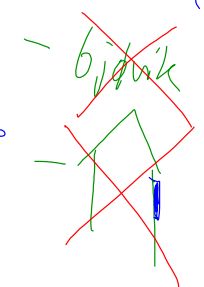


UNIK 4700

Channel models

- Hata \rightarrow Okumura-Hata
- Urban Tokyo
- antennas above roof top



NSB punctuality
 94% in time
 6% are delayed
 0900 --- 0100
 3h rush hours 27h
 6%
 ~ 14% \rightarrow 14%
 \rightarrow ~50% of NSB in Rush hour and delay

scattering & interaction

$$\frac{l}{70} \leq \lambda \leq 2-3 l$$



1mm \dots $\lambda \dots$ 2-3 cm

$$\lambda = \frac{c}{f} = \frac{30 [cm]}{f [GHz]}$$

$$f [GHz] = \frac{30 [cm]}{\lambda}$$

Interaction rain \downarrow $f \sim 300 GHz \dots 10 GHz$

$= 0.7 cm$
 $\cdot 3 cm$

Assignments Part II

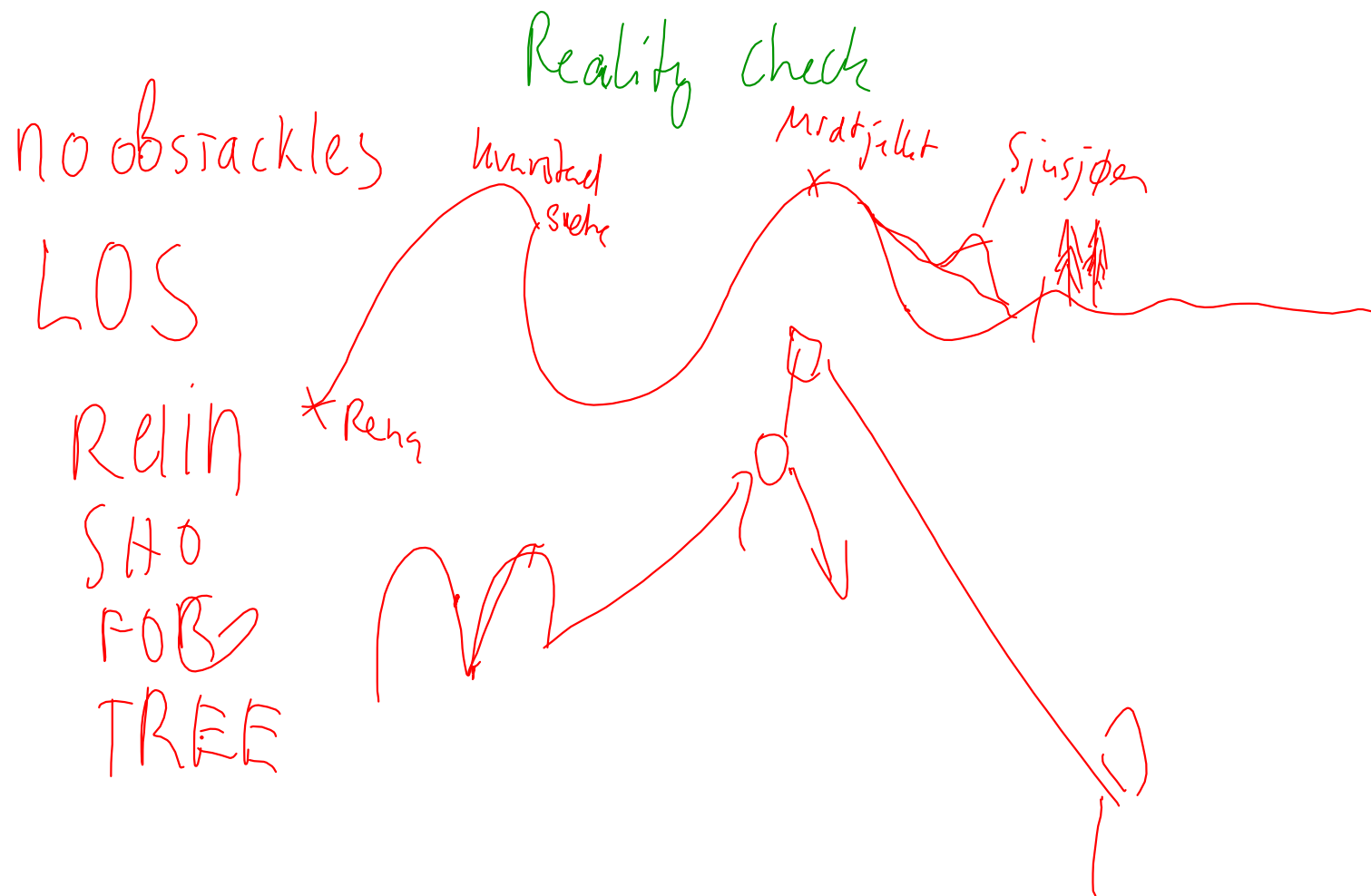
Part II assignments

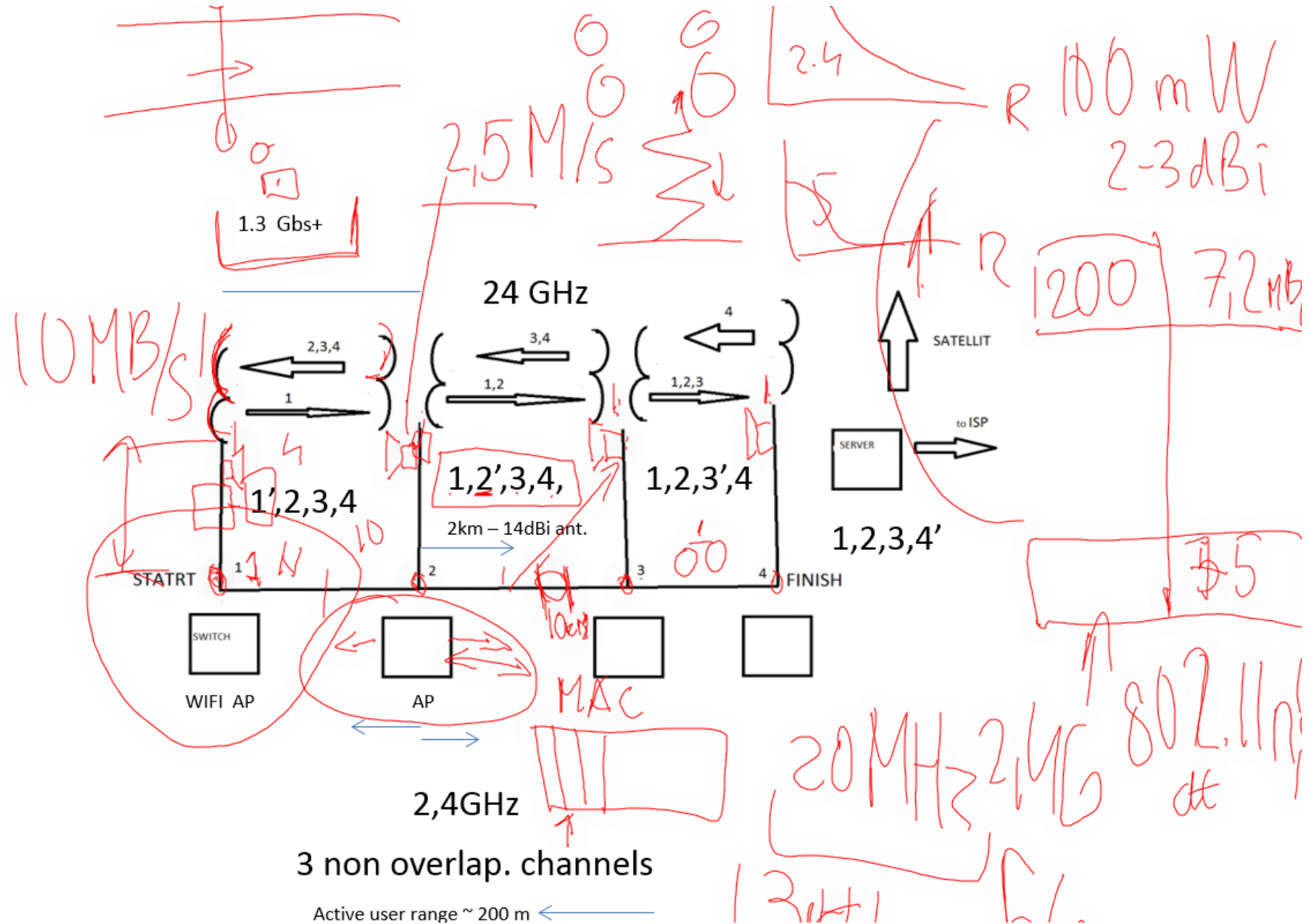
- Cell capacity, System capacity
- Traffic Modelling
- Mobility
- Basic Internet (free access to basic information (text & pictures) on the Internet)
- inverse MVNO: the customer owns the access network
- WLAN system for video communication
- ... (any other topic which you might find interesting)

for further information, see [F1-Future_Networks](#)

Scraj Technical
 ← Kazi : buz model
 "disruptive innovation"
 → customer "owns"

Yun Ai : Distribution of inc. waves in microcell
 Qihaoli : WiMAX for video system
 Raul : WiFi for video system





Real world

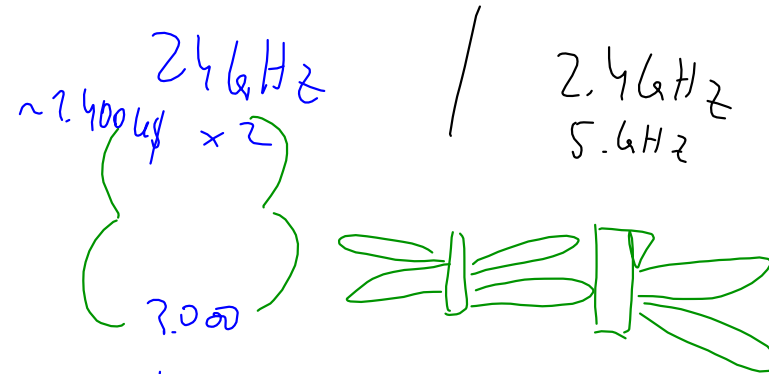
- tree height
- hills

2.4 or 5-GHz

$$P_R = P_T G_T G_R L_{path}$$

$\left. \begin{array}{l} | \\ \} \} \end{array} \right\} 3 \text{ dB}$
 $\left. \begin{array}{l} | \\ \} \} \end{array} \right\} 3 \text{ dB}$

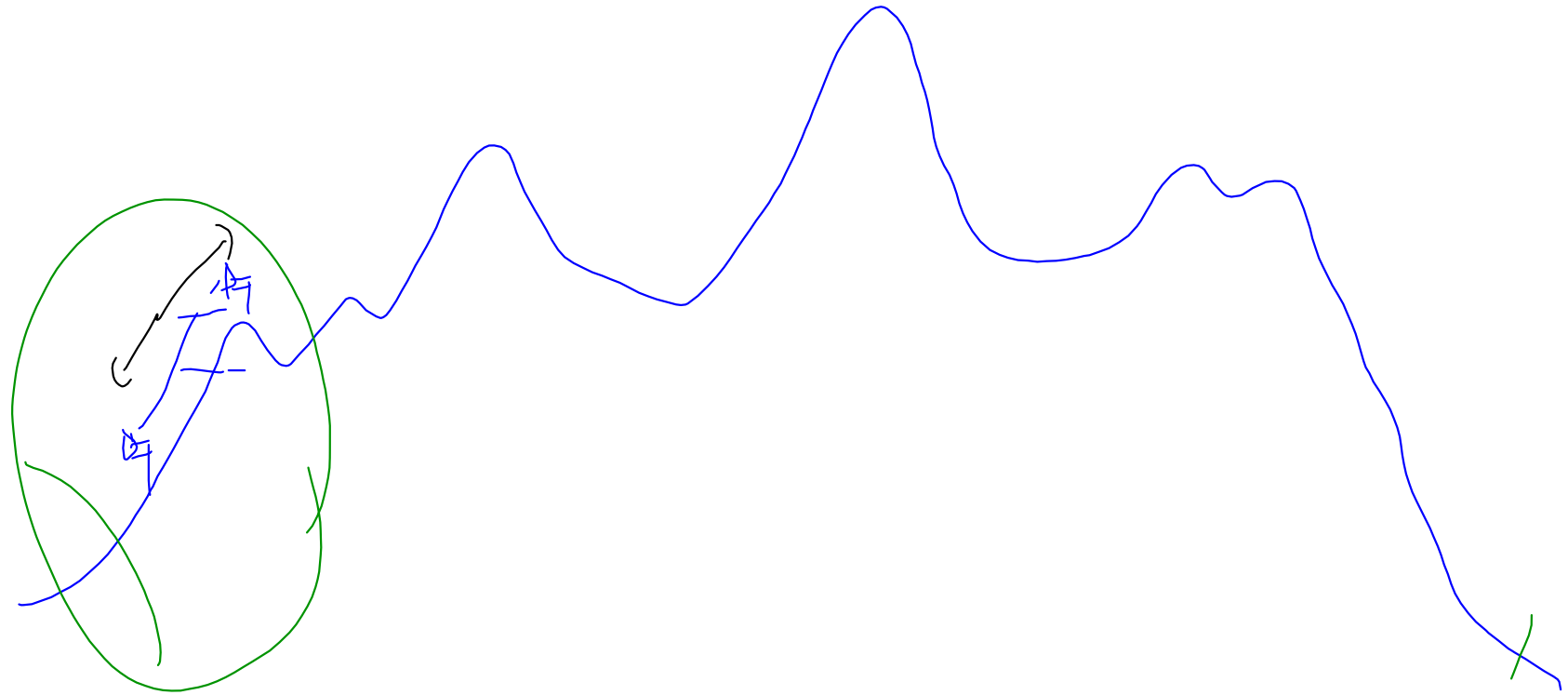
 2.4 GHz beamwidth < 5.5°



- LOS (- license)
- 30m mast
- budget

Capacity range

range ?
 Capacity ↓
 Over Capacity



- 1 Overview
- 2 Introduction
 - goal
 - tech solution
- 3 tech solution
- 4 challenges
 - system
 - power, energy
- 5 conclusion / further steps



802.11a setting

```

CSThresh_      6.31e-12 ;#-82 dBm Wireless interface sensitivity (sensitivity defined in the standard)
Pt_            0.001
freq_          5.18e+9
set noise_floor_ 2.512e-13 ;#-96dBm for 10MHz bandwidth
L_            1.0 ;#default radio circuit gain/loss
PowerMonitorThresh_ 1.259e-13 ;#-99dBm power monitor sensitivity
HeaderDuration_ 0.000020 ;#20 us
BasicModulationScheme_ 0
PreambleCaptureSwitch_ 1
set DataCaptureSwitch_ 0
SINR_PreambleCapture_ 2.5118; ;# 4 dB
SINR_DataCapture_ 100.0; ;# 10 dB
set trace_dist_ 1e6 ;# PHY trace until distance of 1 Mio. km ("infinty")
PHY_DBG_       0
set CWMin_     15
CWMax_        1023
SlotTime_     0.000009
set SIFS_     0.000016
set ShortRetryLimit_ 7
set LongRetryLimit_ 4
set HeaderDuration_ 0.000020
set SymbolDuration_ 0.000004
set BasicModulationScheme_ 0
set use_802_11a_flag_ true
set RTSThreshold_ 2346
set MAC_DBG_ 0
    
```

Receiver sensitivity

- BT = -85 dBm
- Wireless = -95 dBm
- GSM ≈ -105 dBm
- UMTS ≈ -110 dBm

1. Thermal noise $kT \cdot B$
2. Receiver noise figure

64844707

Expeded out come ?
 FER (BER) Jar file
 or Packet Error Rctc

Model / Scenario
 1. receiver & stream
 2. download file

