

Institut National des Postes et Télécommunications
Direction Adjointe de la Recherche

Équipe de Recherche

**Trends in Research on 5G-and-Beyond
Technologies and Eco-Systems
"5TRonG"**

Fiche de Présentation

(Transformation de PACOMS en 5TRonG)

1. INFORMATIONS GENERALES SUR L'EQUIPE

- Nom de l'équipe : **5TRonG : Trends in Research on 5G-and-Beyond Technologies and Eco-Systems**

 - Thèmes de l'équipe :
 - 5G and Beyond (PHY, MAC, NET).
 - Internet of Things "IoT" (Technologies and Applications).
 - SDN-NFV.
 - Smart Cities (Access Technologies and Networks).
 - Green and Energy Efficient Wireless Communications.

 - Mots clés définissant les axes de recherche de l'équipe :
 - mmWave ; Massive MIMO ; Full-Duplex ; mMTC ; D2D ; M2M ; C-RAN ; SDN ; NFV ; Cooperative/Cognitive Communications ; UD HetNets ;
 - Internet of Things (IoT) ; Internet of Everything (IoE)
 - Smart Cities ; Smart Grids ; Smart Campus ; Smart Vehicular ; Smart Home ;
 - Performance Analysis ; Traffic Modeling ; Game Theory ; Optimization ; Stochastic Geometry.

 - Coordinateur de l'équipe :
 - Prénom et Nom : **Mustapha BENJILLALI**.
 - Département : **Systemes de Communications (DSC)**.
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2. MEMBRES PERMANENTS DE L'EQUIPE

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3. PARTENARIATS

Le tableau suivant donne quelques exemples de partenariats que l'équipe entretient actuellement.

1. PARTENARIATS NATIONAUX

	Etablissement	Structure de Recherche	Thème de Recherche	Personne Contact
Partenariats Nationaux	ENSIAS	Équipe MIS	IoT	kobbane@ensias.ma
	EMI	Équipe ERSC	Mobile Communications	guennoun@emi.ac.ma
	ENSEM	Équipe UBICOM	IoT	e.sabir@ensem.ac.ma
	INSEA	—	Réseaux	m.ouzineb@insea.ac.ma

2. PARTENARIATS INTERNATIONAUX

	Etablissement	Structure de Recherche	Thème de Recherche	Personne Contact
Partenariats Internationaux	UQAM Canada	Laboratoire LTIR	Informatique & Réseaux	cherkaoui.omar@uqam.ca
	INRS Canada	Groupe "Communications Sans Fil"	Communications Mobiles	leszek@emt.inrs.ca
	KAUST KSA	Laboratoire CTL	Communications Mobiles	slim.alouini@kaust.edu.sa
	Centrale-Supélec France	Laboratoire Signaux & Systèmes	5G	pierre.duhamel@lss.supelec.fr
	QoS Design	LAAS-Toulouse	Informatique & Réseaux	anouar.rachdi@qosdesign.fr
	Intel Allemagne	—	5G	valerio.Frascolla@intel.com
	IMT-Atlantique France	LabSTICC	Signal & Communications	samir.saoudi@imt-atlantique.fr
	PRACom France	—	5G	brigitte.rivoal@imt-atlantique.fr

4. PUBLICATIONS DE L'ÉQUIPE (Période 2013-2017)

Livres (Books)

- R. El-Azouzi, D. S. Menasche, E. Sabir, F. De Pellegrini, and **M. Benjillali** (Eds), *Advances in Ubiquitous Networking*, Springer Singapore, 2016.

eBook ISBN 978-981-10-1627-1,
 Hardcover ISBN 978-981-10-1626-4,
 Series ISSN 1876-1100.

Revue Internationale avec Comité de Lecture (Journal Papers)

- M. Jabi, L. Szczecinski, **M. Benjillali**, A. Benyouss, and B. Pelletier, "AMC and HARQ: How to Increase the Throughput", submitted to *IEEE Transactions on Communications*, Apr. 2017.
 - **N. Mesbahi**, and **H. Dahmouni**, "Analytical Framework for the Characterization of the Link properties in Multi-hop Mobile Wireless Networks", in *Elsevier Ad-Hoc Networks Journal*, vol. 58, pp.127-137, Apr. 2017.
 - S. Arabi, H. El Hammouti, E. Sabir, H. Elbiaze, **M. Benjillali**, and M. Sadik, "Investing the Right Watt-Dollar in the Right Bit for Multi-RAT-Empowered Internet of Things", submitted to *IEEE Communications Magazine*, Mar. 2017.
 - **A. Soulimani**, **M. Benjillali**, H. Chergui, and D. B. da Costa, "A Comprehensive Performance Analysis of Multihop Weibull-Fading Communications for 5G and IoT Applications", submitted to *IEEE Transactions on Communications*, Mar. 2017.
 - **N. Mesbahi**, **F. Chahlaoui**, **H. Dahmouni**, "Impact of Mobility and Interference on Connectivity in Mobile Ad-hoc Networks". Submitted to *ACM/Springer Mobile Networks & Applications*, Mar. 2017.
 - **C. Essayeh**, **M. Raiss El Fenni**, **H. Dahmouni**, "An Intelligent Home Energy Management System for the On-Grid Mode Based architectures", Submitted to *Elsevier Applied Energy Journal*, Mar. 2017
 - M. Jabi, E. Pierre-Doray, L. Szczecinski, and **M. Benjillali**, "How to Boost the Throughput of HARQ with Off-the-Shelf Codes", *IEEE Transactions on Communications*, Mar. 2017 (Accepted).
 - R. Sassioui, M. Jabi, L. Szczecinski, L. B. Le, **M. Benjillali**, and B. Pelletier, "AMC and HARQ: Friends or Foes?", *IEEE Transactions on Communications*, vol. 65, no. 2, pp. 635-650, Feb. 2017.
 - H. Elhammouti, E. Sabir, **M. Benjillali**, L. Echabbi, and H. Tembine, "Self-Organized Connected Objects: Rethinking QoS Provisioning for IoT Services", *IEEE Communications Magazine*, Nov. 2016 (Accepted).
 - I. Randrianantenaina, **M. Benjillali**, and M.-S. Alouini, "Consumption Factor Optimization for Multihop Relaying over Nakagami-m Fading Channels", *IEEE Transactions on Vehicular Technology*, vol. 65, no. 9, pp. 7796-7801, Sep. 2016.
 - Imane Rahmouni, Mohamed El-Kamili, **Mohammed Raiss-El-Fenni**, and Lahcen Omari, "An effective buffer management in delay tolerant networks based on a partially observed Markov decision process framework", *International Journal of Communication Networks and Distributed Systems*, vol. 16, no. 4, pp. 368-387, 2016.
 - H. Chergui, **M. Benjillali**, and S. Saoudi, "Performance Analysis of Project-and-Forward Relaying in Mixed MIMO-Pinhole and Rayleigh Dual-Hop Channel", *IEEE Communications Letters*, vol. 20, no. 3, pp. 610-613, Mar. 2016.
 - M. Jabi, **M. Benjillali**, L. Szczecinski, and F. Labeau, "Energy Efficiency of Adaptive HARQ", *IEEE Transactions on Communications*, vol. 64, no. 2, pp. 818-831, Feb. 2016.
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- **A. Fedoul** and **M. Benjillali**, "LLR-Based Coded Performance Analysis of Cognitive Dual-Hop BICM Systems", submitted to *EURASIP Journal on Wireless Communications and Networking*, Nov. 2015.
 - M. Jabi, L. Szczecinski, **M. Benjillali**, and F. Labeau, "Outage Minimization via Power Adaptation and Allocation for Truncated Hybrid ARQ", *IEEE Transactions on Communications*, vol. 63, no. 3, pp. 711-723, Mar. 2015.
 - A. Hyadi, **M. Benjillali**, and M.-S. Alouini, "Outage Performance of Decode-and-Forward in Two-Way Relaying with Perfect and Outdated Channel State Information", *IEEE Transactions on Vehicular Technology*, vol. 64, no. 12, pp. 5940-5947, Jan. 2015.
 - **Mohammed Raiss-El-Fenni** and Mohamed El Kamili, "Admission Control Using Stochastic Learning Games in Cognitive Radio Networks", *International Journal of Future Generation Communication and Networking*, vol.7, no.1, pp. 29-42, 2014.
 - Rachid El-Azouzi, Essaïd Sabir, **Mohammed Raiss-El-Fenni**, and Sujit Samanta, "A Unified NET-MAC-PHY Cross-layer Framework for Performance Evaluation of Multi-hop Ad hoc WLANs", *ICST Transactions on Mobile Communications and Applications*, vol. 1, pp. e6, 2014.
 - F. R. V. Guimarães, D. B. da Costa, **M. Benjillali**, T. A. Tsiftsis, and G. K. Karagiannidis, "Cooperative Spectrum Sharing Systems with Relay Selection in the Presence of Multiple Primary Receivers", *IET Communications*, vol. 8, no. 4, pp. 546-553, Mar. 2014.
 - A. Hyadi, **M. Benjillali**, M.-S. Alouini, and D. B. da Costa, "Performance Analysis of Underlay Cognitive Multihop Regenerative Relaying Systems with Multiple Primary Receivers", *IEEE Transactions on Wireless Communications*, vol. 12, no. 12, pp. 6418-6429, Dec. 2013.
 - **M. Benjillali** and M.-S. Alouini, "Partner Cooperation with Decode-and-Forward: Closed-Form Outage Analysis and Comparison", *IEEE Transactions on Vehicular Technology*, vol. 62, no. 1, pp. 127-139, Jan. 2013.

Conférences Internationales avec Comité de Lecture (International Conference Papers)

- S. Ghacham, **M. Benjillali**, and Z. Guennoun, "Low-Complexity Detection For Massive MIMO Systems Over Correlated Rician Fading", in *Proc. 13th International Wireless Communications and Mobile Computing Conference (IWCMC'17)*, 26-30 June 2017, Valencia, Spain.
 - A. Elharoussi, **M. Benjillali**, and A. Soulimani, "MoG-Based Outage Probability Analysis of EGC and MRC Diversity Combining Schemes in Composite Fading-Shadowing MIMO Channels", in *Proc. 13th International Wireless Communications and Mobile Computing Conference (IWCMC'17)*, 26-30 June 2017, Valencia, Spain.
 - A. Soulimani, **M. Benjillali**, and H. Chergui, "Energy-Efficient Multihop Schemes over Weibull-Fading Channels: Performance Analysis and Optimization", in *Proc. 13th International Wireless Communications and Mobile Computing Conference (IWCMC'17)*, 26-30 June 2017, Valencia, Spain.
 - **Houda Chafnaji**, "Spectral Efficiency Analysis of Two-Way Massive MIMO Full-Duplex Relay Systems with Direct Link", in *Proc. The Third International Symposium on Ubiquitous Networking (UNet'17)*, 9-11 May 2017, Casablanca, Morocco.
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- **N. Mesbahi** and **H. Dahmouni**, "Impact of Link Lifetime on QoS in Mobile Ad-hoc Networks", in *Proc. The Third International Symposium on Ubiquitous Networking (UNet'17)*, 9-11 May 2017, Casablanca, Morocco.
 - R. Sassioui, M. Jabi, L. Szczecinski, L. B. Le, **M. Benjillali**, and B. Pelletier, "AMC and HARQ: Friends or Foes?", in *Proc. IEEE Global Telecommunications Conference (GLOBECOM'16)*, 4-8 Dec. 2016, Washington, DC, USA.
 - M. Jabi, E. Pierre-Doray, L. Szczecinski, and **M. Benjillali**, "Boosting the Throughput of HARQ with Off-the-Shelf Codes", in *Proc. IEEE Global Telecommunications Conference (GLOBECOM'16)*, 4-8 Dec. 2016, Washington, DC, USA.
 - **Chaimaa Essayeh, Mohammed Raiss El-Fenni, Hamza Dahmouni** "Towards an intelligent home energy management system for smart Microgrid applications", in *Proc. 12th International Wireless Communications and Mobile Computing Conference (IWCMC'16)*, pp. 1051-1056, Sep. 2016, Paphos, Cyprus.
 - M. Ghandi, E. Tanghe, W. Joseph, **M. Benjillali**, and Z. Guennoun, "Path Loss Characterization of Horn-to-Horn and Textile-to-Textile On-Body Channels at 60 GHz", in *Proc. International Conference on Wireless Networks and Mobile Communications (WINCOM'16)*, pp. 235-239, 26-29 October 2016, Fez, Morocco.
 - I. Fady, G. Vermeeren, W. Joseph, **M. Benjillali**, A. Tribak, E. Tanghe, and L. Martens, "Miniaturized 2.4 GHz Antenna and Path Loss Investigations for Metal Containers Monitoring", in *Proc. International Conference on Wireless Networks and Mobile Communications (WINCOM'16)*, pp. 12-16, 26-29 October 2016, Fez, Morocco.
 - **N. Mesbahi** and **H. Dahmouni**, "Delay and Jitter Analysis in LTE Networks", in *Proc. International Conference on Wireless Networks and Mobile Communications (WINCOM'16)*, 26-29 October 2016, Fez, Morocco.
 - **Chaimaa Essayeh, Mohammed Raiss El-Fenni, Hamza Dahmouni**, "Load management strategy for an off-grid switched mode in smart MicroGrid systems", in *Proc. International Conference on Wireless Networks and Mobile Communications (WINCOM'16)*, pp. 52-57, 26-29 October 2016, Fez, Morocco.
 - N. Larhrissi, N. Haji, A. Tamtaoui, **H. Dahmouni**, Y. Ben Maissa, "Morocco's First Smart Microgrid Green Campus : Case INPT", in *Proc. The 2016 International Conference on Sustainable Development (ICSD)*, Columbia University, Sep. 2016, New York, USA.
 - **S. Bouzghiba, H. Dahmouni**, A. Rachdi, J.M. Garcia, "Towards an Autonomic Approach for Software Defined Networks : An Overview", in *Proc. The Second International Symposium on Ubiquitous Networking (UNet'16)*, May 2016, Casablanca, Morocco.
 - R. Sassioui, L. Szczecinski, L. B. Le, and **M. Benjillali**, "AMC and HARQ: Effective Capacity Analysis", in *Proc. IEEE Wireless Communications and Networking Conference (WCNC'16)*, pp. 371-377, 3-6 April 2016, Doha, Qatar.
 - **A. Soulimani** and **M. Benjillali**, "Closed-Form Performance Analysis of Generalized M-QAM over Multihop Weibull Fading Channels", in *Proc. International Conference on Wireless Networks and Mobile Communications (WINCOM'15)*, 20-23 October 2015, Marrakech, Morocco.
 - **Mohammed Raiss-el-Fenni**, Mohamed El Kamili, Sidi Ahmed Ezzahidi, Ismail Berrada and El Houssine Bouyakhf, "Towards an Optimal Pricing for Mobile Virtual Network Operators", in *Proc. The International Conference on NETWORKED SYSTEMS (NETYS'15)*, pp. 507-512, 2015, Agadir, Morocco.
 - H. El Hammouti, **M. Benjillali**, and L. Echabbi, "Power Allocation Optimization for Heterogeneous Networks: a Potential Game Approach", in *Proc. International*
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Conference on Wireless Networks and Mobile Communications (WINCOM'15), 20-23 October 2015, Marrakech, Morocco. *** Best Paper Award ***

- **N. Mesbahi** and **H. Dahmouni**, "An efficient algorithm for traffic flow optimization in MPLS networks", in the 12th IEEE International Conference on Protocol Engineering, ICPE 2015,, Paris, July 22-24, 2015.
 - **A. Fedoul** and **M. Benjillali**, "Cognitive Detect-and-Forward Relay Channels: Soft Metrics and Performance Analysis", in *Proc. International Workshop on Codes, Cryptography, and Communication Systems (IWCCCS'14)*, pp. 113-117, 27-28 November 2014, El Jadida, Morocco.
 - I. Boufriekch, **M. Benjillali**, and A. Tamtaoui, "On the Performance of Energy Detection Spectrum Sensing for Interweave Cognitive Radio", in *Proc. International Workshop on Codes, Cryptography, and Communication Systems (IWCCCS'14)*, pp. 45-49, 27-28 November 2014, El Jadida, Morocco.
 - **N. Mesbahi** and **H. Dahmouni**, "Towards an efficient full IP networks", in *Proc. The 9th International Conference on Intelligent Systems Theories and Applications (SITA'14)*, 2014, Rabat, Morocco.
 - M. Jabi, L. Szczecinski, **M. Benjillali**, and F. Labeau, "Outage-Optimal Power Adaptation and Allocation for Truncated HARQ", in *Proc. IEEE International Conference on Communications (ICC'14)*, 10-14 June 2014, Sydney, Australia.
 - Imane Rahmouni, Mohamed El Kamili, **Mohammed Raiss-el-Fenni**, Lahcen Omari, "Optimal Buffer Management Policies in DTNs: A POMDP Approach", in *Proc. IEEE International Conference on Communications (ICC'14)*, 10-14 June 2014, Sydney, Australia.
 - Ahmed El Ouadrhiri, Mohamed El Kamili, **Mohammed Raiss-El-Fenni**, "Learning Controlled Forwarding Strategy Improving Probabilistic Routing in DTN", in *Proc. IEEE Wireless Communications and Networking Conference (WCNC'14)*, 6-9 April 2014, Istanbul, Turkey.
 - I. Randrianantenaina, **M. Benjillali**, and M.-S. Alouini, "Transmit Power Optimization for Green Multihop Relaying over Nakagami-m Fading Channels", in *Proc. IEEE Conference on Communications and Networking (ComNet'14)*, 19-22 March 2014, Hammamet, Tunisia.
 - **M. Benjillali**, A. Hyadi, D. B. da Costa, and M.-S. Alouini, "Performance Analysis of Cognitive Multihop Relaying with M-QAM Detect-and-Forward in Nakagami-m Fading Channels", in *Proc. IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC'13)*, 8-11 September 2013, London, UK.
 - F. R. V. Guimarães, D. B. da Costa, **M. Benjillali**, T. A. Tsiftsis, and G. K. Karagiannidis, "Best Relay Selection in Cooperative Spectrum Sharing with Multiple Primary Users", in *Proc. IEEE International Conference on Communications (ICC'13)*, 9-13 June 2013, Budapest, Hungary.
 - H. Chergui, T. Ait-Idir, **M. Benjillali**, and S. Saoudi, "Signal-Level Cooperative Spatial Multiplexing for Uplink Throughput Improvement in MIMO Broadband Systems", in *Proc. IEEE Wireless Communications and Networking Conference (WCNC'13)*, 7-10 April 2013, Shanghai, China.
 - I. Snaiki, **H. Dahmouni**, O. Cherkaoui, "Green Recursive Flow Classification : towards an Energy-efficient Packet Classification", in *Proc. The 10th IEEE International Conference on Embedded Computing*, 2013.
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