

Curriculum Vitae

Dr. KOTIKALAPUDI SRIRAM (Sriram)

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EDUCATION:

- Ph.D. in Electrical Engineering, Syracuse University.
- M.S. in Electrical Engineering, Indian Institute of Technology, Kanpur, India.
- B.S. in Electrical Engineering, Indian Institute of Technology, Kanpur, India.

HONORS AND AWARDS:

- Promoted to **Consulting Member of Technical Staff at Bell Laboratories**, March 2000 (less than 1% of Bell Labs engineers are appointed to this position – at the time of appointment, about 100 were CMTS out of 25,000 engineers in all of Bell Laboratories).
- Patent on QOS methods for VOIP recognized by the *MIT Technology Review Magazine* as one of five “**Killer [Life Changing] Patents**” in 2003, picked out of a total of 155,000 patents issued in 2003. This was based on work I did with Bell Labs colleagues in 1998. Patent title: “Method for providing quality of service for delay sensitive traffic over IP networks,” U.S. Patent No. 6,529,499, March 4, 2003.
- **Fellow of the IEEE** (Jan. 2000). **Citation:** *For the development of performance models, algorithms, protocols, and bandwidth management techniques for multimedia high-speed packet networks.*
- Nominated for Fellow of Bell Laboratories in 2001 (one of only 12 candidates nominated in that year).
- Promoted to **Distinguished Member of Technical Staff at Bell Laboratories**, February 1989 (about 10% of Bell Labs engineers are appointed to this position).
- Received three patent excellence awards from AT&T Business Communications Services (1992-95).
- Two patents nominated in 2001 for Lucent Technologies ‘Hall of Fame Patent’ awards.
- Keynote speaker at the *International Teletraffic Congress: Specialists’ Seminar*, Crackow, Poland (1991).
- Gave invited short courses on Voice/Data Communications Networks as a visiting scholar at universities in Chile, Malaysia, and India.
- Currently serving as a TPC member for IEEE INFOCOM (2008-2010).
- Served as technical area editor for the *IEEE Communications Letters* and the *IEEE Communications Surveys* journals (1998-2001).

BOOK: Contributing author and a coeditor of ***Cable Modems: New Technologies and Applications***, published by the *IEEE Press* and the *International Engineering Consortium* (1999).

PATENTS:

Sixteen patents have been issued. Please see list at the back. Some additional patents are pending. Wide range of inventions related to Agile Optical Networks, VOIP, Voice over ATM (VoATM), QOS in High-Speed Packet (IP/ATM) Networks, Cable Modems, Hybrid Fiber-Coax (HFC) and Wideband Wireless Access Networks.

WORK EXPERIENCE (National Inst. of Standards and Technologies (NIST), September 2002 to present):

Senior Research Engineer, Advanced Network Technologies Division - Responsible for defining and leading research projects in Internet Routing Infrastructure Security, Wireless Access Networks, and Network Architecture and Performance. Leading multiple small teams of researchers and guest scientists on various research projects.

BGP Security: Lead investigator evaluating Internet Routing Protocol (BGP) vulnerabilities using large-scale simulations; Comparing the performance and effectiveness of solutions for BGP security; Regularly representing NIST in the IETF and NANOG meetings; Project funded by the Dept. of Homeland Security (DHS). Recently published a detailed paper in the *IEEE JSAC*, special issue on Network Security (October 2006). Also co-authored a NIST 800-series recommendation on BGP Security (issued July 2007).

Seamless Mobility in Heterogeneous Wireless Access Networks: Investigating efficient methods of call hand-off and resource allocation for seamless mobility in heterogeneous wireless access networks; Extensive network simulations have been performed in collaboration with researchers in South Korea. Paper to be presented at the *IEEE Globecom 2007* and a detailed paper submitted to *IEEE Trans. on Vehicular Technology*.

Optical Burst/Packet Switching: Project leader for internal NIST project on Optical Burst/Packet Switching; architecture studies and performance modeling; also serving as a Member of the Board of Directors of the OBS Forum; close interactions with DARPA.

Agile All-Optical Wavelength Switch (WXC) Architecture: I have lead research work and guided several researchers in projects related to Agile Optical Switching Networks. Developed extensive analytical/simulation models to show performance and cost advantages of dynamically assignable regenerators over regenerators with fixed directionality in wavelength cross-connect switches (WXC). Enhanced the NIST GLASS (GMPLS Light-wave Agile Switching Simulator) tool for this research.

Optical Protection & Restoration Schemes: Developed extensive analytical/simulation models to quantify and evaluate proposals based on the CCAMP Study Group activity in the IETF.

WORK EXPERIENCE (Innovance Networks, July 2001 to September 2002):

Senior Network Architect: Responsible for the Agile Optical Network control plane architecture, protocols, performance and reliability modeling. Also worked on algorithms for efficient resource allocation and dynamic provisioning for implementation in the AgileCore® Optical Switching System. Developed novel algorithms for dynamic wavelength management, which are being implemented in the product. A patent has been filed on these algorithms.

Played a major role in setting up a large simulation system of Network Elements and performed extensive performance studies to identify processor overload conditions and devised ways to mitigate them. A number of performance measures associated with connection processing delays, reliability and processor utilization were measured and carefully analyzed to create in depth understanding of the system. Developed extensive models to ascertain system and Call Management Function (CMF) reliability. Setup a process for MTTR and MTTF data collection during verification. Predicted the reliability/availability for field operation.

WORK EXPERIENCE (Bell Laboratories, October 1983 to July 2001):

Storage Switch with Fabric Centric Storage Controller Functions (2000-2001):

Architecture/performance study of a storage switch with Fiber Channel (FC) switch functionality and high-end fabric-centric storage controller functionality; Developed methods for large data cache management within the SS and developed analytical models for performance predictions and cache sizing.

Algorithms for Automated Design and Planning of Multi-Domain Optical Networks (2000-2001):

Developed detailed algorithms for design, bandwidth provisioning and routing over multi-domain SONET/SDH networks. These are complex networks consisting of multiple domains with equipment from multiple vendors. The algorithms help in optimally designing the network and in provisioning disjoint paths over multiple domains while maximizing the utilization of the network bandwidth. The algorithms have been presented to Lucent Technologies' Optical Networking Group for implementation in the Wave-Star[†] Transport Management System.

Protocols for Integration of Multiple Services over an Optical Transport Link:

Developed a protocol called Multi-service Over Byte-stream (MOB) for bandwidth efficient integration of multiple services (e.g., ATM, TDM, IP) over a common optical communication link. This protocol allows statistical multiplexing of packet data with flexibility to simultaneously provide TDM multiplexing for some of the traffic streams. Recently received a patent on this invention (U.S. Patent No. 5,936,965, August 10, 1999).

Design of Metropolitan Optical Networks for MSOs and Wireless Service Providers:

Designed Optical Metro-Networks for both Multi-Service Operators (MSOs) and Wireless Service Providers (WSPs). Multiple types of traffic (e.g., VoIP, IP data, Voice/Data over AAL2/AAL5) are aggregated at an MSO's head-end or a WSP's Base Stations. The multi-service aggregate traffic is transported to MSO Hubs or Mobile Switching Centers (MSCs). I was the lead engineer doing network designs for these access applications, and comparing the QoS and economics of various transport architectures/protocols including TDM, MPLS, IP, and ATM.

Cable Modems and Hybrid Fiber Coax (HFC) Networks:

Played a leading role in designing the Medium Access Control (MAC) protocols and bandwidth management algorithms for cable modems and HFC networks to support Internet data applications. Showed through performance modeling that variable-length protocol data units and dynamically variable request mini-slots result in high bandwidth efficiency in MAC protocols for cable modems. Influenced by my work, these important MAC protocol concepts are now part of the IEEE LAN/MAN 802.14 (approved draft) standard as well as the specification on cable modems (DOCSIS) adopted by a prominent cable industry consortium (latter available at <http://www.cablelabs.com/cable-spec.html>). The recent work in this area also included design of QoS and Bandwidth Management algorithms for Lucent's CMTS product, and extensive interactions with Lucent's customers as a technical product specialist. I am a co-inventor on several patents related to protocols and algorithms used in cable modems.

Wireless Network Architectures and Protocols:

Worked on network design and performance characterization of TDMA and CDMA wireless access networks. Conducted a major economic study comparing various transport alternatives – ATM/AAL2, ATM/AAL5, IP, and MPLS – for transport of voice and IP data over wireless access networks. Working closely with the development teams to transition these design concepts into product architecture and implementation. I am a co-inventor on two pending patents in this area.

Integrated Packet Voice/Data Networks (IP, ATM, Frame Relay):

My early work on packetized voice and data networks has received industry-wide and international recognition. I was the principal author and technical contributor of an *IEEE JSAC* (Sept. '86) paper, which provided major insights into the nature of traffic burstiness and correlations, and their impact on the performance of packetized voice and data multiplexers. This classic paper and several other papers of mine are noted for providing significant understanding of the intricate interplay of packet delay/loss performance, buffer sizing, and selective load shedding in multiplexers supporting bursty sources.

A patent of mine (issued April '90, No. 4, 914,650, sole inventor) has served as a foundation for QoS management based on per-class queuing and dynamic bandwidth allocation via weighted fair queuing. The concepts in this patent show how in an integrated packet network the QoS of one traffic type can be protected from the bursty (unpredictable) nature of another type of traffic. A follow-up patent (issued October '95, No. 5,436,620, sole inventor) further extended the invention to integrated multi-service high-speed packet networks supporting diverse traffic types and QoS requirements. The inventions described in these two patents are now used ubiquitously in gigabit packet routers and IP/ATM switches. I closely worked with the development teams and contributed to the architecture and design of several Lucent Technologies' products that have implemented the above-mentioned inventions. These products include Packet Star 6400 IP switch, GX550 and Globeview 2000 ATM switches, and IACS – packet voice gateway used in over 50 countries. The two patents mentioned above have been nominated for Lucent Technologies' 'Hall of Fame Patent' awards.

Voice over IP (VoIP) and Voice over ATM (VoATM):

I worked closely with development teams on design and architectures of Lucent's MX1000 ATM access switch for VoATM and the Packet Voice Gateway (PVG) for VoIP. I have developed and patented algorithms for dynamic playback-delay control and QoS management for packet voice transport over IP and ATM networks. These algorithms help mitigate the effects of network congestion. I have also contributed significantly to the ATM Forum Voice Telephony over ATM (VTOA) specification. Here, I solved the ATM Adaptation Layer 2 (AAL2) sequence number sizing problem using performance modeling, presented the results at ATM Forum VTOA and ITU-T/SG-13 meetings, and my recommendation on the size was unanimously accepted.

SERVICE TO THE PROFESSION:

- Served as technical area editor for the *IEEE Communications Letters* (1998-2000).
- Served as technical area editor for the *IEEE Communications Surveys* journal (1999-2001).
- Keynote speaker at the *Internat. Teletraffic Congress: Specialists' Seminar*, Cracow, Poland (1991).
- Invited speaker at a number of sessions in several international conferences of IEEE, ACM, and SPIE.
- Chaired a number of sessions in several international conferences of IEEE, ACM, and SPIE.
- Gave invited short courses on Voice/Data Communications Networks as a visiting scholar at universities in Chile, Malaysia, and India.
- Made significant contributions to developing new standards in Cable Modem technology, ATM and IP communications protocols and traffic management.

AREAS OF RESEARCH INTEREST:

Performance, scalability and security of Internetworking Protocols (OSPF, BGP, S-BGP, so-BGP, MPLS, GMPLS); Seamless mobility in heterogeneous wireless access networks; Metro and long-haul optical systems and networks; Architecture, protocol design, and performance analysis of communications networks; Resource management and congestion control methods for high-speed packet and GMPLS optical networks; Medium Access Control (MAC) protocols; Voice over ATM; Voice over IP; Hybrid Fiber Coax (HFC) networks; Fiber To The Curb (FTTC) and Asynchronous Digital Subscriber Loop (ADSL) systems; Integrated voice/data networks, Applied probability and stochastic processes.

MEMBERSHIPS: IEEE Communications Society (IEEE Fellow); IETF SIDR, RRG, and RPSEC groups, OBS Forum (Member of the BOD); IEEE 802.14 Standards Working Group (work concluded); SCTE-DCS Standards Working Group (work concluded); the ATM Forum VTOA Committee (work concluded).

OTHER INTERESTS: Tennis; Yoga and meditation; Keen student of Vedanta and Buddhist philosophies.

PERSONAL DATA: US Citizen

PATENTS:

- 1 [6,813,277](#) [Method and apparatus enabling multiple access on a broadband communication network](#)
- 2 [6,674,744](#) [Point-to-point data transport over the internet utilizing label switching without IP headers](#)
- 3 [6,529,499](#) [Method for providing quality of service for delay sensitive traffic over IP networks](#)
- 4 [6,349,138](#) [Method and apparatus for digital transmission incorporating scrambling and forward error correction while preventing bit error spreading associated with descrambling](#)
- 5 [6,282,196](#) [Dynamic build-out approach for use in packet voice systems](#)
- 6 [6,219,339](#) [Method and apparatus for selectively discarding packets](#)
- 7 [6,169,738](#) [Method for call admission in packet voice system using statistical multiplexing and dynamic voice encoding](#)
- 8 [6,075,798](#) [Extended header for use in ATM adaptation layer type 2 packets](#)
- 9 [6,055,242](#) [Method and apparatus enabling synchronous transfer mode, variable length and packet mode access for multiple services over a broadband communication network](#)
- 10 [6,041,051](#) [Method and apparatus enabling multiple access for multiple services and multiple transmission modes over a broadband communication network utilizing an adaptive digital access protocol](#)
- 11 [5,953,344](#) [Method and apparatus enabling enhanced throughput efficiency by use of dynamically adjustable mini-slots in access protocols for shared transmission media](#)
- 12 [5,936,965](#) [Method and apparatus for transmission of asynchronous, synchronous, and variable length mode protocols multiplexed over a common bytestream](#)
- 13 [5,570,355](#) [Method and apparatus enabling synchronous transfer mode and packet mode access for multiple services on a broadband communication network](#)
- 14 [5,463,620](#) [Bandwidth allocation, transmission scheduling, and congestion avoidance in broadband asynchronous transfer mode networks](#)
- 15 [4,914,650](#) [Bandwidth allocation and congestion control scheme for an integrated voice and data network](#)

PUBLICATIONS:

(In refereed journals and conference proceedings; also included are some selected significant contributions presented at the IEEE 802.14 LAN/MAN committee and the ATM Forum meetings):

1. K. Sriram, P. K. Varshney, and J. G. Shanthikumar, "Modeling and Analysis of an Integrated Voice-Data Multiplexer," *IEEE International Symposium on Information Theory*, Santa Monica, CA, February 1981.
2. J.G. Shanthikumar, P. K. Varshney, and K. Sriram, "Priority Cut-off Flow Control Scheme for Integrated Voice/Data Multiplexers," *ACM-Sigmetrics Performance Evaluation Review*, vol. 11, no. 3, pp. 8-14, Fall 1982.
3. K. Sriram, P. K. Varshney, and J. G. Shanthikumar, "Discrete-Time Analysis of Integrated Voice-Data Multiplexers with and without Speech Activity Detectors," *Proceedings of the IEEE GLOBECOM*, vol. 1, pp. B2.2.1-5, Miami, Dec., 1982; also in the *IEEE Journal on Selected Areas in Communications*: Special issue on Packet Switched Voice and Data Communications, pp. 1124-1132, December 1983.
4. K. Sriram, P. K. Varshney, and J. G. Shanthikumar, "Buffered Digital Speech Interpolation with Fixed Delay," *Proceedings of the IEEE ICC*, Boston, vol. 2, pp. D6.2.1-5, June 1983.
5. K. Sriram and P.K. Varshney, "Performance Evaluation of Integrated Voice/Data Multiplexers," *Proc. of the International Conference on Computers, Systems and Signal Processing*, Bangalore, India, December 9-12, 1984.
6. K. Sriram and W. Whitt, "Characterizing Superposition Arrival Processes in Packet Multiplexers for Voice and Data," *IEEE Journal on Selected Areas in Commun.*, vol. SAC-4, no. 6, pp. 833-846, September 1986.

7. K. Sriram and D. M. Lucantoni, "Traffic Smoothing Effects of Bit Dropping in A Packet Voice Multiplexer," *Proc. of the IEEE INFOCOM*, New Orleans, March 1988, pp. 759-770. Also in the *IEEE Trans. on Commun.*, pp. 703-712, July 1989.
8. H. Heffes, D.M. Lucantoni, K. Sriram, and W. Whitt, "Characterization of Packetized Voice Traffic and Related Statistical Multiplexer Performance." *Proceedings of AT&T Symposium on Performance Analysis*, May 1985, 12 pp.
9. V.R. Karanam, K. Sriram, and D. O. Bowker, "Performance Evaluation of Variable Bit Rate Voice in Packet Networks," *AT&T Technical Journal: Special issue on Performance Modeling and Analysis*, pp. 41-56, September-October 1988. Also in part in the *Proc. of the IEEE GLOBECOM*, Hollywood, Florida, November 1988, pp. 1617-1622.
10. S. Dravida and K. Sriram, "End-to-End Performance Models for Variable Bit Rate Voice over Tandem Links in Packet Networks," *Proc. of the IEEE INFOCOM*, Ottawa, Canada, April 1989, pp. 1089-1097. Also in the *IEEE Journal on Selected Areas in Communications: Special issue on Packet Speech and Video*, pp. 718-728, June 1989.
11. K. Sriram, "Dynamic Bandwidth Allocation and Congestion Control Schemes for Voice and Data Multiplexing in Wideband Packet Technology," *Proc. of the IEEE ICC*, Atlanta, Georgia, April 1990, vol. 3, pp. 1003-1009.
12. K. Sriram, M.A. Gonzalo, D.O. Bowker, and A.U. Mac Rae, "An Integrated Access Terminal for Wideband Packet Networking: Design and Performance Overview," *Proc. of the International Switching Symp.*, Stockholm, Sweden, May 1990, vol. 6, pp. 17-24.
13. K. Sriram, R.S. McKinney, and M.H. Sherif, "Voice Packetization and Compression in Broadband ATM Networks," *Proc. of the ITC Seminar*, Morristown, New Jersey, October 1990, and in the *IEEE J. Selected Areas in Commun.*, April 1991.
14. K. Sriram, "Wideband Packet Technology: Performance and Modeling," *Proceedings of the ITC Specialists' Seminar*, Cracow, Poland, April 22-27, 1991 (invited survey paper and keynote presentation).
15. K. Sriram, V.B. Mendiratta, and C.A. LaPadula, "Performance Modeling of the Ethernet LAN and Its Applications in Internal Operations in a Telecommunications Switch," presented at the *ORSA/TIMS Conference*, Orlando, Florida, April 1992.
16. K. Sriram, "Methodologies for bandwidth allocation, transmission scheduling, and congestion avoidance in broadband ATM networks," *Proc. of the IEEE GLOBECOM*, Orlando, December 1992, pp. 1545-1551 (in part). Full paper in the *Computer Networks and ISDN Systems Journal*, special issue on "Traffic Issues in ATM Networks", pp. 43-59, Vol. 26, September 1993.
17. K. Sriram, C. Li, P. Magill, N.A. Whitaker, J.E. Dail, M.A. Dajer, C.A. Siller, Jr., "An Adaptive MAC-Layer Protocol for Multi-Service Digital Access via Tree and Branch Communication Networks," *SPIE Proceedings: Hybrid Fiber-Coax Systems*, vol. 2609, pp. 10-21, October 1995.
18. J.E. Dail, M.A. Dajer, C. Li, P. Magill, C.A. Siller, K. Sriram, and N.A. Whitaker, "Adaptive Digital Access Protocol (ADAPt): A MAC Protocol for Multi-Service Broadband Access Networks," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-95/142, November 6, 1995.
19. J.E. Dail, C. Li, P. Magill, C.A. Siller, and K. Sriram, "ADAPt PDU and MAC/PHY Services in Support of ATM," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-95/168, November 6, 1995.
20. K. Sriram, "Comparison of a Residential Community Network Using the ADAPt Protocol with Ethernet LAN in the Office Environment," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-96/020, January 22, 1996.
21. J.E. Dail, M.A. Dajer, C.-C. Li, P.D. Magill, C.A. Siller, Jr., K. Sriram, and N.A. Whitaker, "Adaptive Digital Access Protocol: A MAC Protocol for Multiservice Broadband Access Networks," *IEEE Communications Magazine*, pp. 104-112, March 1996.
22. K. Sriram, B.T. Doshi, P.D. Magill, and C.A. Siller, Jr., "Adaptive Digital Access Protocol (ADAPt): Performance and Capacity Modeling Results Based on Phase 2 Criteria," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-96/121, May 1, 1996.

23. K. Sriram and P.D. Magill, "HFC MAC Protocols with Dynamically Variable vs. Fixed Number of Request Mini-Slots: Performance and Capacity Comparisons," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-96/120, May 1, 1996.
24. K. Sriram, B.T. Doshi, S. Dravida, P.D. Magill, and C. A. Siller, Jr., "Possible Methods of Supporting Multiple Types of Traffic in the Downstream, and Related Performance Comparisons," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-96/184, July 8, 1996.
25. K.A. Cone, B.T. Doshi, S. Dravida, P.D. Magill, M. Murdocca, C.A. Siller, Jr., and K. Sriram, "Downstream FEC Considerations and Proposed Architectural Principles," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-96/218, September 17, 1996.
26. K.A. Cone, B.T. Doshi, S. Dravida, P.D. Magill, M. Murdocca, C.A. Siller, Jr., and K. Sriram, "FEC At Physical Layer," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-96/219, September 17, 1996.
27. B.T. Doshi, S. Dravida, P.D. Magill, M. Murdocca, C.A. Siller, Jr., and K. Sriram, "A Proposal for Downstream Frame Structure and Frame Duration," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-96/220, September 17, 1996.
28. B.T. Doshi, S. Dravida, P.D. Magill, M. Murdocca, C.A. Siller, Jr., and K. Sriram, "Advantages and Methods of Supporting Variable Length PDUs in Upstream and Downstream HFC Channels," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-96/221, September 17, 1996.
29. B.T. Doshi, S. Dravida, P.D. Magill, C.A. Siller, Jr., and K. Sriram, "A Broadband Multiple Access Protocol for STM, ATM, and Variable Length Data Services on Hybrid Fiber-Coax Networks," IEEE 802.14 LAN/MAN Committee, Contribution # IEEE 802.14-96/222, September 17, 1996.
30. B.T. Doshi, S. Dravida, P.D. Magill, and C.A. Siller, Jr., and K. Sriram, "A Broadband Multiple Access Protocol for STM, ATM, and Variable Length Data Services on Hybrid Fiber-Coax Networks," *Bell Labs Technical Journal*, Volume 1, Number 1, Summer 1996, pp. 36-65.
31. K. Sriram and P.D. Magill, "Enhanced Throughput Efficiency by Use of Dynamically Variable Request Mini-Slots in MAC Protocols for HFC and Wireless Access Networks," *Telecommunications Systems* Vol. 9, Nos. 3,4, pp. 315-333 (1998).
32. K. Sriram, "Performance of MAC Protocols for Broadband HFC and Wireless Access Networks," *Advances in Performance Analysis*, vol. 1, no. 1, pp. 1-37, March 1998.
33. B.T. Doshi, S. Dravida, E. Hernandez-Valencia, K. Sriram, J. Anderson, and J. Manchester, "Multi-protocol Over a Bytestream (MOB): A New Protocol Stack for Supporting Heterogeneous Traffic Over a Common Link," Proc. of the *Networld+Interop Engineers Conference '98*, Las Vegas, Nevada, May 1998.
34. K. Sriram, "Performance of ATM and Variable Length Packet Access in Broadband HFC and Wireless Networks," *Proc. of the IEEE ICUPC*, Vol. 1, pp. 495-501, Florence, Italy, October 5-9, 1998.
35. K. Sriram, T.G. Lyons, and Y.T. Wang, "Use of Sequence Numbers and Mitigation of Anomalies Due to Delay and Loss in AAL2 Packet Voice Systems," ATM Forum Contribution # 97_0776, Distributed to VTOA Committee, ATM Forum Meeting, Paris, France, September 22-26, 1997. Also presented in part at the *INFORMS Telecommun. Conf.*, Boca Raton, FL, March 8-11, 1997.
36. B.T. Doshi, E. Hernandez-Valencia, K. Sriram, Y.T. Wang and O. Yue, "Protocols, Performance and Controls for Voice over Wide Area Packet Networks," *Bell Labs Tech. J.*, Vol. 3, No. 4, October-December 1998, pp. 297-337. (This is a complete paper related to the U.S. Patent No. 6,529,499, recognized by the MIT Technology Review Magazine as one of five 'Killer Patents' of 2003.)
37. K. Sriram, T. G. Lyons, and Y. T. Wang, "Anomalies Due to Delay and Loss in AAL2 Packet Voice Systems: Performance Models and Methods of Mitigation," *IEEE J. on Selected Areas in Commun.*, special issue on Future Voice Technologies, Vol. 17, No. 1, pp. 4-17, January 1999.
38. K. Sriram and Y. T. Wang, "Voice Over ATM Using AAL2 and Bit Dropping: Performance and Call Admission Control," *IEEE J. on Selected. Areas in Commun.*, special issue on Future Voice Technologies, Vol. 17, No. 1, pp. 18-28, Jan. 1999.

39. K. Sriram, B. Samadi, S. Park, B. Desai, and T. Garry, "Economic Studies of Network Technologies for Wireless Access Network," Proceedings of the Networks 2000, Toronto, Canada, September 10-14, 2000.
40. K. Sriram, D. Griffith, S. Lee, and N. Golmie, "Backup Resource Pooling in (M:N)ⁿ Fault Recovery Schemes in GMPLS Optical Networks," in *Proceedings of SPIE Vol. 5285 OptiComm 2003: Optical Networking and Communications*, October 2003, pp. 185-196.
41. K. Sriram, D. Griffith, S. Lee, and N. Golmie, "Optical Burst Switching: Benefits and Challenges," the *Proc. of the First International Workshop on OBS (WOBS 2003)*, Dallas, TX, October 2003.
42. D. Griffith, R. Rouil, S. Klink, and K. Sriram, "An Analysis of Path Recovery Schemes in GMPLS Optical Networks with Various Levels of Pre-Provisioning," in *Proceedings of SPIE Vol. 5285 OptiComm 2003: Optical Networking and Communications*, October 2003, pp. 197-208.
43. S. Lee, K. Sriram, H. Kim, and J. Song, "Contention-Based Limited Deflection Routing in OBS Networks," the *Proc. of the IEEE Globecom 2003*, San Francisco, December 2003.
44. S.K. Lee, K. Sriram, H.S. Kim, and J.S. Song, "Performance Improvement of Deflection Routing in Optical Burst Switching", *Proc. of the ICCS (International Conference on Computational Science)*, Melbourne, Victoria, Australia, June 2-4, 2003.
45. D. Griffith, K. Sriram, S. Lee, and N. Golmie, "Restorability versus Efficiency in (1:1)ⁿ Protection Schemes for Optical Networks," *Proc. of the IEEE ICC 2004*, Paris, June 2004.
46. K. Sriram, D. Griffith, R. Su, and N. Golmie, "Static vs. dynamic regenerator assignment in optical switches: Models and cost trade-offs," *Proceedings of the IEEE Workshop on High Performance Switching and Routing (HPSR 2004)*, April 2004, Phoenix, AZ, pp. 151-155.
47. D. Griffith, K. Sriram, S. Klink, and N. Golmie, "Optimal Mixtures of Different Types of Recovery Schemes in Optical Networks," *Proc. of Broadband Networks 2004 - Broadband Optical Networking Symposium*.
48. D. Griffith, K. Sriram, L. Krivulina, and N. Golmie, "Resource Planning and Bandwidth Allocation in Hybrid Fiber-Coax Residential Networks," *Optical Switching and Networking*, August 2005.
49. D. Griffith, K. Sriram, and N. Golmie, "Protection Switching for Optical Bursts Using Segmentation and Deflection Routing," *IEEE Communications Letters*, August 2005.
50. D. Griffith, K. Sriram, J.S. Gao, and N. Golmie, "Wireless Enhancements for Storage Area Networks," *Proceedings of the IEEE Broadnets 2005: Optical Networking Symposium*, Boston, October 3-7, 2005.
51. K. Sriram, D. Griffith, O. Borchert, G. DiLorenzo, R. Su, and N. Golmie, "Performance Comparison of Agile Optical Network Architectures with Static Vs. Dynamic Regenerator Assignment," *Proceedings of the IEEE Broadnets 2005: Optical Networking Symposium*, Boston, October 3-7, 2005, pp. 55-64. [PDF](#)
52. S. Lee, K. Sriram, H.S. Kim, and J.S. Song, "Contention-Based Limited Deflection Routing Protocol in Optical Burst-Switched Networks," *IEEE J. Selected Areas in Commun.*, special issue on Optical Communication and Networking, Vol. 23, No. 8, August 2005, pp 1596-1611. [PDF](#)
53. D.R. Kuhn, K. Sriram, and D. Montgomery, "Border Gateway Protocol Security," NIST Special Publication 800-54 (Guidance Document for the Telecom Industry and US Government agencies), Issued July 2007. <http://csrc.nist.gov/publications/nistpubs/800-54/SP800-54.pdf>
54. K. Sriram, D. Montgomery, O. Borchert, O. Kim, and D. R. Kuhn, "Study of BGP Peering Session Attacks and Their Impacts on Routing Performance," *IEEE Journal on Selected Areas in Communications: Special issue on High-Speed Network Security*, Vol. 24, No. 10, October 2006, pp. 1901-1915. [PDF](#)
55. S.K. Lee, K. Sriram, K. Kim, J.H. Lee, Y.H. Kim, and N. Golmie, "Vertical Handoff Decision Algorithms for Providing Optimized Performance in Heterogeneous Wireless Networks," *Proc. of the IEEE Globecom 2007*, Washington D.C., November 2007 (to appear). Also submitted to the *IEEE Trans. on Vehicular Technology*. http://www.antd.nist.gov/~ksriram/vho_algorithm.pdf
56. Kotikalapudi Sriram, Doug Montgomery, Rick Kuhn, W.E. Burr, and Alan Mink, "Measurement Science and Architecture Evaluation Methodologies for Security Driven Internet Architectures and Protocols," *Proceeding of the DARPA workshop on Assurable Global Networking*, February 22-23, 2007, Arlington, VA. <http://csc-ballston.dmeid.org/darpa/meetings/presentations/jQfxH8aC/NIST.pdf>