EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

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COST Action IC1104 2012-2016

Random Network Coding and Designs over GF(q)

Information and Communication Technologies (ICT)

Participating countries: 24

AT, BE, BG, CH, DE, DK, EE, EL, ES, FI, FR, HR, HU, IE, IL, IT, NL, NO, PT, RS, SI, SK, TR, UK

Objectives

- Existence and construction of good and possibly optimal network codes.
- Efficient encoding and decoding schemes for a given network code.
- Set up a European research network and establish network coding as a European core area in communication technology.
- Bring together experts from pure and applied mathematics, computer science, and electrical engineering, working in the areas of discrete mathematics, coding theory, information theory and related fields.

Working Groups

- WG 1: Bounds on the Size of Network Codes
- WG 2: Development of Encoding and Decoding Schemes, Practical Aspects of Network Coding
- WG 3: Cryptographic Aspects of Network Codes
- WG 4: Construction of Network Codes and Grassmannian Codes
- WG 5: Foundational Aspects, Algebraic Methods in Random Network Coding, Distributed Storage

Main Achievements

- 17 journal and conference papers include results on distributed storage and storage security, network codes over finite rings, wiretap channels and information theoretic security, combinatorial, algebraic and geometric attempts to q-design structure analysis.
- The breakthrough result: **There exist q-analogues of Steiner systems**! In a 5-author (mathematicians + computer scientists) interdisciplinary joint work the construction of a binary Steiner triple system on 13 points was constructed using the Kramer-Mesner method and an old conjecture disproved; a result leading directly to optimal network codes.
- Intensive interdisciplinary ***First European Training School on Network Coding*** was organized: 10 trainers (engineers, computer scientists, mathematicians) involved, 111 participants (48% senior and 52% early stage researchers).
- Subworkshop of the renowned WCC in Bergen 2013.
- 6 countries joined the Action during the first year, Australian application is pending.

Gender Balance and Early Stage Researchers

- Objectives: intensive support of ESR on all levels: scientific and financial; non-discriminatory gender balance treatment of all Action members.
- Status: 13 out of 73 female researchers, 1 female WG leader; at least 24 ESR.
- Foreseen Support Measures: Insisting on STSMs to be given to ESR and that in large numbers; Full support to ESR in research, giving project problems worth a PhD thesis from the research fields of the project; another Training School in Information Theory in 2014 with grants for 24 ESR of the Action.

Dissemination

- Achieved: A web-page has been established having an intranet to share all unpublished materials between Action participants.
- Plan: survey articles with lists of open interested problems, subconferences of renowned conference series.

Contact details

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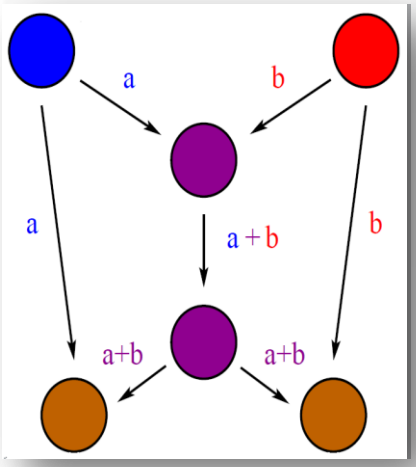

Image caption: Academic example of Network Coding

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