

Francesco Musumeci

Ph.D.

via Ponzio 34/5
20131 - Milan
Italy

☎ +39 02 2399 3691

FAX +39 02 2399 3413

✉ francesco.musumeci@polimi.it

🏠 home.deib.polimi.it/fmusumeci



Personal data

Date of birth 14 August 1985

Place of birth Acireale (CT), Italy

Nationality Italian

Current position

01/2016–now **Assistant Professor**, *Politecnico di Milano, Dept. of Electronics, Information and Bioengineering*, Milan, Italy.

Main activities Research; Participating to research projects (national and international); Teaching; Tutoring PhD and MSc students.

Research interests Next Generation Optical Networks; Fixed-Mobile Convergence (FMC); 5G Centralized Radio Access Networks (C-RAN); Content Delivery Networks (CDN); Network Function Virtualization (NFV); Disaster Resiliency.

Education and Training

2013 **PhD Degree in Information Engineering**, *Politecnico di Milano*, Milano, Italy.
Thesis title: *Energy-Efficient Photonic Switching and Networking* (Advisor Prof. A. Pattavina).

2013 **European Union PhD Degree (*Doctor Europaeus*) in Information Engineering**, *Politecnico di Milano*, Milano, Italy.
Thesis title: *Energy-Efficient Photonic Switching and Networking* (Advisor Prof. A. Pattavina).

2012 **Licence for Professional Information Engineers (Italian State examination, section A)**, *Politecnico di Milano*, Milan, Italy.

2011 **Visiting PhD student**, *Institute of Communication Engineering, National Tsing-Hua University*, Hsinchu City, Taiwan R.O.C..
Research title: *The Distributed Averaging Consensus in Large Complex Networks* (Advisor Prof. C.-S. Chang).

2009 **MSc Degree in Telecommunication Engineering**, *Politecnico di Milano*, Milano, Italy, *Grade: 110/110 cum laude*.
Thesis title: *Structures for Optical Buffers Implementation* (Advisor Prof. A. Pattavina).

- 2006 **BSc Degree in Telecommunication Engineering**, *University of Catania*, Catania, Italy, *Grade: 110/110 cum laude*.
Thesis title: *Study and realization of a microstrip-line with Photonic Bandgap (PBG) filtering structure over an RT/Duroid 6010 substrate* (Advisor Prof. S. Barbarino).

Professional Experience

- 2015 **Post-Doctoral Researcher**, *Politecnico di Milano, Dept. of Electronics, Information and Bioengineering*, Milan, Italy.
Main activities: Research; Participating to research projects (national and international); Teaching; Tutoring PhD and MSc students.
- 2015 **Adjunct Professor**, *Politecnico di Milano, Dept. of Electronics, Information and Bioengineering*, Milan, Italy.
Teaching of "Communication Networks and Internet" course for 3rd year BSc students.
- 2014–2015 **Team Leader - Help Desk ADSL/VOIP**, *Sirti S.p.A.*, Milan, Italy.
Coordinating the Help Desk group of ADSL/VOIP troubleshooting for consumers' access networks. Customer's KPI analysis. Interface with Customer for KPI reports analysis and establishment of troubleshooting procedures.
- 2013–2014 **NOC Engineer**, *Sirti S.p.A.*, Milan, Italy.
ADSL/VOIP troubleshooting for consumers' access networks.
- 2013 **Post-Doctoral Researcher**, *Politecnico di Milano, Dept. of Electronics, Information and Bioengineering*, Milan, Italy.
Main activities: Research; Participating to research projects (national and international); Teaching; Tutoring PhD and MSc students.

Research and Teaching Experience

Projects

- 2016–now **New Optical Horizon**, Collaborative Project funded by *Regione Lombardia*.
- 2015–2016 **COMBO**, *CO*nvergence of fixed and Mobile *Br*oadband access/*agg*regation networks), EU FP7 Integrated Project.
- 2010–2012 **TREND**, *Towards Real Energy-efficient Network Design*), EU FP7 Network of Excellence.
- 2010–2012 **BESOS**, *Bandwidth efficiency and Energy Saving by sub-lambda Optical Switching*, National project, PRIN 2008.

Teaching

- 2015–now **Communication Networks and Internet**, *Politecnico di Milano, Milan, Italy*.
Course for 3rd year BSc students (100 hrs). Academic year 2015/2016.
- 2010–2013 **Communication Networks and Internet (Lab)**, *Politecnico di Milano, Milan, Italy*.
Lab for 3rd year BSc students (20 hrs). Academic years 2010/2011, 2011/2012, 2012/2013.

Reviewing activities

2010-now I use to serve as reviewer for the following international journals: IEEE/ACM Transactions on Networking, IEEE Transactions on Communications, IEEE Journal on Selected Areas on Communication, IEEE/OSA Journal of Lightwave Technology, IEEE/OSA Journal of Optical Communications and Networking, IEEE Communications Letters, Elsevier Optical Switching and Networking, Computer Networks, Computer Communications, ETRI Journal, Optical Fiber Technology Journal. Besides, I used to serve as TPC member and/or reviewer for (amongst the others) IEEE Globecom, ICC, HPSR, ONDM Conferences.

Invited Talks

2016 **ICGREEN 2016**, F. Musumeci, "Green Distributed Cloud Systems: a Networking Perspective", International Conference on Green IT Solutions (ICGREEN) July 6th, 2015, Milan, Italy.

Attended Conferences

2010–now ONDM 2011 (Bologna, Italy); ICC 2011 (Kyoto, Japan); ONDM 2012 (Colechester, UK); Greencom 2012 (online); ICGREEN 2015 (Milan, Italy).

Publications

International Journals

- J.12 **F. Musumeci**, C. Bellanzon, N. Carapellese, M. Tornatore, A. Pattavina, S. Goselin, "Optimal BBU placement for 5G C-RAN deployment over WDM aggregation networks", in *IEEE/OSA Journal of Lightwave Technology (JLT)*, vol. 34, n. 8, pp. 1963-1970, Apr. 2016.
- J.11 Y. Ye, F. J. Arribas, J. Elmighani, F. Idzikowski, J. Lopez, P. Monti, **F. Musumeci**, A. Pattavina, W. Van Heddeghem, "Energy-efficient resilient optical networks: Challenges and trade-offs", in *IEEE Communications Magazine*, vol. 53, n. 2, pp. 144-150, Feb. 2015.
- J.10 W. Van Heddeghem, F. Idzikowski, **F. Musumeci**, A. Pattavina, B. Lannoo, D. Colle, M. Pickavet, "A power consumption sensitivity analysis of circuit-switched versus packet-switched backbone networks", in *Computer Networks, Elsevier*, vol. 78, pp. 42-56, Feb. 2015.
- J.9 A. Pagés, M. Tornatore, **F. Musumeci**, S. Spadaro, J. Perello, A. Morea, "A Blocking Analysis for Green WDM Networks With Transponder Power Management", in *IEEE Journal of Lightwave Technology (JLT)*, vol. 32, n. 22, pp. 4261-4271, Nov. 2014.
- J.8 L. Velasco, A. Asensio, J. Ll. Berral, E. Bonetto, **F. Musumeci**, V. Lopez, "Elastic Operations in Federated Datacenters for Performance and Cost Optimization", in *Computer Communications, Elsevier*, vol. 50, pp. 142-151, Sep. 2014.
- J.7 J. L. Vizcaino, Y. Ye, V. Lopez, F. Jiménez, **F. Musumeci**, M. Tornatore, A. Pattavina, P. M. Krummrich, "Protection in Optical Transport Networks with Fixed and Flexible grid: Cost and Energy Efficiency Evaluation", in *Optical Switching and Networking Journal, Elsevier, S.I. on Optical network architecture and applications*, vol. 11, part A, pp. 55-71, Jan. 2014.

- J.6 F. Idzikowski, E. Bonetto, L. Chiaraviglio, A. Cianfrani, A. Coiro, R. Duque, F. Jiménez, E. Le Rouzic, **F. Musumeci**, W. Van Heddeghem, J. L. Vizcaino, Y. Ye, "TREND in energy-aware adaptive routing solutions", in *IEEE Communications Magazine*, vol. 51, n. 11, pp. 94-104, Nov. 2013.
- J.5 **F. Musumeci**, M. Tornatore, J. L. Vizcaino, Y. Ye, A. Pattavina, "Energy-Efficiency of Protected IP-over-WDM Networks with Sleep-mode Devices", in *IOS Journal of High Speed Networks (JHSN)*, vol. 19, n. 1, pp. 19-32, Mar. 2013.
- J.4 **F. Musumeci**, A. Pattavina, "Handling Priorities in Optical Buffers", in *IEEE Transaction on Communications*, vol. 60, n. 10, pp. 2784-2788, Oct. 2012.
- J.3 **F. Musumeci**, M. Tornatore, G. Fontana, M. Riunno, S. Bregni, A. Pattavina, "Energy-Efficiency of All-Optical Transport through Time Driven Switching", in *IET Optoelectronics Journal, Special Issue on Green Photonics*, vol. 6, n. 4, pp. 173-182, Aug 2012.
- J.2 **F. Musumeci**, M. Tornatore, A. Pattavina, "A Power Consumption Analysis for IP-Over-WDM Core Network Architectures", in *IEEE/OSA Journal of Optical Communications and Networking (JOCN)*, vol. 4, n. 2, pp. 108-117, Feb. 2012.
- J.1 S. Bregni, V. Grković, **F. Musumeci**, M. Tornatore, F. Vismara, "On the Energy Efficiency of IP-over-WDM Networks", in *IEEE Latin America Transactions (Revista IEEE America Latina)*, vol. 9, n. 4, pp. 477-483, July 2011 (Invited paper).

International Conference Proceedings

- C.27 A. Hmaity, M. Savi, **F. Musumeci**, M. Tornatore, A. Pattavina, "Virtual Network Function Placement For Resilient Service Chain Provisioning", in *IEEE International Workshop on Resilient Networks Design and Modeling (RNDM) 2016*, Halmstad, Sweden, Sep. 2016.
- C.26 D. Breuer, E. Weis, K. Grobe, S. Kraus, **F. Musumeci**, J. Torrijos Gijon, B. Skubic, "5G Transport in Future Access Network", in *European Conference and Exhibition on Optical Communications (ECOC) 2016*, Dusseldorf, Germany, Sep. 2016.
- C.25 **F. Musumeci**, M. Tornatore, A. Pattavina, "A Techno-Economic Outlook to Optical-Interface Requirements for Midhauling of 5G Small Cells", in *European Conference and Exhibition on Optical Communications (ECOC) 2016*, Dusseldorf, Germany, Sep. 2016.
- C.24 O. Ayoub, L. Pace, **F. Musumeci**, A. Pattavina, "Dynamic Routing and Bandwidth Assignment for Live Virtual Machines Migrations", in *IEEE Conference on Optical Network Design and Modeling (ONDM) 2016*, Cartagena, Spain, May 2016.
- C.23 A. Hmaity, **F. Musumeci**, M. Tornatore, "Survivable Virtual Network Mapping to Provide Content Connectivity Against Double-link Failures", in *IEEE Design of Reliable Communication Networks (DRCN) Conference 2016*, Paris, France, Mar. 2016.
- C.22 **F. Musumeci**, C. Bellanzon, N. Carapellese, M. Tornatore, A. Pattavina, S. Gosselin, "On the Placement of BBU Hotels in an Optical Access/Aggregation Network for 5G Transport", in *IEEE/OSA/SPIE Asia Communications and Photonics (ACP) Conference 2015*, Hong Kong, Nov. 2015.

- C.21 **F. Musumeci**, A. Hmaity, M. Tornatore, A. Pattavina, "Energy Efficiency in Reliable Optical Core Networks", in *IEEE online Conference on Green Communications (GreenCom) 2015*, Nov. 2015 (online).
- C.20 M. Savi, O. Ayoub, **F. Musumeci**, Z. Li, G. Verticale, M. Tornatore, "Energy-Efficient Caching for Video-on-Demand in Fixed-Mobile Convergent Networks", in *IEEE online Conference on Green Communications (GreenCom) 2015*, Nov. 2015 (online).
- C.19 M. Recalcati, **F. Musumeci**, M. Tornatore, S. Bregni, A. Pattavina, "Benefits of elastic spectrum allocation in optical networks with dynamic traffic", in *IEEE Latin-America Conference on Communications (IEEE LatinCom) 2014*, Cartagena de Indias, Colombia, Nov. 2014.
- C.18 R. Modrzejewski, L. Chiaraviglio, I. Tahiri, F. Giroire, E. Le Rouzic, E. Bonetto, **F. Musumeci**, R. Gonzalez, C. Guerrero, "Energy efficient content distribution in an ISP network", in *IEEE Global Communications Conference (GLOBECOM) 2013*, Atlanta, GA-USA, Dec. 2013.
- C.17 W. Van Heddeghem, B. Lannoo, D. Colle, M. Pickavet, **F. Musumeci**, A. Pattavina, F. Idzikowski, "Power Consumption Evaluation of Circuit-Switched Versus Packet-Switched Optical Backbone Networks", in *IEEE online Conference on Green Communications (GreenCom) 2013*, Oct. 2013 (online).
- C.16 E. Le Rouzic, R. M. Indre, L. Chiaraviglio, **F. Musumeci**, A. Pattavina, J. L. Vizcaino, Y. Ye, W. Van Heddeghem, A. Bianco, E. Bonetto, M. Meo, F. Jiménez, F. Idzikowski, R. Cuevas, "TREND big picture on energy-efficient backbone networks", in *IEEE Tyrrhenian International Workshop on Digital Communications (TIWDC) 2013*, Genoa, Italy, Sep. 2013.
- C.15 **F. Musumeci**, M. Tornatore, M. Riunno, A. Pattavina, "A Blocking Analysis for Green WDM Networks with Transponder Power Management", in *IEEE International Conference on Transparent Optical Networks (ICTON) 2013*, Cartagena, Spain, June 2013.
- C.14 **F. Musumeci**, F. Puleio, M. Tornatore, "Dynamic Grooming and Spectrum Allocation in Optical Metro Ring Networks with Flexible Grid", in *IEEE International Conference on Transparent Optical Networks (ICTON) 2013*, Cartagena, Spain, June 2013 (invited paper).
- C.13 A. Bianco, E. Bonetto, **F. Musumeci**, A. Pattavina, M. Tornatore, "CapEx/OpEx evaluation of circuit vs packet switched optical networks", in *IEEE Conference on Optical Network Design and Modelling (ONDM) 2013*, Brest, France, Apr. 2013.
- C.12 E. Le Rouzic, E. Bonetto, L. Chiaraviglio, F. Giroire, F. Idzikowski, F. Jiménez, C. Lange, J. Montalvo, **F. Musumeci**, I. Tahiri, A. Valenti, W. Van Heddeghem, Y. Ye, A. Bianco, A. Pattavina, "TREND towards more energy-efficient optical networks", in *IEEE Conference on Optical Network Design and Modelling (ONDM) 2013*, Brest, France, Apr. 2013 (invited paper).

- C.11 J. L. Vizcaino, Y. Ye, V. Lopez, F. Jimenez, R. Duque, **F. Musumeci**, A. Pattavina, P. Krummrich, "Differentiated Quality of Protection to Improve Energy Efficiency of Survivable Optical Transport Networks", in *IEEE/OSA Conference on Optical Fiber Communication, National Fiber Optic Engineers Conference (OFC/NFOEC) 2013*, Anaheim, CA-USA, Mar. 2013.
- C.10 J. L. Vizcaino, Y. Ye, F. Jimenez, R. Duque, **F. Musumeci**, M. Tornatore, P. M. Krummrich, A. Pattavina, "Quality of protection schemes with extended flexibility for improved energy efficiency in transport networks", in *IEEE Conference on Design of Reliable Communication Networks (DRCN) 2013*, Budapest, Hungary, Mar. 2013.
- C.9 J. L. Vizcaino, Y. Ye, V. Lopez, F. Jimenez, R. Duque, P. M. Krummrich, **F. Musumeci**, M. Tornatore, A. Pattavina., "Traffic and Power-Aware Protection Scheme in Elastic Optical Networks", in *IEEE NETWORKS 2012 Conference*, Rome, Italy, Oct. 2012.
- C.8 **F. Musumeci**, M. Tornatore, J. L. Vizcaino, Y. Ye, A. Pattavina, "Power-Aware Design of Protected IP-over-WDM Networks with Sleep-mode Devices", in *IEEE online Conference on Green Communications (GreenCom) 2012*, Sep. 2012 (online).
- C.7 **F. Musumeci**, D. Siracusa, G. Rizzelli, M. Tornatore, R. Fiandra, A. Pattavina, "On the Energy Consumption of IP-over-WDM Architectures", in *IEEE Conference on Communications (IEEE ICC) 2012*, Ottawa, Canada, June 2012.
- C.6 **F. Musumeci**, L. Hernandez, L. Zapata, M. Tornatore, M. Riunno, A. Pattavina, "Dynamic Routing and Resource Allocation in Time-Driven-Switched Optical Networks", in *IEEE Conference on High Performance Switching and Routing (HPSR) 2012*, Belgrade, Serbia, June 2012.
- C.5 **F. Musumeci**, M. Tornatore, R. Fiandra, A. Pattavina, "The Role of Network Topology on the Energy Efficiency of IP-over-WDM Architectures", in *IEEE Conference on Optical Network Design and Modelling (ONDM) 2012*, Colchester, England, Apr. 2012.
- C.4 **F. Musumeci**, F. Vismara, V. Grković, M. Tornatore, A. Pattavina, "On the Energy Efficiency of Optical Transport with Time Driven Switching", in *IEEE Conference on Communications (IEEE ICC) 2011*, Kyoto, Japan, June 2011.
- C.3 G. Rizzelli, **F. Musumeci**, M. Tornatore, G. Maier, A. Pattavina, "Wavelength-Aware Translucent Network Design", in *IEEE/OSA Conference on Optical Fiber Communication, National Fiber Optic Engineers Conference (OFC/NFOEC) 2011*, Los Angeles, CA-USA, Mar. 2011.
- C.2 F. Vismara, **F. Musumeci**, M. Tornatore, A. Pattavina, "A Comparative Blocking Analysis for Time-Driven-Switched Optical Networks", in *IEEE Conference on Optical Network Design and Modelling (ONDM) 2011*, Bologna, Italy, Feb. 2011.
- C.1 F. Vismara, **F. Musumeci**, V. Grkovic, M. Tornatore, S. Bregni, "On the Energy Efficiency of IP-over-WDM Networks", in *IEEE Latin-America Conference on Communications (IEEE LatinCom) 2010*, Bogotá, Colombia, Sep. 2010 (**Best Paper Awarded**)

Technical skills

Professional skills	Ethernet, OTN, SONET/SDH, WDM, IP/MPLS, STP, BGP, RIP, OSPF, VPN, GSM/UMTS/LTE, WiFi/WiMax, Silicon Photonics, Satellite Communications, Network Design and Management, Optimization, Operation Research.
Programming Languages	C, C++, Matlab, HTML, Bash Scripting.
Simulation tools	NS2, Cisco Packet Tracer, "igraph" suite for C-language, CST Microwave Studio's.
Optimization	AMPL/CPLEX.
OS	MS Windows and Mac OS suite (any version), Linux (Ubuntu and CentOS distributions), Cisco IOS.
Common applications	MS Office, OpenOffice, LaTeX, Internet Browser, e-mail Clients, Adobe Photoshop and Dreamweaver, Autocad.

Languages

Italian	Native	
English	Fluent (Cambridge FCE Certification awarded in 2007)	<i>CEFR level B2</i>

I hereby authorize the use of personal data contained in my curriculum vitae based on art. 13 Lgs. Decree 196/2003.

June 15, 2016

Francesco Musumeci