

# Publications by Christian Bettstetter

July 15, 2010

---

## Journals and Magazines

---

— Articles —

- [1] C. Bettstetter, H.-J. Vögel, and J. Eberspächer, “GSM phase 2+ general packet radio service GPRS: Architecture, protocols, and air interface,” *IEEE Communications Surveys*, vol. 2, third quarter 1999. <http://www.comsoc.org/livepubs/surveys/>.
- [2] C. Weiß, C. Bettstetter, and S. Riedel, “Code construction and decoding of parallel concatenated tail-biting codes,” *IEEE Trans. Inform. Theory*, vol. 47, pp. 368–388, Jan. 2001.
- [3] C. Bettstetter, “Mobility modeling in wireless networks: Categorization, smooth movement, and border effects,” *ACM Mobile Computing and Commun. Rev.*, vol. 5, pp. 55–67, July 2001.
- [4] W. Kellerer, C. Bettstetter, C. Schwingenschlögl, P. Sties, K.-E. Steinberg, and H.-J. Vögel, “(Auto)Mobile communication in a heterogeneous and converged world,” *IEEE Personal Commun. Mag.*, vol. 8, pp. 41–47, Dec. 2001.
- [5] C. Bettstetter, G. Resta, and P. Santi, “The node distribution of the random waypoint mobility model for wireless ad hoc networks,” *IEEE Trans. Mobile Comput.*, vol. 2, pp. 257–269, July–September 2003.
- [6] C. Prehofer, J. Hillebrand, P. Hofmann, P. Mendes, Q. Wei, and C. Bettstetter, “Active IP networking: Towards self-organized ambient communication,” *NTT DoCoMo Techn. Journal*, vol. 6, June 2004.
- [7] C. Bettstetter, “On the connectivity of ad hoc networks,” *The Computer Journal*, vol. 47, pp. 432–447, July 2004. Oxford University Press.

- [8] C. Bettstetter, H. Hartenstein, and X. Pérez-Costa, “Stochastic properties of the random waypoint mobility model,” *ACM Wireless Networks*, vol. 10, pp. 555–567, Sept. 2004.
- [9] C. Prehofer and C. Bettstetter, “Self-organization in communication networks: Principles and design paradigms,” *IEEE Commun. Mag.*, vol. 43, pp. 78–85, July 2005.
- [10] C. Bettstetter and C. Hartmann, “Connectivity of wireless multihop networks in a shadow fading environment,” *ACM Wireless Networks*, vol. 11, pp. 571–589, Sept. 2005.
- [11] R. Vilzmann, C. Bettstetter, and C. Hartmann, “BeamMAC: A new paradigm for medium access in wireless networks,” *Intern. Journal of Electronics and Communications (AEÜ)*, vol. 60, pp. 3–7, Jan. 2006.
- [12] P. Hofmann, C. Bettstetter, and C. Prehofer, “Performance impact of multihop handovers in an IP-based multihop radio access network,” *ACM Mobile Computing and Commun. Rev.*, vol. 10, pp. 13–25, Apr. 2006.
- [13] E. Carlson, C. Prehofer, C. Bettstetter, H. Karl, and A. Wolisz, “A distributed end-to-end reservation protocol for IEEE 802.11-based wireless mesh networks,” *IEEE J. Select. Areas Commun.*, vol. 24, pp. 2018–2027, Nov. 2006.
- [14] A. Tyrrell, G. Auer, and C. Bettstetter, “Biologically inspired synchronization for wireless networks,” in *Advances in Biologically Inspired Information Systems: Models, Methods, and Tools* (F. Dressler and I. Carreras, eds.), vol. 69 of *Studies in Computational Intelligence*, pp. 47–62, Springer, 2007.
- [15] W. Elmenreich, N. Marchenko, H. Adam, C. Hofbauer, G. Brandner, C. Bettstetter, and M. Huemer, “Building blocks of cooperative relaying in wireless systems,” *e & i Elektrotechnik und Informationstechnik, Special Issue on Networked Embedded Systems*, vol. 126, pp. 353–359, Oct. 2008.
- [16] A. Tyrrell, G. Auer, and C. Bettstetter, “Emergent slot synchronization in wireless networks,” *IEEE Trans. Mobile Comput.*, vol. 9, pp. 719–732, May 2010.

— **Letters** —

- [17] C. Bettstetter, “Topology properties of ad hoc networks with random waypoint mobility,” *ACM Mobile Computing and Commun. Rev.*, vol. 7, pp. 50–52, July 2003.
- [18] X. Pérez-Costa, C. Bettstetter, and H. Hartenstein, “Toward a mobility metric for comparable and reproducible results in ad hoc networks research,” *ACM Mobile Computing and Commun. Rev.*, vol. 7, pp. 58–60, Oct. 2003.

---

**Books**

---

- [19] J. Eberspächer, H.-J. Vögel, and C. Bettstetter, *GSM — Global System for Mobile Communication. Vermittlung, Dienste und Protokolle in digitalen Mobilfunknetzen*. Teubner, 3rd ed., Jan. 2001.
- [20] J. Eberspächer, H.-J. Vögel, and C. Bettstetter, *GSM — Switching, Services, and Protocols*. Wiley, 2nd ed., Mar. 2001.
- [21] C. Bettstetter, *Mobility Modeling, Connectivity, and Adaptive Clustering in Ad Hoc Networks*. PhD thesis, Technische Universität München, Germany, Oct. 2003.
- [22] J. Eberspächer, H.-J. Vögel, C. Bettstetter, and C. Hartmann, *GSM — Architecture, Protocols and Services*. Wiley, 3rd ed., Jan. 2009.

---

**Book Chapters**

---

- [23] J. Hagenauer, J. F. Barros, C. Bettstetter, and S. Jauck, “Three years of experience with an international graduate program at TU München,” in *Educating the Engineer for the 21st Century* (D. Weichert, B. Rauhut, and R. Schmidt, eds.), Kluwer Academic Publishers, Nov. 2001.
- [24] C. Bettstetter and C. Hartmann, “GSM digital cellular communication system,” in *Encyclopedia of Telecommunications* (J. G. Proakis, ed.), Wiley, Dec. 2002.

- [25] C. Bettstetter and C. Hartmann, “General packet radio service (GPRS),” in *Encyclopedia of Telecommunications* (J. G. Proakis, ed.), Wiley, Dec. 2002.
- [26] A. Sarma, C. Bettstetter, and S. Dixit, “Self-organization in communication networks,” in *Technologies for the Wireless Future: Wireless World Research Forum (WWRF)* (R. Tafazolli, ed.), vol. 2, ch. 9, pp. 423–452, Wiley, June 2006.
- [27] C. Prehofer, C. Bettstetter, and J. Widmer, “Mobile communication networks,” in *Towards 4G Technologies: Services with Initiative* (H. Berndt, ed.), ch. 2, pp. 17–50, Wiley, Feb. 2008.

---

## Conferences

---

- [28] C. Weiß, C. Bettstetter, S. Riedel, and D. J. Costello, “Turbo decoding with tail-biting trellises,” in *Proc. URSI Intern. Symp. on Signals, Systems, and Electronics (ISSSE)*, (Pisa, Italy), pp. 343–348, Oct. 1998.
- [29] C. Bettstetter, “Global wireless Internet access with GPRS,” in *Proc. EUNICE Open European Summer School*, (Barcelona, Spain), pp. 151–162, Sept. 1999.
- [30] C. Bettstetter, A. Riedl, and G. Geßler, “Interoperation of Mobile IPv6 and Protocol Independent Multicast Dense Mode,” in *Proc. Intern. Conf. on Parallel Processing (ICPP), Workshop on Wireless Networks and Mobile Computing*, (Toronto, Canada), pp. 531–539, Aug. 2000.
- [31] C. Bettstetter, “Toward Internet-based car communications: On some system architecture and protocol aspects,” in *Proc. EUNICE Open European Summer School*, (Twente, Netherlands), Sept. 2000.
- [32] C. Bettstetter and C. Renner, “A comparison of service discovery protocols and implementation of the service location protocol,” in *Proc. EUNICE Open European Summer School*, (Twente, Netherlands), Sept. 2000.
- [33] C. Bettstetter and J. Xi, “Mobility modeling and analysis of adaptive clustering algorithms in ad hoc networks,” in *Proc. European Personal Mobile Commun. Conf. (EPMCC)*, (Vienna, Austria), Feb. 2001.

- [34] C. Bettstetter, "Smooth is better than sharp: A random mobility model for simulation of wireless networks," in *Proc. ACM Intern. Workshop on Modeling, Analysis, and Simulation of Wireless and Mobile Systems (MSWiM)*, (Rome, Italy), July 2001.
- [35] C. Bettstetter and O. Krause, "On border effects in modeling and simulation of wireless ad hoc networks," in *Proc. IEEE Intern. Conf. on Mobile and Wireless Commun. Networks (MWCN)*, (Recife, Brazil), Aug. 2001.
- [36] E. Jåsund, C. Bettstetter, and C. Schwingenschlögl, "A service browser for the service location protocol version 2 (SLPv2)," in *Proc. EUNICE Open European Summer School*, (Paris, France), Sept. 2001.
- [37] M. Vettorello, C. Bettstetter, and C. Schwingenschlögl, "Some notes on security in the service location protocol version 2 (SLPv2)," in *Proc. European Conf. on Computer Supported Cooperative Work (ECSCW), Workshop on Ad hoc Communications*, (Bonn, Germany), Sept. 2001.
- [38] C. Bettstetter and R. Krausser, "Scenario-based stability analysis of the distributed mobility-adaptive clustering (DMAC) algorithm," in *Proc. ACM Intern. Symp. on Mobile Ad Hoc Networking and Computing (MobiHoc)*, (Long Beach, USA), Oct. 2001.
- [39] C. Bettstetter and S. König, "On the message and time complexity of a distributed mobility-adaptive clustering algorithm in wireless ad hoc networks," in *Proc. European Wireless (EW)*, (Florence, Italy), Feb. 2002.
- [40] C. Bettstetter and C. Wagner, "The spatial node distribution of the random waypoint mobility model," in *Proc. German Workshop on Mobile Ad Hoc Networks (WMAN)*, (Ulm, Germany), Mar. 2002.
- [41] J. Xi and C. Bettstetter, "Wireless multi-hop Internet access: Gateway discovery, routing, and addressing," in *Proc. Intern. Conf. on Third Generation Wireless and Beyond (3Gwireless)*, (San Francisco, USA), May 2002.
- [42] C. Bettstetter, "On the minimum node degree and connectivity of a wireless multihop network," in *Proc. ACM Intern. Symp. on Mobile Ad Hoc Networking and Computing (MobiHoc)*, (Lausanne, Switzerland), June 2002.

- [43] C. Bettstetter and J. Zangl, “How to achieve a connected ad hoc network with homogeneous range assignment: An analytical study with consideration of border effects,” in *Proc. IEEE Intern. Conf. on Mobile and Wireless Commun. Networks (MWCN)*, (Stockholm, Sweden), Sept. 2002.
- [44] C. Bettstetter, “On the connectivity of wireless multihop networks with homogeneous and inhomogeneous range assignment,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Vancouver, Canada), Sept. 2002.
- [45] C. Bettstetter, H. Hartenstein, and X. Pérez-Costa, “Stochastic properties of the random waypoint mobility model: Epoch length, direction distribution, and cell change rate,” in *Proc. ACM Intern. Workshop on Modeling, Analysis, and Simulation of Wireless and Mobile Systems (MSWiM)*, (Atlanta, USA), Sept. 2002.
- [46] T. Kosch, C. Schwingenschlögl, and C. Bettstetter, “Situative IP-basierte Fahrerinformationssysteme: Szenarien, Routing und prototypische Realisierung,” in *Proc. VDE Conf. 'NetWorlds'*, (Dresden, Germany), Oct. 2002.
- [47] C. Bettstetter and C. Moser, “Simulationsbasierte Konnektivitätsanalyse von gleich- und normalverteilten drahtlosen Sensornetzen,” in *Proc. ITG/GI Conf. on 'Kommunikation in Verteilten Systemen' (KiVS)*, (Leipzig, Germany), Feb. 2003.
- [48] C. Bettstetter and B. Friedrich, “Time and message complexities of the generalized distributed mobility-adaptive clustering (GDMAC) algorithm in wireless multihop networks,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Jeju, Korea), Apr. 2003.
- [49] C. Bettstetter and J. Eberspächer, “Hop distances in homogeneous ad hoc networks,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Jeju, Korea), Apr. 2003.
- [50] C. Bettstetter and C. Hartmann, “Connectivity of wireless multihop networks in a shadow fading environment,” in *Proc. ACM Intern. Workshop on Modeling, Analysis, and Simulation of Wireless and Mobile Systems (MSWiM)*, (San Diego, USA), pp. 28–32, Sept. 2003.
- [51] C. Bettstetter and C. Prehofer, “Toward self-organization in mobile communication networks,” in *Proc. Wireless World Research Forum (WWRFF) meeting*, (Beijing, China), Feb. 2004.

- [52] C. Bettstetter, “The cluster density of a distributed clustering algorithm in ad hoc networks,” in *Proc. IEEE Intern. Conf. on Communications (ICC)*, (Paris, France), June 2004.
- [53] C. Bettstetter, “Failure-resilient ad hoc and sensor networks in a shadow fading environment,” in *Proc. IEEE/IFIP Intern. Conf. on Dependable Systems and Networks (DSN), Workshop on Dependability Issues in Wireless Ad Hoc Networks and Sensor Networks (DIWANS)*, (Florence, Italy), June 2004.
- [54] E. Carlson, C. Bettstetter, H. Karl, C. Prehofer, and A. Wolisz, “Distributed maintenance of resource reservation paths in multihop 802.11 networks,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Los Angeles, USA), Sept. 2004.
- [55] P. Hofmann, C. Bettstetter, J. Wehren, and C. Prehofer, “Performance impact of mobility in an emulated IP-based multihop radio access network,” in *Proc. IEEE Intern. Conf. on Mobile and Wireless Commun. Networks (MWCN)*, (Paris, France), Oct. 2004.
- [56] E. Carlson, C. Bettstetter, C. Prehofer, and A. Wolisz, “A performance comparison of QoS approaches for ad hoc networks: 802.11e versus distributed resource allocation,” in *Proc. European Wireless (EW)*, (Nicosia, Cyprus), Apr. 2005.
- [57] A. Joseph, S. Banerjee, C. Bettstetter, E.-K. Lua, M. Meo, P. Mähönen, M. Papadopouli, and M. van Steen, “Modeling and performance evaluation of P2P MANET,” in *Proc. Dagstuhl Seminar on Peer-to-Peer Mobile Ad Hoc Networks*, (Dagstuhl, Germany), Apr. 2005.
- [58] C. Bettstetter, C. Hartmann, and C. Moser, “How does randomized beamforming improve the connectivity of ad hoc networks?,” in *Proc. IEEE Intern. Conf. on Communications (ICC)*, (Seoul, Korea), May 2005.
- [59] R. Vilzmann and C. Bettstetter, “A survey on MAC protocols for ad hoc networks with directional antennas,” in *Proc. EUNICE Open European Summer School*, (Colmenarejo, Spain), July 2005.
- [60] R. Vilzmann, C. Bettstetter, and C. Hartmann, “On the impact of beamforming on mutual interference in wireless mesh networks,” in *Proc. IEEE Workshop on Wireless Mesh Networks (WiMesh)*, (Santa Clara, USA), Sept. 2005.

- [61] R. Vilzmann, C. Bettstetter, D. Medina, and C. Hartmann, “Hop distances and flooding in wireless multihop networks with randomized beamforming,” in *Proc. ACM/IEEE Intern. Symp. on Modeling, Analysis, and Simulation of Wireless and Mobile Systems (MSWiM)*, (Montreal, Canada), Oct. 2005.
- [62] P. Hofmann, K. Kuladinithi, A. Timm-Giel, C. Görg, C. Bettstetter, F. Capman, and C. Toulosy, “Are IEEE 802 wireless technologies suited for fire fighters?,” in *Proc. European Wireless (EW)*, (Athens, Greece), Apr. 2006.
- [63] A. Tyrrell, G. Auer, and C. Bettstetter, “Synchronization inspired from nature for wireless meshed networks,” in *Proc. Intern. Conf. on Wireless Communications, Networking, and Mobile Computing*, (Wuhan, China), Sept. 2006.
- [64] A. Tyrrell, G. Auer, and C. Bettstetter, “Fireflies as role models for synchronization in ad hoc networks,” in *Proc. Intern. Conf. on Bio-Inspired Models of Network, Information, and Computing Systems (BIONETICS)*, (Cavalese, Italy), Dec. 2006.
- [65] C. Bettstetter, M. Gyarmati, and U. Schilcher, “An inhomogeneous node distribution and its stochastic properties,” in *Proc. ACM/IEEE Intern. Symp. on Modeling, Analysis, and Simulation of Wireless and Mobile Systems (MSWiM)*, (Chania, Greece), pp. 400–404, Oct. 2007.
- [66] U. Schilcher, M. Gyarmati, C. Bettstetter, Y. W. Chung, and Y. H. Kim, “Measuring inhomogeneity in spatial distributions,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Marina Bay, Singapore), May 2008.
- [67] S. Crisóstomo, J. Barros, and C. Bettstetter, “Flooding the network: Multipoint relays versus network coding,” in *Proc. IEEE Intern. Conf. on Circuits and Systems for Communications (ICCSC)*, (Shanghai, China), May 2008.
- [68] H. Adam, C. Bettstetter, and S. M. Senouci, “Adaptive relay selection in cooperative wireless networks,” in *Proc. IEEE Intern. Symp. on Personal, Indoor and Mobile Radio Communications (PIMRC)*, (Cannes, France), Sept. 2008.
- [69] C. Bettstetter, G. Brandner, and R. Vilzmann, “On colliding first messages in slotted ALOHA,” in *Proc. IEEE Intern. Symp. on Personal,*

*Indoor and Mobile Radio Communications (PIMRC)*, (Cannes, France), Sept. 2008.

- [70] M. Quaritsch, E. Stojanovski, C. Bettstetter, G. Friedrich, H. Hellwagner, B. Rinner, H. Hofbaur, and M. Shah, “Collaborative microdrones: Applications and research challenges,” in *Proc. Intern. Conf. on Autonomous Computing and Commun. Systems (Autonomics)*, (Turin, Italy), Sept. 2008.
- [71] A. Tyrrell, G. Auer, and C. Bettstetter, “On the accuracy of firefly synchronization with delays,” in *Intern. Symp. on Applied Sciences in Biomedical and Communication Technologies (ISABEL)*, (Aalborg, Denmark), Oct. 2008.
- [72] S. Crisóstomo, J. Barros, and C. Bettstetter, “Network coding with shortcuts,” in *Proc. IEEE Intern. Conf. on Communication Systems (ICCS)*, (Guangzhou, China), Nov. 2008.
- [73] A. Tyrrell, G. Auer, and C. Bettstetter, “A synchronization metric for meshed networks of pulse-coupled oscillators,” in *Proc. Intern. Conf. on Bio-Inspired Models of Network, Information, and Computing Systems (BIONETICS)*, (Hyogo, Japan), Nov. 2008.
- [74] M. Gyarmati, U. Schilcher, G. Brandner, C. Bettstetter, Y. W. Chung, and Y. H. Kim, “Impact of random mobility on the inhomogeneity of spatial distributions,” in *Proc. IEEE Global Commun. Conf. (GLOBECOM)*, (New Orleans, LA, USA), Nov. 2008.
- [75] R. Holzer, H. de Meer, and C. Bettstetter, “On autonomy and emergence in self-organizing systems,” in *Proc. Intern. Workshop on Self-Organizing Systems (IWSOS)*, (Vienna, Austria), Dec. 2008.
- [76] H. Adam, C. Bettstetter, and S. M. Senouci, “Multi-hop-aware cooperative relaying,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Barcelona, Spain), Apr. 2009.
- [77] G. Brandner, U. Schilcher, M. Gyarmati, and C. Bettstetter, “Non-colliding first messages in slotted ALOHA: Further insights toward a practical solution,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Barcelona, Spain), Apr. 2009.
- [78] N. Marchenko, C. Bettstetter, and E. Yanmaz, “On radio resource allocation in proactive cooperative relaying,” in *Proc. IEEE Workshop on*

*Cooperative Mobile Networks (CoCoNet)*, (Dresden, Germany), June 2009.

- [79] S. Crisóstomo, U. Schilcher, C. Bettstetter, and J. Barros, “Analysis of probabilistic flooding: How do we choose the right coin?,” in *Proc. IEEE Intern. Conf. on Communications (ICC)*, (Dresden, Germany), June 2009.
- [80] J. Klinglmayr, C. Bettstetter, and M. Timme, “Globally stable synchronization by inhibitory pulse coupling,” in *Proc. Intern. Symp. on Applied Sciences in Biomedical and Communication Technologies (ISABEL)*, (Bratislava, Slovak Republic), Nov. 2009.
- [81] H. Adam, W. Elmenreich, C. Bettstetter, and S. M. Senouci, “CoRe-MAC: a MAC-protocol for cooperative relaying in wireless networks,” in *Proc. IEEE Global Commun. Conf. (GLOBECOM)*, (Honolulu, Hawaii), Nov. 2009.
- [82] N. Marchenko, E. Yanmaz, H. Adam, and C. Bettstetter, “Selecting a spatially efficient cooperative relay,” in *Proc. IEEE Global Commun. Conf. (GLOBECOM)*, (Honolulu, Hawaii), Nov. 2009.
- [83] W. Elmenreich, R. D’Souza, C. Bettstetter, and H. de Meer, “A survey of models and design methods for self-organizing networked systems,” in *Proc. Intern. Workshop on Self-Organizing Systems (IWSOS)*, (Zürich, Switzerland), Dec. 2009.
- [84] G. Brandner, U. Schilcher, and C. Bettstetter, “Cooperative relaying in car-to-car communications: Initial results from an experimental study,” in *Proc. IEEE Intern. Symp. Communications, Control and Signal Processing (ISCCSP)*, (Limassol, Cyprus), Mar. 2010.
- [85] H. Adam, E. Yanmaz, E. Elmenreich, and C. Bettstetter, “Contention-based neighborhood estimation,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Taipei, Taiwan), May 2010.
- [86] E. Yanmaz and C. Bettstetter, “Area coverage with unmanned vehicles: A belief-based approach,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Taipei, Taiwan), May 2010.
- [87] C. Bettstetter, J. Klinglmayr, and S. Lettner, “On the degree distribution of  $k$ -connected random networks,” in *Proc. IEEE Intern. Conf. on Communications (ICC)*, (Cape Town, South Africa), May 2010.

- [88] A. Tyrrell, G. Auer, C. Bettstetter, and R. Naripella, “How does a faulty node disturb decentralized slot synchronization over wireless networks?,” in *Proc. IEEE Intern. Conf. on Communications (ICC)*, (Cape Town, South Africa), May 2010.
- [89] N. Marchenko and C. Bettstetter, “Cooperative multicast with low-cost radios,” in *Proc. IEEE Vehicular Technology Conf. (VTC)*, (Ottawa, Canada), Sept. 2010. Accepted for publication.
- [90] R. Leidenfrost, W. Elmenreich, and C. Bettstetter, “Fault-tolerant averaging for self-organizing synchronization in wireless ad hoc networks,” in *Proc. Intern. Symp. on Wireless Communication Systems (ISWCS)*, (York, UK), Sept. 2010. Accepted for publication.
- [91] N. Marchenko, W. Elmenreich, and C. Bettstetter, “Incremental cooperative relaying in time-correlated rayleigh fading channels,” in *Proc. IEEE Global Commun. Conf. (GLOBECOM)*, (Miami, FL, USA), Dec. 2010. Accepted for publication.

---

## Publication Awards

---

- Outstanding publication award from the German *Information Technology Society (ITG)* (“Preis der ITG”) [5]
- Best paper award from the *IEEE Vehicular Technology Society* [66]
- Best student paper award [71]
- Best paper award from the *IEEE Vehicular Technology Society* [76]