Nadia FAWAZ

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PROFILE: Principal Research Scientist at Technicolor, Los Altos, CA with 8 years of professional experience, specializing in **data privacy and personalization**, and wireless communications. Leverages techniques from information theory, random matrix theory, statistics, probability theory, and machine learning, and aims at bridging theory and practice. Contributes to challenging international high-tech projects in cooperation between Europe, America, Asia. Has lived in USA, and France and is used to working in multi-cultural and versatile environments at the cutting-edge of innovation.

EDUCATION

Nov. 2007- Feb 2008 During Ph.D.	**Massachusetts Institute of Technology MIT– Lab. for Information & Decision Systems LIDS** Visiting graduate student: research on wireless relay channels in the wideband regime	**Cambridge, MA, USA**
Apr.-June 2007 During Ph.D.	**Ecole Nationale des Ponts et Chaussées ENPC - School of International Management** *Certificate* "Docteur pour l'Entreprise": ParisTech post-graduate program in management (150 hours)	**Paris, FRANCE**
2005 - 2008	**Telecom ParisTech ENST & EURECOM, Mobile Communications Department** *Ph.D. in Electrical Engineering*, received with highest honors *(mention très honorable)* Supported by a French Defense DGA fellowship (Délégation Générale à l'Armement) • thesis on Cooperative Systems for Mobile Ad Hoc Networks • contributed to international EU research projects (NEWCOM++, FAST, BIONETS, NEWCOM) • co-advised Master students, teaching	**Paris & Sophia-Antipolis, FRANCE**
2002 - 2005	*Diplôme d'Ingénieur (Master) in Electrical Engineering* • & Eurecom Certificate in telecommunication systems • major : Mobile communications, graduated 1st in my major, with the best master thesis	
2000 - 2002	**Preparatory classes, Lycée Louis Le Grand** *MPSI – MP*:* Mathematics, Physics, Chemistry, Engineering Sciences Preparation for national competitive examinations for entry to the French engineering schools	**Paris, FRANCE**
2000 - 2002 in parallel of preparatory classes	**University Pierre and Marie Curie, Paris VI** *DEUG*: Diploma of general university studies, received with highest honors *(mention très bien)* Major: MIAS, Mathematics and computer science applied to science	**Paris, FRANCE**
1997-2000	**High school, Lycée Saint Charles,** graduated 1st in my class *French Baccalaureate S*: high school diploma received with highest honors *(mention très bien)*	**Athis-Mons, FRANCE**

PROFESSIONAL EXPERIENCE

Since Jan. 2011	**Technicolor – Research and Innovation** *Principal Research Scientist* specializing in data privacy and personalization Prior positions held: Senior Researcher, Researcher
	• contribute to research (from theoretical conceptualization, to algorithm, to test on data) and publish in
	 o **data privacy**: inference attacks, differential privacy, information theoretic privacy, privacy-utility tradeoffs, privacy for time-series, privacy for smart-meter data
	   o *PriView demo*: privacy-aware recommender. Designed the backend and contributed to its frontend UI
	 o **personalization**: user data analytics, user personas and interest modeling, composite accounts disaggregation, recommendation systems
	   o *User Personas API and demo*: customer segments, demographics, user profiles, content profiles
	   o *VoD real-time analytics demo*: coded prediction of lifetime analytics (churn, revenue, transactions)
	• consult internally with business units on privacy risks and measures
	• contribute to intellectual property (patents, technical disclosures)
	• mentor teams of research interns, engineers, researchers
	• led work package on data privacy (team of 8 researchers)
	• led exploratory project on information theoretic privacy
	• manage the lab seminar series, organize workshops, collaborate with and give talks in academia
		Los Altos / Palo Alto, CA, USA

Jan.2009-Jan.2011	**Massachusetts Institute of Technology MIT– Research Lab. of Electronics RLE** *Post-Doctoral researcher* in wireless networks • contributed to DARPA funded IT-MANET project • co-advised PhD student, taught lectures	**Cambridge, MA, USA**

July - Sep. 2006	**Samsung Advanced Institute of Technology SAIT**	**Seoul, SOUTH KOREA**

Research Intern—Communication and Connectivity Lab
- created an innovative cooperative communication strategy improving throughput of mobile ad hoc networks
- produced a survey on European research in mobile communications
- initiated bilingual Korean-English communication (meeting, email) in presence of foreign employees
- followed up cooperation to give opportunity to another PhD student to intern at SAIT the following summer

March - Aug. 2005	**CEA-LETI (Commissariat à l'Energie Atomique, Labo. d'Électronique des Technologies de**	**Grenoble, FRANCE**

l'Information) - government-funded technological research organization /15000 employees

Research intern—Algorithms and Digital Communications Department
- created algorithms for semi-blind adaptive equalization in multi-antenna 3G mobile systems (SIMO MC-CDMA), decreasing overhead and improving rate
- got acquainted with the funding mechanisms in the European research world

July-Sept. 2004	**Bouygues Telecom** —Mobile Communications Access Provider / 8500 employees	**Paris, FRANCE**

Engineering Intern— Networks Directorate - EDGE project
- compared GPRS/EDGE simulation results and data from sensors in the actual GPRS provider network
- managed project team to organise an experiment on an actual EDGE platform
- produced EDGE cell models (rates, services, customers) at the busy hour
- served as liaison between technical team and marketing team developing future mobile services EDGE

July-August 2003	**Advanced Timbers PTY LTD** —Building material retailer/20 employees	**Sydney, AUSTRALIA**

Account assistant—Accounting
- learned about finance and value creation in a small business environment
- helped the accountant to use the IT infrastructure more efficiently and faster

COMPUTER SKILLS

Programming	Python (Pandas, SciKit-learn, Numpy, Matplotlib), Matlab, HTML/CSS, LaTeX

AWARDS & DISTINCTIONS

2014	**MIT TechReview article cites and describes our UAI 2012 paper**	**Cambridge, MA, USA**

as "The Ultimate Challenge For Recommendation Engines"
http://www.technologyreview.com/view/530196/the-ultimate-challenge-for-recommendation-engines/

2013	**Awarded "Associate Member" level in Technicolor Fellowship Network**	**Palo Alto, CA, USA**

Program honoring employees who deliver exceptional technical contributions

2011	**Winner of the RecSys challenge on Context-Aware Movie Recommendations CAMRa 2011**	**Chicago, IL**

2010	**DGA Award**	**Paris, FRANCE**

for the best Ph.D. thesis. Prize awarded by the French Ministries of Defense and of Education and Research

2009-2010	**DGA Post-Graduate Fellowship**	**Paris, FRANCE**

awarded for 1 year by the French Defense Body DGA (Délégation Générale à l'Armement)

2005-2008	**DGA Graduate Fellowship**	**Paris, FRANCE**

awarded for 3 years by the French Defense Body DGA (Délégation Générale à l'Armement)

2006	**Member of the program "100 Jeunes Scientifiques Français en Chine"**	**Beijing, Shanghai, Wuhan, CHINA**

- selected by the French Ministry of Foreign Affairs to represent French Young Scientists for diplomatic trip
- received by **President Jacques Chirac** and **President Hu Jintao** at Diaoyutai State Guesthouse in Beijing
- received by senior officials in embassy, companies, China Academy of Science, universities, labs in China

2005	**HITACHI Award**	**Sophia-Antipolis, FRANCE**

for the best Master thesis (fulfilled at CEA-LETI in partial requirement for the Master degree)

Since 2003	**Honor member of the Junior Entreprise "European Junior of Eurecom"**	**Sophia-Antipolis, FRANCE**

as a founder of the Junior entreprise

2000	**CIC Bank Award**	**Paris, FRANCE**

for excellence of results in high school diploma: grant and trip to Spain

2000	**Golden Palm, High school Saint Charles**	**Athis-Mons, FRANCE**

for excellence of academic results and general positive attitude

LEADERSHIP

Since Jan. 2011	**Technicolor Seminar Series**	**Palo Alto/Los Altos, CA, USA**

Organizer of the weekly seminar series featuring technical talks open to the public

Feb. 2013	**DIMACS Workshop on the Economics of Information Sharing**	**Stanford University, CA, USA**

Co-chair and organizer

July 2011	**Technicolor Privacy and Security Week 2011**	**Palo Alto, CA, USA**

Organization chair
Organized, managed and hosted
- a two-day Privacy Course, taught by Prof. Dawn Song, and Dr. Elaine Shi, UC Berkeley, July 18-19 2011
- a tutorial on Cryptography, taught by Marc Joye, Technicolor Security Lab., Rennes, July 20-21 2011

2007- 2011	**Eurecom Community**– Eurecom Alumni Association	**Sophia-Antipolis, FRANCE**

President (2007-2009), Advisor to the governing board (2009-2011)

June 2003-Feb. 2005	**European Junior of Eurecom, Junior Enterprise**	**Sophia-Antipolis, FRANCE**

Founder and General Secretary — Governing Board
- coordinated team for creation of the Junior Enterprise
- organized the Mediterranean Regional Congress of the Junior Enterprises in Sophia-Antipolis
- trained the following governing team

2002 - 2003	**Forum of Telecommunications 2003**	**Paris, FRANCE**

student-run recruitment fair in High-Technology/ 3000 visitors every year/ 80 employees
Coordinator of team in charge of contacts with exhibitors
- managed the team in contact with exhibitors and coordinated relations with fair-administrators
- increased the database of potential exhibitors/customers
- trained the following team for edition 2004

PROFESSIONAL SERVICE & AFFILIATIONS

Teaching experience

Spring 2010	**MIT Course 6.441: Information Theory,** instructor: Prof. Médard	**Cambridge, MA, USA**

Taught Lectures 4, 9, 17, and 23

Fall 2009 & 2010	**MIT Course 6.450: Principles of Digital Communication I,** instructor: Prof. Médard	**Cambridge, MA, USA**

Taught Lectures 7, 10

Fall 2005	**EURECOM Course: Mobile Communication Techniques,** instructor: Prof. Debbah	**Sophia Antipolis, FRANCE**

Taught several lectures and problem sessions

Conference Technical Program Committees

Nov. 2014	**Workshop on Privacy in the Electronic Society, WPES 2014**	**Scottsdale, AZ, USA**

Member of the technical program committee

Dec. 2013	**IEEE Global Conference on Signal and Information Processing, GlobalSIP 2013**	**Austin, TX, USA**

Member of the technical program committee, symposium on cyber-security and privacy challenges in networks

June 2013	**ACM Conference on Electronic Commerce, EC 2013**	**Philadelphia, PA, USA**

Member of the program committee

Feb. 2013	**DIMACS Workshop on the Economics of Information Sharing**	**Stanford University, CA, USA**

Co-chair and organizer

June 2012	**ACM workshop on Privacy and Anonymity for the Digital Economy, PADE 2012**	**London, UK**

Member of the technical program committee, workshop held in conjunction with ACM SIGMETRICS 2012

Apr. 2012	**International Conference on Telecommunications, ICT 2012**	**Jounieh, Lebanon**

Member of the technical program committee

July 2011	**International Conference on Computer Communications and Networks, ICCCN 2011**	**Hawaii, USA**

Member of the technical program committee of the track on Wireless Communications

Oct. 2009	**IEEE International Conference on Ultra Modern Telecommunications 2009**	**Saint Petersburg, RUSSIA**

Member of the technical program committee of the workshop on Random Matrix Theory

June 2009	**ACM IWCMC 2009, International Wireless Communications and Mobile Computing Conference**	**Leipzig, GERMANY**

Member of the technical program committee of the MIMO Systems Symposium

Apr. 2007	**IEEE Winterschool on Information and Coding theory 2007**	**St Paul de Vence, FRANCE**

Publications Chair
- in charge of the proceedings (content, edition, distribution) and technical program (sessions, support)
- proposed video-recording of plenary talks and making them available online to global scientific community

July 2006	**SPAWC 2006, IEEE Workshop on Signal Processing Advances in Wireless Communications**	**Cannes, FRANCE**

Coordinator of student helping team (15 team members)

- defined and organized work in tasks and teams: IT, Communication, Sessions support, Social events support
- coordinated student team and relations with senior committee

Reviewer

Journals	IEEE Journal on Selected Topics in Signal Processing, IEEE Transactions on Information Forensics and Security, IEEE Transactions on Communications, IEEE Transactions on Wireless Communications, IEEE Transactions on Vehicular Technologies, EURASIP Journal on Wireless Communications and Networking
Conferences	WPES 2014, IEEE GlobalSIP2013, EC 2013, ICT 2012, EURASIP EUSIPCO 2011, ICCCN 2011, IEEE ISIT 2010, IEEE Globecom 2009 and 2007, ICST WiOpt 2009, ACM IWCMC 2009, IEEE ICASSP 2008 and 2007, IEEE VTC Fall 2008 and Spring 2007, IEEE SPAWC 2008, IEEE PIMRC 2008, ICST SimuTools 2008, IEEE ICC 2007, IEEE ISWCS 2006

Affiliations

Member	IEEE, IEEE Information Theory Society, IEEE Communication Society, IEEE Women in Information Theory
Member	ACM, ACM SigComm, ACM SigECom, ACM SigKDD, ACM SigMetrics, ACM Women in Computing

PUBLICATIONS

Journal articles

Oct. 2015 — **Managing your Private and Public Data: Bringing down Inference Attacks against your Privacy**
Salman Salamatian, Amy Zhang, Flavio du Pin Calmon, Sandilya Bhamidipati, Nadia Fawaz, Branislav Kveton, Pedro Oliveira, Nina Taft
IEEE Journal of Selected Topics in Signal Processing, JSTSP
Special Issue on Signal and Information Processing for Privacy

July 2015 — **PriView: Personalized Media Consumption Meets Privacy Against Inference Attacks**
Sandilya Bhamidipati, Nadia Fawaz, Branislav Kveton, Amy Zhang
IEEE Software
Special Issue on Security and Privacy on the Web

July 2014 — **Privacy auctions for recommendation systems**
Pranav Dandekar, Nadia Fawaz, Stratis Ioannidis
ACM Transactions on Economics and Computation, TEAC

April 2011 — **Asymptotic Capacity and Optimal Precoding in MIMO Multi-Hop Relay Networks**
Nadia Fawaz, Keyvan Zarifi, Merouane Debbah, David Gesbert
IEEE Transactions on Information Theory, vol. 57, no. 4, pages 2050 - 2069, April 2011

July 2010 — **From Spectrum Pooling to Space Pooling: Opportunistic Interference Alignment in MIMO Cognitive Networks -** Samir Medina Perlaza, Nadia. Fawaz, Samson Lasaulce, Merouane Debbah
IEEE Transactions on Signal Processing, vol. 58, no. 7, pages 3728 − 3741, July 2010

May 2008 — **When Network Coding and Dirty Paper Coding Meet in a Cooperative Ad Hoc Network**
Nadia Fawaz, David Gesbert, Merouane Debbah
IEEE Transactions on Wireless Communications, Vol. 7, No. 5, May 2008

Conference papers

June 2015 — **Privacy-Utility Trade-off under Continual Observation** — **Hong Kong**
Murat Erdogdu, Nadia Fawaz
IEEE International Symposium on Information Theory, ISIT 2015

Feb. 2015 — **Privacy-Utility Tradeoffs for Time-Series** — **San Diego, CA, USA**
Nadia Fawaz, Murat Erdogdu
Invited at Information Theory and Applications Workshop, ITA 2015

Jan. 2015 — **Privacy-Utility tradeoff for time-series with application to smart-meter data** — **Austin, TX, USA**
Murat Erdogdu, Nadia Fawaz, Andrea Montanari
AAAI conference on artificial intelligence, AAAI 2015 workshop on computational sustainability

Dec. 2014 — **Sequential Relevance Maximization with Binary Feedback** — **Montreal, Canada**
Vijay Kamble, Nadia Fawaz, Fernando Silveira
Conference on Neural Information Processing Systems, NIPS 2014 workshop on personalization

Nov. 2014 — **From the Information Bottleneck to the Privacy Funnel** — **Hobart, Australia**
Ali Makhdoumi, Salman Salamatian, Nadia Fawaz, Muriel Medard
IEEE Information Theory Workshop, ITW 2014

| July 2014 | **SPPM: Sparse Privacy Preserving Mappings** | **Quebec City, Canada** |

Salman Salamatian, Nadia Fawaz, Branislav Kveton, Nina Taft
Conference on Uncertainty in Artificial Intelligence, UAI 2014

| June 2014 | **Privacy Tradeoffs in Predictive Analytics** | **Austin, TX, USA** |

Stratis Ioannidis, Andrea Montanari, Udi Weinsberg, Smriti Bhagat, Nadia Fawaz, Nina Taft
ACM International Conference on Measurement and Modeling of Computer Systems, SIGMETRICS 2014

| May 2014 | **PriView: Media Consumption and Recommendation Meet Privacy Against Inference Attacks** |

Amy Zhang, Sandilya Bhamidipati, Nadia Fawaz, Branislav Kveton   **San Jose, CA, USA**
IEEE Web 2.0 Security and Privacy Workshop, W2SP 2014 (Workshop of IEEE SSP Oakland Symposium)

| Feb. 2014 | **From Differential Privacy to Divergence Privacy** | **San Diego, CA, USA** |

Nadia Fawaz, Flavio du Pin Calmon, Ali Makhdoumi, Salman Salamatian
Invited at Information Theory and Applications Workshop, ITA 2014

| Jan. 2014 | **Privacy against Inference Attacks: From Theory to Practice** | **Uni. of Florida at Gainesville, FL, USA** |

Nadia Fawaz
Invited abstract at C^3 2nd Workshop on Cognition and Control, 2014

| Dec. 2013 | **How to Hide the Elephant– or the Donkey– in the Room: Practical Privacy Against Statistical Inference** |

Salman Salamatian, Amy Zhang, Flavio du Pin Calmon, Sandilya Bhamidipati,
Nadia Fawaz, Branislav Kveton, Pedro Oliveira and Nina Taft.   **Austin, TX, USA**
IEEE Global Conference on Signal and Information Processing, GlobalSIP 2013

| Oct. 2013 | **Privacy-Utility Trade-Off under Statistical Uncertainty** | **Allerton, IL, USA** |

Ali Makhdoumi, Nadia Fawaz
Allerton Conference on Communication, Control, and Computing, ALLERTON 2013

| Sep. 2013 | **Nearly Optimal Private Convolution** | **Sophia-Antipolis, FRANCE** |

Nadia Fawaz, S. Muthukrishnan, Aleksandar Nikolov
European Symposium on Algorithms, ESA 2013

| Mar. 2013 | **Private Predicate Sums on Decayed Streams** | **Genoa, Italy** |

Jean Bolot, Nadia Fawaz, S. Muthukrishnan, Aleksandar Nikolov, Nina Taft
International Conference on Database Theory, ICDT 2013

| Dec. 2012 | **Privacy Auctions for Recommender Systems** | **Liverpool, UK** |

Pranav Dandekar, Nadia Fawaz, Stratis Ioannidis
Workshop on Internet & Network Economics, WINE 2012

| Oct. 2012 | **Privacy against Statistical Inference** | **Allerton, IL, USA** |

Flavio du Pin Calmon, Nadia Fawaz
Allerton Conference on Communication, Control, and Computing, ALLERTON 2012

| Aug. 2012 | **Guess Who Rated This Movie: Identifying Users Through Subspace Clustering** | **Catalina Island, USA** |

Amy Zhang, Nadia Fawaz, Stratis Ioannidis, Andrea Montanari
Conference on Uncertainty in Artificial Intelligence, UAI 2012
Featured in MIT TechReview August 2014

| July 2012 | **Reducibility of joint relay positioning and flow optimization problem** | **Cambridge, MA, USA** |

Mohit Thakur, Nadia Fawaz, and Muriel Medard
IEEE International Symposium on Information Theory, ISIT 2012

| Feb. 2012 | **Private linear maps under decaying privacy** | **San Diego, CA, USA** |

Nadia Fawaz, S. Muthukrishnan, Aleksandar Nikolov
invited at Information Theory and Applications Workshop, ITA 2012

Oct. 2011	**Identifying Users From Their Rating Patterns**	**Chicago, IL , USA**
Winner		
Of challenge	José Bento, Nadia Fawaz, Andrea Montanari, Stratis Ioannidis	

Winner of ACM RecSys Challenge on Context-aware Movie Recommendation, CAMRa 2011

| Oct. 2011 | **A Converse for the Wideband Relay Channel with Physically Degraded Broadcast** | **Paraty, Brazil** |

Nadia Fawaz, Muriel Medard
Invited paper at IEEE Information Theory Workshop, ITW 2011

| July 2011 | **On the Geometry of Wireless Network Multicast in 2-D** | **Saint Petersburg, Russia** |

Mohit Thakur, Nadia Fawaz, and Muriel Medard
IEEE International Symposium on Information Theory, ISIT 2011

| April 2011 | **Optimal relay location and power allocation for low SNR broadcast relay channels** | **Shanghai, CHINA** |

Mohit Thakur, Nadia Fawaz, Muriel Médard
IEEE International Conference on Computer Communications, INFOCOM 2011

Feb. 2011	**On wireless networks in the wideband regime** Nadia Fawaz, Mohit Thakur, Muriel Medard invited at Information Theory and Applications Workshop, ITA 2011	**San Diego, CA, USA**
June 2010	**On the Non-Coherent Wideband Multipath Fading Relay Channel** Nadia Fawaz, Muriel Médard IEEE International Symposium on Information Theory, ISIT 2010	**Austin, TX, USA**
September 2009	**Alignement d'Interférence Opportuniste avec des Terminaux Multi-Antennes** Samir Medina Perlaza, Nadia. Fawaz, Samson Lasaulce, Merouane Debbah Signal and Image Processing Workshop, GRETSI 2009	**Dijon, FRANCE**
May 2008	**Improving Ad Hoc Networks Capacity and Connectivity using Dynamic Blind Beamforming** Nadia Fawaz, Zafer Beyaztas, Merouane Debbah, David Gesbert IEEE Vehicular Technology Conference, VTC Spring 2008	**SINGAPORE**
May 2008	**Asymptotic Capacity and Optimal Precoding Strategy of Multi-level Precode & Forward in Correlated Channels -** Nadia Fawaz, Keyvan Zarifi, Merouane Debbah, David Gesbert IEEE Information Theory Workshop, ITW 2008	**Porto, PORTUGAL**
April 2008	**Large system design and analysis of protocols for decode-forward relay networks** Laura Cottatellucci, Terence Chan, Nadia Fawaz ICST Workshop on Physics-Inspired Paradigms in Wireless Communications and Networks, WiOpt/PHYSCOMNET 2008	**Berlin, GERMANY**
June 2007	**Capacity and Positioning in Dense Scattering Environments** Nadia Fawaz, Merouane Debbah, David Gesbert IEEE Workshop on Signal Processing Advances in Wireless Communications, SPAWC 2007	**Helsinki, FINLAND**
March 2007	**When Network Coding and Dirty Paper Coding Cooperate** Nadia Fawaz, David Gesbert, Merouane Debbah IEEE Winter School on Coding and Information Theory, WSIT 2007	**La-Colle-sur-Loup, FRANCE**
January 2007	**Capacity of Dense Scattering Environments** Nadia Fawaz, Merouane Debbah, David Gesbert IRAMUS Workshop	**Val-Thorens, FRANCE**

Other publications

April 2012	**Privacy in the Personalized Computing Era** Nina Taft, Anmol Sheth, Nadia Fawaz Technicolor White Paper	**Palo Alto, CA, USA**
May 2010	**A Conjecture on the Gaussian Relay Channel in the low SNR Regime** Nadia Fawaz, Muriel Médard Technical Poster and slide for IT-MANET PI Meeting, Uni. of Texas at Austin, TX, USA	**Austin, TX, USA**
May 2010	**Non-coherent Multipath Fading Relay Networks in the Wideband Regime** Nadia Fawaz, Muriel Médard Technical Poster and slide for IT-MANET PI Meeting, MIT, Cambridge, MA, USA	**Cambridge, MA, USA**
June 2009	**Asymptotic Capacity and Optimal Precoding Strategy for MIMO Relay Systems** Nadia Fawaz Chapter 4.5.1 in Deliverable DR6.2 of NEWCOM++ Work Package WPR6	
April 2008	**Large System Analysis of Relay Networks** Nadia Fawaz, Laura Cottatellucci Chapter 5.3.2 in Deliverable DR6.1 of NEWCOM++ Work Package WPR6	
August 2007	**Network Design and Optimization: Ad-Hoc Network Infrastructure** Nadia Fawaz Chapter 4 in Deliverable D1.3.2 of BIONETS Work Package WP 1.3	
June 2007	**WSIT'007 – 9th IEEE Winter School on Coding and Information Theory** Nadia Fawaz, Merouane Debbah Article in IEEE Information Theory Society Newsletter, June 2007	
September 2006	**When Network Coding and Dirty Paper Coding Meet in a Cooperative Ad Hoc Network** Nadia Fawaz, David Gesbert, Merouane Debbah EURECOM Research Report, RR-07-199, September 2006	