or STA
    - Probing with ESSID ”Any” makes most of the APs answer with their ESSID
    - AP:s sends beacon packets every 100 ms with ESSID in clear text



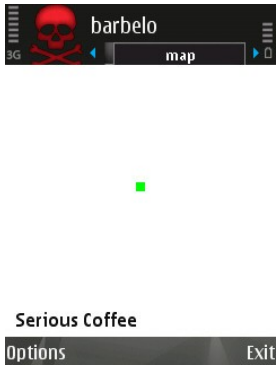
Active scanning (any probe) with Netstumbler

- Superseeded by inSSIDer
  - http://www.inssider.com/

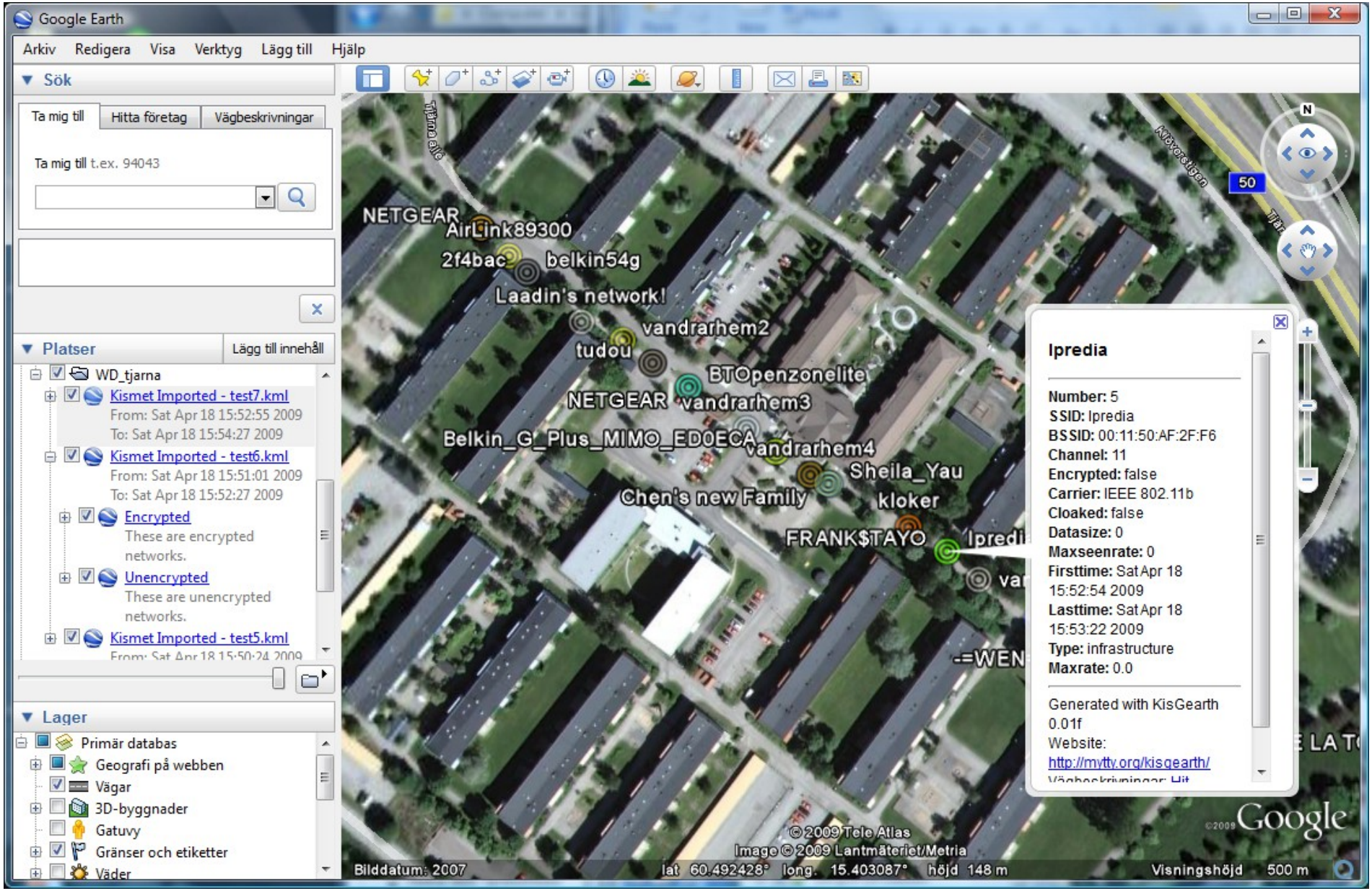


Active scanning with old mobile phone

- Barbelo and gpsd under Symbian S60v3(v5)
  - http://darkircop.org/barbelo/ (unfortunately bugs)
  - http://wiki.nomi.cz/gpsd:start (also turn your phone into BT GPS)
- Kisgearth (Perl script - Kismet XML > KML)
  - More than 1 AP in Wi-Fi network log
  - å, ä, ö and comma (',') must be converted to US standard '.'
  - http://mytty.org/kisgearth/
- Other wardriving apps for Windows Mobile 6.x etc.
  - AiroMap (http://blogs.wefrag.com/divide/airosuite/)
  - http://www.wardrive.net/wardriving/tools/
- View KML with Google Earth

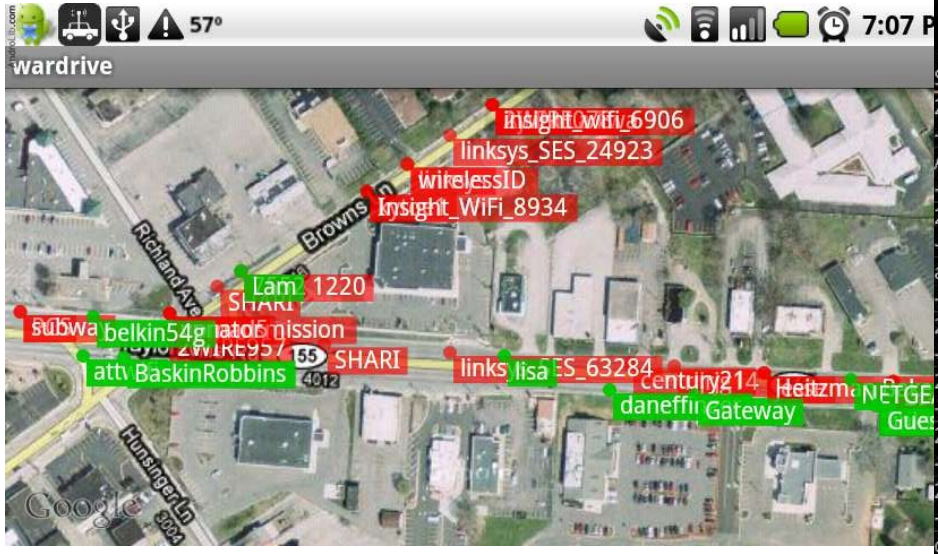


View in Google Earth



Active scanning with Android phone

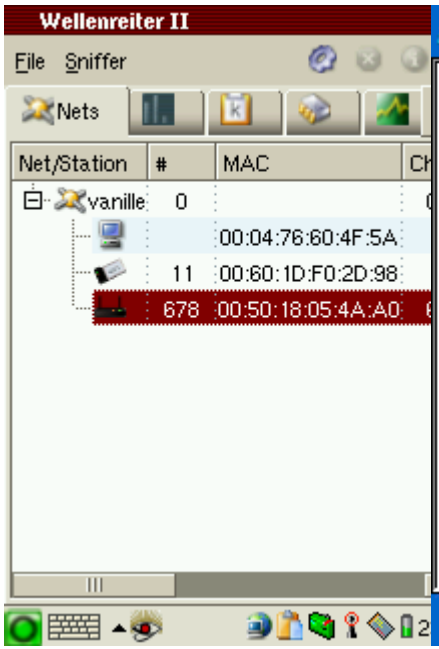
- Android apps (there is a lot!)
- Most support KML, export etc.
- Wardrive, Wigle WiFi, WiFi Scanner
- Scout, G-MoN, WlanPollution
- Antennas (Cell-ID)
- Penetrate (Crack)
- ...

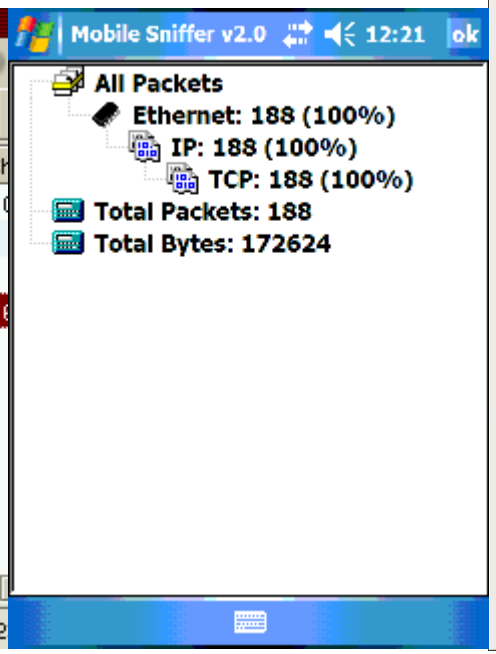


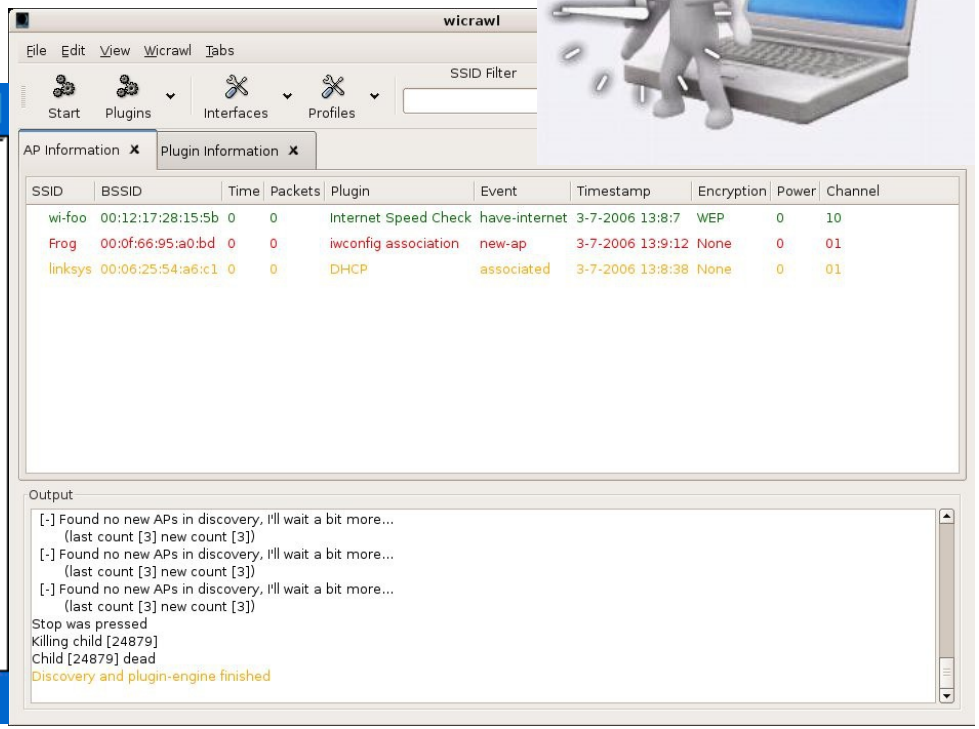
Passive scanning (rfmon/monitor mode)

- Handheld - Wellenreiter II
  - http://www.vanille-media.de/site/index.php/projects/wellenreiter-ii
- Hotspotter
  - http://www.wirelessdefence.org/Contents/hotspotter.htm
- Wicrawl (plugin support)
  - http://midnightresearch.com/projects/wicrawl/
- Airscanner Mobile Sniffer
  - http://www.airscanner.com/

Packet Sniffer

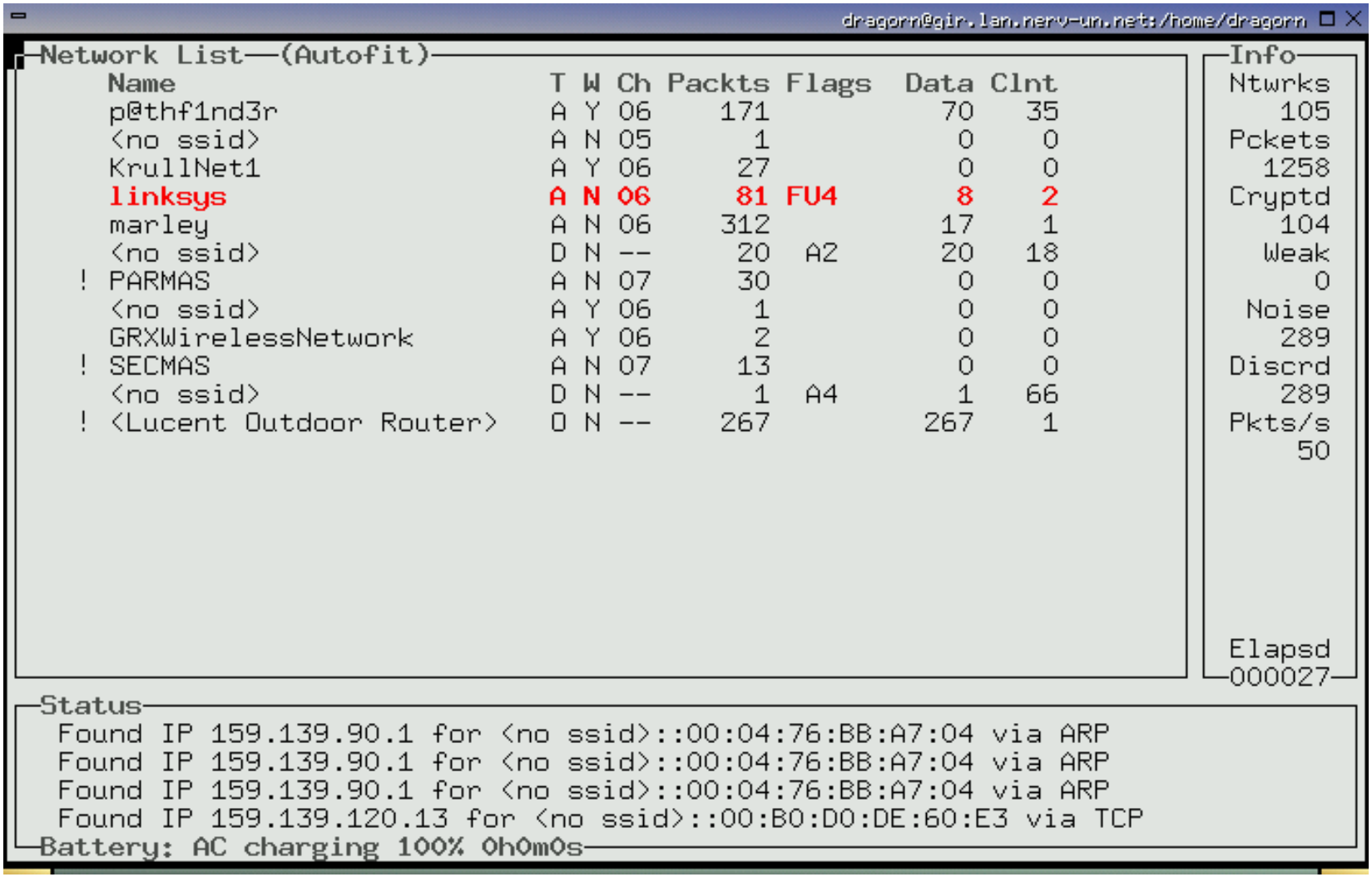




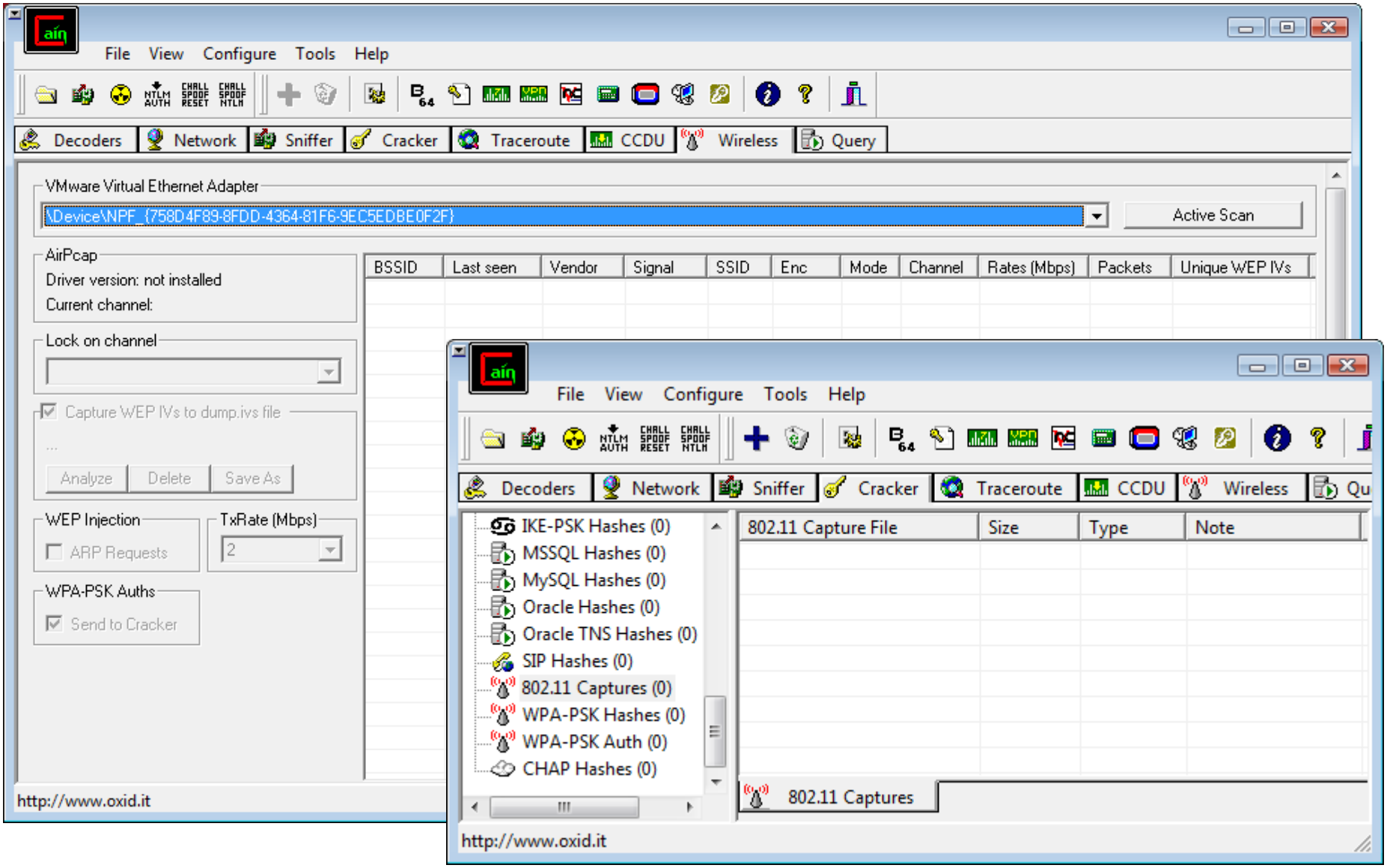


Passive scanning with KISMET

- Also used to capture data when forcing deauthentication



Cain and CACE AirPcap USB dongle



War Driving Defenses

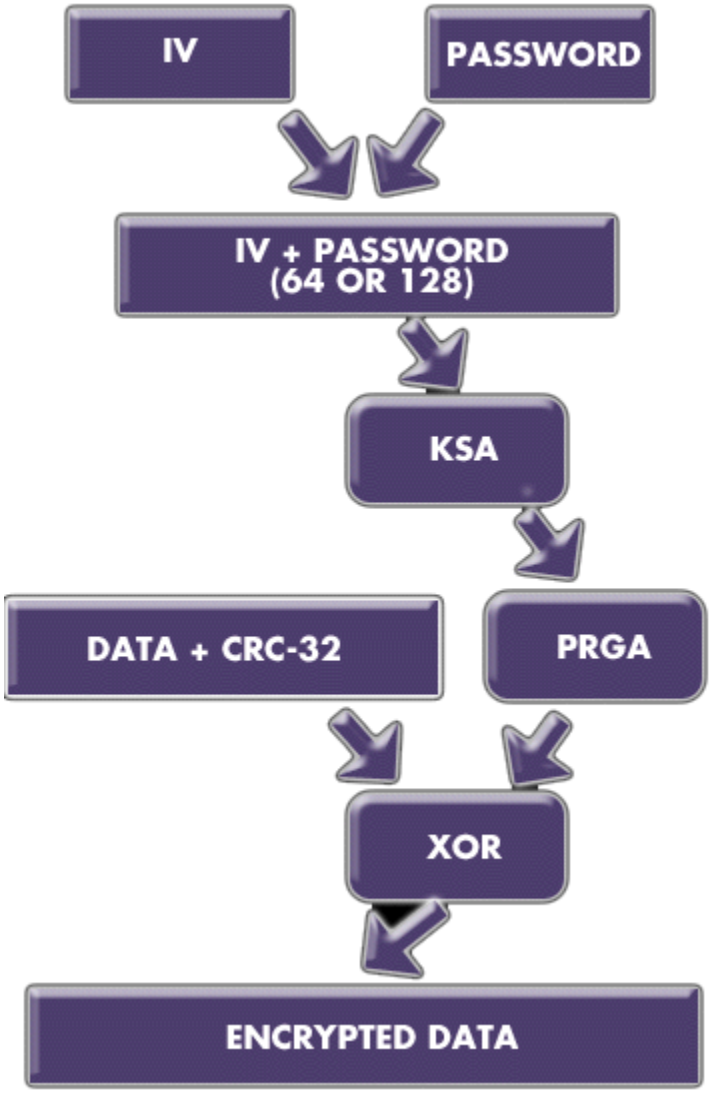
- Set non informative ESSID in AP and an unique name
- Set AP to ignore probe requests that do not contain ESSID and omit ESSID in beacon packets
- Set AP to filter out MAC-addresses that are unknown
  - Mac MakeUp (Windows)
  - ifconfig [if] hw ether [mac address] (Unix)
- Wired Equivalent Privacy (WEP)
  - Protocol is broken – not recommended to use
  - FMS (Fluhrer, Mantin, and Shamir)/KoreK attack method - 2001
  - PTW (Pyshkin, Tews, Weinmann) attack method - 2007
- WiFi Protected Access (WPA)
  - WPA implements a subset of 802.11i (WPA2) but uses RC4 instead of AES cipher
  - WPA/WPA2-PSK
    - Short passphrase (less than 21 characters) is vulnerable to a dictionary attack http://seclists.org/isn/2003/Nov/0021.html

Offensive Security: WPA Rainbow Tables, 49 million word dictionary

- **http://www.offensive-security.com/wpa-tables/**

WEP (Wired Equivalent Privacy)

- IVs (initialization vectors) used with stream cipher RC4
  - IV produce a unique stream independent from other streams produced by the same encryption key
- RC4 uses the key to initialize a state machine via Key Scheduling Algorithm (KSA)
  - Then continuously modifies the state and generates a new byte of the key-stream from the new state
- RC4 XOR-encrypts one byte at a time with the key-stream output from Pseudo Random Generation Algorithm (PRGA)
  - http://en.wikipedia.org/wiki/RC4
  - http://en.wikipedia.org/wiki/Wired_Equivalent_Privacy



WEP key reuse

- Many packets contain well known fields at well known locations
  - E.g. header fields in IP and ARP etc.
- RC4 64 bit seed is created by concatenating a 40 bit shared secret (10 hex characters) with a 24 bit initialization vector (IV)
- A family of 2^24 keys for each shared secret
- Keys are cycled for each packet
  - Frames can be lost and stream ciphers do not deal with missing bits, so the stream must be reset with each packet
  - Therefore, a new IV is sent in the clear with each packet
- IV is only 24 bits, the time to repeat IV's (and thus keys) with high probability is very short
  - 50% probability of getting some IV reuse after using 4096 IV's
  - 99% likely that you get IV re-use after 12430 frames or 1 or 2 seconds of operation at 11 Mbps

Aircrack-ng

http://www.aircrack-ng.org/doku.php?id=aircrack-ng

- Knowing two of key stream, plain-text, and cipher-text lets you easily compute the third
  - Reusing a key value is a really, really bad idea. A well known fact for RC4

XOR

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	0

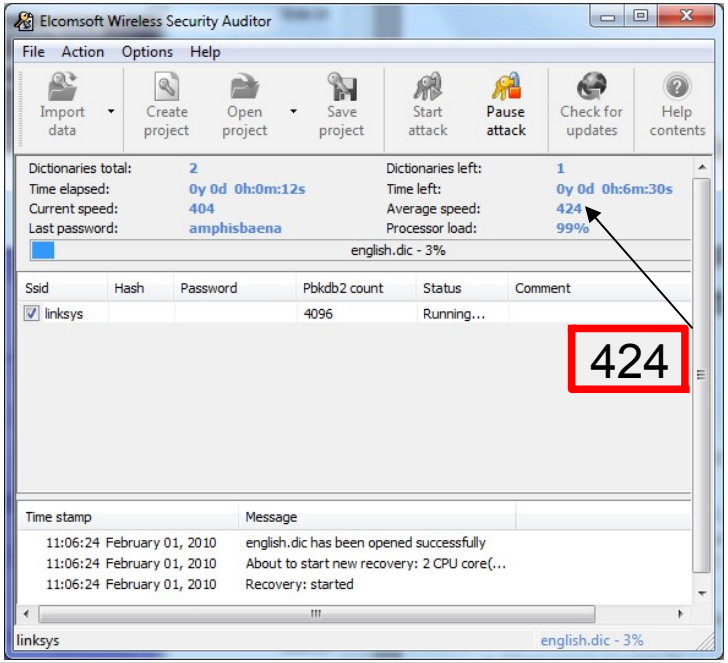
- FMS/KoreK chopchop attack method
  - When enough IVs are captured incorporate various statistical attacks to discover the WEP key and use these in combination with brute forcing
  - http://en.wikipedia.org/wiki/Fluhrer,_Mantin,_and_Shamir_attack
  - http://www.aircrack-ng.org/doku.php?id=korek_chopchop
- PTW attack
  - Builds upon Andreas Klein work which in turn works on FMS/KoreK work
    - http://eprint.iacr.org/2007/120
  - Fewer data packets/IVs are needed but is limited to only ARP
  - http://www.cdc.informatik.tu-darmstadt.de/aircrack-ptw/
- For cracking WPA/WPA2 PSK, a dictionary method is preferred

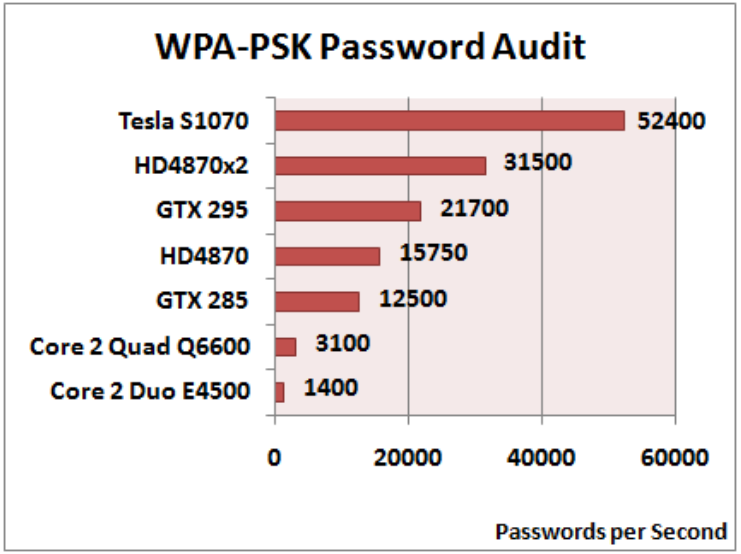
WPA/WPA2-PSK

- Elcomsoft Wireless Security Auditor
- Pyrit (Python), backtrack support
  - http://code.google.com/p/pyrit/
- Only wordlist or hash chain attack make sense!
- Algorithm – the PMK (Pair-wise Master Key) may be pre-computed

1. **Generate PMK:** `PMK = PBKDF2(PSK, SSID, SSID_Len, 4096, 256)`
2. **Generate PTK:** `PTK = sha1_prf(PMK, PKM_Len, Pairwise key expansion, data, sizeof(data))`
   where data is composed of: LowerMac, HigherMac, LowerNonce, HigherNonce
   - MAC of client and AP (packet 3)
   - AP nonce (packet 3)
   - Client nonce (packet 2)

   PTK is captured with aircrack-ng
3. **Generate the MIC:**
   TKIP: MIC = hmac_md5(key, 16, data);
   AES: MIC = hmac_sha1(key, 16, data);
4. **Compare computed MIC with captured MIC from packet 4**





Possible offline extraction of PMKs

- Pre-Shared Key (PSK): 8-63 printable ASCII characters (keyspace 96)
- Note! You may not need the PSK, try use the PMK hash directly in config?
- PMK = 32 bytes (256 bits), PBKDF2 = HMAC-SHA1, iterated 4096 times
  - Generate a PMK hash: http://www.wireshark.org/tools/wpa-psk.html
- PMKs are in Windows XP encrypted and decrypted with the DPAPI CryptProtectData and CryptUnprotectData functions, ex. WZCook (Aircrack-ng)
  - http://msdn.microsoft.com/en-us/library/ms706987%28VS.85%29.aspx
- The registry/file location of PMKs storage where the Interface GUID represents the wireless network card
  - Windows XP: SOFTWARE\Microsoft\WZCSVC\Parameters\Interfaces\[Interface GUID]
  - Windows Vista/7: stored in the file system in a .xml file (keyMaterial element), under C:\ProgramData\Microsoft\Wlansvc\Profiles\Interfaces\[Interface GUID]
- Starting from Windows 7, Microsoft changed the encryption and hashing algorithms that are used by the Windows Data Protection (DPAPI) system
- In Linux the PMK is usually stored in some wpa_supplicant config file

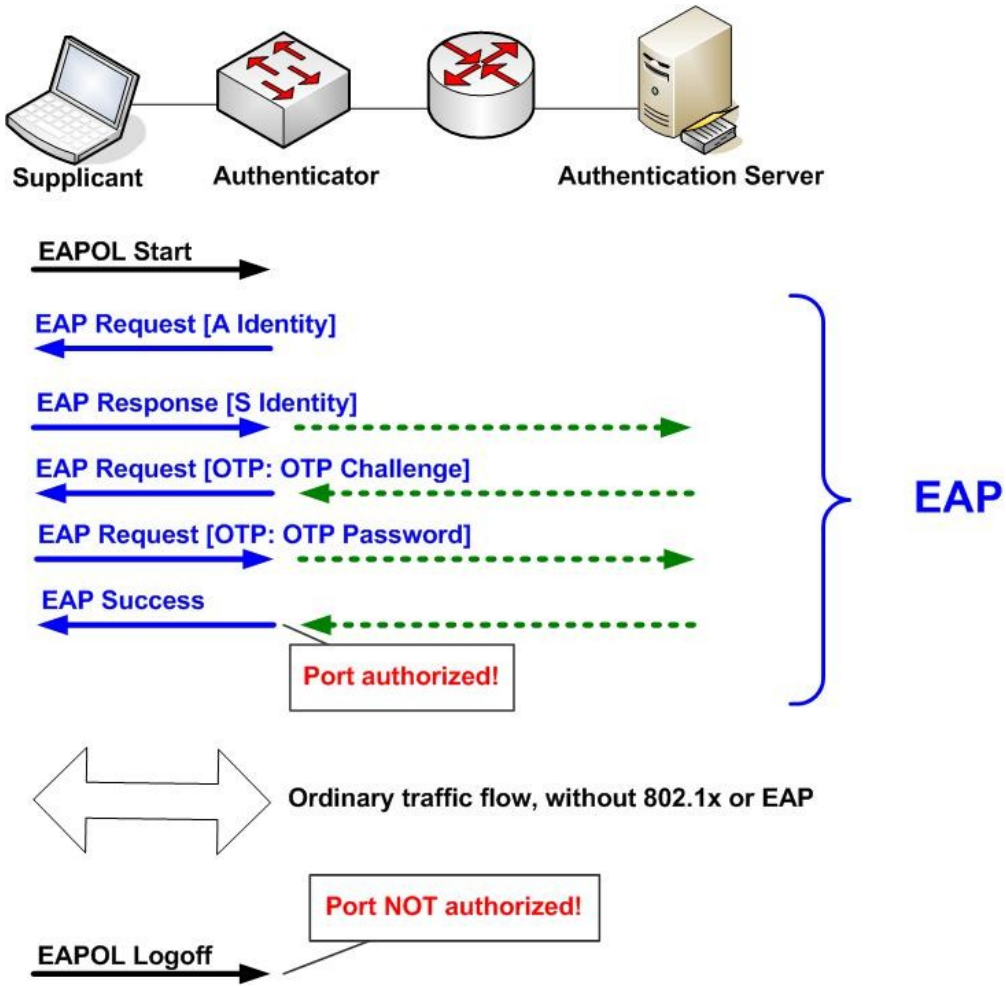
802.11i architecture

- WPA2 = 802.11i also called RSN(Robust Security Network)
- The 802.11i architecture contains the following components
  - 802.1X for authentication (entailing the use of EAP and an authentication server)
    - http://en.wikipedia.org/wiki/802.1x
  - AES-based CCMP (Counter Mode with Cipher Block Chaining Message Authentication Code Protocol), to provide confidentiality, integrity and origin authentication
    - Replaces TKIP (Temporal Key Integrity Protocol)
  - http://en.wikipedia.org/wiki/IEEE_802.11i
- EAP is an authentication framework, not a specific authentication mechanism
  - There are about 40 different EAP methods for authentication
    - EAP-MD5, EAP-OTP, EAP-GTC, EAP-TLS, EAP-IKEv2, EAP-SIM, EAP-AKA, PEAP, LEAP, EAP-TTLS… EAP-PSK
  - EAP (Extensible Authentication Protocol) methods and messages provide authentication and a secure PMK (Pair-wise Master Key) between STA and AP
  - If EAP is embedded in 802.1x it is called EAPOL (EAP Over LANs)
    - The PMK/PTK is used for the wireless encryption session which uses TKIP or CCMP
    - http://en.wikipedia.org/wiki/Extensible_Authentication_Protocol

General EAP authentication

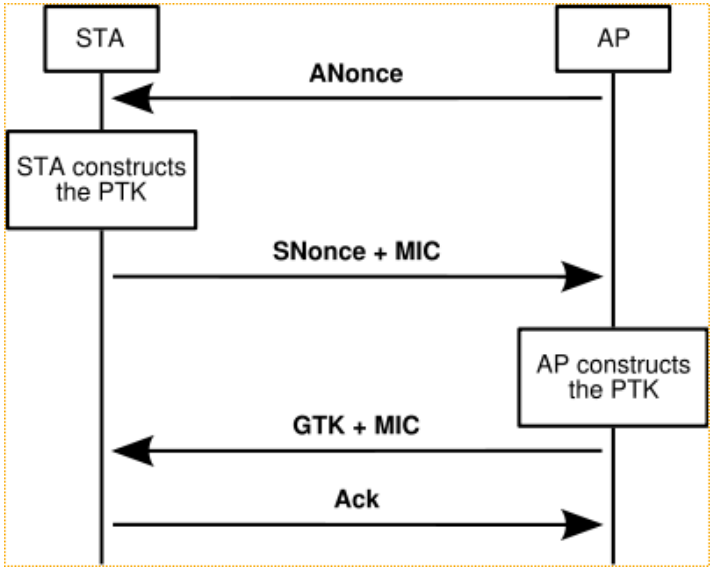
http://www.netcraftsmen.net/welcher/papers/dot1x.html

- Encapsulation of EAP Over LANs
  - 802.1X EAPOL
  - Layer 2 wrapper to transport EAP information
- EAPOL start is only used if the supplicant init the exchange
- Green dotted lines shows RADIUS (AS) messages
- EAP-OTP (One Time Password)
- EAP-PSK = OTP
  - If passphrase is 256 bit, PMK = passphrase, else
  - PMK = PBKDF2(passphrase, ssid, ssidLength, 4096, 256)
  - Hashed 4096 times



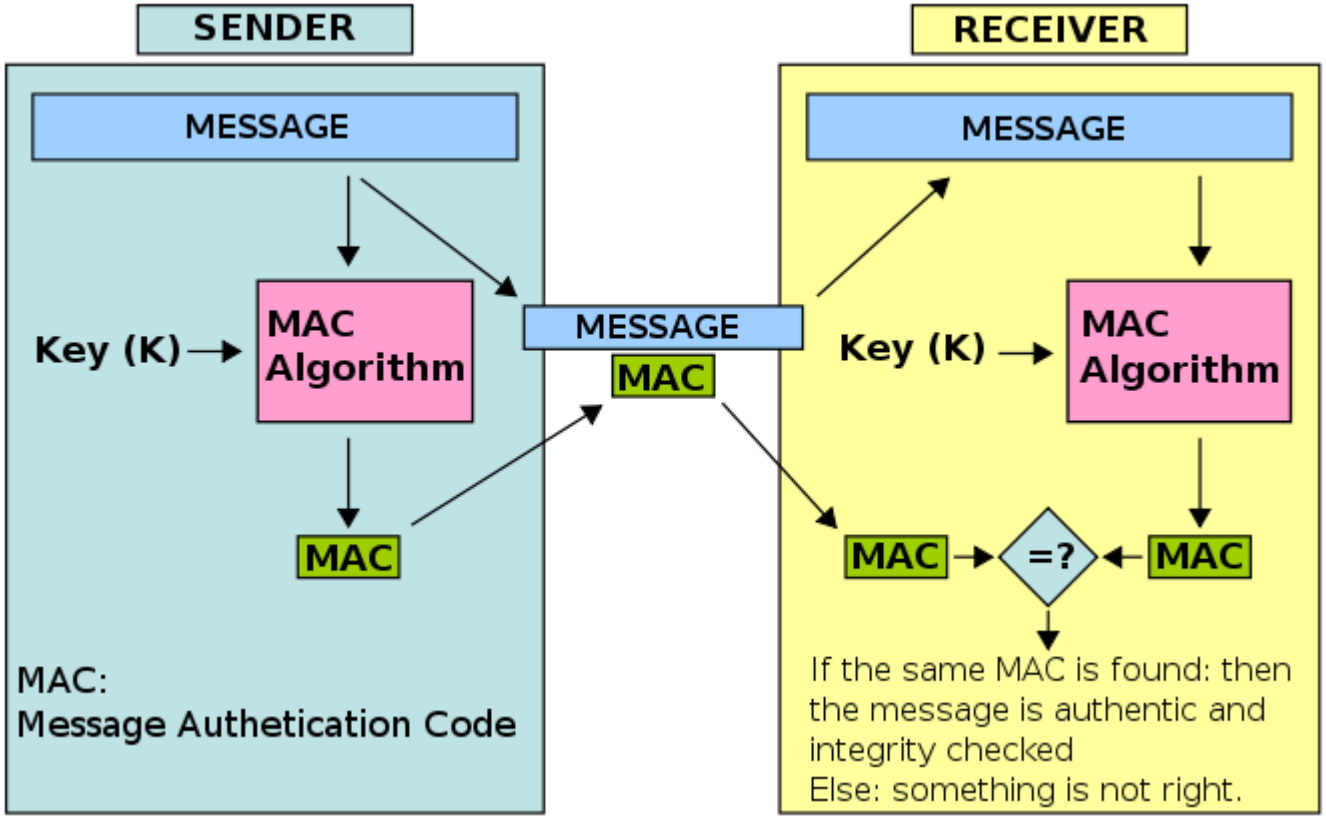
802.11i Encryption key distribution

- The earlier 802.1x EAP exchange has provided the shared secret key PMK (Pair-wise Master Key) Note! If it is WPA2-PSK we already know it.
  - This key is however designed to last the entire session and should be exposed as little as possible
- Therefore the four-way handshake is used to establish another key called the PTK (Pair-wise Transient Key)
  - The PTK is generated by concatenating the following attributes: PMK, AP nonce (ANonce), STA nonce (SNonce), AP MAC address and STA MAC address
  - The product is then put through a cryptographic hash function
  - The handshake also yields the GTK (Group Temporal Key), used to decrypt multicast and broadcast traffic
  - **Nonce** stands for: number or bit string used only once
  - **MIC** = Message Integrity Code
  - All the messages are sent as EAPOL-Key frames
  - http://en.wikipedia.org/wiki/IEEE_802.11i



MAC

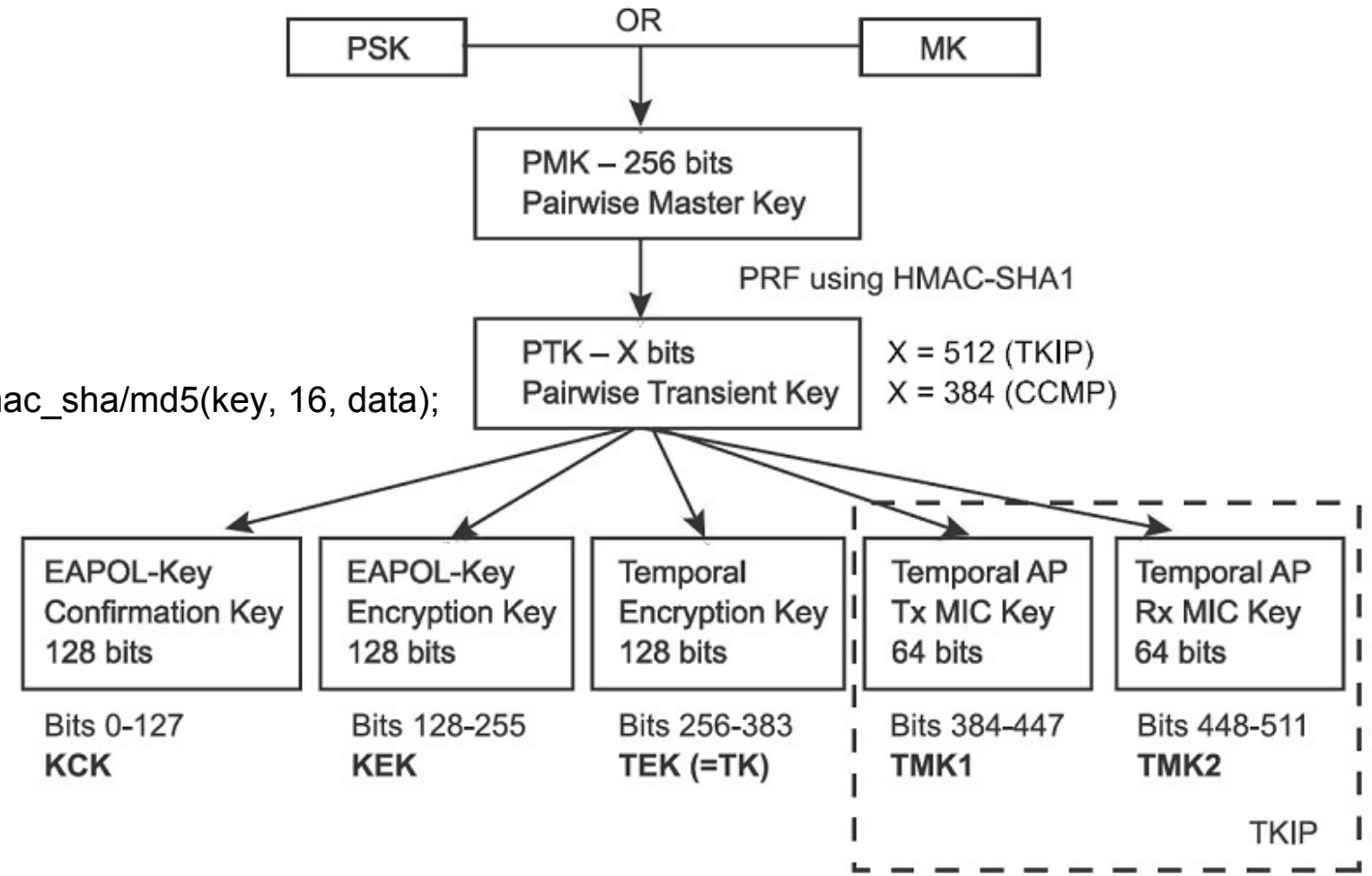
- (H)MAC = (Hash-based) Message Authentication Code
  - http://en.wikipedia.org/wiki/HMAC
  - http://en.wikipedia.org/wiki/Message_authentication_code



MIC and the hierarchy of keys

- The KCK (Key Confirmation Key) is used for computing the MIC (Message Integrity code)
- If computed MIC is equal to eavesdropped MIC we can calculate the PSK/MK

MIC = hmac_sha/md5(key, 16, data);



RADIUS, VPN and defense

- Remote Autenthication Dial-In User Service (RADIUS)
  - AAA (Autehentication, Authorization and Accounting)
  - Centralized client/server approach
  - Uses a shared secret that never is sent over the net
  - Flexible authentication with PAP, CHAP, LDAP etc.
  - Uses UDP port 1812
  - FreeRADIUS http://www.freeradius.org
- VPN
  - PPTP and L2TP
  - IPsec
  - OpenVPN (SSL/TLS based)
- IDS (Intrusion Detection System)
- Physical defense (Faraday cage) or turn down transmit power

War Dialing

- Looking for modems in all the **right** places
  - Remote access lines
  - Often weak protection
- Automated dialers
  - Feed with recon data
- TCH-Scan 2.0
  - Full featured
  - http://freeworld.thc.org/welcome/
- If inside you really are inside!
- Defenses
  - Modem policy
  - Dial out only
  - Find the modems before the attacker

WiFi Definitions 1

Term Name	Definition
802.11	A group of wireless networking standards defined by the Institute of Electrical and Electronics Engineers (IEEE) and commonly referred to as Wi-Fi or WLAN.
802.11a	A Wi-Fi network standard that describes radio transmissions in the 5.0-5.8GHz frequency range and with data rates of up to 54Mbps.
802.11b	A Wi-Fi network standard that describes radio transmissions in the 2.4GHz frequency range and with data rates of up to 11Mbps.
802.11g	A Wi-Fi network standard that describes radio transmissions in the 2.4GHz frequency range and with data rates of up to 54Mbps.
802.11i	An IEEE standard that specifies AES or TKIP encryption and 802.1X authentication for securing Wi-Fi networks. It supersedes the previous WEP specification from the original 802.11 standard that was found to be easily compromised.
802.11n	A yet-to-be-released, next generation Wi-Fi network standard that describes radio transmissions in both the 2.4GHz and 5.0-5.8GHz frequency ranges and with data rates of up to 600Mbps.
802.1x	An IEEE standard for port-based network access control, providing for the authentication of users attempting to access a network. It is specified by the IEEE 802.11i standard and the Wi-Fi Alliance WPA and WPA2 certifications for implementing Wi-Fi security. It is typically operated in conjunction with a RADIUS server.
Access Point	A Wi-Fi device (typically with 1 or 2 radios) that connects wireless devices/users to another (typically wired) network. Commonly abbreviated as AP.
Ad Hoc	A Wi-Fi network connection method that does not require an access point (base station). Using this mode, Wi-Fi devices such as laptops or gaming stations can connect directly to each other.

WiFi Definitions 2

Ad Hoc	A Wi-Fi network connection method that does not require an access point (base station). Using this mode, Wi-Fi devices such as laptops or gaming stations can connect directly to each other.
AES (Advanced Encryption Standard)	The preferred encryption algorithm for use in wireless LANs today. It provides government-grade encryption and can be used with both WPA and WPA2 Wi-Fi security.
BSSID (Basic Service Set Identifier)	The MAC address of the Access Point.
CCMP (Counter Mode with Cipher Block Chaining with Message Authentication Code)	An encryption protocol defined by IEEE 802.11i. It is used in conjunction with the AES encryption algorithm and is part of both WPA and WPA2 Wi-Fi security.
Channel	A frequency band, identified by a unique number, used for Wi-Fi communication. Each channel supports independent communication from any other channel. Wi-Fi channels are 20MHz wide in 802.11a/b/g networks, and can be either 20MHz or 40MHz in 802.11n networks.
dBm	A logarithmic unit of measure for milliwatts of power, used in Wi-Fi to measure the strength of a signal. Several examples of the conversion from dBm to milliwatts: 0 dBm = 1 milliwatt; 10dBm = 10 milliwatts; 20dBm = 100 milliwatts; -10dBm = 0.1 milliwatts.
MAC Address (Media Access Control Address)	A quasi-unique address value used to identify network adapters that follow different communication standards. In Wi-Fi (as well as Ethernet and other standards), MAC addresses are six bytes (48 bits) in length.
PSK (Pre-shared Key)	An encryption key shared between and common to the access point and client. It is used in WPA and WPA2 security.
RADIUS (Remote Authentication Dial In User Service)	An AAA (Authentication, Authorization and Accounting) protocol for controlling user access to a wired or wireless network.

WiFi Definitions 3

Roaming	The ability for a mobile wireless station to transparently change its connection between access points as it moves throughout a wireless network.
RSSI (Receive Signal Strength Indication)	The strength of the Wi-Fi signal as measured by the receiver of the signal. The larger the signal strength, the better the connection. RSSI is usually expressed in dBm or as a numerical percentage. The translation of dBm to percentage is: -100dBm = 0% and -50dBm = 100%, with each dBm accounting for 2% in between. A "good" Wi-Fi signal is typically considered to be -70dBm or greater (keep in mind negative numbers, so -60dBm is greater than -70dBm for example).
Signal Strength	See RSSI.
SSID (Service Set Identifier)	A unique name that identifies a wireless LAN and that differentiates it from others. All access points and clients attempting to connect to a specific WLAN must use the same SSID.
TKIP (Temporal Key Exchange Protocol)	An encryption protocol defined by 802.11i as an enhancement to WEP. Both WPA and WPA2 Wi-Fi security allow for the use of TKIP encryption.
WEP (Wired Equivalency Protocol)	The original encryption protocol defined for 802.11 wireless LANs by the IEEE. WEP encryption is easily cracked and is not recommended for implementing Wi-Fi security today.
WEP-104	WEP with 104 bit master encryption key.
WEP-40	WEP with 40 bit master encryption key.
Wi-Fi	A term developed by the Wi-Fi Alliance to describe wireless local area network (WLAN) products that are based on the IEEE 802.11 standards.
Wi-Fi Alliance	Industry organization that certifies 802.11a/b/g/n products for interoperability.
WPA (Wireless Protected Access)	The original Wi-Fi Alliance certification of 802.11i security for wireless LANs. It provides good Wi-Fi security but was introduced an interim option before WPA2 was released.
WPA2 (Wireless Protected Access 2)	The second generation Wi-Fi Alliance certification of 802.11i security for wireless LANs. Use of WPA2 is considered best practice for implementing Wi-Fi security today.