

# Arnaud Legout

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Citizenship: French  
Date of birth: June, 10th 1973

## EXPERIENCE

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Oct 2004-today **Research Scientist, INRIA, France**

### *Research interests*

- Peer-to-peer networks  
This project, on the evaluation of BitTorrent, is a joint work with the Institut Eurecom and UCLA. The methodology is based on instrumentation, experimentation and measurement. Our most notable findings are: i) BitTorrent efficiency is close to optimality (ACM SIGCOMM/USENIX IMC'2006), ii) The content provider provisioning will determine the BitTorrent sharing incentive, thus the robustness of BitTorrent to free riders (ACM SIGMETRICS'2007), iii) It is possible to localize BitTorrent traffic without penalizing end-users and with huge inter-ISP bandwidth savings (Computer Networks). The page of this project is: [http://planete.inria.fr/p2p\\_cd](http://planete.inria.fr/p2p_cd)
- Privacy in the Internet  
Bluebear is a project focused on the privacy threats in the Internet. This work in collaboration with the Polytechnic Institute of NYU is based on large scale measurements and the evaluation of the architecture of Internet protocols. One of our main achievement are the following. i) We show that we can track without any dedicated infrastructure most BitTorrent users. Specifically, we succeeded to monitor (by IP address) the downloading activity of 148M unique BitTorrent users downloading 1.5M contents for 103 days (LEET'2010). ii) We show that using Tor does not help protecting your privacy (LEET'2011). iii) We show that we can exploit peer-to-peer VoIP systems to map a social identity to a network activity. In particular, we show that we can track VoIP users mobility and BitTorrent downloads. The page of this project is: <http://planete.inria.fr/bluebear>
- Chaotic behaviors in computer networks  
Chaos is a prominent feature of complex systems and dynamical systems theory provides methods for analyzing this kind of behavior. The goal of this project is to explore the impact of complex dynamics on the efficiency and fairness of Internet protocols. This work is in collaboration with Physicists.

Dec 2000-Oct 2004

**Architect, Castify Networks, France**

Castify Networks is a startup founded in 2000 that develops a software platform for Content Delivery Networks (CDNs).

*Technical work*

This work was on the design of major components of the Castify products and was the object of two European patents. Achievements are:

- A content lookup and meta-content lookup mechanism, which enables finding the best content (according to the meta-content rules) in few memory lookups for millions of end-users, millions of contents, and thousands of servers. All the data structures fit in the memory of a standard PC.
- An authentication protocol, which preserves from link hi-jacking, enforces a predefined path of server to get a content, but does not require any communication among the servers during the authentication process. Therefore, it is highly scalable.
- A data distribution platform, which enables content delivery on unicast, multicast, and satellite networks in a scalable and transparent way.
- An encryption protocol in a one way delivery environment, which enables secure data distribution in any number of subgroups and perfect forward secrecy without feedback channel.
- A feedback suppression protocol in a one way delivery environment, which enables scalable feedback suppression without multicast connectivity among the receivers and without complex timer computation.

*Management work*

This work was on the QA strategy at Castify. My effort was oriented toward the test, the development process, and the communication strategy. Achievements are:

- The creation and management of a development workflow. This workflow covered all the process from the early implementation to the delivery of a release.
- The creation and management of a testbed. I defined a process to use the testbed and created tools to improve its management and usability.
- The creation and management of a weekly department meeting. I created and was in charge of a periodic meeting where technical and organizational issues were addressed.
- The creation of a project management tool based on an extension of scarab an open source leading issue tracking system.

Nov 1997-Nov 2000

**Research Assistant, Institut Eurecom, France**

The Institut Eurecom is an engineering school and a research center in communications systems created in 1991 in Sophia Antipolis that is part of the GET (Groupement des écoles de télécommunications).

*Research achievements*

This work was on multicast congestion control for best effort networks. Achievements are:

- The design of a theoretical framework for the conception of optimal congestion control protocols.
- The design and implementation (in ns) of a new congestion control protocol called PLM for multicast transmissions. This protocol outperformed all the existing multicast congestion control protocols. This protocol was a validation of the theoretical framework.
- The design of a bandwidth allocation policy for multicast transmissions that improves the user satisfaction without a significant decrease in fairness.
- The study of popular congestion control protocols (RLM and RLC) that exhibited for the first time major pathological behaviors.

## RELEVANT PUBLICATIONS

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- 2011 **Network Characteristics of Video Streaming Traffic.** Ashwin Rao, Yeon-sup Lim, Chadi Barakat, Arnaud Legout, Don Towsley, and Walid Dabbous. In *Proc. of ACM CoNEXT'11*, Dec. 6–9, 2011, Tokyo, Japan.
- I Know Where You are and What You are Sharing: Exploiting P2P Communications to Invade Users' Privacy.** Stevens Le Blond, Chao Zhang, Arnaud Legout, Keith Ross, and Walid Dabbous. In *Proc. of ACM SIGCOMM/USENIX IMC'11*, Nov. 2–3, 2011, Berlin, Germany.
- Network Non-Neutrality Debate: An Economic Analysis.** Eitan Altman, Arnaud Legout, Yue-dong Xu. In *Proc. of IFIP Networking'11*, May 9–13, 2011, Valencia, Spain.
- One Bad Apple Spoils the Bunch: Exploiting P2P Applications to Trace and Profile Tor Users.** Stevens Le Blond, Pere Manils, Abdelberi Chaabane, Mohamed Ali Kaafar, Claude Castelluccia, Arnaud Legout, Walid Dabbous. In *Proc. of LEET'11*, March 29, 2011, Boston, MA, USA.
- 2010 **Pushing BitTorrent Locality to the Limit.** Stevens Le Blond, Arnaud Legout, Walid Dabbous. *Computer Networks*, doi:10.1016/j.comnet.2010.09.014, 2010.
- Can Realistic BitTorrent Experiments Be Performed on Clusters?.** Ashwin Rao, Arnaud Legout, Walid Dabbous. In *Proc. of P2P'10*, August 25–27, 2010, Delft, Netherlands.
- Spying the World from your Laptop - Identifying and Profiling Content Providers and Big Downloaders in BitTorrent.** Stevens Le Blond, Arnaud Legout, Fabrice Lefessant, Walid Dabbous, Mohamed Ali Kaafar. In *Proc. of LEET'10*, April 27, 2010, San Jose, CA, USA.
- 2009 **Swarming Overlay Construction Strategies.** Anwar Al Hamra, Nikitas Liogkas, Arnaud Legout, Chadi Barakat. In *Proc. of ICCCN'2009*, August 2–6, 2009, San Francisco, CA, USA.
- 2008 **Small Is Not Always Beautiful.** P. Marciniak, N. Liogkas, A. Legout, E. Kohler *IPTPS'2008*, Tampa Bay, FL, USA, February 2008.
- 2007 **Clustering and Sharing Incentives in BitTorrent Systems.** A. Legout, N. Liogkas, E. Kohler, L. Zhang. In *proceedings of ACM SIGMETRICS'2007*, San Diego, CA, USA, June 2007.
- 2006 **Rarest First and Choke Algorithms Are Enough.** A. Legout, G. Urvoy-Keller, and P. Michiardi. In *Proceedings of ACM SIGCOMM/USENIX IMC'2006*, Rio de Janeiro, Brazil, October 2006.
- 2005 **Understanding BitTorrent: An Experimental Perspective.** A. Legout, G. Urvoy-Keller, and P. Michiardi. *Technical Report (inria-00000156, version 2 - 19 July 2005)*, INRIA, Sophia Antipolis, July 2005.
- 2002 **Revisiting the Fair Queueing Paradigm for End-to-End Congestion Control.** A. Legout, and E. W. Biersack. *IEEE Network Magazine*, 16(5), September 2002.
- 2001 **Bandwidth Allocation Policies for Unicast and Multicast Flows.** A. Legout, J. Nonnenmacher, and E. W. Biersack. *IEEE/ACM Transactions on Networking*, 9(4), August 2001.
- 2000 **Pathological Behaviors for RLM and RLC.** A. Legout, and E. W. Biersack. In *Proceedings of NOSSDAV'2000*, Chapel Hill, North Carolina, USA, June 2000.
- PLM: Fast Convergence for Cumulative Layered Multicast Transmission Schemes.** A. Legout, and E. W. Biersack. In *Proceedings of ACM SIGMETRICS'2000*. Santa Clara, CA, USA, June 2000.
- 1999 **Bandwidth Allocation Policies for Unicast and Multicast Flows.** A. Legout, J. Nonnenmacher, and E. W. Biersack. In *Proceedings of IEEE INFOCOM'99*. New York, NY, USA, March 1999.

## PATENTS

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- 2004 **Process for selecting a server in a content delivery network.** A. Legout, L. Anliker, J. Hummes. *EPI322094A1*, Granted September 2004. *WO03055178*, Published Application July 2003.
- 2003 **A process for providing access of a client to a content provider server under control of a resource locator server.** A. Legout, J. Hummes. *EPI278112B1*, Granted May 2003. *JP2003122724*, Published Application July 2003.

## TEACHING

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- Course Material      Arnaud Legout. **Peer-to-peer applications?** Slides (*cel-00544132, version 1, - 7 December 2010*), INRIA, Sophia Antipolis, December 2010. License CC BY-NC-SA.  
Arnaud Legout. **How to Give a Good Talk?** Slides (*cel-00529505, version 1, - 26 October 2010*), INRIA, Sophia Antipolis, October 2010. License CC BY-NC-SA.
- 2011
- Taught a course on *peer-to-peer file replication* (graduate level, master Ubinet, UNSA).
  - Taught a course on *peer-to-peer file replication* (graduate level, master RTM, IUP GMI Avignon).
- 2010
- Taught a course on *peer-to-peer file replication* (graduate level, master Ubinet, UNSA).
  - Taught a course on *peer-to-peer file replication* (graduate level, master RTM, IUP GMI Avignon).
- 2009
- Taught a course on *peer-to-peer file replication* (graduate level, master Ubinet, UNSA).
  - Taught a course on *peer-to-peer file replication* (graduate level, master IFI, UNSA).
  - Taught a course on *peer-to-peer file replication* (graduate level, master RTM, IUP GMI Avignon).
  - Taught a course on *peer-to-peer file replication* (graduate level, master TSM, UNSA).
- 2008
- Taught a course (short version) on *peer-to-peer file replication* (graduate level, ETH Zurich, Switzerland).
  - Taught a course on *peer-to-peer file replication* (graduate level, master RTM, IUP GMI Avignon).
  - Taught a course on *peer-to-peer file replication* (graduate level, master RSD, UNSA).
  - Taught a course on *peer-to-peer file replication* (graduate level, master TIM, UNSA).
  - Taught a course on *computer networks* (undergraduate level, IUT GTR).
- 2007
- Taught a course on *peer-to-peer file replication* (graduate level, master RSD, UNSA).
  - Taught a course on *peer-to-peer file replication* (graduate level, master TIM, UNSA).
  - Taught and supervised laboratory sessions on *C system programming on Unix* (undergraduate level, IUT GTR).
- 2006
- Taught a course on *peer-to-peer file replication* (graduate level, master RSD, UNSA).
  - Taught a course on *computer networks* (undergraduate level, IUT GTR).
  - Taught and supervised laboratory sessions on *C system programming on Unix* (undergraduate level, IUT GTR).
- 2005
- Taught and supervised laboratory sessions on *C system programming on Unix* (undergraduate level, IUT GTR).
- 1998-2000
- Assisted in teaching a course on *High-Speed Networking and Internet Protocols* (graduate level, Institut Eurecom).
  - Taught and supervised laboratory sessions on *ATM, error and flow control mechanisms, advanced TCP, advanced scheduling and buffer* (graduate level, Institut Eurecom) .

## PROFESSIONAL ACTIVITIES

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- **TPC Chair**
  - ICCCN'2009 P2P track (co-chair with Yi Cui)
- **Technical Program Committee**
  - IPTPS'2009
  - CoNEXT'2008.
  - P2P-TV Workshop 2007.
  - ACM Sigcomm'07 PC heavy.
  - ACM Sigcomm'06 PC light.
  - ACM Sigcomm'05 shadow PC.
- **Reviewer**
  - *Journals*: IEEE/ACM Transactions on Networking, IEEE/ACM Transactions on Computers, IEEE Transactions on Parallel and Distributed Systems, IEEE Network, Computer Communications, ACM SIGCOMM CCR, Computer Networks.
  - *Conferences*: IEEE Infocom, ACM Sigmetrics.
  - *Workshops*: HPSR'07.
- **Other Activities**
  - Reviewer of STREP projects for the European Commission (2009, 2010).
  - Member of the scientific committee for the summer school RESCOM'2008.
  - External expert for Eurecom students master thesis defense (2004 - 2009).
  - Expert Conseil Régional d'Aquitaine (2006).
  - ACM Member (2010-present).
  - IEEE Member (1997-present).

## MENTORING AND SUPERVISING STUDENTS

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### Post-doc

- Dongliang Guan (Apr. 2005 – Oct. 2005, University of Shanghai JiaoTong, China).

### Ph.D. students

- Ashwin Rao (Sep. 2009 – Sep. 2012, co-supervised with Walid Dabbous)
- Stevens Le Blond (Sep. 2007 – Apr. 2011, co-supervised with Walid Dabbous)

### Master students

- Ludovic Fardel (Feb. 2009 – Aug. 2009, EPFL, Lauzanne, Switzerland).
- Guy Hugot-Derville (Apr. 2008 – Jul. 2008, École Polytechnique, Palaiseau, France).
- Pawel Marciniak (Mar. 2007 – Jul. 2007, M.Sc., Poznan University of Technology, Poland).
- Mounir Chahid (Apr. 2007 – Jul. 2007, M1 MPRI, École Polytechnique, Palaiseau, France).
- Edmond Abboud (Jan. 2006 – Jun. 2006, Master RSD, Sophia Antipolis, France).
- Youssef Zaki (Mar. 2006 – Sep 2006, Master RSD, Sophia Antipolis, France).
- Clement Perrin (Apr. 2006 – Jun. 2006, École Polytechnique, Palaiseau, France).
- Vincent Charpin (Apr. 2005 – Jun. 2005, École Polytechnique, Palaiseau, France).

## EDUCATION

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- Jan 2012            **Habilitation diriger les recherches**  
Université de Nice-Sophia Antipolis.  
Title: "Efficacité et vie privée : de BitTorrent Skype".
- Nov 1997-Oct 2000    **Ph.D. in Communication Systems**  
Université de Nice-Sophia Antipolis.  
Title: "Contrôle de congestion multipoint pour les réseaux best effort".  
Advisor: Prof. Ernst W. Biersack. Institut Eurecom.
- 1996-1997            **Military service**
- 1995-1996            **Postgraduate School qualification in Networking and Distributed Systems**  
Université de Nice-Sophia Antipolis.
- 1994-1995            **Master degree in mathematics**  
Université de Nice-Sophia Antipolis.

## LANGUAGES

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- **French** : Native language.
- **English** : Working language.

## COMPUTER SKILLS

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- **Languages**: Python, C, Java, JavaScript, XML, XSL, Tcl, OTcl, Shell programming, HTML, awk.
- **Systems**: Linux, Windows.
- **Softwares**: Matlab, Network Simulator (ns), Scarab (issue/bug tracking tool), LaTeX, Emacs.
- **Networking**: TCP/IP, IP-Multicast, IP lookup, scheduling and buffer management mechanisms, multicast and unicast: routing protocols, congestion control protocols, reliable protocols; cryptography, quantum networks, peer-to-peer protocols, DHT.