Optimized resource allocation in MANETs

Optimal allocation of network resources across all degrees of freedom: bandwidth, power, rate, antennas, and end-to-end routes.

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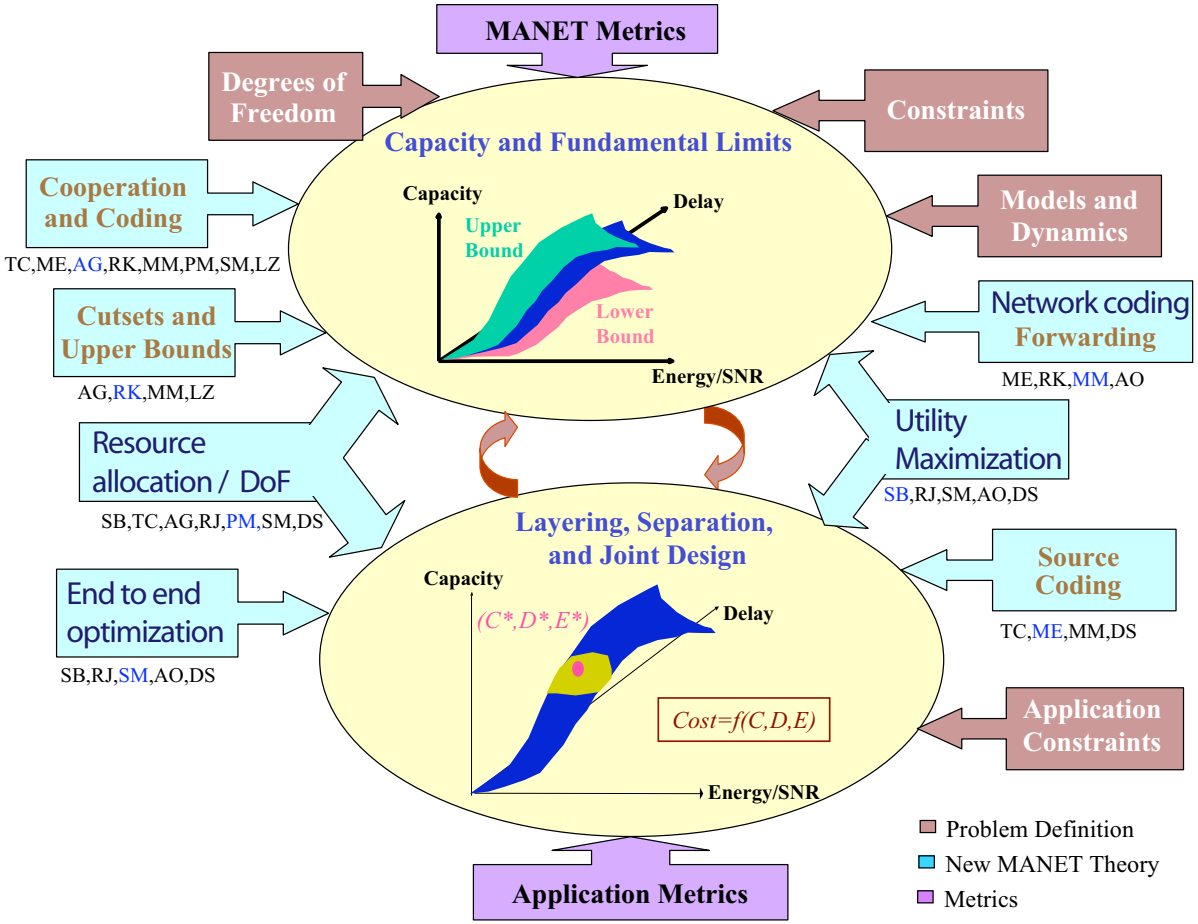
Goldsmith (Stanford)
Johari (Stanford)

Coleman (UIUC)
Koetter (UIUC)
Meyn (UIUC)
Moulin (UIUC)

Asu Ozdgalar (MIT)
Devavrat Shah (MIT)
Medard (MIT)



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Collaborations underway ...

Relaxation techniques for network coding
Decentralized routing and resource allocation
Adaptive tuning of algorithms for coding and resource allocation

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Relaxation techniques for network coding
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Adaptive tuning of algorithms for coding and resource allocation

This thrust is strongly embedded in all others!

Stochastic Stability Under Fair Bandwidth Allocation:

General File Size Distribution

Devavrat Shah (MIT)

Issues: Network modeled as a graph $G = (\mathcal{V}, \mathcal{J}, C, \mathcal{I})$

Multiple flows in a stochastic model

Subject to capacity and topological constraints

How to allocate rates in decentralized setting?

Stochastic Stability Under Fair Bandwidth Allocation: *General File Size Distribution*

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Recent progress: Distributed solution obtained under very general conditions through *monotropic program*

Flexibility of solution allows application in many domains

Finding the Best Allocation Algorithm

A. Eryilmaz and A. Ozdgalar (MIT) S. Meyn (UIUC)

Issues: Utility based allocation algorithms and related MaxWeight policies are 'parameterized' by a surrogate value function

How to tune policy based on on-line data?

Recent progress: Project initiated recently.

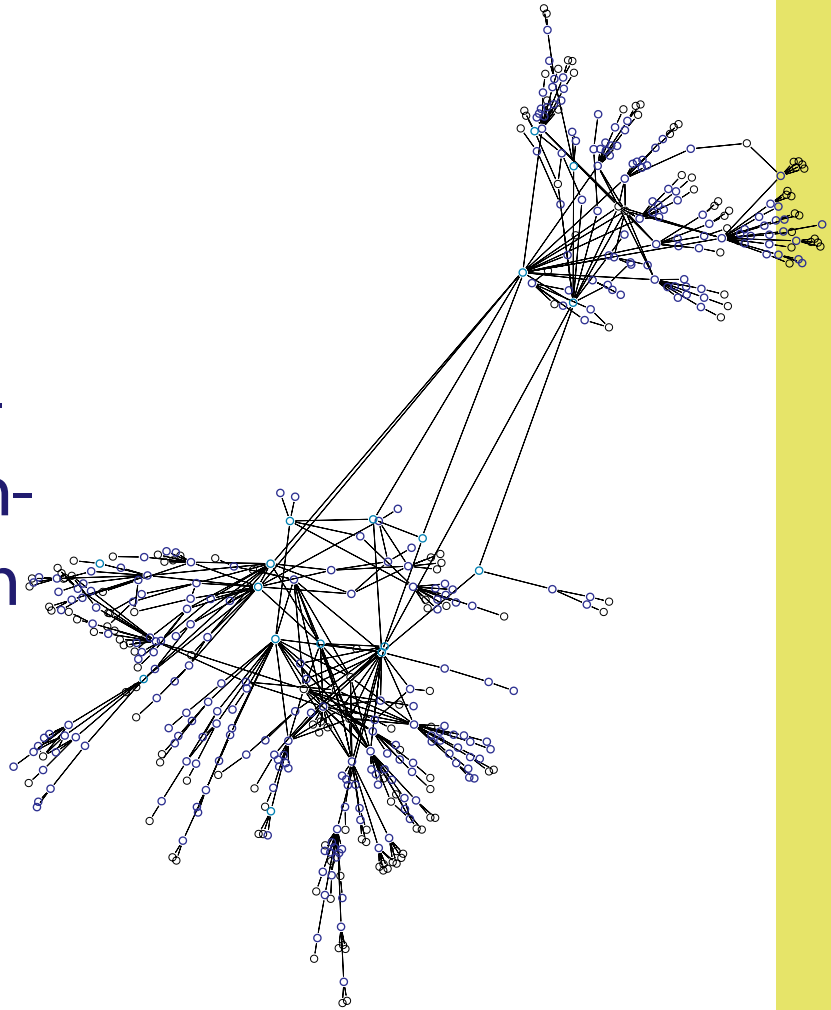
Techniques from TD learning will be used, along with foundational work of these PIs as well as Shah andSrikant.

Topology formation: when can local competition yield global cooperation?

Ramesh Johari (MIT)

Issues: It is critical that small wireless nodes be able to create a *good* network topology in a decentralized manner.

This problem presents a successful case study of the application of game theoretic methods to decentralized algorithm design.

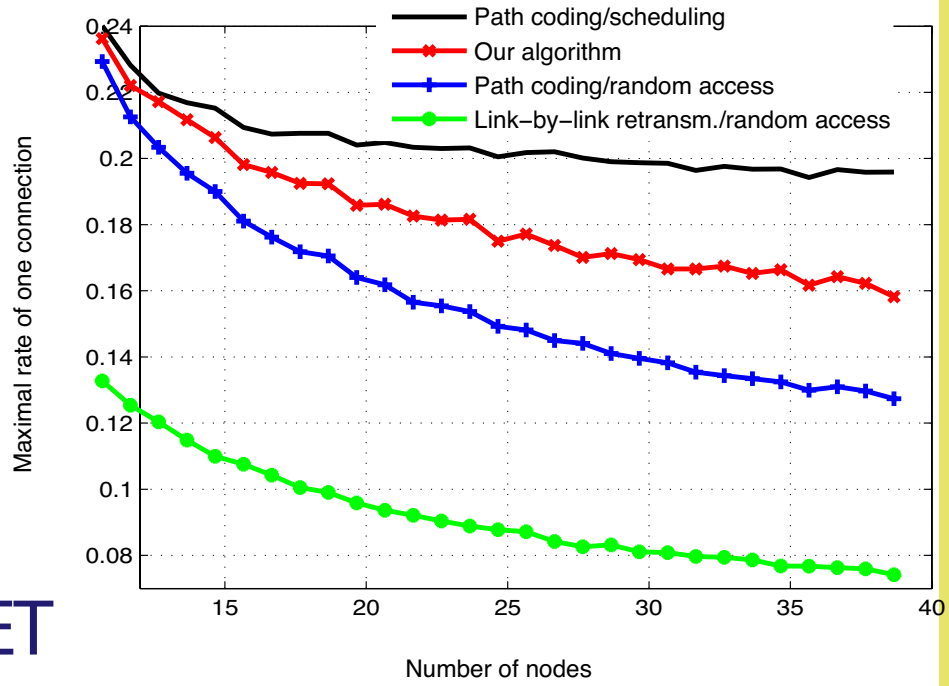


Network Coding and Medium Access A Joint Approach

Ralf Koetter and Danail Traskov (UIUC)

Issues: Resource allocation in wireless ad-hoc network (scheduling, random access technique, hybrids...)

Focus on the role and effect of network coding



Research presented at CBMANET

Network Coding and Medium Access A Joint Approach

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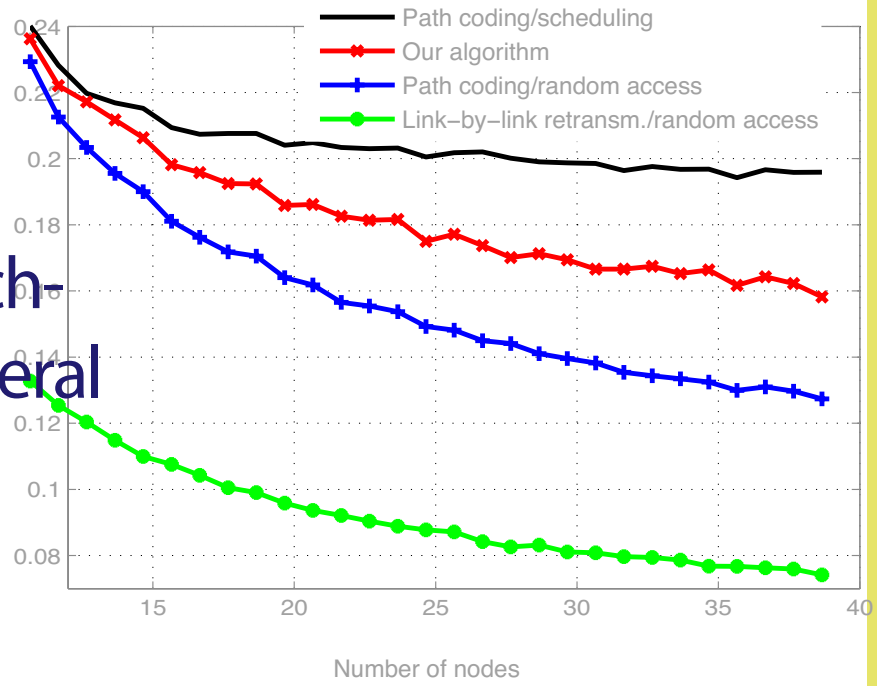
Issues: Resource allocation in wireless ad-hoc network (scheduling, random access technique, hybrids...)

Focus on the role and effect of network coding

Recent results:

Relaxation and iterative technique introduced for a general class of models.

Research presented at CBMANET

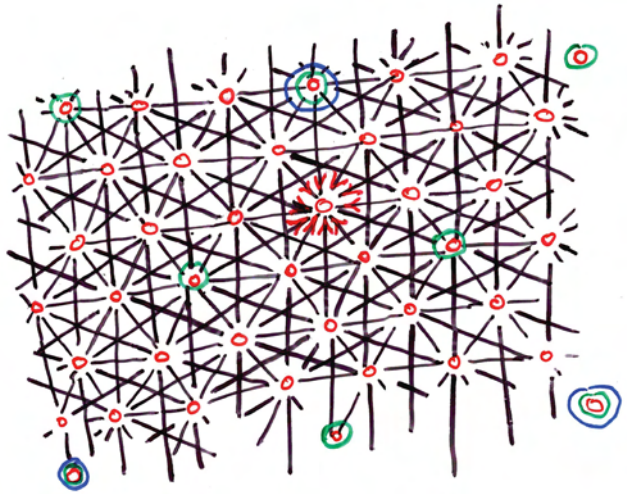


Workload Relaxations for Model Reduction

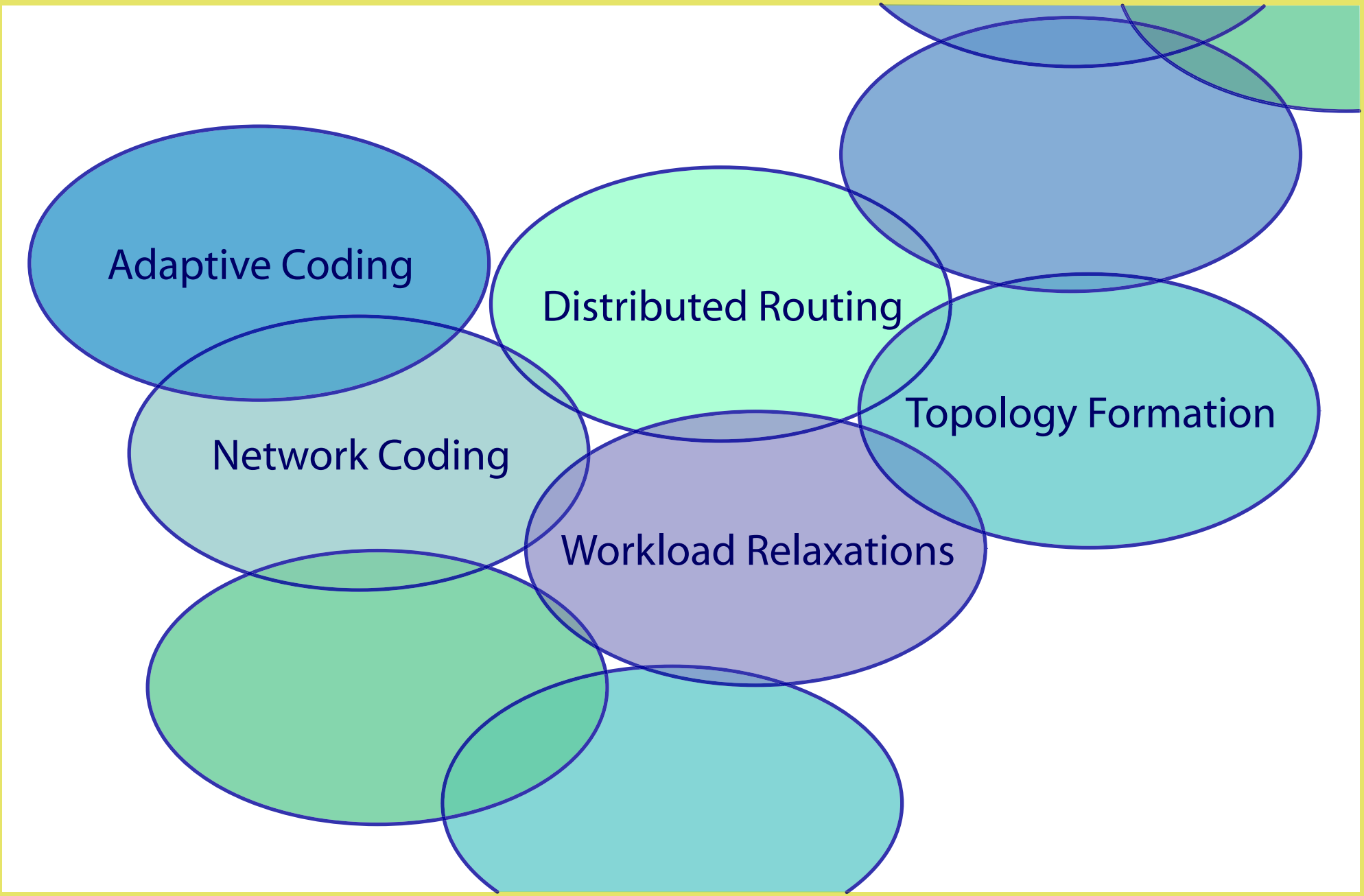
Constraint relaxation
for network coding -
similar in spirit to workload
relaxations for resource alloca-
tion in stochasitc networks.

Control Techniques for Complex Networks

To appear, November, 2007



Summary: *A Slice of the Research Web for ITMANET*



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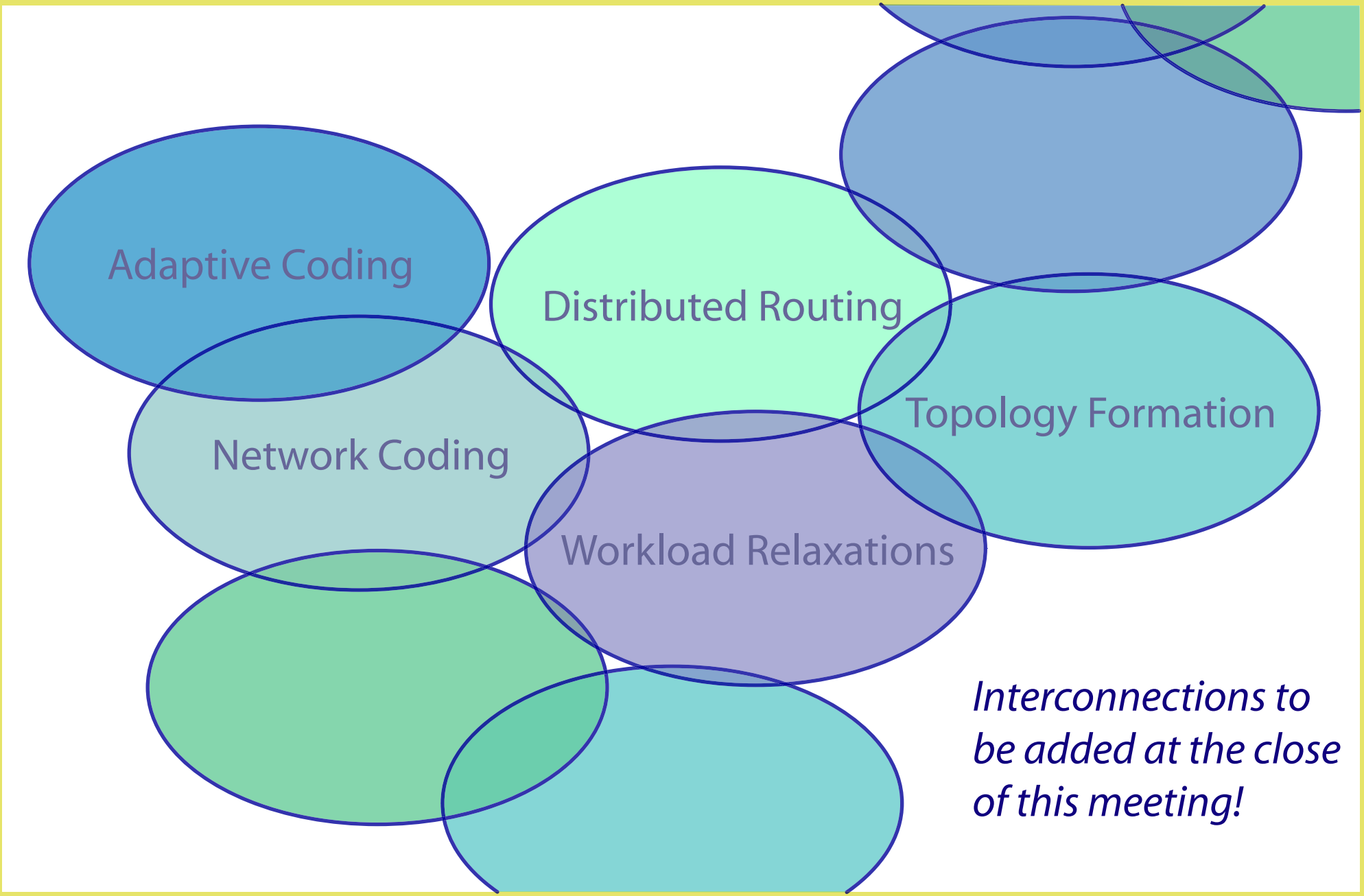
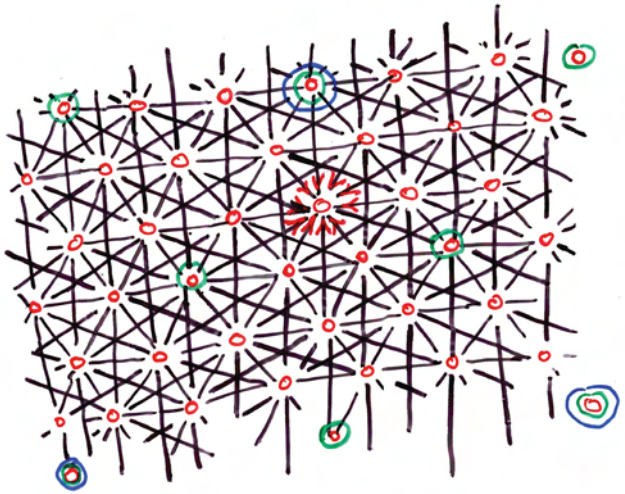


Reaching out ...

Dynarum : Model reduction for complex interconnected systems. January 2007 meeting:
How can we reach out to IT community?



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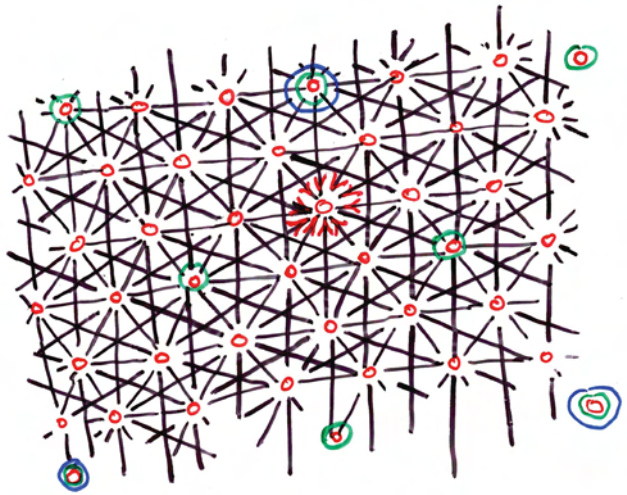
Egress

Intelligent massive antennae for space exploration

Dynamics of the Monterey Bay

Face recognition...



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Joint meeting?

Second International Conference
on Performance Evaluation Methodologies and Tools Nantes, France October 23-25, 2007