



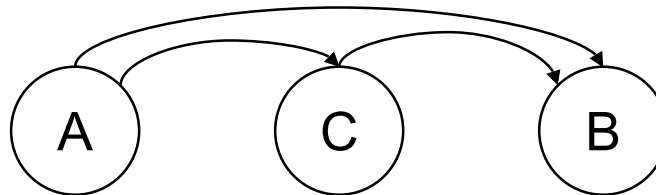
**Relaying –
bad for energy,
good for capacity?**

Daniel Hollos, Martin Kubisch, Seble Mengesha
Holger Karl, Adam Wolisz

Technical University Berlin,
Telecommunications Networks Group

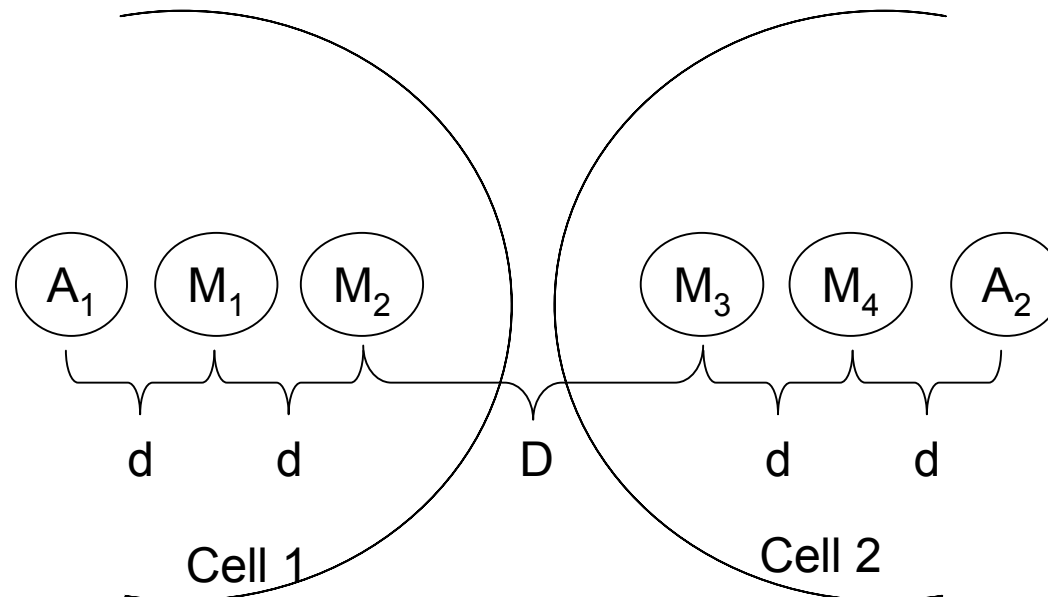


- Using relaying terminals allows lower transmission power



- Should result in lower total energy required to communicate a bit from A to B
- In reality, not so simple: idle power, non-linear behavior of power amplifiers etc. need to be taken into account
 - Hence, direct communication is better more often than computer scientists think
- Goal: When to do relaying/direct - carefully taking hardware, channel properties, PERs, battery behavior ... into account

- Lower transmission power also results in lower interference
- Lower interference gives better PERs
- But: relaying terminal has own traffic to transmit!?



- Way out: lower interference allows relay terminal to use “faster” modulation
 - Handle own and relayed traffic at acceptable error rate
- Carefully tuning transmission power and modulation -> relaying can dramatically improve capacity
 - Capacity: amount of correct data going via an access point
 - Assumptions: HiperLAN/2 channel model, TDMA
- Goal: Find optimal choices for modulation / power, decide about relaying
- What if “optimal” modulation data rate does not exist?
 - Could switching between existing bit rates provide similar behavior?

- Uplink capacity gain for path loss coefficient $\alpha = 3$
(larger means relaying is better)

