**Practice Test #1 – RF Fundamentals**

* Channels (per Freq Band)
  + Discuss frequency bands and their characteristics (when and how they are used).
* Behaviour (propagation)
* Frequency vs Bandwidth
* Licencing (ACMA)
* SLAs
  + BER
  + RX Levels
  + SNR
  + Interference
* Shannons Law
* License Free Bands
  + LTE
  + WIFI
  + Carrier Aggregation (CA) of LTE Carriers
    - 2.6GHz + 2.4GHz/5.8GHz (Bonded)
    - 3CA – 2 x2.6GHz (2 x20MHz) + 1x2.4GHz (20MHz) = 60MhZ
      * 20MHz = 150Mbps (DL)
      * 3CA 🡪 450Mbps
    - Modulation DL 256QAM
    - 6CA
    - 4 x 4 MIMO
    - Handset Support
* Antenna Systems (selection)
  + Types vs Freq Band
  + Gain
  + Signal Spread
  + Range
  + Mounting

---------------------------------------------------------------------------------------------------------

**Exercise #1**

**Practice Test #2 – 802.11 Technical Fundamentals**

* Standards
  + IEEE
  + ITU-R and ITU-T
  + WIFI 🡪 WIFI 6 (Home and Office)
    - Evolution of standards
  + 3GPP (3G 🡪 5G, mmW 🡪 28GHz)
  + 6G (AR/VR, AI/ML, D-BAND/W-BAND🡪 Higher frequency Band 100GHz+ 🡪 100Gbps 🡪 Automated Factories/Robotics 🡪 Industrial Revolution 2.0)
* Convergence of Wireless Tech
  + Mobility
  + Seamless Transition between technologies
  + Impact of congestion (many connected users)
* Key call outs

---------------------------------------------------------------------------------------------------------

**Exercise #2**

**Practical #3 – How to Implement/Operate a Wireless Network**

* Set up
* Configuration
* Integration
* Trouble Shooting
* MININET (Virtual Environment) or other
  + Design network
  + Looks and feels like a CISCO Networking Environment
  + [Mininet: An Instant Virtual Network on Your Laptop (or Other PC) - Mininet](http://mininet.org/)
  + Connect to or setup local virtual environment (Virtual Box)
  + Ubuntu
    - OS

---------------------------------------------------------------------------------------------------------

**Exercise #3**

**Practical #4 – Performing a Wireless Network Site Survey**

* Pros and Cons
  + What to look out for and why.
* Tools for RF Propagation/ Coverage Prediction
  + <https://www.networkstraining.com/best-wifi-heatmap-software/>

---------------------------------------------------------------------------------------------------------

**Exercise #4**

**Practical #5 – Wireless Network Design and Analysis**

* Network Architecture
  + Home Network
  + Wide Area Network
  + Cellular Network
* Architecture Selection:
  + Number of connected users
  + Topology Types: Hub/Spoke, Chain, Meshing, Rings
  + Network Resilience
  + Supporting Bandwidth/Performance/SLA
    - Impact of Bit Errors
    - Impact on Rx Sensitivity

---------------------------------------------------------------------------------------------------------

**Exercise #5**

**Practice Test #6 – Wireless Technology and Selection**

* WIFI
* Cellular (2G - GSM, 3G – UMTS, 4G - LTE, 5G - NR)
* Satellite
  + LEO/MEO/GEO
  + Starlink (Elon Musk)
    - LEO (320km)
    - V-BAND
    - <https://vividcomm.com/2020/09/06/starlink-rain-fade-will-it-work/>
  + NBN
* Access and Backhaul

---------------------------------------------------------------------------------------------------------

**Exercise #6**