Channel model

0430 meeting

https://gist.github.com/brian09088/3e7be0d082590c361b024b6bba04d346
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- fading, pathloss, modulation, uplink, downlink

1. **Basic setup**
    - Satellite altitude = 650 km
    - communication path distance = 1597.492286 (km)
    - EIRP Density = 34.000000 (dBW/MHz)
    - center frequency = 2 GHz
    - transmit power = 200 mW
    - UE_antenna_gain = 0
    - Sat_antenna_gain = 30
    - Transmit_antenna_gain = 0
    - UE_antenna_power = 200.000000 mW
    - UE_antenna_power = 52.983174 dBm
2. **others**
    - EIRP = -6.989700 (dBW)
    - FSPL = 222.539375 (dB)
    - Doppler model : -0.000000 (kHz)
    - Fading channel model : 3GPP TDL-D
    - maximum possible Doppler shift compensation (fd_max) = 1 (kHz)

- Reference CNR: 9.3198 dB
- Uplink

ElevationAngle(degrees)	CNR(dB)	FSPL(dB)
5	-4.4943	166.24
15	-1.4878	163.23
30	2.0158	159.73
60	5.9015	155.84
90	7.0198	154.73

- Downlink

ElevationAngle(degrees)	Link Margin(dB)	NRep_Add
5	-13.814	24
15	-10.808	12
30	-7.304	5
60	-3.4183	2
90	-2.3	1

- Reference CNR: 0.2889 dB
- Uplink

ElevationAngle(degrees)	CNR(dB)	FSPL(dB)
5	-3.6656	166.24
15	-0.65901	163.23
30	2.8445	159.73
60	6.7303	155.84
90	7.8485	154.73

- Downlink

ElevationAngle(degrees)	Link Margin(dB)	NRep_Add
5	-3.9545	2
15	-0.9479	1
30	2.5556	0
60	6.4414	0
90	7.5596	0

- 因為衛星天線屬於射頻晶片（RF），所以採用SNR而非SNR
- SNR是總訊號功率比雜訊。 CNR有用訊號功率比噪音
- **Satellite CNR Config**:
  - TransmitterPower: 22.9832
  - TransmitterSystemLoss: 0
  - TransmitterAntennaGain: 0
  - Distance: 1.5975e+03
  - Frequency: 2
  - MiscellaneousLoss: 0
  - GainToNoiseTemperatureRatio: 1.1000
  - ReceiverSystemLoss: 0
  - BitRate: 0.0100
  - SymbolRate: 10
  - Bandwidth: 6
- **CN = 22.3637 dB**
  - TransmitterEIRP: 22.9832
  - FSPL: 162.5372
  - ReceivedIsotropicPower: -139.5540
  - CarrierToNoiseDensityRatio: 90.1452
  - ReceivedEbNo: 50.1452
  - ReceivedEsNo: 20.1452

- 會議記錄(會後討論)
- merge學姊的程式碼來做combine
- 先用GEO 單一靜止衛星去試試看
  - 需要combine參數及設計函數傳遞學姐的程式