

Bow-Nan Cheng

<http://bcheng.mit.edu> • bcheng@ieee.org

Research scientist with over 15 years of experience designing and developing airborne tactical and backbone networks

EXPERIENCE

MIT Lincoln Laboratory

Lexington, MA

11/2019 – Present *Associate Group Leader*

8/2016 – 11/2019 *Assistant Group Leader*

- Manage a portfolio of future airborne tactical and high capacity backbone networking research
- Co-lead tactical networks group comprising of 60+ staff and contractors
- Set strategic group vision and work to grow research and development efforts

7/2008 – 8/2016 *Member of Technical Staff*

- Principal researcher in several aspects of airborne networking from MANET routing, cross-layer optimization, embedded radio systems development, and next generation information dissemination techniques
- Served as Principal Investigator (PI) on several multi-million dollar programs covering military airborne networks
 - Developed and implemented several key technologies for airborne tactical networks
 - Defined project proposals, key technologies, system architecture and work plans
 - Allocated and tracked financial, personnel, and capital resources
 - Led multi-disciplinary teams of 15+ staff through cycles of design, development, and evaluation
- Extensive experience in Linux kernel network internals:
 - Implemented MANET IP Header Compression (MIPHC) kernel module
 - Extended BATMAN-adv kernel module to support network namespaces
 - Helped debug and identify issues with RObust Header Compression (ROHC) kernel module
 - Supervised several staff in kernel development on novel next generation routing techniques
- Developed key technologies including radio-to-router interface (R2RI) technologies, network-coded connected dominating set (NCDS) theory, MANET IP Header Compression (MIPHC), and others
- Interfaced regularly with DoD leadership to provide technical advice and brief novel concepts
- Designed and implemented test frameworks, surrogate test applications, continuous integration frameworks and scenario generators to evaluate airborne networking scenarios
 - Extensive experience in internals of all current and emerging DoD airborne tactical data links

Nanwob Solutions

Burlington, MA

03/2003 – 11/2019 *Owner/Senior Web Developer*

- Implemented mobile-friendly conference registration system as a custom Wordpress plugin.
- Implemented MLS backend for major real-estate company.
- Developed online in-patient registration and payment system for home-based healthcare company
- Integrated e-commerce solutions into client sites
- Plan and execute entire lifecycle of development projects

Rensselaer Polytechnic Institute – Network Laboratory

08/03 – 05/08 *IGERT Fellow / Research Assistant*

Troy, NY

- Developed and simulated advanced new routing protocols for wireless hybrid free-space-optical and RF mobile ad hoc and mesh networks.
- Significant contributions to using directionality in various fixed and mobile routing architectures

EDUCATION

08/05 – 05/08 **RENSSELAER POLYTECHNIC INSTITUTE**

Troy, NY

Ph.D. in Computer Systems Engineering

Dissertation: “Using Directionality in Wireless Routing”

08/03 - 05/05 **RENSSELAER POLYTECHNIC INSTITUTE**

Troy, NY

Master of Science in Computer Systems Engineering

Thesis: “Geographic Distributed Addressing for Community Wireless Mesh Networks”

08/99 - 05/03 **UNIVERSITY OF ILLINOIS**

Urbana-Champaign, IL

Bachelor of Science in Electrical Engineering

SELECTED PUBLICATIONS (Full List at <http://bcheng.mit.edu>)

JOURNAL PUBLICATIONS

1. B. Cheng, G. Kuperman, P. Deutsch, L. Mercer, A. Narula-Tam, Group-Centric Networking: Addressing Information Sharing Requirements at the Tactical Edge, *In IEEE Communications Magazine*, October 2016.
2. B. Cheng, F. Block, B. R. Hamilton, D. Ripplinger, *et al.*, Design Considerations for Next-Generation Airborne Tactical Networks, *In IEEE Communications Magazine*, Vol. 52, No. 5, May 2014, pages 138-145.
3. B. Cheng, R. Charland, P. Christensen, L. Veytser, J. Wheeler, Evaluation of a Multi-hop Airborne IP Backbone with Heterogeneous Radio Technologies, *In IEEE Transactions on Mobile Computing (TMC)*, Vol. 13, No. 2, February 2014.
4. B. Cheng, J. Wheeler, B. Hung, Internet Protocol Header Compression (IPHC) Technology and Its Applicability on the Tactical Edge, *IEEE Communications Magazine*, Vol. 51, No. 10, October 2013, pages 58-65.
5. B. Cheng, A. Coyle, S. McGarry, *et al.*, Characterizing Routing with Radio-to-Router Information in a Heterogeneous Airborne Network, *In IEEE Transactions on Wireless Communications (TWC)*, Vol. 12, Issue 8, August 2013.
6. B. Cheng, J. Wheeler, and L. Veytser, Radio-to-Router Interface Technology and Its Applicability at the Tactical Edge, *In Proceedings of IEEE Communications Magazine*, Vol. 50, No. 10, October, 2012, pages 70-77.
7. B. Cheng, M. Yuksel, and S. Kalyanaraman, Using Directionality in Mobile Routing. *In ACM/Springer Wireless Networks*, Vol 16, Number 17, October 2010, pages 2065-2086.
8. B. Cheng, M. Yuksel, and S. Kalyanaraman, Orthogonal Rendezvous Routing Protocol for Wireless Mesh Networks, *In IEEE/ACM Transactions on Networking (ToN)*, Vol. 17, Issue 2, April 2009, pages 542-555.

CONFERENCE PROCEEDINGS

1. B. Cheng, S. Mann, T. Arganbright, Toward Composable Hardware Agnostic Communications Blocks - Lessons Learned, *In IEEE MILCOM 2016*, November 2016.
2. B. Cheng, *et al.*, A Linux Kernel Implementation of MANET IP Header Compression, *IEEE MILCOM 2014*, October 2014.
3. L. Veytser, B. Cheng, Network-Coded Connected Dominating Set Relaying for Airborne Tactical Networks, *In ACM Mobihoc 2014 Workshop on Airborne Networking and Communications*, Philadelphia, PA, August 2014.
4. B. Cheng, J. Wheeler, B. Hung, S. Moore, P. Sukumar, A Comparison of IP Header Compression Schemes in MANETs, *In IEEE IPCCC 2013*, December 2013.
5. B. Cheng, S. Moore, Securing ROBust Header Compression (ROHC), *In IEEE MILCOM 2013*, November 2013.
6. L. Veytser, B. Cheng, A Linux Kernel Implementation of Broadcast Interflow Network Coding, *In IEEE MILCOM 2013*, November 2013.
7. B. Cheng, J. Zuenaga, J. Wheeler, *et al.*, MANET IP Header Compression, *In IEEE MILCOM 2013*, November 2013.
8. B. Cheng, R. Charland, P. Christensen, A. Coyle, *et al.*, Comparing Radio-to-Router Interface Implementations on Experimental CoTs and Open Source Routers, *In Proceedings of IEEE MILCOM 2012*, October 2012.
9. B. Cheng, S. Moore, An Evaluation of MANET Routing Protocols on Airborne Tactical Networks, *In Proceedings of IEEE MILCOM 2012*, October 2012.
10. B. Cheng, R. Charland, P. Christensen, L. Veytser, J. Wheeler, Evaluation of a Multi-hop Airborne IP Backbone with Heterogeneous Radio Technologies, *In Proceedings of ACM Mobihoc 2012 Workshop on Airborne Networking and Communications*, June 2012.
11. L. Veytser, B. Cheng, An Implementation of a Common Virtual Multipoint Interface in Linux, *In Proceedings of IEEE MILCOM 2011*, Baltimore, MD, November 2011.
12. B. Cheng, M. Yuksel, and S. Kalyanaraman, Virtual Direction Routing for Unstructured Overlay Networks, *In Proceedings of IEEE International Conference on Peer-to-Peer Computing (P2P)*, September 2009.

INTERNET ENGINEERING TASK FORCE (IETF) PROPOSED STANDARDS

1. B. Cheng, D. Wiggins, L. Berger, DLEP DiffServ Aware Credit Windowing Extension, IETF Draft: Standards Track
2. B. Cheng, D. Wiggins, L. Berger, DLEP Control Plane Based Pause Extension, IETF RFC 8651: Standards Track
3. B. Cheng, L. Berger, DLEP Latency Range Extension, IETF RFC 8757: Standards Track
4. B. Cheng, L. Berger, DLEP Multi-Hop Forwarding Extension, IETF RFC 8629: Standards Track

SKILLS

- Wireless network system, algorithm and protocol design
- Expert on all TCP/IP and MANET protocols such as TCP/UDP, OSPF-MDR, OLSR, BATMAN-adv
- C, Python, Bash Scripting, PHP, MySQL, CSS, HTML, Javascript, Perl
- EMANE/CORE emulation environment, NS-2, NS-3, OPNET

HONOR AND AWARDS

- IEEE MILCOM Best Paper Award - 2017
- MIT Lincoln Laboratory Early Career Technical Achievement Award - 2016
- OPNETWORK 2013 Distinguished Paper Award - 2013
- IGERT Fellowship - 2005-2008