Noise figure

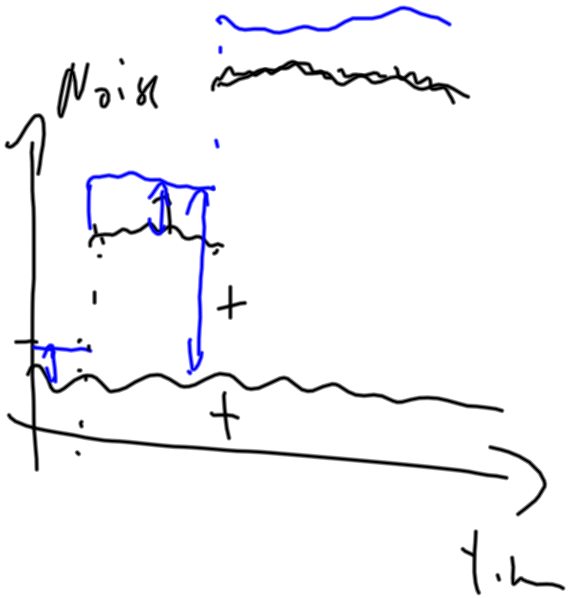
$\frac{T}{3} \cdot 10 = \frac{50}{3} \sim 18$

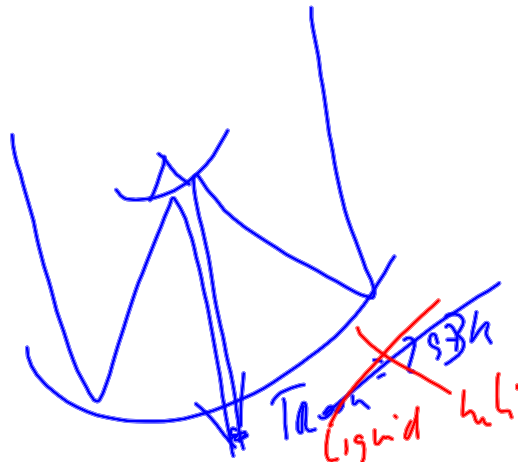
$N = k T_B B$

$T_{Background} = 2.7k$

$T_{star} = 5k$

$SNR \sim 2$





helium $T_R \sim 3k$

$SNR_1 = 5/3$

$Amplify = 10$

$SNR \sim 17$

Ampl = 10

$T_R = 3$

$T_N = 10$

20

Noise figure$_{total}$

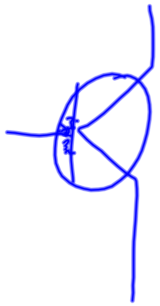
$= N_1 + \frac{N_2}{Ampl_1} + \frac{N_3}{Ampl_1 \cdot Ampl_2}$

3   10   10

$1.7 \sim 34$

$3+1=4$

Real System



$T_{usage} \approx 293\,K$ (20°C)

+ Noise $\frac{5\,k}{298\,k}$

Specification Mobile phone

GPS Signal

Noise floor at 20°C, Noise figure, SNR

P_{NU} -108 dBm + 3 - 12 (-105)

$B_U \approx 3.8$ MHz

$P_U \sim -117$ dBm (UMTS -102 dB included 9 dB SNR)

Typical $P_R \sim -160$ dB, ~ -190 dBm

$P_{NG} = -121$ dBm + 10 + 9 (-111)

B = 200 kHz

$P_{GSM} \sim -111$ dBm, SNR not included

$P_{R_{min}} = -102$ dBm

UMTS: 62 dBm (2.5 kW)

SNR = -10

Noise figure 7 (5)

P_{Tx} = 18 - 2 (cable loss)

HS-DSCH = 46 dBm

$P_{Thermal}$ = -104.5 dBm (3.84 MHz)

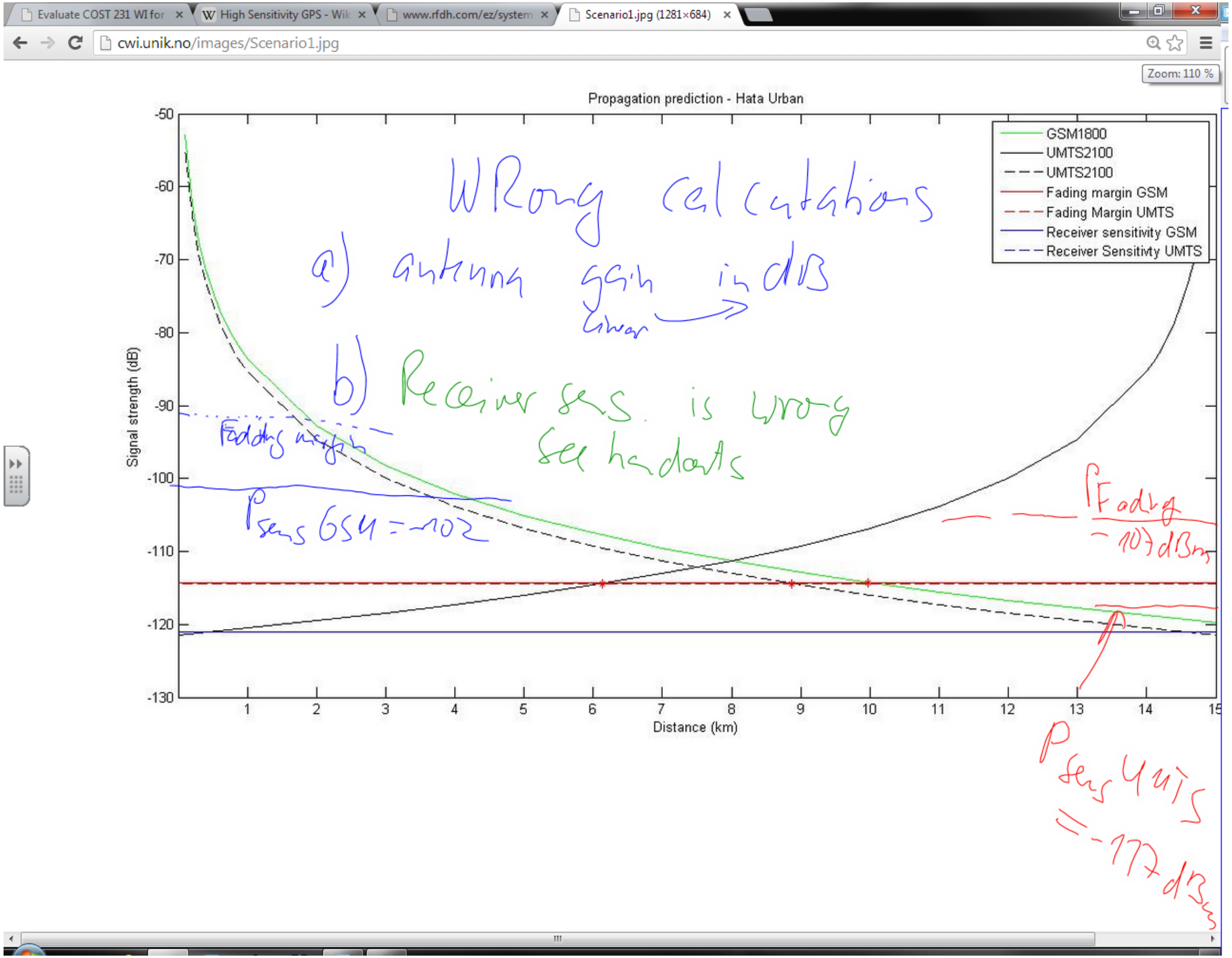
P_{noise} = -97.5 dBm

P_{Tx} = 25 W = 25 000 mW = 2.5E4 mW

40 + 10 log(2.5) = 44 dBm (4)

G_{Rx} = 0 dB, 2 dB

$P_R \approx -107.5$ dBm


cwi.unik.no/images/Scenario1.jpg
Propagation prediction - Hata Urban
Signal strength (dB)
Distance (km)
GSM1800
UMTS2100
UMTS2100
Fading margin GSM
Fading Margin UMTS
Receiver sensitivity GSM
Receiver Sensitivty UMTS
WRong calculations
a) antenna gain in dB
b) Receiver sens. is wrong
see handouts
Fading margin
Psens GSM = -102
Psens UMTS = -117 dBm
-107 dBm

Evaluate COST 231 WI for × | High Sensitivity GPS - Wik × | File:Scenario1.jpg - CWI ×

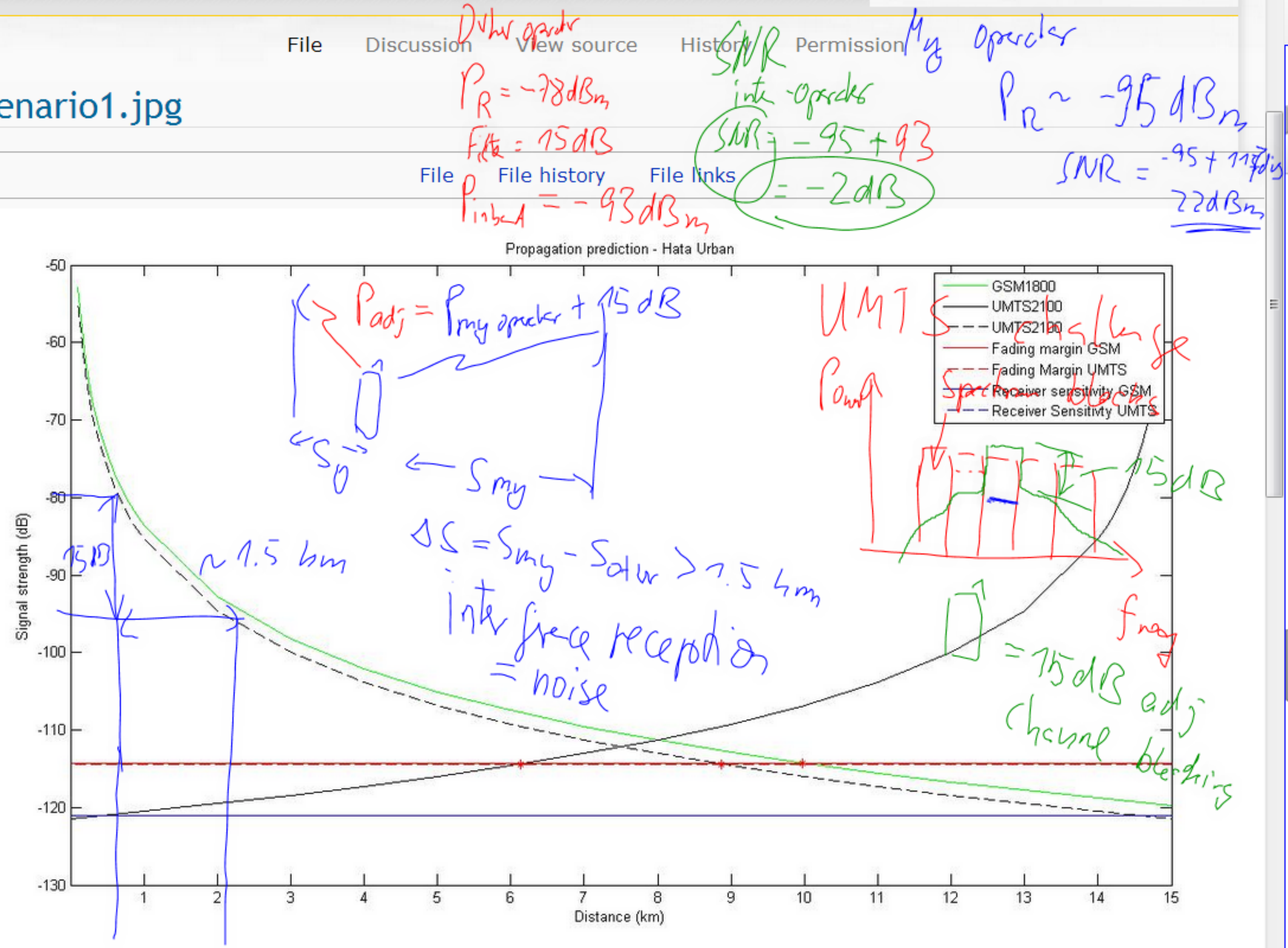
cwi.unik.no/wiki/File:Scenario1.jpg

UNIK wiki | WNIS@UNIK | Master/PhD Courses | Master Thesis | Research Areas

File | Discussion | View source | History | Permission

File:Scenario1.jpg

File | File history | File links



Size of this preview: 800 × 427 pixels

Full resolution (1,281 × 684 pixels, file size: 58 KB, MIME type: image/jpeg)

Graph showing handover between GSM and UMTS with Okumura model

Evaluate COST 231 WI for | High Sensitivity GPS - Wik | www.ece.ucsb.edu/yuegr

www.ece.ucsb.edu/yuegroup/Teaching/ECE594BB/Lectures/RF-receiver-basics.pdf

Receiver NF Requirement Calculations

- IEEE 802.11a WLAN
- FCC limits the PSD in 5GHz to 2.5 mW/MHz
- Channel bandwidth is 16 MHz
- Transmit Power is 40 mW or 16 dBm
- Thermal noise floor –174 dBm/Hz X 16 MHz = –102 dBm
- Total SNR budget is 16 dBm – (–102 dBm) = 118 dBm
- To cover ~300 ft. at 5 GHz results in a path loss of 86 dB
  - i.e. Receiver sensitivity is –70 dBm (802.11a specification is –65 dBm)
- Required SNR for 64QAM (54Mbps) is 27 dB
  - 802.11a packet length is 8 kb
  - Worst packet loss < 10%, $(1 – BER)^{8000} = 1 – 10\%$, $BER = 10^{-5}$
- Receiver noise figure requirement = Tx Power– Path Loss – Required SNR – Noise floor = 16 + 102 – 86 – 27 = 5 dB

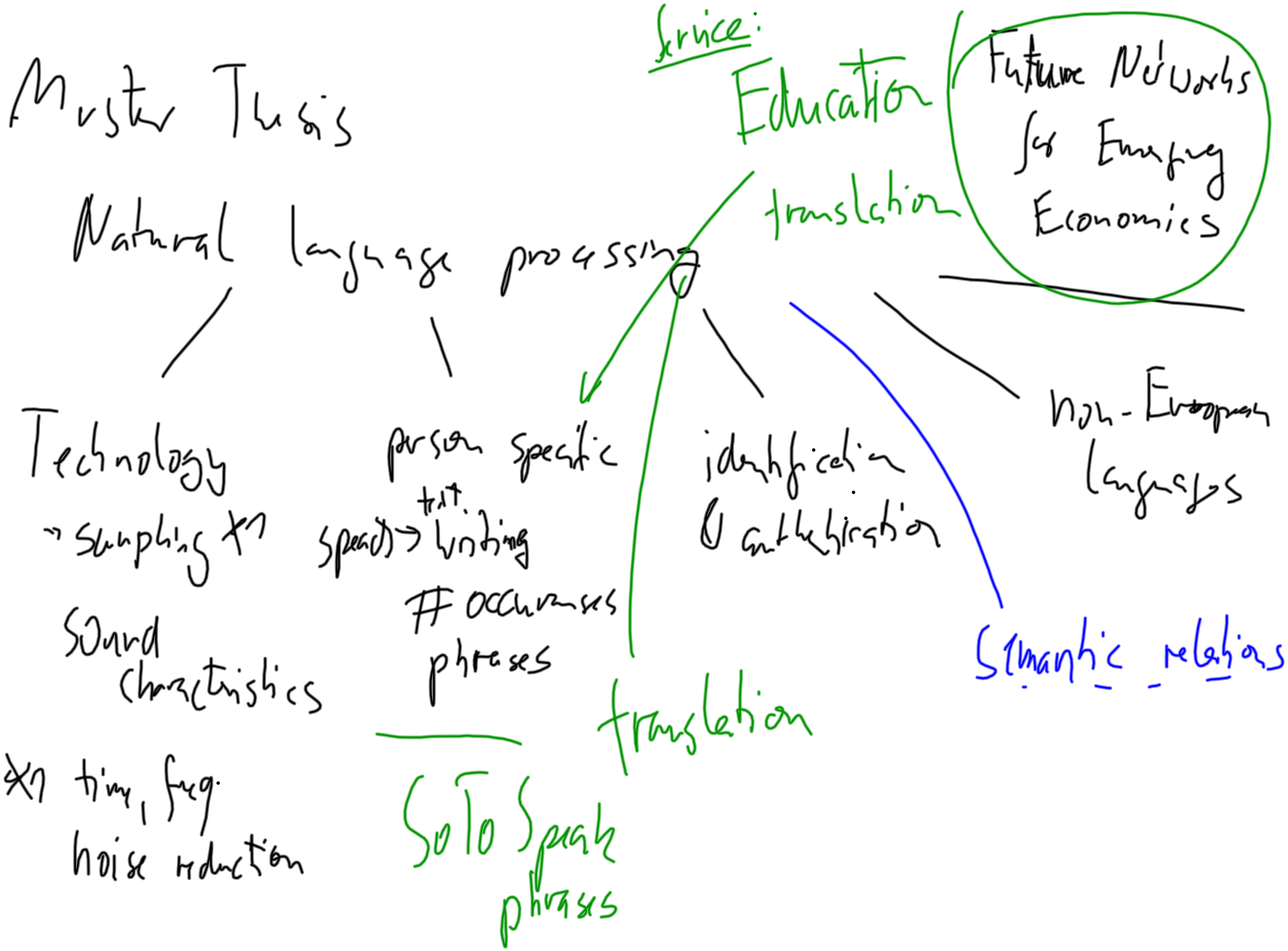
- GSM (DCS-1800) cellular
- FCC limits the PSD in 1.8 GHz to 5 mW/kHz
- Channel bandwidth is 200 kHz
- Thermal noise floor –174 dBm/Hz X 200 kHz = –121 dBm
- Required SNR for GSM is 9 dB
  - to keep BER < 10^{-3}
- GSM receiver sensitivity specification is –102 dBm
- Receiver noise figure requirement = Receive sensitivity – Noise floor – Required SNR = –102 – (–121) – 9 = 10 dB

293° k, kT, B, 10 · log(k T B), 10 log(kT) + 10 log B, 70 · 0.3 = 3 + 50, 53, –102 dBm, 9 dB SNR, 10 Noise factor, Noise –121 dBm

UMTS

$-174\ \mathrm{dBm/Hz} + 10\log(3.8E6)$

$-174 + 60 + 6 = -108\ \mathrm{dBm}$

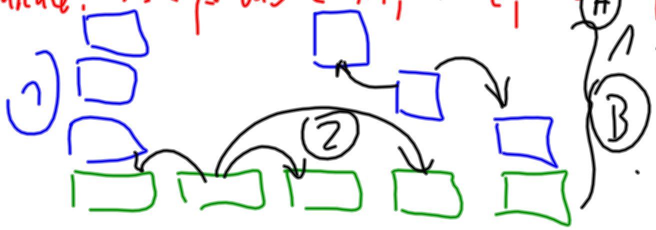

Master Thesis
Natural language processing
Technology
→ sampling ×n
sound characteristics
×n time, freq.
noise reduction
person specific
speech → text writing
occurrences
phrases
identification & authentication
non-European languages
Semantic relations
Service:
Education
translation
translation
Future Networks for Emerging Economics
SoToSpeak
phrases

Cognitive Computing – "Watson" (IBM)

Question: how big has my antenna to be to WiFi communicate over 5 km?

how: theorems ...

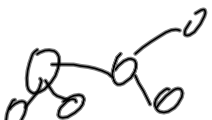
communicate: ... radio comm, voice, letter, email, ...



(A) Mio opportunities

(B) combination plausible?

Knowledge base: + gossip of the world



logically

72 GB --links--> < 500 GByte DBPedia, Max Planck location, ??

answer evaluation

B) own evaluation

follow this lecture, understood earlier:

having followed ", understanding of:

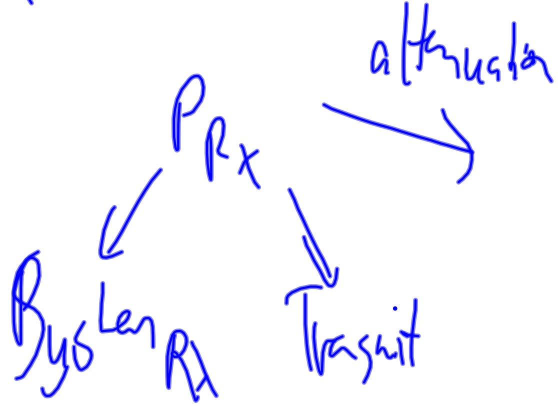
ask question: ? attenuation

influences receive power?

bandwidth noise level

certain answers P_{Tx}

- keywords QoS Receiver
- relate keywords



A) reading & writing learning