Bruce A. Mah

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Experience

Packet Design, Inc. / Packet Design, LLC **Santa Clara, CA**
Distinguished Engineer *July 2007–Present*

As a returning member of the Engineering group, I led a team that implemented an MPLS WAN Explorer feature, which extends Route Explorer (REX) and Traffic Explorer (TEX) functionality to networks using MPLS VPNs for their wide-area connectivity, and assisted the Product Marketing and Sales groups with initial customer presentations and demonstrations. I planned and implemented the porting of REX and TEX to 64-bit environment appliances and virtualized environments.

I am currently leading a project team that is rearchitecting the configuration system; we have also redesigned and implemented a Web-accessible reports system. I am responsible for OS (Linux) and hardware integration of REX appliances, including qualification of new hardware platforms. I currently maintain most of the Engineering development infrastructure, including the build servers, source code control (Subversion) repository, and bug-tracking (Bugzilla) system, and am serving as the product build engineer. I occasionally assist our support group and work with customers on pre-sales and post-sales support issues. I am the primary resource for security incidents and vulnerability management for the REX product.

I have also worked on some internal network infrastructure, including rolling out IPv6 on the corporate network, and deploying Nagios and Cacti to monitor the state and performance of a number of key systems.

nCircle Network Security, Inc. **San Francisco, CA**
Principal Engineer *March 2006–June 2007*

Member of the Development team, working on the IP360 vulnerability management system. I implemented a scheduling system for IP360 security scans and other activities. I also participated in the design of improvements and integration for IP360's Topology Risk Analysis feature and the next-generation IP360 software architecture. Finally I made a number of improvements to the product build and release processes, converting ad hoc build and installation procedures into repeatable, well-documented processes, and assisted in specifying, evaluating, and testing future hardware and operating system platforms for IP360.

Packet Design, LLC / Packet Design, Inc. **Palo Alto, CA**
Member of Technical Staff / Senior Software Engineer / Lead Engineer *July 2001–March 2006*

As a member of the Engineering (formerly Network Science) group, my most recent work involved designing and implementing algorithms for measuring and analyzing network traffic and routing data within the context of Route Explorer (REX), a route analytics appliance. I was responsible for the implementation of the NetFlow collector piece of Traffic Explorer (TEX), which includes many of these designs. I worked with customers on test deployments and provided assistance to our support group when required. I also assisted technical marketing in determining the requirements and design for current and future product features.

I also worked on system integration, operating system support, and release engineering for REX, and maintained the REX security document. I converted the REX source code repository from CVS to Subversion, and set up infrastructure necessary for developers to use Subversion effectively.

Cisco Systems, Inc. **San Jose, CA**
Software Engineer, Office of the CTO *April 2000–June 2001*

I extended my open-source *pchar* network measurement utility to incorporate new statistical techniques and measurement methodologies. I constructed and tested a prototype implementation of *pchar* for the Cisco IOS environment.

Sandia National Laboratories **Livermore, CA**
Senior Member of the Technical Staff *January 1997–April 2000*

My research projects included network performance analysis, traffic modeling, and protocol implementation. I developed the open source *pchar* network measurement platform to measure bandwidth and latency properties of the links between two Internet hosts.

I participated in the design and implementation of the Diesel Combustion Collaboratory, a project to aid remote collaborations between researchers in Sandia's Combustion Research Facility and their peers in industry and other government laboratories. I was also involved in several computer security activities, including a Department of Energy Information Security Management Task Force.

University of California, Computer Science Division, Tenet Group **Berkeley, CA**
Graduate Student Researcher *August 1991–December 1996*

My dissertation research investigated the use of ATM quality of service to support IP-over-ATM, and performance implications of multiplexing and various virtual circuit management policies. To evaluate the performance of various alternatives for IP-over-ATM schemes, I constructed a network simulator that simulates the operation of various Internet applications across an IP internetwork. My other research projects included network traffic measurements and modeling, support for mobile computing in connection-oriented networks, and real-time network protocols.

Education

University of California **Berkeley, CA**
PhD, Computer Science *December 1996*

Major field: Systems. Minor fields: Theory and Stochastic Processes. Dissertation title: *Quality of Service and Asynchronous Transfer Mode in IP Internetworks*. Advisor: Professor Domenico Ferrari.

University of California **Berkeley, CA**
MS, Computer Science *May 1993*

Masters report: *A Mechanism for the Administration of Real-Time Channels*. Advisor: Professor Domenico Ferrari.

University of California **Berkeley, CA**
BS with Highest Honors, Electrical Engineering and Computer Sciences *May 1991*

Minor in Asian American Studies. Honors in eight of eight semesters.

Teaching Experience

University of California, Computer Science Division **Berkeley, CA**
Graduate Student Instructor *January 1994–May 1994*

I was the head teaching assistant for Computer Science 162 (*Operating Systems and Systems Programming*), an upper-division, undergraduate course with over two hundred students. I taught an "honors" discussion section, which covered advanced topics in operating systems. The students gave me an overall rating of 4.4 out of 5.0.

Honors and Awards

Eta Kappa Nu (HKN), electrical engineering honor society. Mu Chapter Corresponding Secretary and Acting Recording Secretary (Fall 1989), Vice-President (Spring 1990), President (Fall 1990).

Tau Beta Pi (TBP), engineering honor society. California Alpha Chapter Seminar Director (Fall 1989).

EECS Honors Program, University of California at Berkeley, Spring 1989–Spring 1991.

National Science Foundation Graduate Fellowship, awarded Spring 1991.

Bechtel Achievement Award (highest award bestowed by the College of Engineering, for

outstanding academic achievement and community service), University of California at Berkeley, Spring 1991.

Professional and Volunteer Activities

FreeBSD Project (August 2000–September 2009). Member of the release engineering team, which coordinates the efforts of over three hundred volunteer and paid developers for each public release of FreeBSD.

Global Montessori International School (August 2009–Present). Member of advisory board, volunteer network and system administrator. I managed the migration of the school Web site and worked with a Web designer to improve the content, aesthetics, and information presentation. I reorganized, and continue to manage, email lists used for communication within the school community. When the school moved sites, I designed and deployed the build-out of an internal network, which support dual-stack IPv4/IPv6, VPN access, and a guest wireless network.

Member, Association for Computing Machinery (ACM).

Member, Institute of Electrical and Electronics Engineers (IEEE).

Member, The USENIX Association, and LISA Special Interest Group for Sysadmins (formerly SAGE).

Skills

Operating Systems (use and administer): FreeBSD, Mac OS X, Linux (RedHat), Microsoft Windows variants. Prior experience with Solaris, SunOS, HP/UX, OSF/1, Ultrix, BSD UNIX, Plan 9 from Bell Labs.

Programming Languages: C/C++ (and STL), Perl, awk, sed, sh. Some prior experience with Tcl/Tk, Java.

Other software tools: CVS, Subversion, Bugzilla, GCC, GDB, Make, Apache httpd, sendmail. Some prior experience with yacc/bison, lex/flex, Perforce.

Networking: Familiarity with the IPv4 / IPv6 protocol stack, Internet routing protocols (OSPF, ISIS, BGP), IP multicast, NetFlow, Nagios, Cacti.

Publications

R. Prasad, C. Dovrolis, and B. Mah. "The Effect of Layer-2 Store-and-Forward Devices on Per-Hop Capacity Estimation", *Proceedings of IEEE INFOCOM 2003*, San Francisco, CA, April 2003.

R. Prasad, C. Dovrolis, and B. Mah. "The Effect of Layer-2 Switches on Pathchar-Like Tools", *Proceedings of the ACM Internet Measurement Workshop*, Marseille, France, November 2002.

H. Chen, J. Hutchins, and B. Mah. "A Lightweight, Link-layer, Source-based Routing Protocol for LEO Satellite Networks", *Proceedings of NanoSpace '98*, Houston, TX, November 1998.

B. Mah, P. Sholander, L. Martinez, and L. Tolendino. "IPB: An Internet Protocol Benchmarking Using Simulated Traffic", *Proceedings of MASCOTS '98*, Montreal, Canada, July 1998.

P. Sholander, L. Martinez, L. Tolendino, and B. A. Mah. "The Effects of User Mobility on Usage Parameter Control (UPC) in Wireless ATM Systems", *Proceedings of the 1998 IEEE International Performance, Computing, and Communications Conference*, Phoenix/Tempe, AZ, February 1998.

B. Mah. "An Empirical Model of HTTP Network Traffic", *Proceedings of IEEE INFOCOM '97*, Kobe, Japan, April 1997.

A. Banerjea, D. Ferrari, B. Mah, M. Moran, D. Verma, and H. Zhang. "The Tenet Real-Time Protocol Suite: Design, Implementation, and Experiences", *IEEE/ACM Transactions on Networking, Volume 4*, Number 1, February 1996.

B. Mah. "Measurements and Observations of IP Multicast Traffic", Technical Report UCB/CSD-

94-858, University of California, Berkeley, CA, December 1994.

E. Knightly, F. Templin, A. Banerjea, B. Mah, H. Zhang, and D. Ferrari. "The Tenet Real-time Protocol Suite: A Demonstration", video presentation in *Proceedings of the ACM Multimedia 94 Conference*, San Francisco, CA, October 1994.

B. Mah, S. Seshan, K. Keeton, R. Katz, and D. Ferrari. "Providing Network Video Service to Mobile Clients", *Proceedings of the Fourth Workshop on Workstation Operating Systems*, Napa, CA, October 1993.

K. Keeton, B. Mah, S. Seshan, R. Katz, and D. Ferrari. "Providing Connection-Oriented Network Services to Mobile Hosts", *Proceedings of the 1993 USENIX Symposium on Mobile and Location-Independent Computing*, Cambridge, MA, August 1993.

A. Banerjea and B. Mah. "The Real-Time Channel Administration Protocol", *Proceedings of the Second Workshop on Network and Operating Systems Support for Digital Audio and Video*, Heidelberg, Germany, October 1991.