

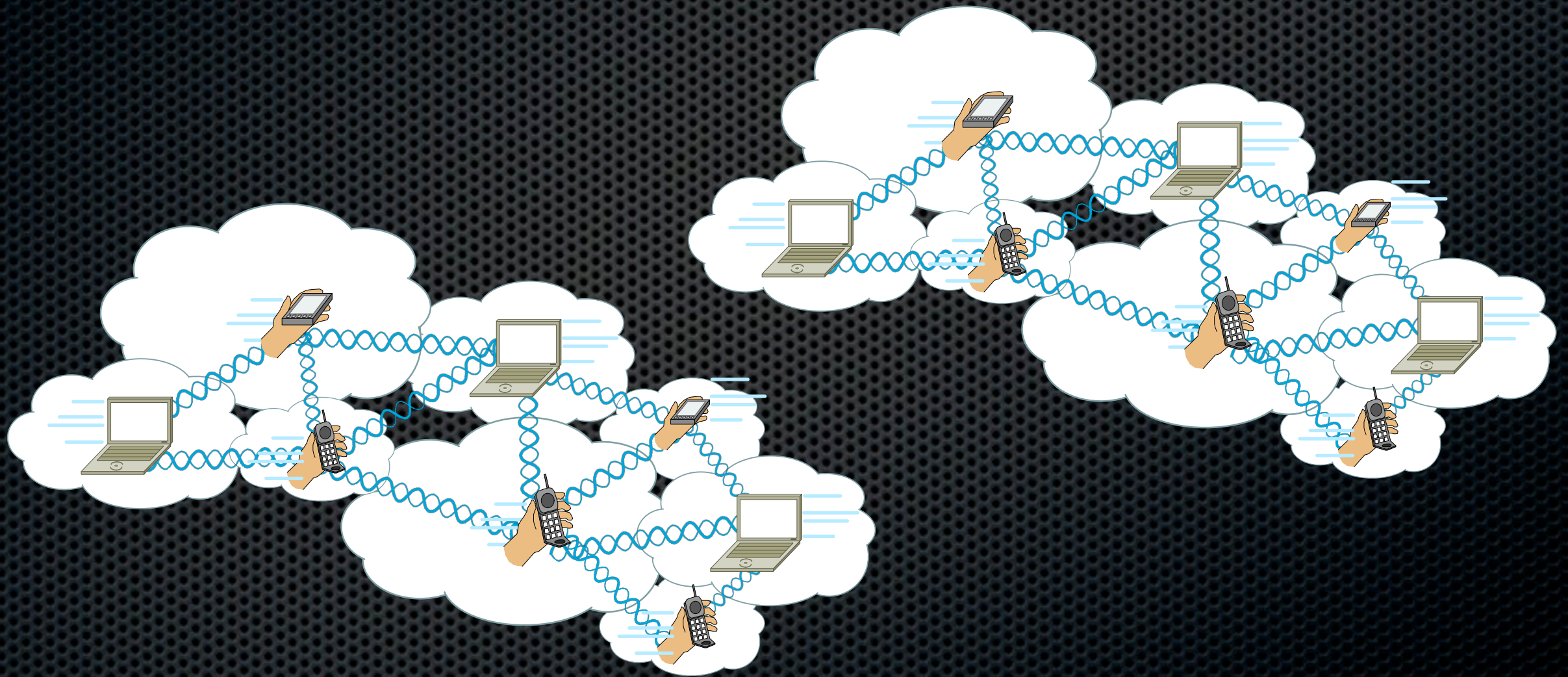
Volatility of Communication Edges to construct Robust Trusted Spanning Forests

Optimisation Techniques for Computer Science

Apivadee Piyatumrong <apivadee.piyatumrong@uni.lu>

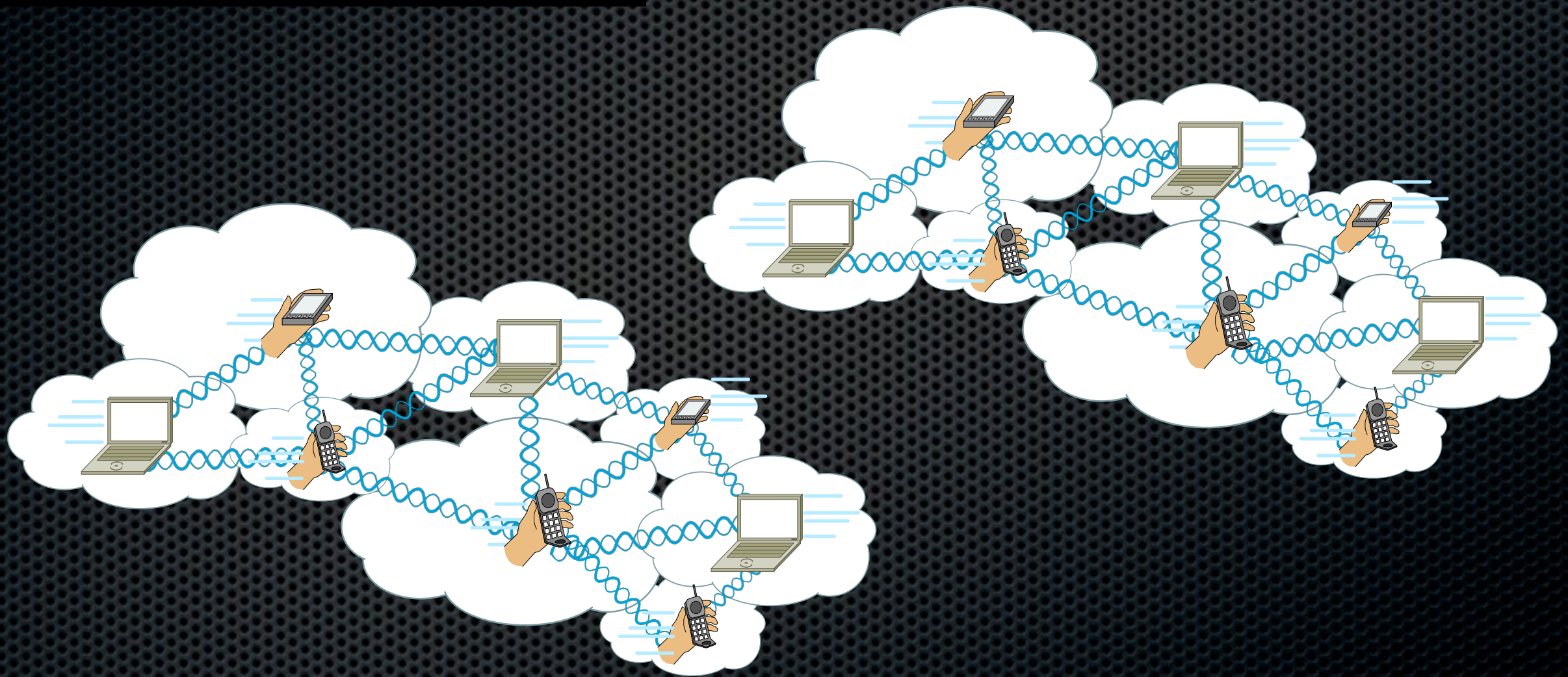
Guillaume-Jean Herbiet <guillaume.herbiet@uni.lu>

Delay Tolerant MANETs - DTMs



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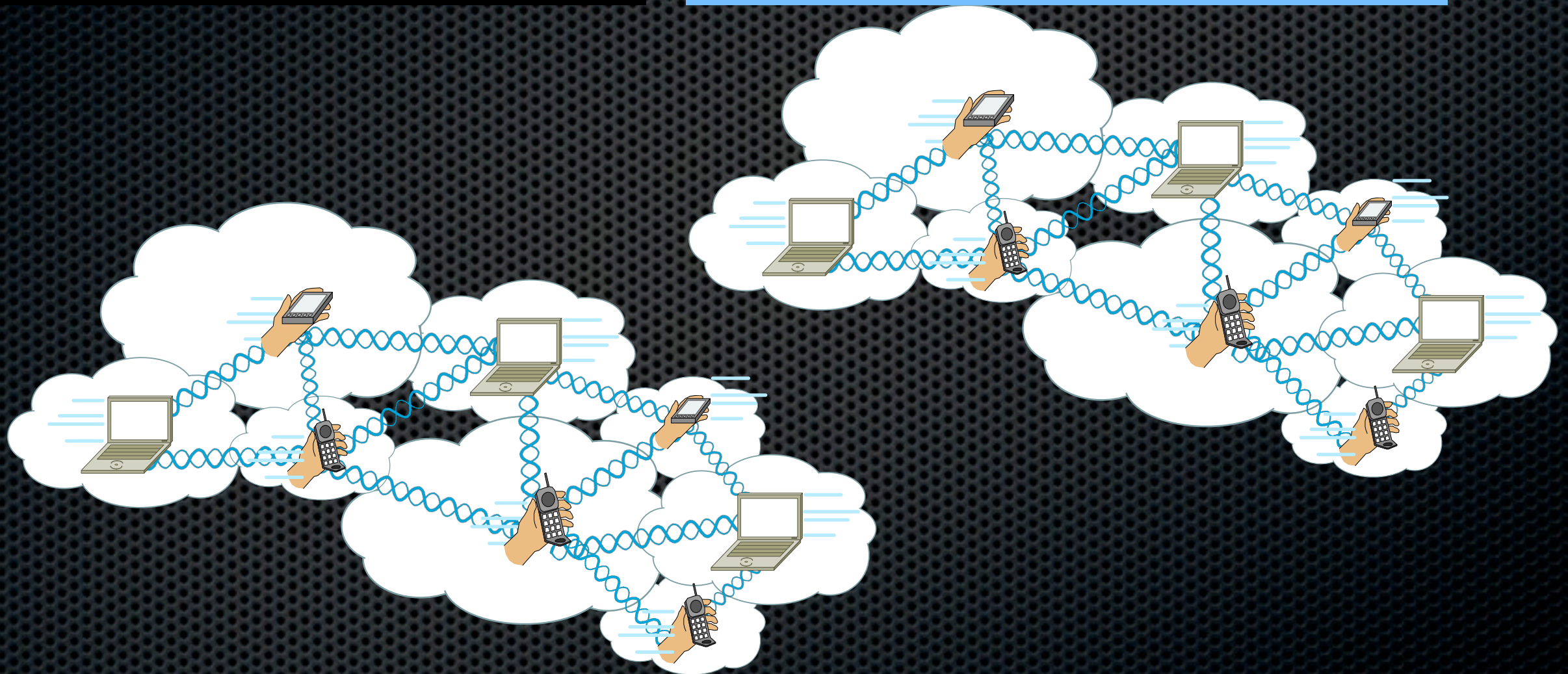
What people want?



Delay Tolerant MANETs - DTMs

What people want?

Efficient communication

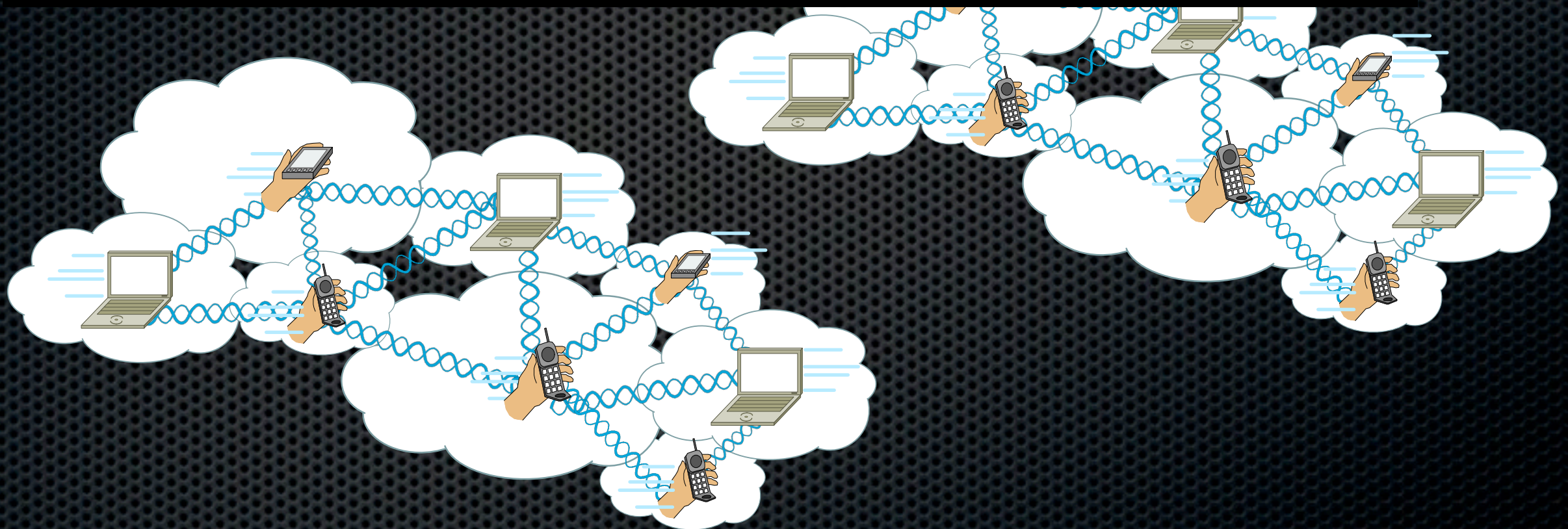


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But it is dynamic and has partitioned nature?



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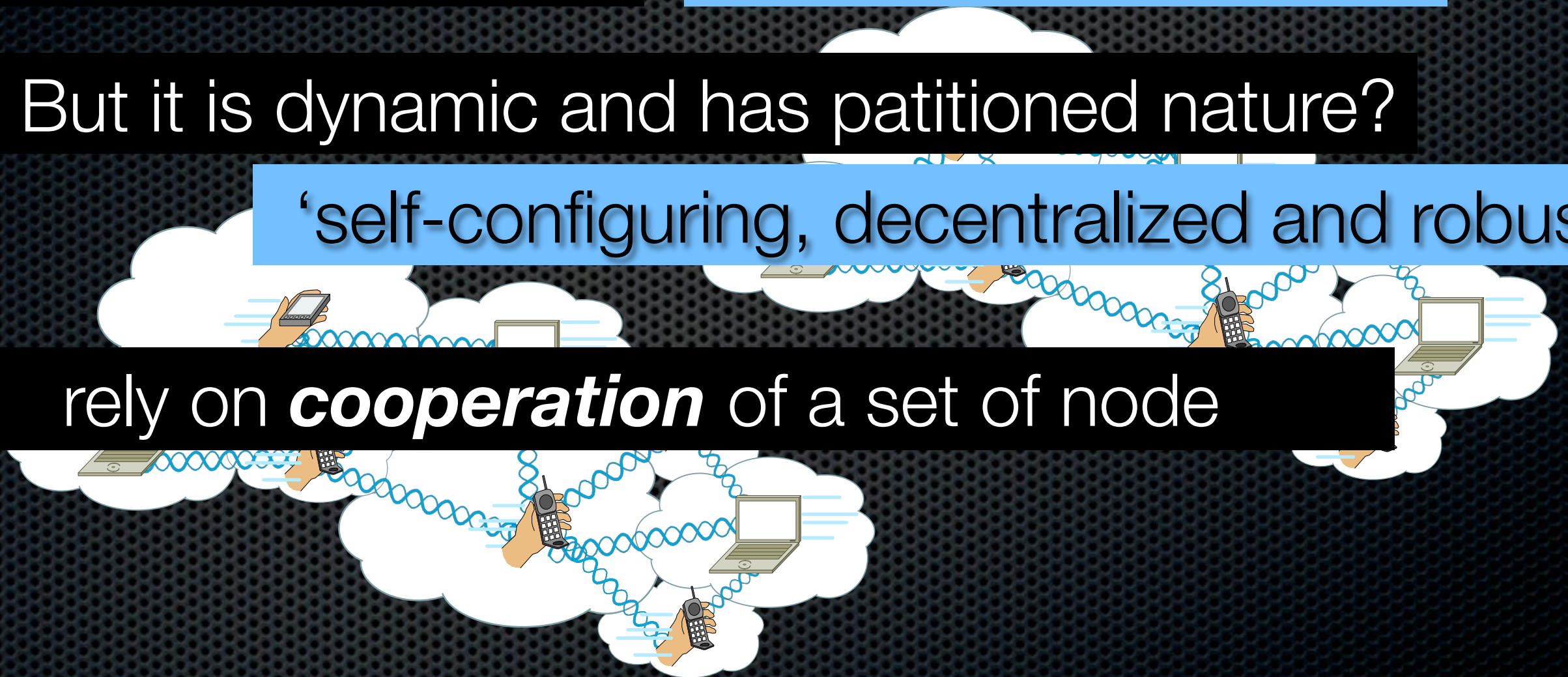
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rely on **cooperation** of a set of node



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‘self-configuring, decentralized and robust’

rely on **cooperation** of a set of node

cooperative enforcement approaches

- enhance the robustness,
- the availability
- the overall throughput

Robust Trusted Spanning Forest

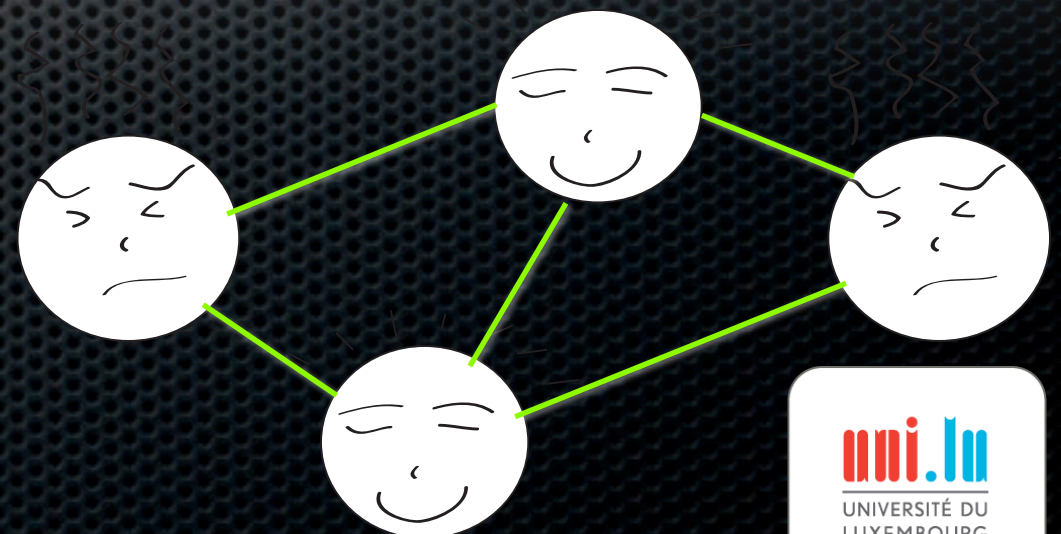
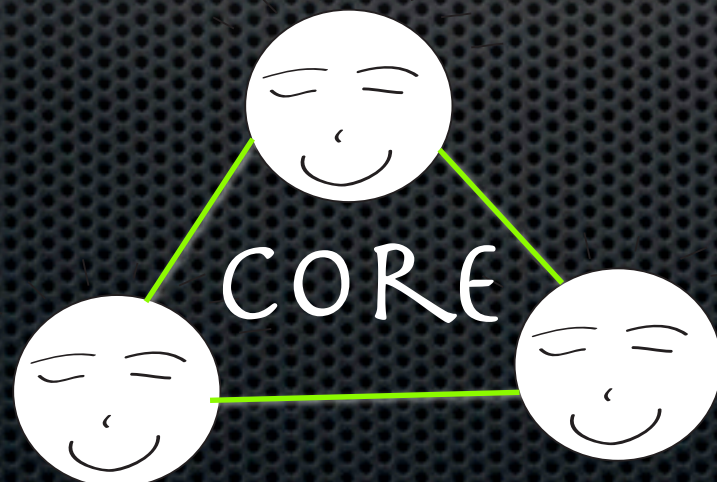
- 'Trust' and 'Reputation value' --> the cooperative level
- trust information --> strengthen the spanning forest within a DTM

How robust trusted spanning trees can be created ?

◎G-TRUST

◎G-TRUST BREAK

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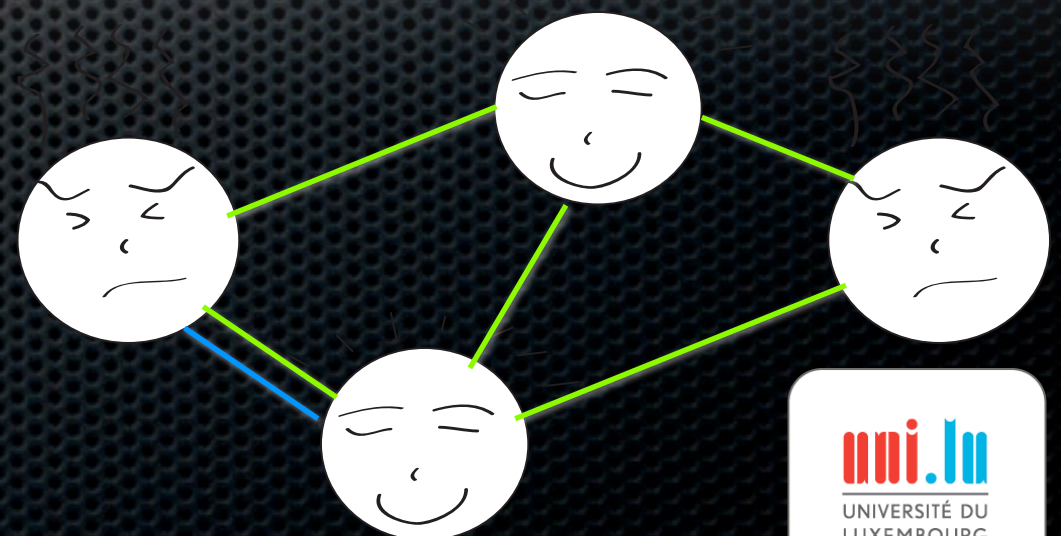
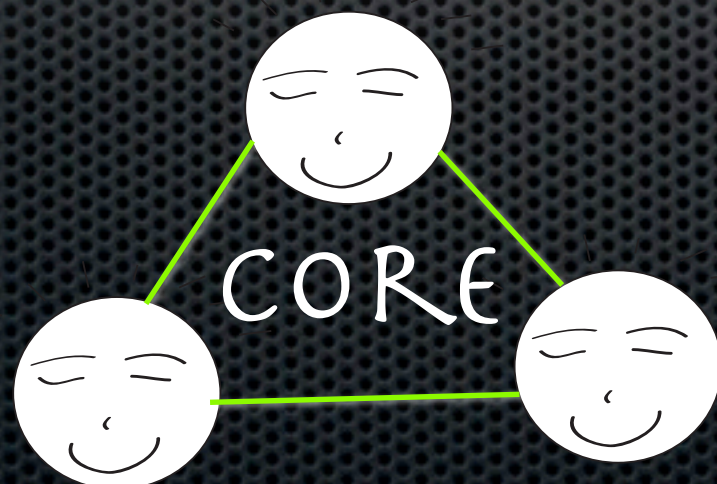
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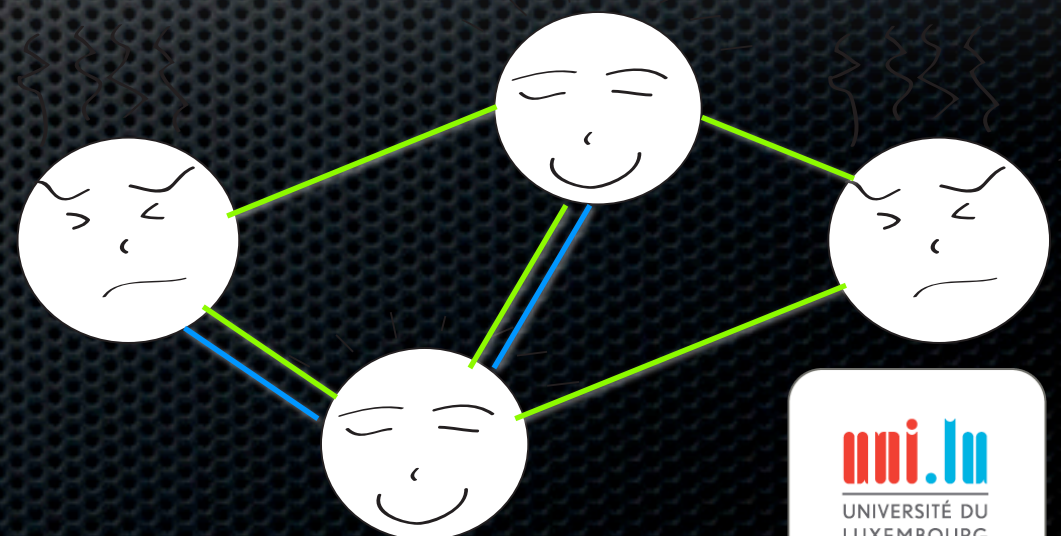
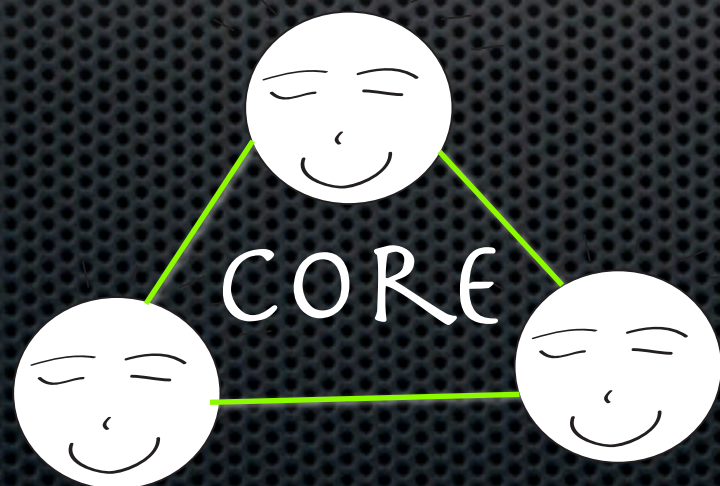
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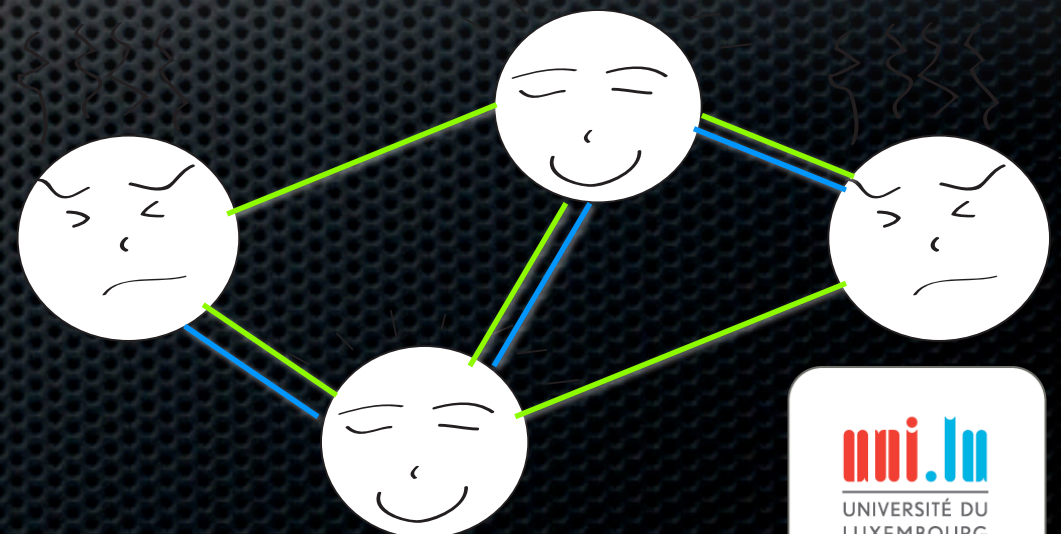
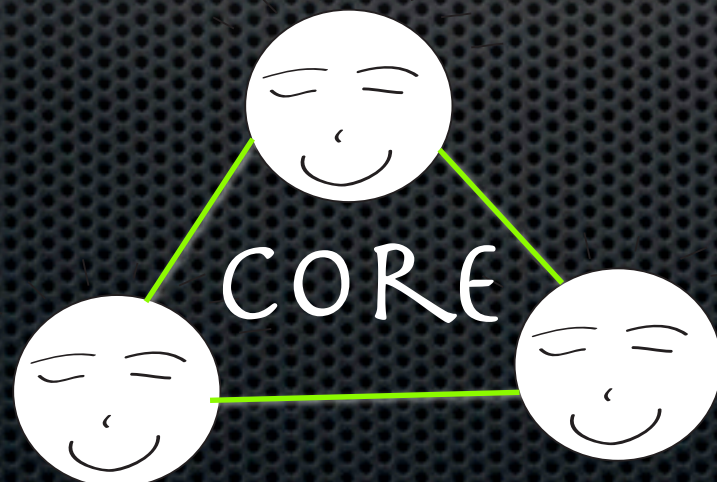
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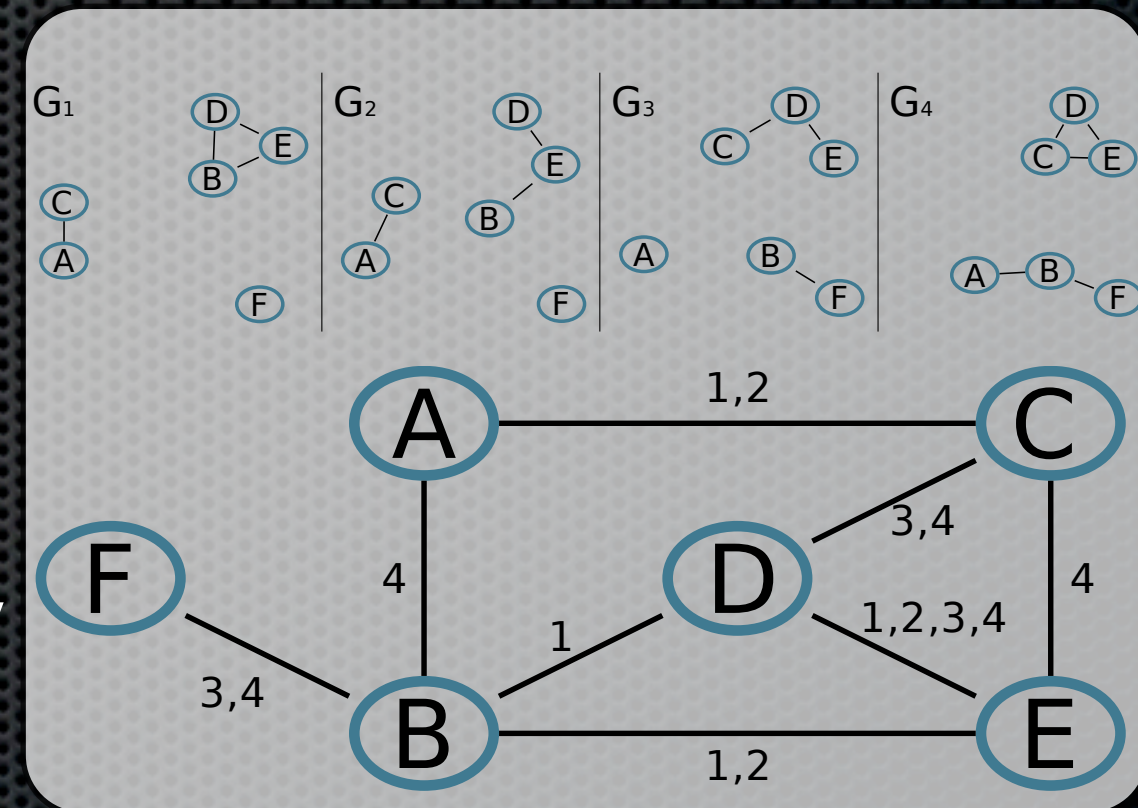
Mobility models

- ✦ Simple but unrealistic **synthetic models** (e.g. Random Waypoint)
- ✦ More realistic models should take into account
 - ✦ **laws of physic** (speed/direction change),
 - ✦ the **environment** (constrain movement to streets)
 - ✦ **social behavior** of user (habits, interests, etc.)
- ✦ Trace-based models

Mobility + radio propagation lead to dynamic topology

Dynamic graphs and associated metrics

- **Dynamic graphs** are required to represent MANETs and DTMS
 - Allows to study the dynamics of a network with new metrics¹
 - Cumulated age
 - Volatility
 - Renewal rate
- Conditioned by mobility pattern of nodes



A dynamic graph represented as an evolute graph

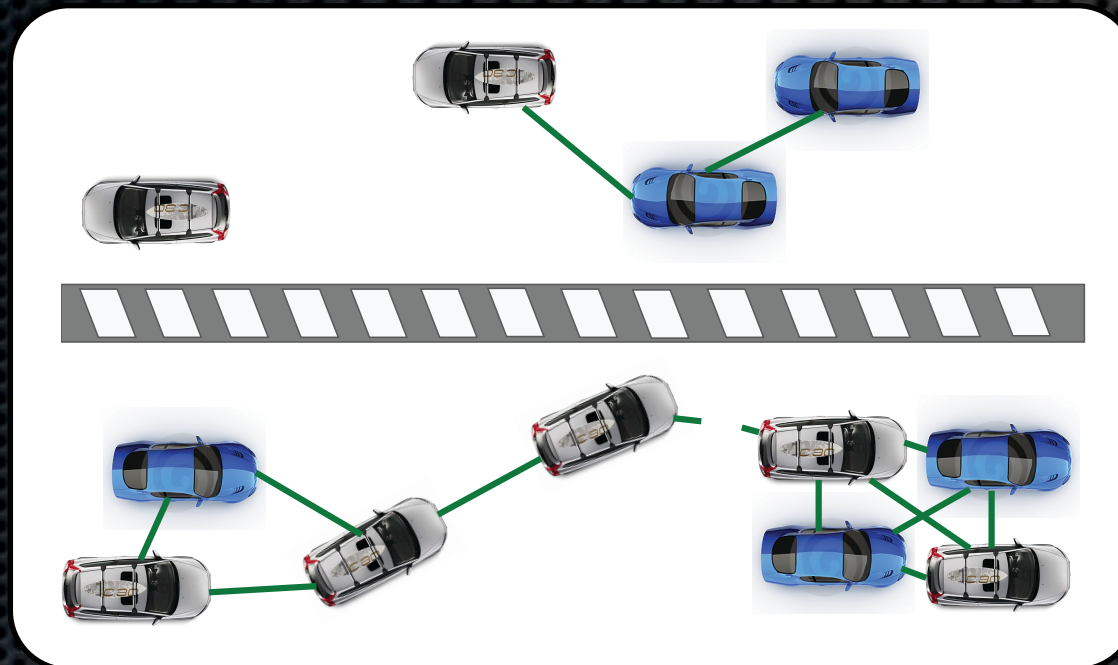
Many possible definitions for link stability²

¹ Yoann Pigné. *Modélisation et Traitement Décentralisé des Graphes Dynamiques - Application Aux Réseaux Mobiles Ad Hoc*. PhD thesis, L'Université du Havre, December 2008

² Adrian Andronache. *HyWerCs: A Middleware for Backbone Assisted Mobile Ad hoc Networks*. PhD thesis, University of Luxembourg, September 2008.

Project objectives

- ✦ Study the volatility characteristic over the communication edge based on two mobility models: 'Highway' and 'Shopping Mall'



- ✦ Find a stability threshold value of each specified mobility model to optimize the robustness of the constructed trusted spanning forest.

Prerequisites

- ✦ JAVA programming
 - ✦ Basic background in algorithmic
 - ✦ Basic background in graph theory
 - ✦ Basic background in networking
-
- ✦ Project requires use of a network simulator and/or graph simulator:
 - ✦ Tool usage will be taught during project

Contacts



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