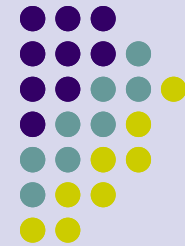


Security Considerations for Cellular 3G Modems & 3G Wireless Routers



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RfWeL - Radio Frequency Wireless Electronics
www.rfwel.com



About RfWeL

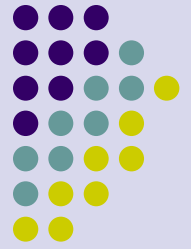
RfWeL, **R**adio **F**requency **W**ireless **E**lectronics, based in Phoenix, Arizona, is a leading wireless system integrator & VAR with expertise in remote wireless data technologies. Founded in 2004 RfWeL has grown to be one of the main players in the WWAN space and in particular as an expert in leveraging low cost 3G cellular data technologies for remote wireless data applications.

Our experience spans several vertical markets with applications ranging from remote wireless video surveillance, telemetry & SCADA systems, long range wireless bridging, wireless signal amplification & distribution, broadband wireless access & GPS telematics. We are also adept at enabling technologies supporting remote data applications such as solar pv technology & high capacity battery systems particularly for the public sector & emergency management markets.

For more information visit us online at www.rfwel.com

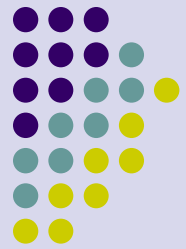


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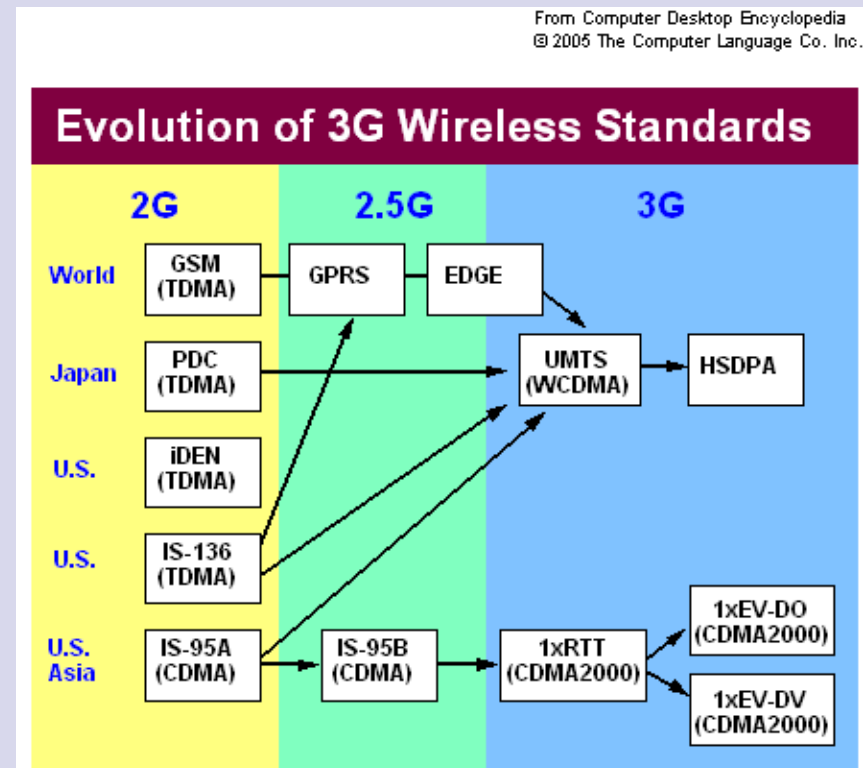
Topics to Cover

- Overview of Cellular 3G Data Networks
- Introduction to Cellular data routers
- Cellular-side security considerations
- WLAN-side security considerations



Overview of Cellular 3G

- EVDO RevA vs HSUPA
- Forward Link (download) vs Reverse Links (upload) datarate
- Latency issues
- Modem styles
- Evolution of 3G → 4G





3G data from CDMA Carriers

Data Protocol	Sprint Service Name	Alltel Service Name	Download Speed* (Forward Link)	Upload Speed* (Reverse Link)	Latency [†]	Notes
WiMax	Xohm, Clearwire	N/A	2-4 Mbps	1-2 Mbps	20-100ms	Sprint/ Clearwire partnership. Planned for 2008.
EVDO RevA	Mobile Broadband™	-	600-1400 Kbps Bursts of 3.8 Mbps	350-500 kbps	~50ms	Changes primarily to reverse link (upload). Also improves latency.
EVDO Rev0		Access Broadband™	500-700 Kbps Bursts of 2.4 Mbps	60-80 kbps Bursts of 144 Kbps	100-500ms	
1xRTT		Access MobileLink™	60-80 Kbps Bursts of 144 Kbps	60-80 Kbps Bursts of 144 Kbps	300-1000ms	

*Speeds shown are approximate and general. Individual speeds may vary from market-to-market and device-to-device. Contact an RfWeL Wireless Support specialist for what variables could affect your actual speeds or your local carrier for the most accurate info.



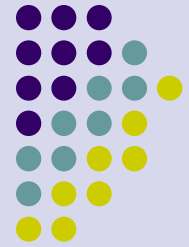
3G data from CDMA Carriers

Data Protocol	AT&T Service Name	T-Mobile Service Name	Download Speed* (Forward Link)	Upload Speed* (Reverse Link)	Latency [†]	Notes
3GPP LTE ^{††}	N/A	N/A	~100Mbps	~50Mbps	<5ms	Long Term Evolution VZW to support this
HSUPA	AT&T DataConnect	N/A	14.4Mbps theoretical max (1.8Mbps typ max)	5.76Mbps theoretical max 500-800 kbps typ	~50ms	High Speed Uplink Packet Access. Uplink improved by HARQ & shorter TTI
HSDPA		N/A (expected 2008)	14.4Mbps theoretical max (1.8Mbps typ max)	220-320 kbps typ	100-500ms	High Speed Downlink Packet Access. A 3GPP protocol to improve downlink of UMTS systems.
EDGE		T-Mobile EDGE	236.8 kbps (70-135 kbps typ)	236.8 kbps	800-1100ms	Enhanced Datarate for GSM evolution. A.k.a EGPRS. Theoretical 384kbps. Typically 70-135kbps.
GPRS		T-Mobile GPRS	80 kbps	80 kbps	800-1100ms	General Packet Radio Service.

*Speeds shown are approximate and theoretical. Carriers throttle down significantly.

^{††}May also be implemented by CDMA carriers, VZW for example. Speeds are projected since no commercial deployments to date (Q1, 2008)

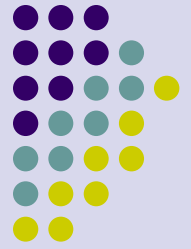




Cellular data routers

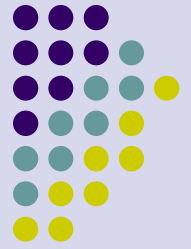
- Convert Cellular Data (EVDO, 1xRTT, EDGE, UMTS, HSDPA, HSUPA) to an 802.11b/g/n Wireless LAN Network (WiFi) & an 802.3 Wired LAN Network.
- Typical residential, SOHO, SMB have all features commonly found in standard wireless routers e.g NAT, Switch, Web management, virtual server, remote management, etc.
- No practical throttling of speed





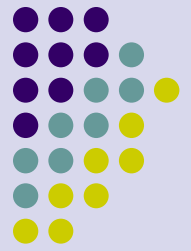
Cellular-side security

- Virtually nothing to worry about here
- Both EVDO & HSxPA utilize AES cryptography (Advanced Encryption Standard FIPS 197 approved by NSA for Top Secret information).
- Much harder to intercept & decode 3G data in air interface!
- Jamming of cellular data signals is illegal in the U.S for any reason!!



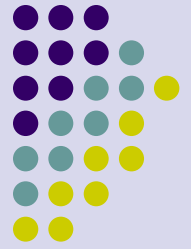
WLAN Security

- A MUST HAVE!
- Letting unauthorized access will lead to:
 - Virus vulnerability to network
 - Identity theft – access to computer files
 - Liability when cybercrime is originated from your network
 - Speed degradation
- Extremely simply to protect against all but the very determined and very competent



WLAN Security Risk Mitigation

- Control range of network via directional antennas & nominal gain
- Network Authentication & Data Encryption
 - WEP – Wired Equivalency Protocol
 - 64 or 128-bit, 13 or 26 hex characters
 - Open system vs Shared key (Use Open System)
 - WPA & WPA2 – Wireless Protected Access
 - TKIP
 - WPA2 based on 802.11i & uses AES (Same as EVDO)
 - 802.1x Authentication (RADIUS) vs PSK (6-23 ascii or 64 hex)



WLAN Security Risk Mitigation

- SSID Hiding
- MAC Filtering
- Password of Router
- VPN
- SSL (Secure websites)