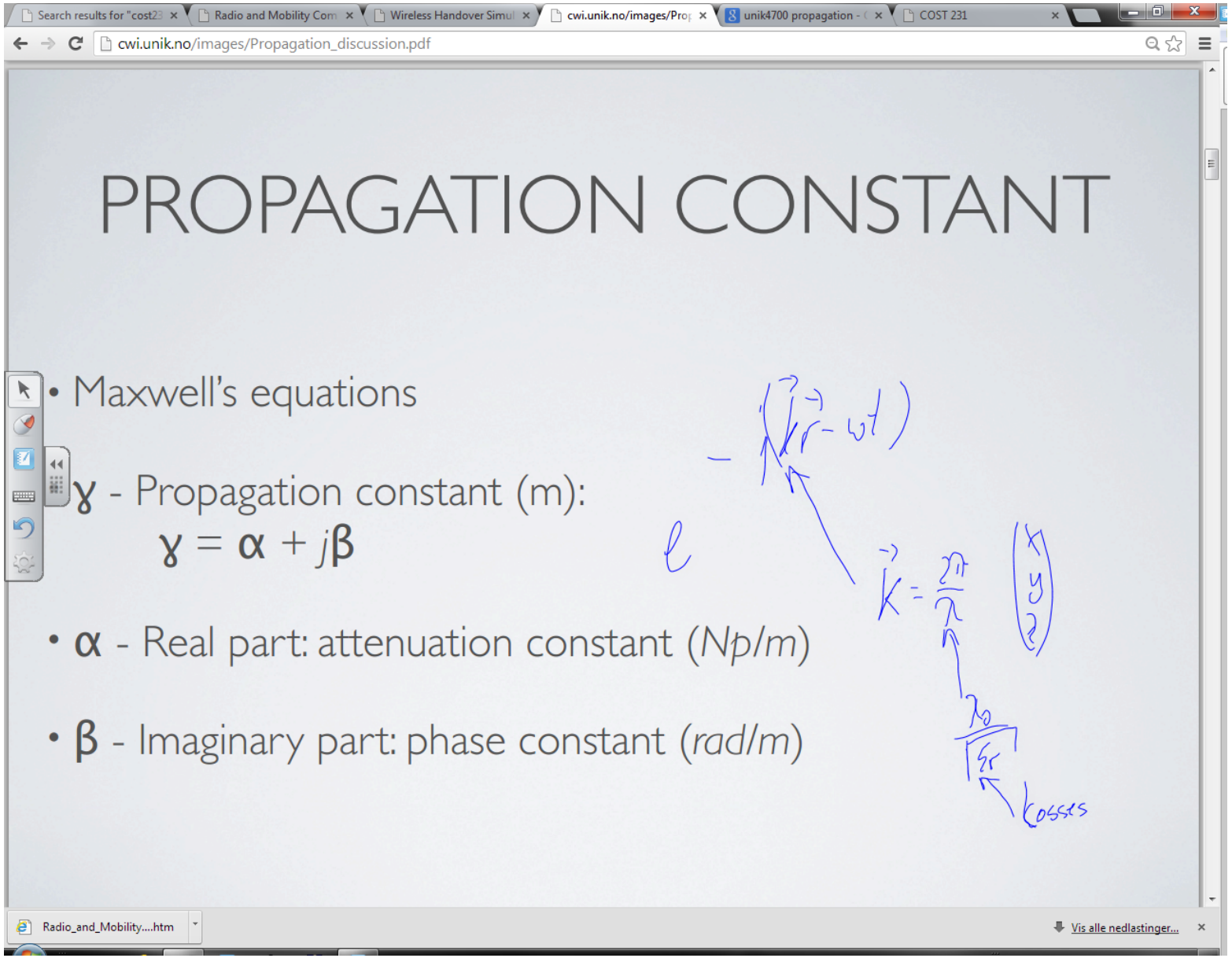
- Recall "state of knowledge"
- lack of appropriate propagation models ⇗ better SW model
  - Convert free space loss → dB
- Example: Free Internet access for everybody
  - apply 700 .... 5 GHz
  - including 802.11ac
- "Measurements" indicative (mobile)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unik4700 propagation -
COST 231
cwi.unik.no/images/Propagation_discussion.pdf
PROPAGATION CONSTANT
• Maxwell's equations
γ - Propagation constant (m):
γ = α + jβ
• α - Real part: attenuation constant (Np/m)
• β - Imaginary part: phase constant (rad/m)
losses
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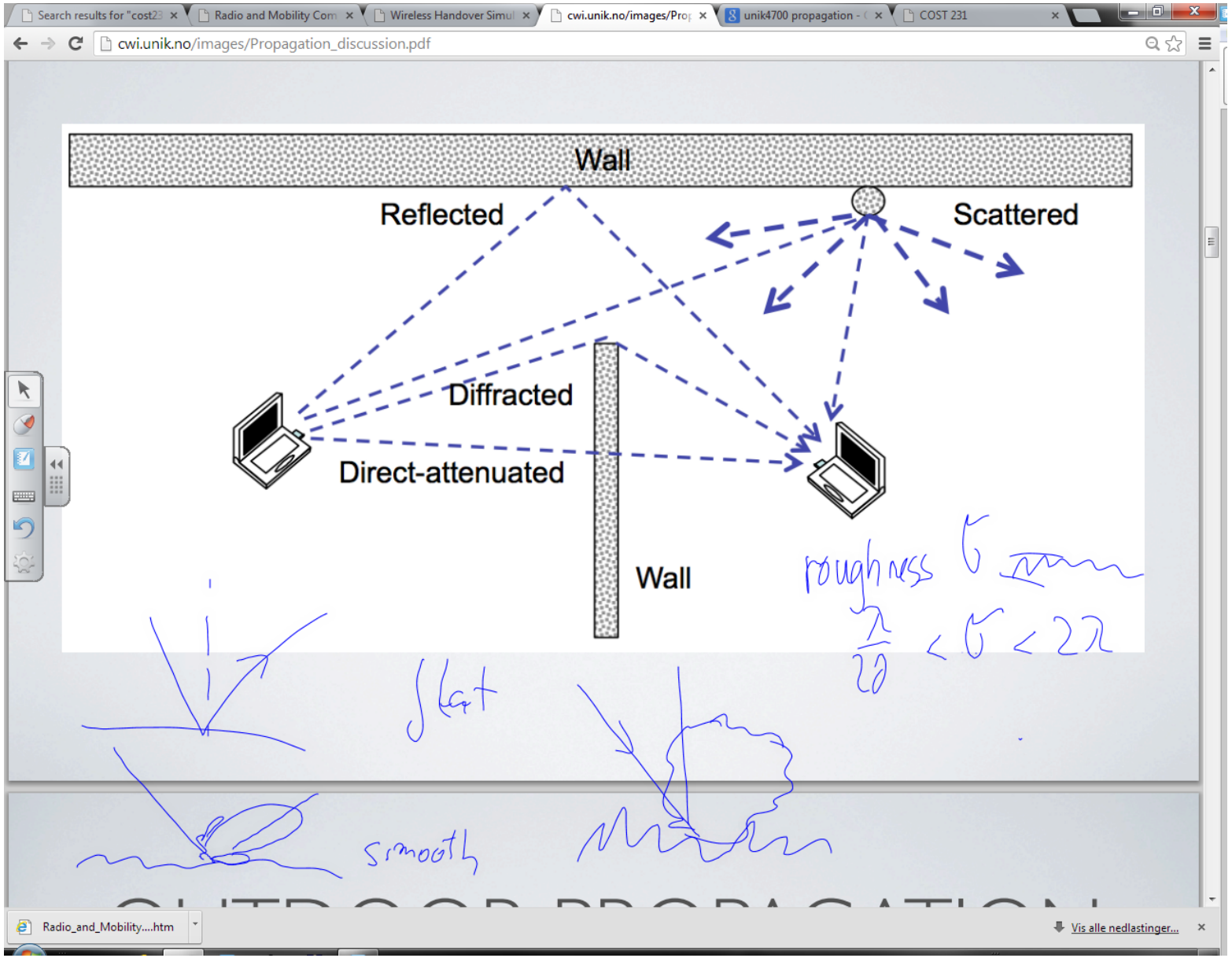
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Wall
Reflected
Scattered
Diffracted
Direct-attenuated
Wall
roughness
flat
smooth
OUTDOOR PROPAGATION
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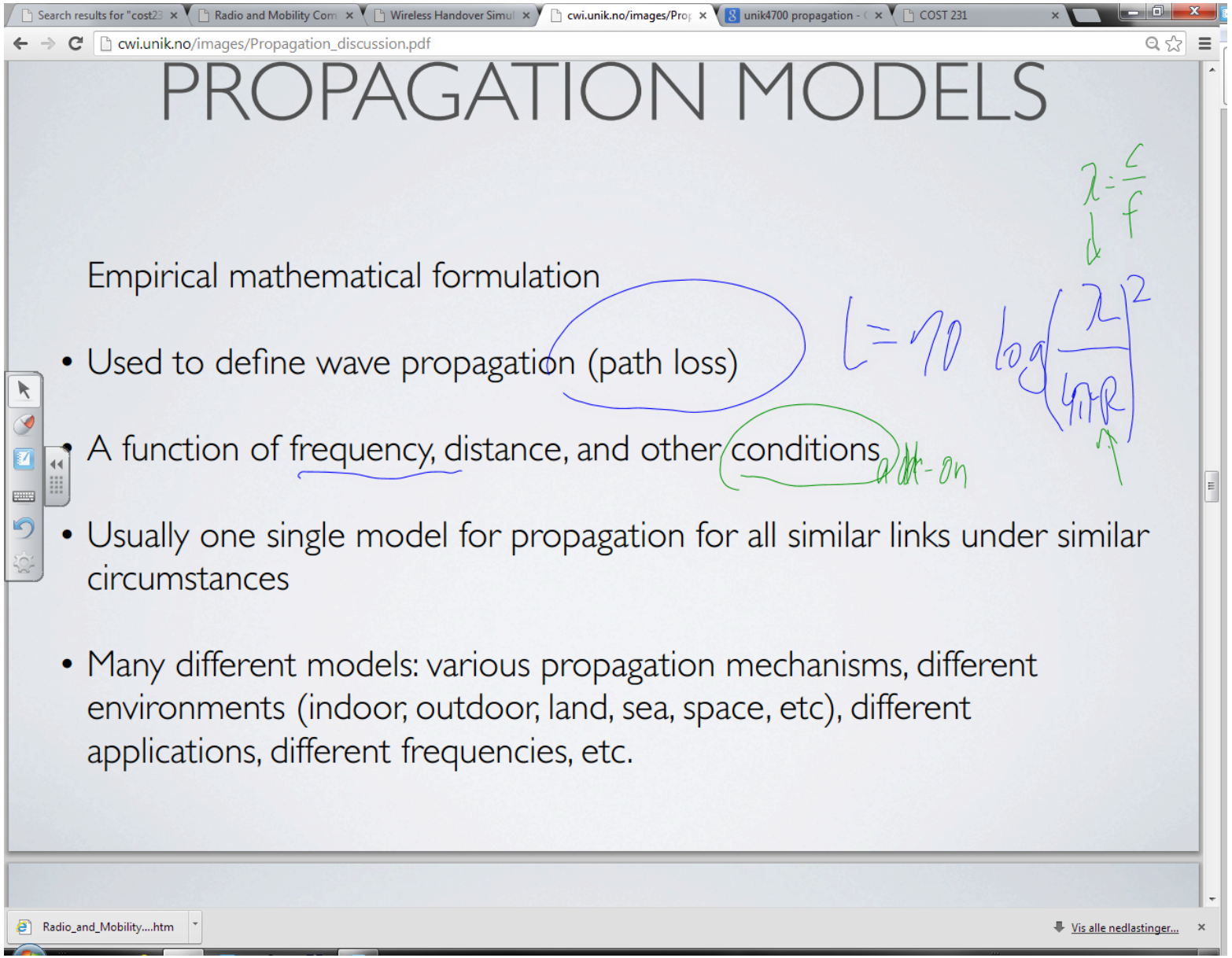
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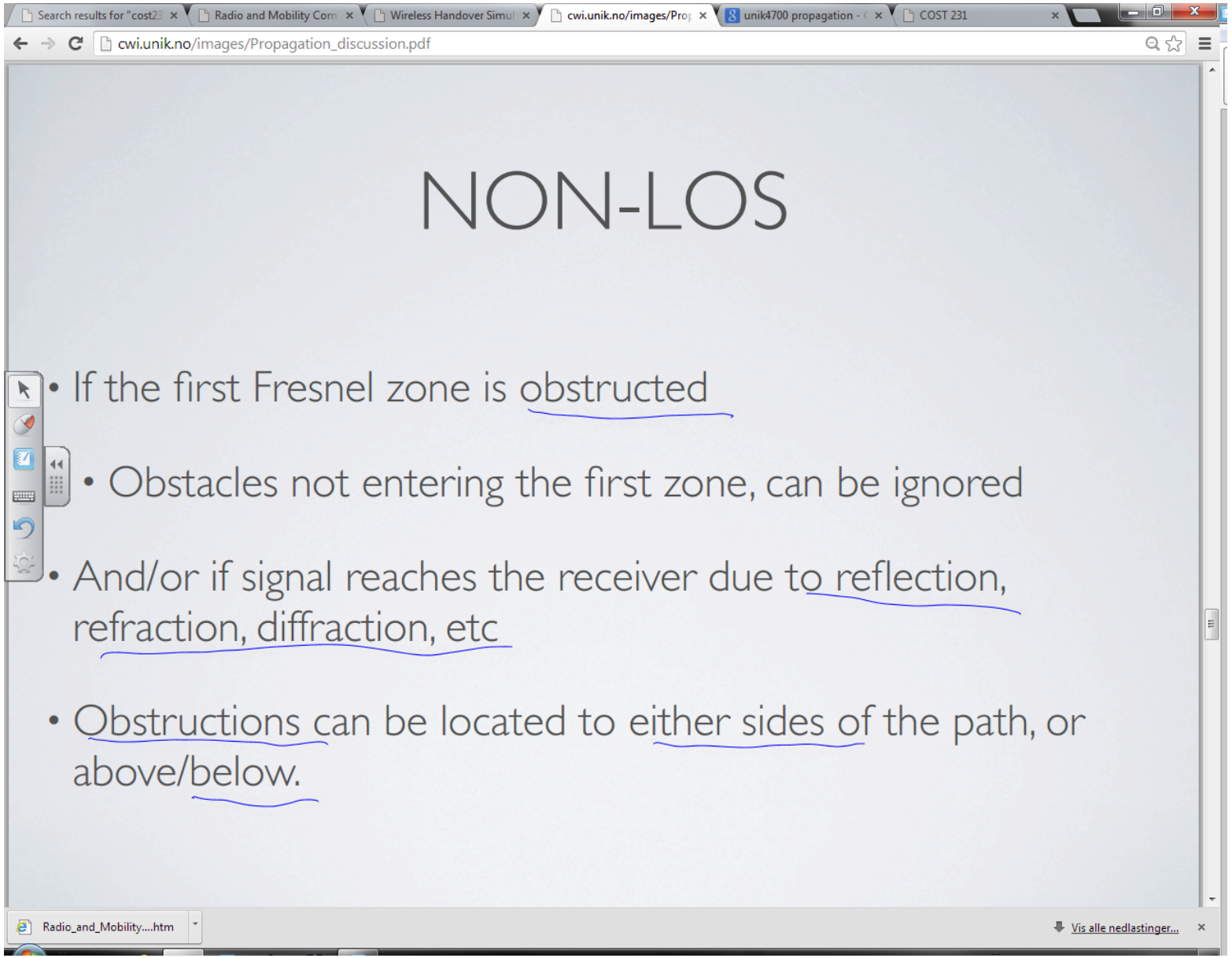
PROPAGATION MODELS
Empirical mathematical formulation
Used to define wave propagation (path loss)
A function of frequency, distance, and other conditions
Usually one single model for propagation for all similar links under similar circumstances
Many different models: various propagation mechanisms, different environments (indoor, outdoor, land, sea, space, etc), different applications, different frequencies, etc.
Radio_and_Mobility....htm
Vis alle nedlastinger...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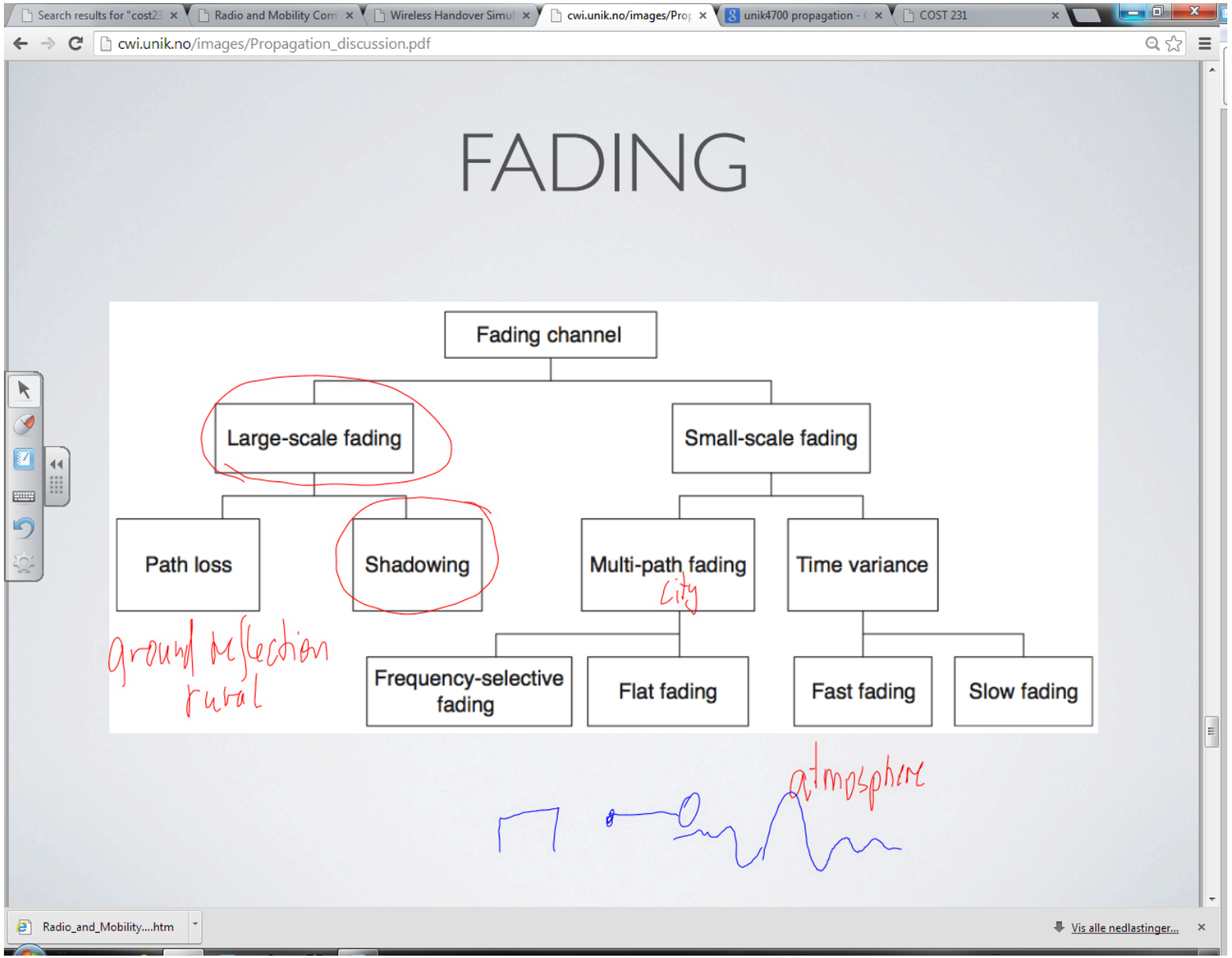
NON-LOS
If the first Fresnel zone is obstructed
Obstacles not entering the first zone, can be ignored
And/or if signal reaches the receiver due to reflection, refraction, diffraction, etc
Obstructions can be located to either sides of the path, or above/below.
Radio_and_Mobility....htm
Vis alle nedlastinger...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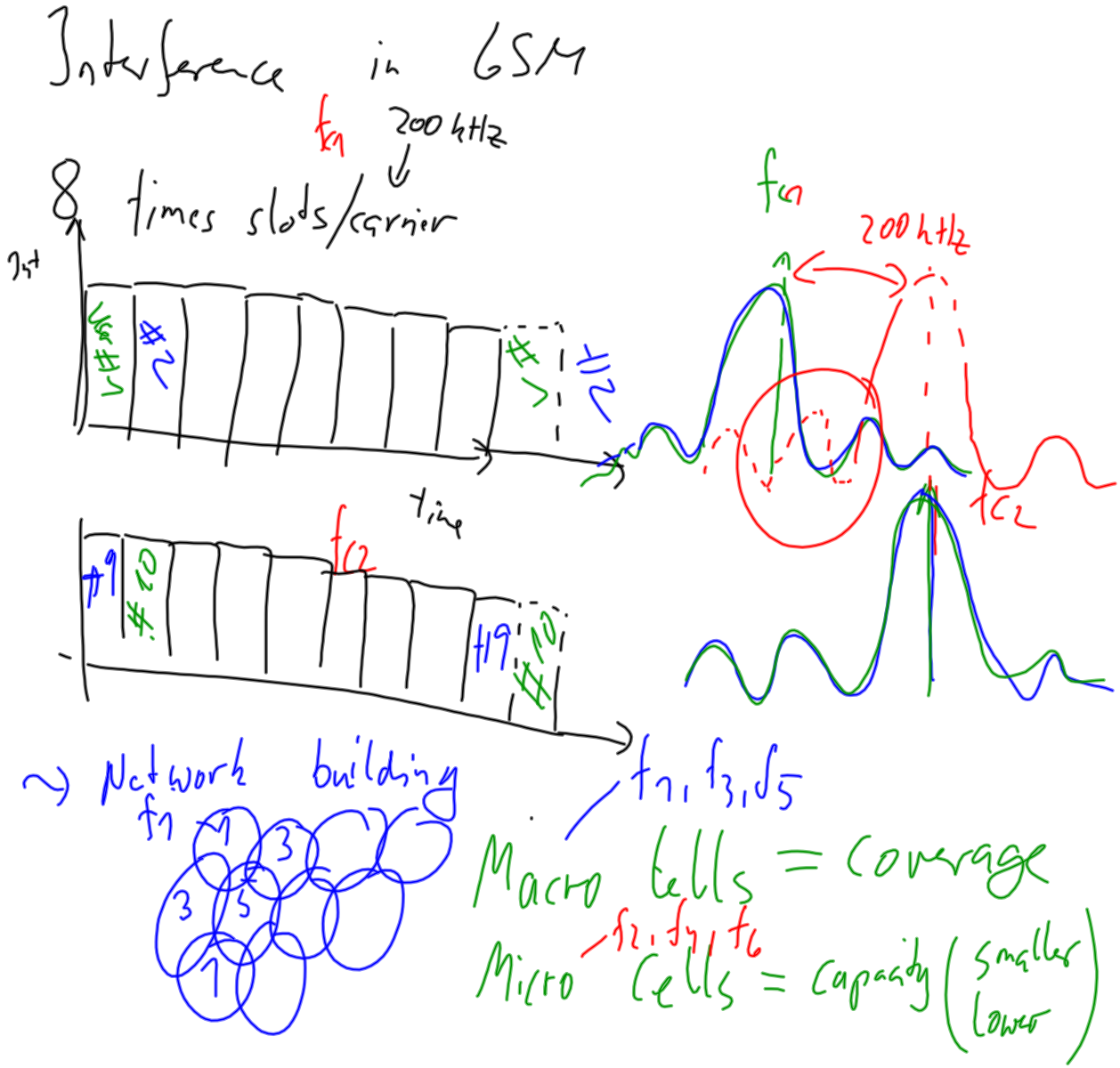
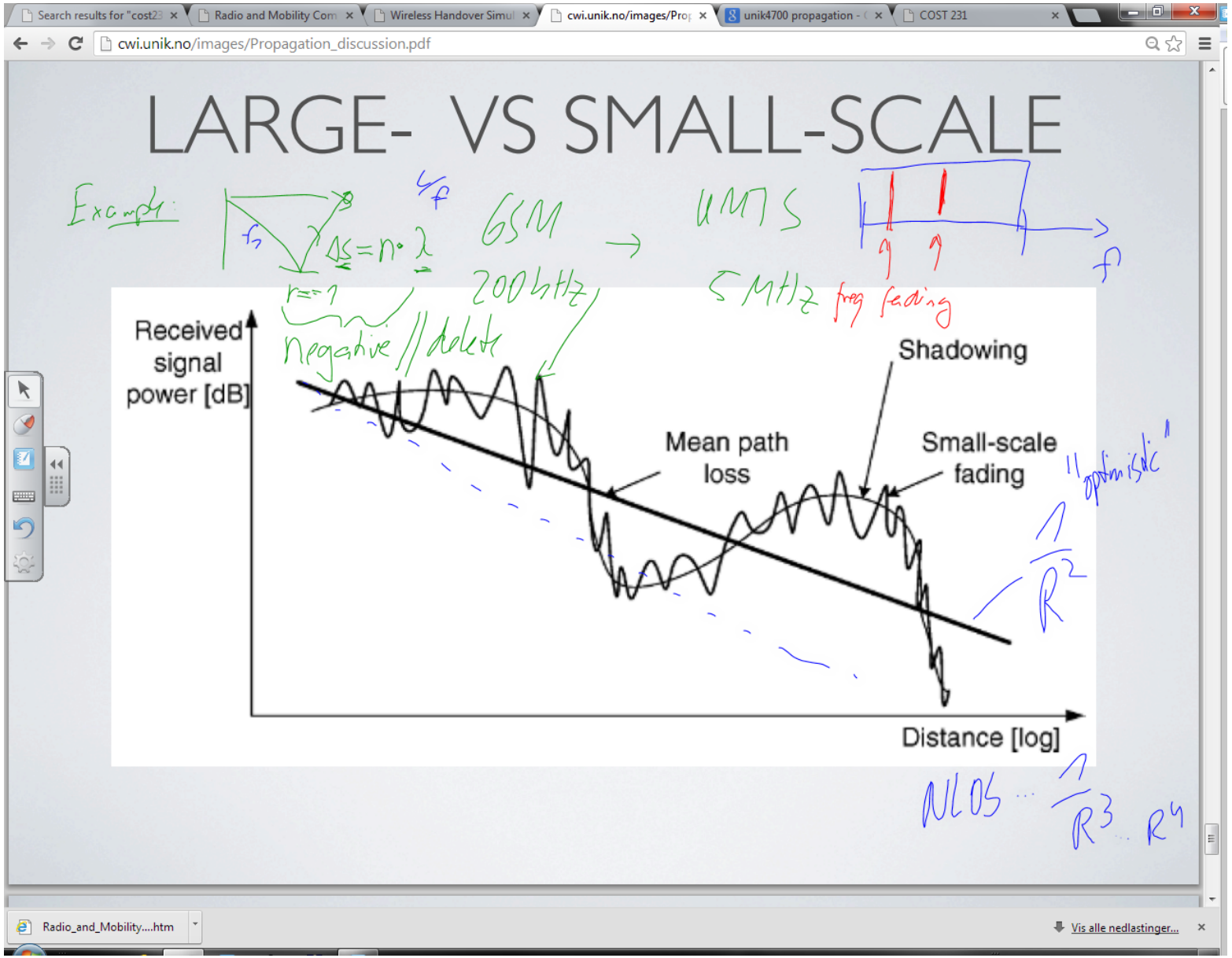
COST 231
cwi.unik.no/images/Propagation_discussion.pdf
FADING
Fading channel
Large-scale fading
Small-scale fading
Path loss
Shadowing
Multi-path fading
Time variance
Frequency-selective fading
Flat fading
Fast fading
Slow fading
ground reflection
rural
city
atmospheric
Radio_and_Mobility....htm
Vis alle nedlastinger...


Interference in GSM
f_{c1}
200 kHz
8 times slots/carrier
Int
User #1
#2
#11
time
f_{c2}
#9
#10
#19
#10
f_{c1}
200 kHz
f_{c2}
→ Network building
f_1
1
3
3
5
1
f_1, f_3, f_5
Macro cells = coverage
f_2, f_4, f_6
Micro Cells = capacity (smaller lower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LARGE- VS SMALL-SCALE
Received signal power [dB]
Shadowing
Mean path loss
Small-scale fading
Distance [log]
GSM
200kHz
UMTS
5MHz
freq fading
Negative // delete
"optimistic"
NLOS
Radio_and_Mobility....htm
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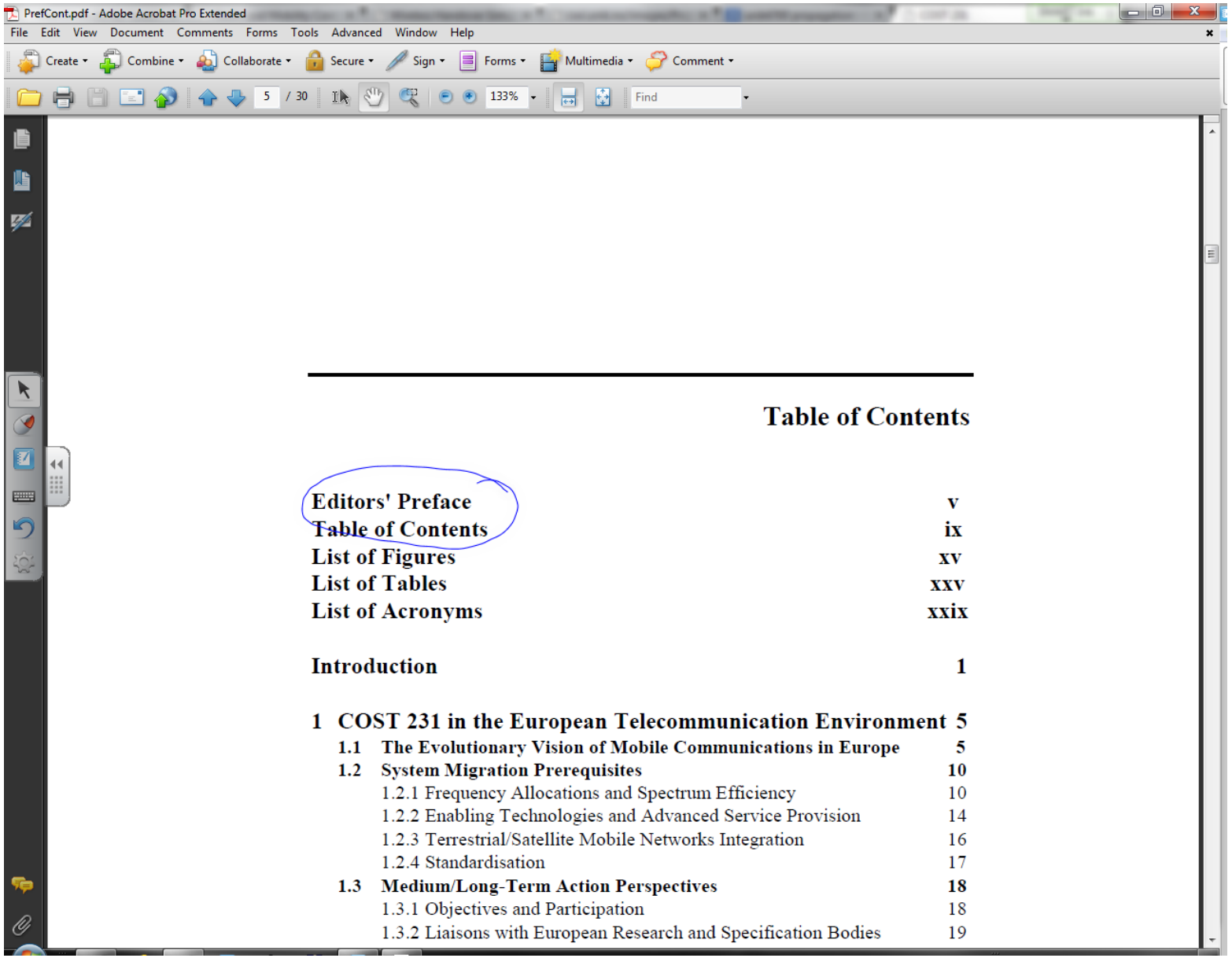
Goal: Better propagation model

- analyse Cost 231 models
- present
- programm
- compare



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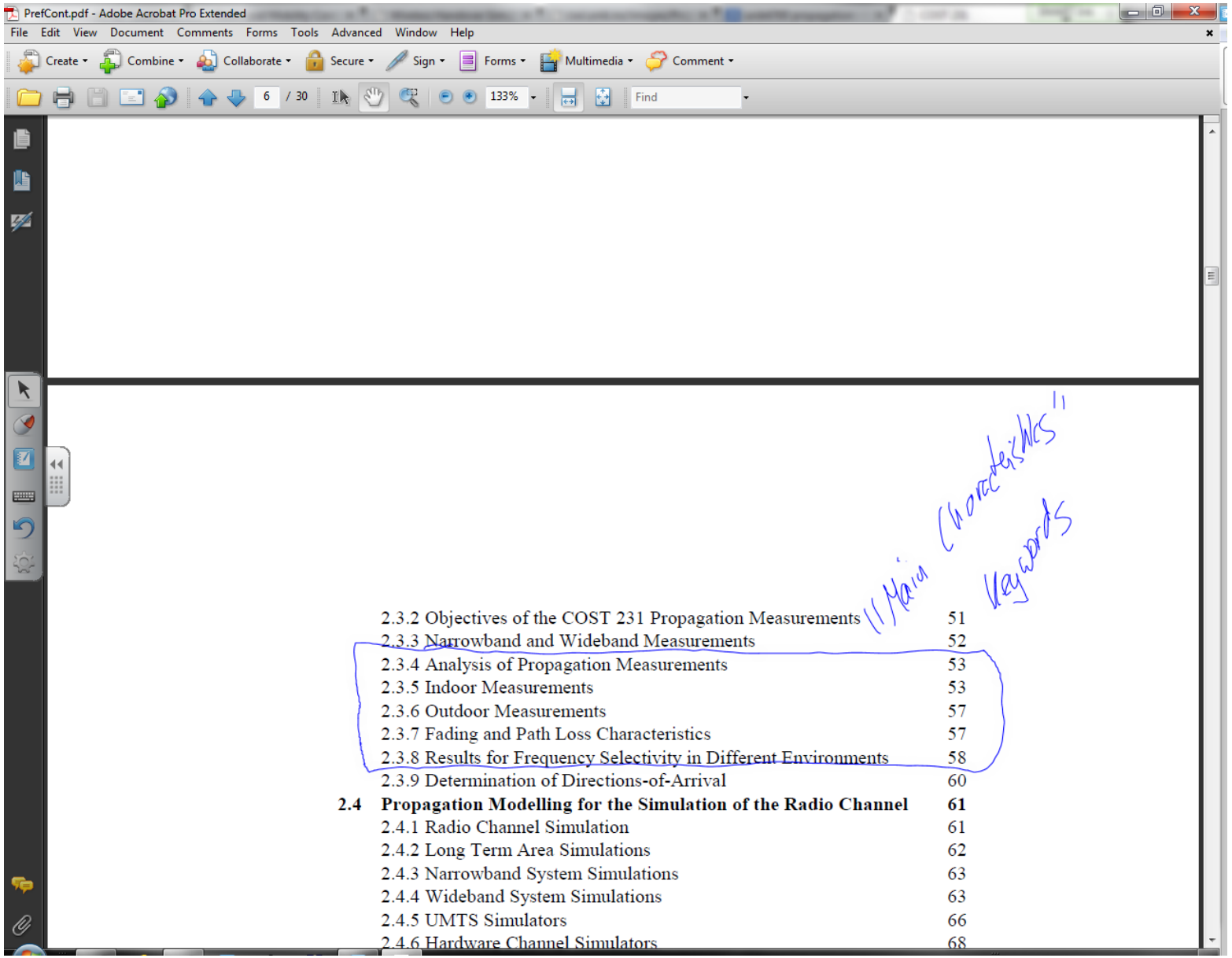
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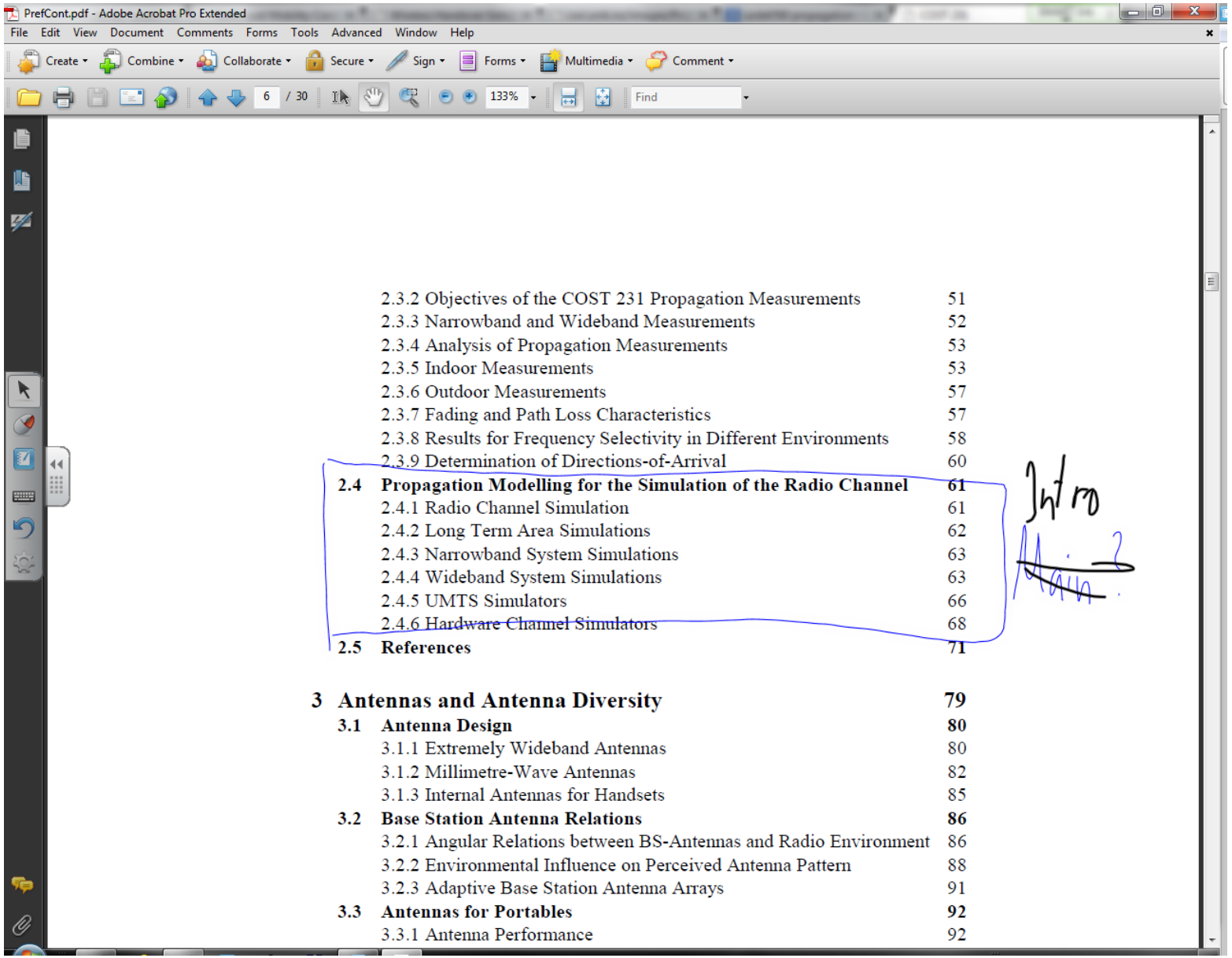
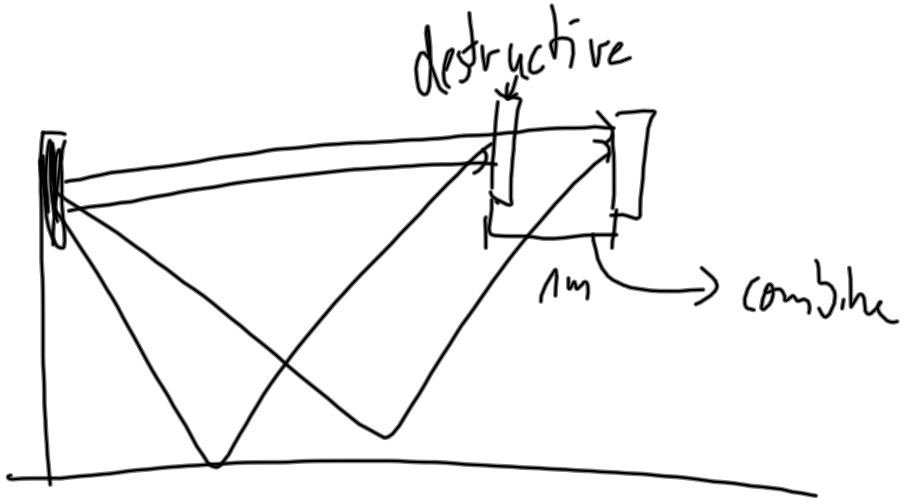
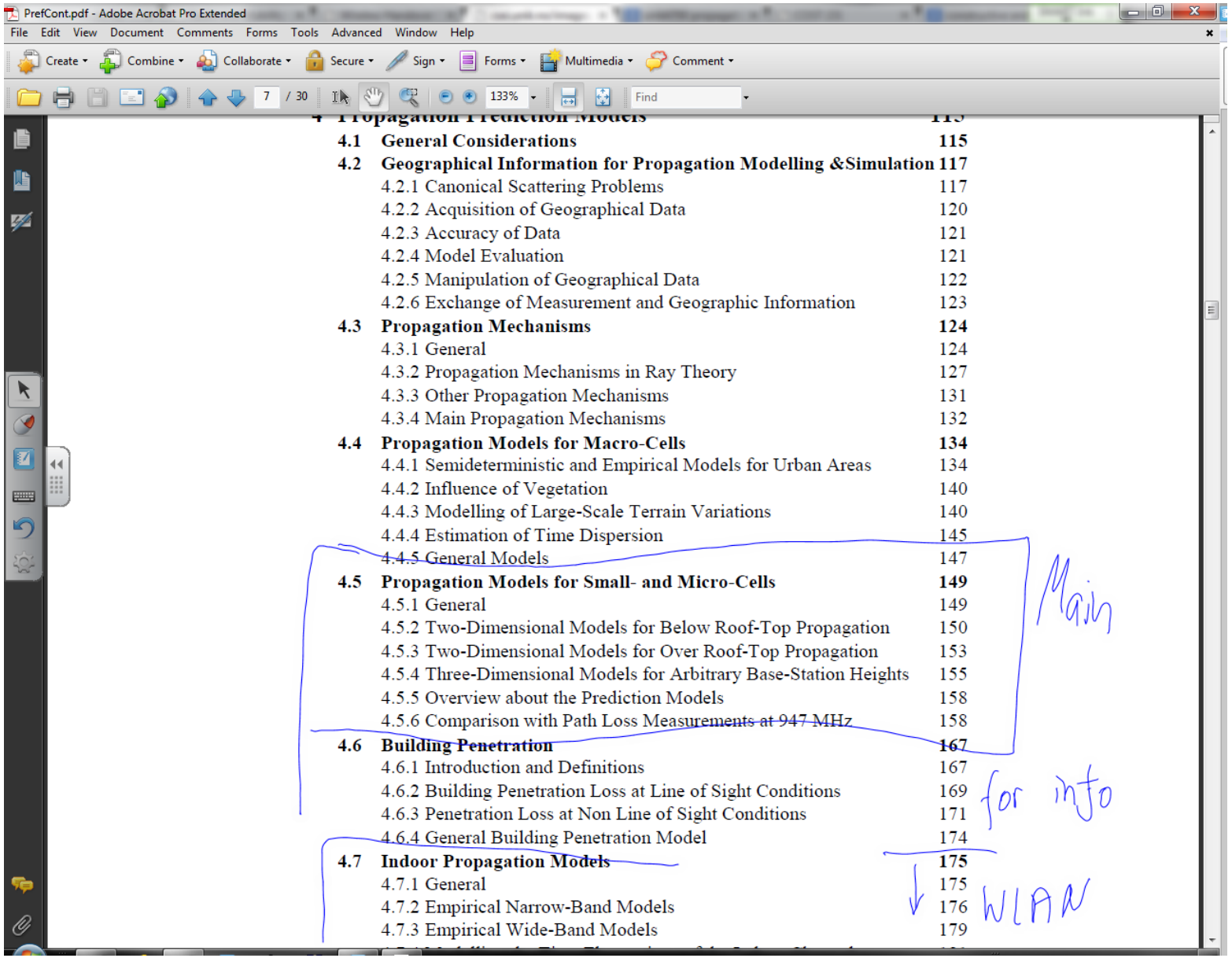


Side remark: Diversity < Space

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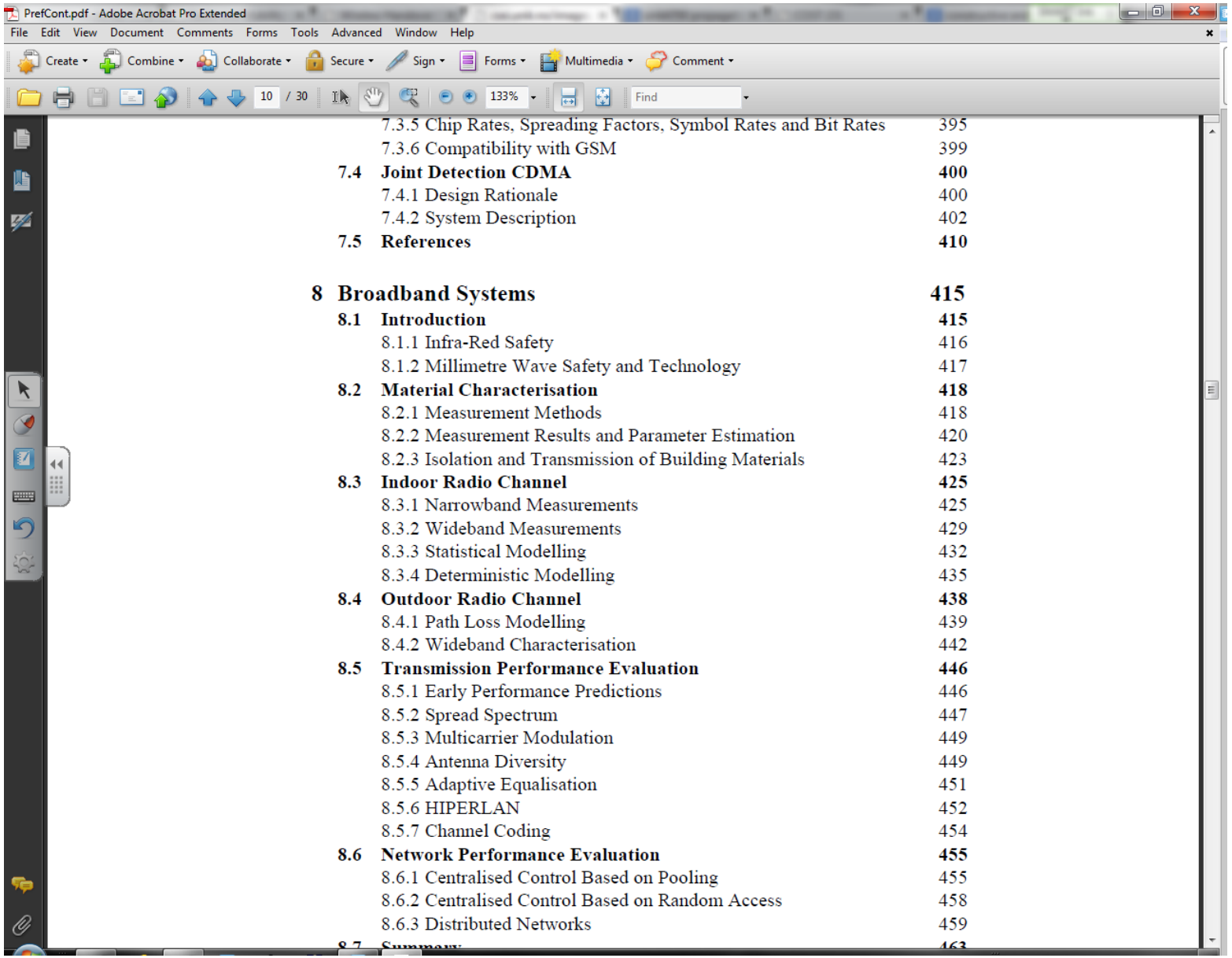

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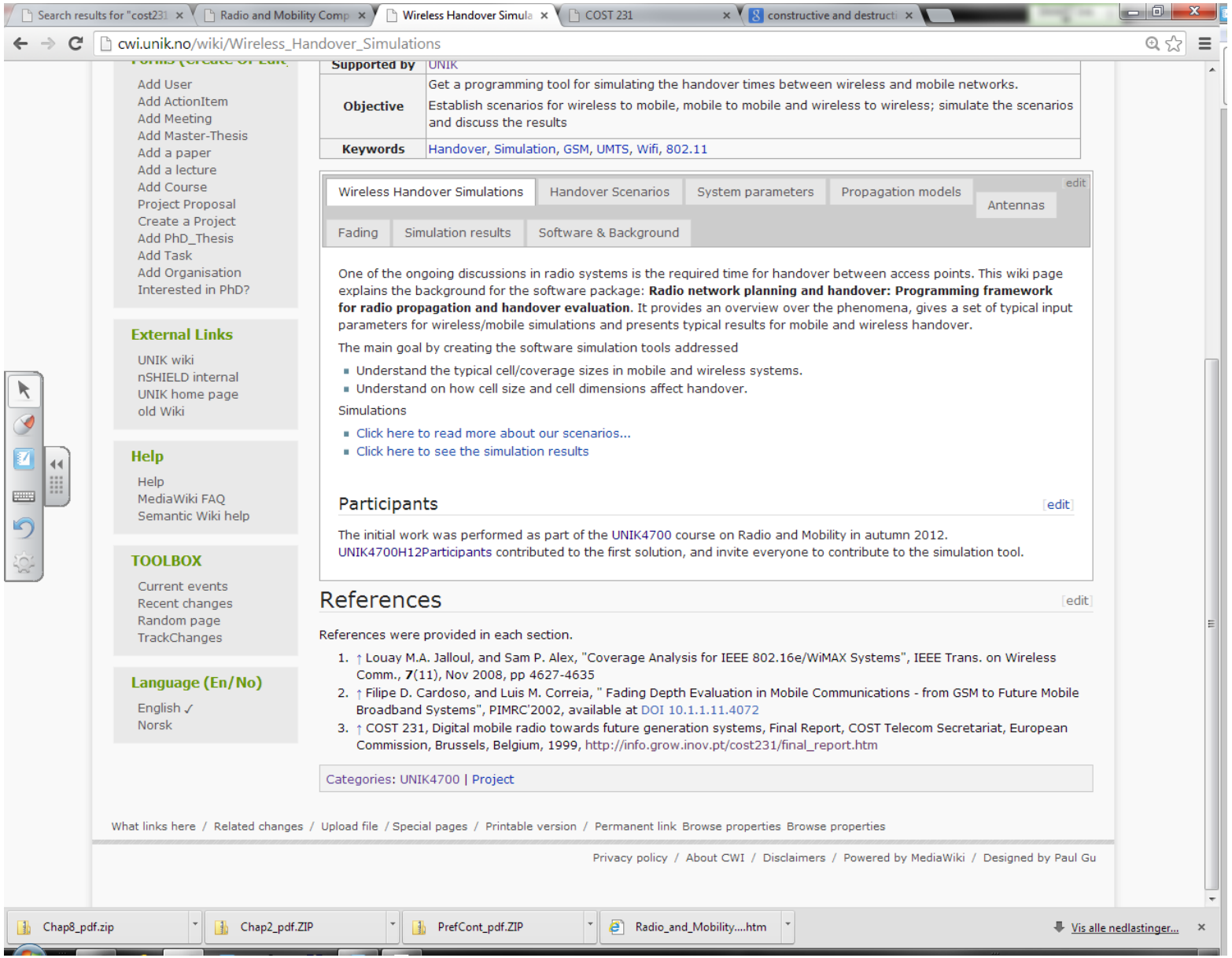
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Objective
Get a programming tool for simulating the handover times between wireless and mobile networks.
Establish scenarios for wireless to mobile, mobile to mobile and wireless to wireless; simulate the scenarios and discuss the results
Keywords
Handover, Simulation, GSM, UMTS, Wifi, 802.11
Wireless Handover Simulations
Handover Scenarios
System parameters
Propagation models
Antennas
Fading
Simulation results
Software & Background
edit
One of the ongoing discussions in radio systems is the required time for handover between access points. This wiki page explains the background for the software package: Radio network planning and handover: Programming framework for radio propagation and handover evaluation. It provides an overview over the phenomena, gives a set of typical input parameters for wireless/mobile simulations and presents typical results for mobile and wireless handover.
The main goal by creating the software simulation tools addressed
Understand the typical cell/coverage sizes in mobile and wireless systems.
Understand on how cell size and cell dimensions affect handover.
Simulations
Click here to read more about our scenarios...
Click here to see the simulation results
Participants
edit
The initial work was performed as part of the UNIK4700 course on Radio and Mobility in autumn 2012.
UNIK4700H12Participants contributed to the first solution, and invite everyone to contribute to the simulation tool.
References
edit
References were provided in each section.
1. ↑ Louay M.A. Jalloul, and Sam P. Alex, "Coverage Analysis for IEEE 802.16e/WiMAX Systems", IEEE Trans. on Wireless Comm., 7(11), Nov 2008, pp 4627-4635
2. ↑ Filipe D. Cardoso, and Luis M. Correia, " Fading Depth Evaluation in Mobile Communications - from GSM to Future Mobile Broadband Systems", PIMRC'2002, available at DOI 10.1.1.11.4072
3. ↑ COST 231, Digital mobile radio towards future generation systems, Final Report, COST Telecom Secretariat, European Commission, Brussels, Belgium, 1999, http://info.grow.inov.pt/cost231/final_report.htm
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Free space Loss → dB

Log rq. [1]

$$L = 20\log\left(\frac{\lambda}{4\pi R}\right) \qquad \lambda = \frac{c}{f}$$

use GHz

$$L^* = 20\log\left(\frac{4\pi}{c}\right) + 20\log f + 20\log R$$

c: 3E8 m/s

f [MHz] (GHz): E9 E6

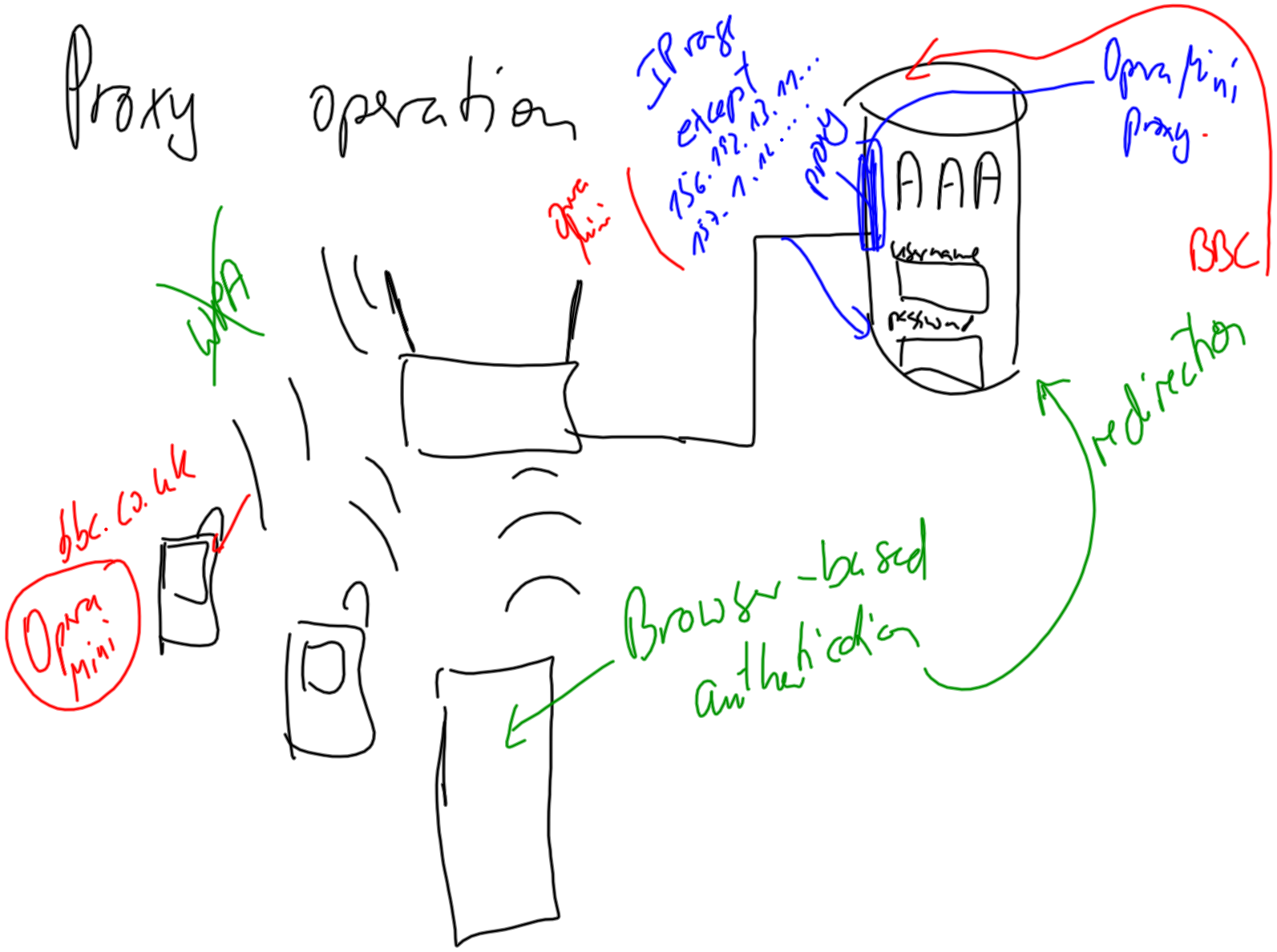
R [km]: E3

$$+ 20\log f\,[\text{MHz}] + 20\log R\,[\text{km}]$$

Table

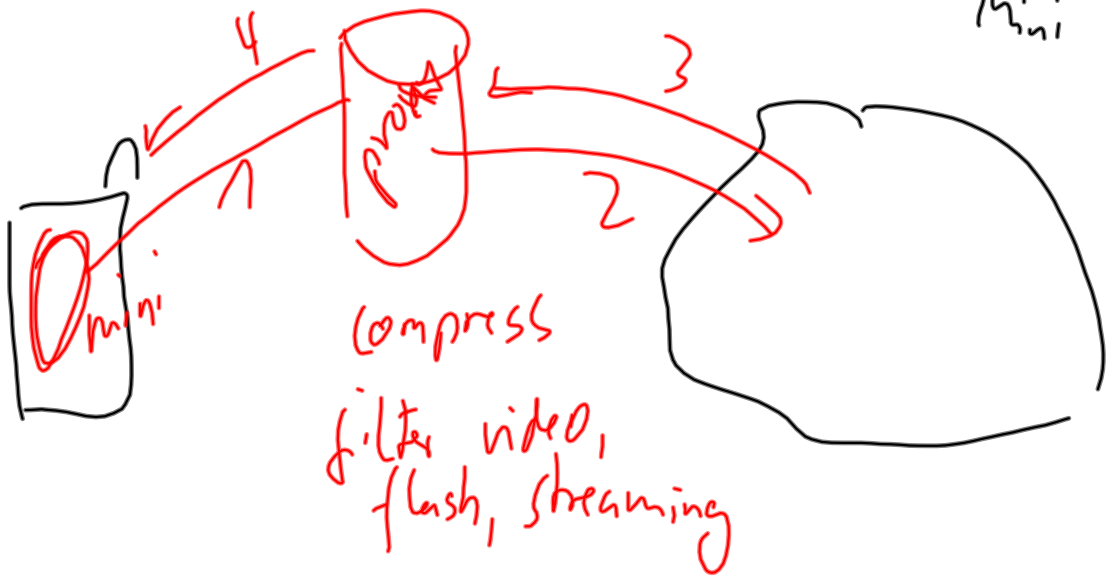
f [GHz]	R [km]	L*
6GHz	0.1	
1	1	
	10	
	100	
4G/5G/Wi-Fi	0.01	
2	0.1	
	1	
	10	
802.11g	0.01	
5	0.1	
	1	

* 231 indoor
231 outdoor


Proxy operation
IP rng except 156.192.13.11... 157.1.1...
Opera Mini
proxy
AAA
Opera Mini Proxy
BBC
WAP
bbc.co.uk
Opera Mini
Browser-based authentication
redirection

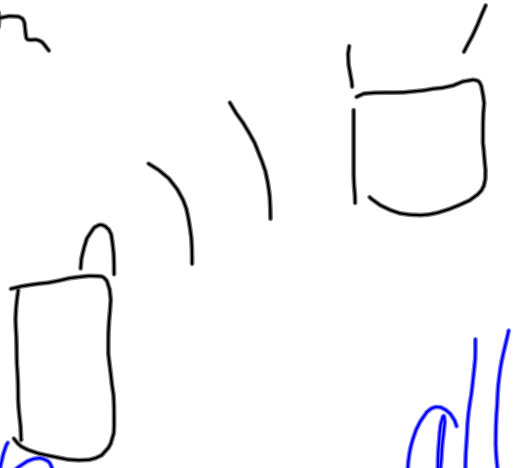
By installing app (Opera Mini)

- associate an IP range for Opera Mini Proxy



- Proxy for 20-30 kbit/s
- Authentication

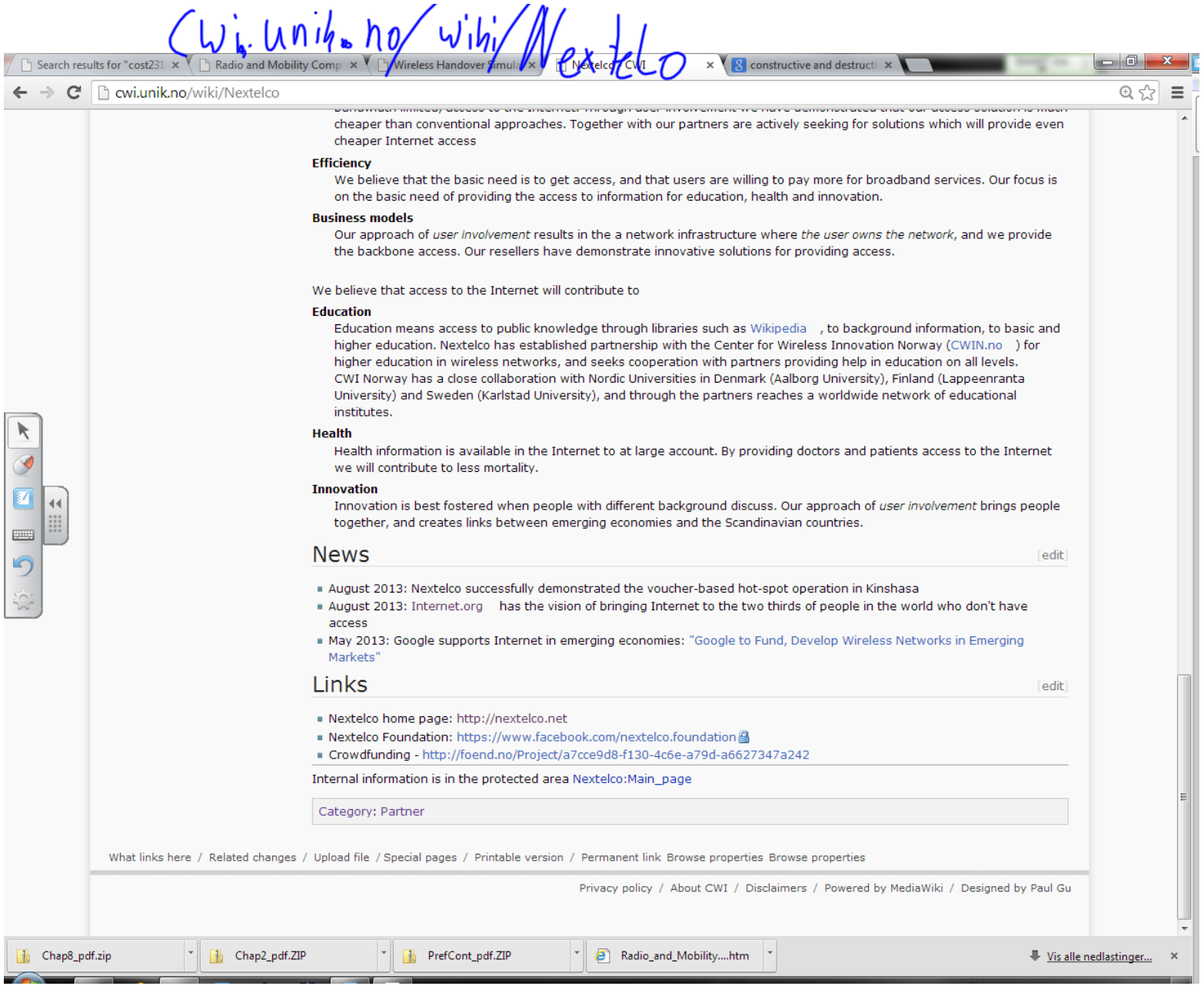
background 10-30 kbit/s free



bandwidth hungry paid

PL, DK, DE, NO

always online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cheaper than conventional approaches. Together with our partners are actively seeking for solutions which will provide even cheaper Internet access
Efficiency
We believe that the basic need is to get access, and that users are willing to pay more for broadband services. Our focus is on the basic need of providing the access to information for education, health and innovation.
Business models
Our approach of user involvement results in the a network infrastructure where the user owns the network, and we provide the backbone access. Our resellers have demonstrate innovative solutions for providing access.
We believe that access to the Internet will contribute to
Education
Education means access to public knowledge through libraries such as Wikipedia , to background information, to basic and higher education. Nextelco has established partnership with the Center for Wireless Innovation Norway (CWIN.no) for higher education in wireless networks, and seeks cooperation with partners providing help in education on all levels. CWI Norway has a close collaboration with Nordic Universities in Denmark (Aalborg University), Finland (Lappeenranta University) and Sweden (Karlstad University), and through the partners reaches a worldwide network of educational institutes.
Health
Health information is available in the Internet to at large account. By providing doctors and patients access to the Internet we will contribute to less mortality.
Innovation
Innovation is best fostered when people with different background discuss. Our approach of user involvement brings people together, and creates links between emerging economies and the Scandinavian countries.
News
[edit]
August 2013: Nextelco successfully demonstrated the voucher-based hot-spot operation in Kinshasa
August 2013: Internet.org has the vision of bringing Internet to the two thirds of people in the world who don't have access
May 2013: Google supports Internet in emerging economies: "Google to Fund, Develop Wireless Networks in Emerging Markets"
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Category: Partner
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