

# ARUP ACHARYA

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| <b>RESEARCH INTERESTS</b> | Network-based applications and services in wireline and mobile/wireless networks, especially SIP-based services such as VoIP, IM and Presence   |
| <b>WORK EXPERIENCE</b>    | <p>Research Staff Member <span style="float: right;">Jan 00 – present</span><br/>         Security, Networking and Privacy Dept<br/>         IBM TJ Watson Research Center, Hawthorne, NY<br/>         Projects : SIP and SIP-based network infrastructure and applications/services (VoIP, Instant Messaging, Presence, IMS)<br/>         Wireless Mesh networks, Wireless LANs, IPv6, and Content Distribution Networks.</p> <p>Global Lead, Advanced Networking Services Micropractice <span style="float: right;">March 04 - Present</span><br/>         On-demand Innovation Services, IBM Research<br/>         Consulting Engagements : Financial organization, Cable companies, National Govts in the area of SIP/VoIP</p> <p>Research Staff Member <span style="float: right;">May 95 – Nov 99</span><br/>         Systems Architecture Dept<br/>         NEC C&amp;C Research Laboratories, Princeton, NJ<br/>         Projects: Mobile/wireless ATM, IP Switching/ MPLS. Mobile RSVP</p>   |
| <b>EDUCATION</b>          | <p>Post-doctoral Researcher <span style="float: right;">Feb - May '95</span><br/>         Wireless Information Networks Laboratory (WINLAB)<br/>         Rutgers University, New Brunswick, NJ, USA.<br/>         Topic : Extending multicast services for mobile hosts (IP Multicast, Mobile IP)</p> <p>Ph.D (Computer Science) <span style="float: right;">May '95</span><br/>         Rutgers University, New Brunswick, NJ, USA.<br/>         Thesis title : Designing <u>distributed algorithms and services for networks with mobile hosts</u></p> <p>M.S. (Computer Science) <span style="float: right;">May '90</span><br/>         Rutgers University, New Brunswick, NJ, USA.</p> <p>Bachelor of Technology (Honours) <span style="float: right;">June '87</span><br/>         Computer Science &amp; Engineering, Indian Institute of Technology (IIT), Kharagpur, India.</p>  |
| <b>ADJUNCT FACULTY</b>    | Visiting Professor, Wireless Information Networks Laboratory (WINLAB), Rutgers University, April 2004 - Present   |
| <b>PROJECTS</b>           | <p><b>IBM RESEARCH</b></p> <p><b><u>Session Initiation Protocol (SIP)/ Voice-over-IP (VoIP)</u></b></p> <p><b>Server Enhancements and SIP Workload/ Performance characterization:</b> (a) Leading a project to develop a set of server systems enhancements for high-performance SIP security solution applicable for both wireline and mobile service providers (IMS) and (b) a benchmark to characterize SIP workloads for VoIP, Instant Messaging &amp; Presence. [Jan 2005 – Present]</p> <p><b>Application Enablement with SIP:</b> Lead for design / implementation of a client-side service to enable any application to leverage the capabilities of SIP such as VoIP, IM &amp; Presence. Developed new application such as seamless transfer between multiple/ongoing conferences and VoIP-enabled multi-player networked games. Network infrastructure blocks include coupling conference control server with a hardware media conferencing unit, SIP-enabled web servers and game servers.</p> <p><b>Wearable Computing with SIP:</b> Lead for design / implementation of a solution for enabling a Research prototype of a Bluetooth-enabled Linux Watch to work as a wearable communications device supporting VoIP and Instant Messaging.</p> <p><b>Mobility Control for dual-mode devices:</b> Architected a solution for vertical handoffs for dual-mode devices such as wlan-enabled cell-phones, using SIP signaling.</p> <p><b>VoIP over 802.11:</b> designed architecture for providing quality-of-service to SIP-based VoIP on 802.11 using the PCF feature of 802.11 medium access standards.</p> <p><b>Peer-to-peer VoIP and IM:</b> Design/implementation of a SIP based IM/VoIP for ad-hoc wireless network coupling application-layer control/data messages with wireless mesh MAC protocols.</p> |

**Mobile/ Wireless Networks**

**NSF ORBIT project:** This is a \$5.4 million joint academia/industry project for a next-generation wireless testbed. My participation representing IBM Research includes design/implementation of a mesh networking architecture with a peer-to-peer VoIP/IM. Other participants include Rutgers WINLAB (lead), Columbia, Princeton, Bell Labs and Thomson. [Sept 2002 – Present]

**Wireless Mesh Networks:** Designed (a) a "wireless router" with for packet forwarding between multiple wireless interfaces combining MPLS labels with 802.11 MAC extensions, and (b) a "multi-cellular" architecture for simultaneous transmissions in neighboring cells of a mesh network. This work has received a Best Paper award.

**Cross-Layer routing in Mobile Ad-Hoc Networks:** Contributed to design of a PHY/MAC aware routing algorithm for ad-hoc networks with multi-rate radios.

**802.11 based Hotspot:** Developed an architecture/prototype for a Public Wireless LAN system (airConn) for pay-per-use Internet access at 802.11 hotspots, at multiple tiers of service.

**Network Infrastructure**

**MPLS Based Web-switching:** architected a solution for web-switching by using a MPLS switch as a reverse proxy in front of a server farm avoiding TCP terminations.

**IPv6 Content Distribution Networks (CDNs):** investigated ways in which the intrinsic mobility support in IPv6 can be used for request routing in CDNs.

**IPSec Validation:** contributor to a solution for validating IPSec tunnel between two endhosts.

**Storage Virtualization:** architected a solution for storage virtualization by assigning virtual IP address and port numbers to disk blocks such that movement of blocks is transparent to hosts.

**NEC C&C RESEARCH LABS**

**Mobile ATM:** Technical Lead for design / implementation of a mobile IP/ATM protocol architecture for a 25Mbps wireless-ATM based mobile broadband networks, with additional support for wLAN and GSM access. Provided core technical specifications on "mobile ATM" in the wireless ATM working group at the ATM Forum. Supervised an offshore development team of 8 engineers and coordinated software development across India and NEC Labs in Japan, for pre-commercial trials of this mobile broadband system at two large carriers.

**IP Switching/ MPLS:** Technical lead for design/implementation of Ipsofacto, an IP switching technology, whose key features were (a) IP multicast over wired and wireless ATM and (b) IP based mobility architecture of above wireless-ATM system, using Mobile IP and RSVP. Ipsofacto was used by NEC Europe in a major EU pilot on IP Switching. Supervised an offshore development team coordinating software development with NEC Labs, Germany.

**Linux based switch controller:** An open architecture for IP/ATM switches and base-stations, with separation of networking software (running on an external Linux PC) from the switching hardware. In 1996, this was one of the earliest use of open-source software for telecom/networking. Supervised a team of two engineers for initial prototype of a Linux based system for mobile ATM and Ipsofacto.

**Mobile RSVP:** Joint work with Rutgers University on extending RSVP for signaling QoS in IP based mobile networks. Includes work on extending the Integrated Services architecture to support predictive and guaranteed services for mobile hosts.

**CORPORATE TECHNOLOGY TEAM ASSESMENTS**

Research representative at a Corporate Technology Team study on SIP, that set direction for IBM to pursue emerging market opportunities in this area. (Feb - April 2004).

Member, Task force on SIP and SIMPLE, sponsored by IBM Corporate Strategy Office, laying the technical groundwork for above study (Sept 2003)

Member, Corporate Technology Team study on VoIP. One of the first studies within IBM on this topic, with findings presented to Senior VP (Technology),IBM. Sept 2002.

**CUSTOMER CONSULTING ENGAGEMENTS**

**Network assessment for scaling VoIP and VoD:** Engagement with IBM Business Consulting Services for Comcast Cable for an infrastructure assessment for scaling VoIP and VoD services over 5 years. [July '05 – Present]

**SIP Adoption Strategy:** Subject matter expert for IBM Global Services project with Canadian Imperial Bank of Commerce (CIBC) for adoption of SIP and SIP-based services such as VoIP, Instant Messaging & Presence within the banking infrastructure. [Nov '04 – July '05]

**e911:** Architected an in-building e911 solution for Wake Forest University using 802.11 based location determination with VoIP, as part of IBM Global Services consulting project. [ May – June '04]

## PROFESSIONAL ACTIVITIES

### Conference Organization

Vice-Chair (Wireless and Mobile Computing), 26<sup>th</sup> IEEE Intl Conference on Distributed Computing Systems (ICDCS), 2006

Program Co-Chair, 4<sup>th</sup> Asian Intl Mobile Computing Conference (AMOC), 2006

Vice- Chair, MAC and Lower-layers, 2<sup>nd</sup> IEEE Conference on Mobile Ad-Hoc and Sensor Systems (MASS), 2005.

Co-Chair, Workshop on Software for Wireless Communications and Applications (SoftWIM), COMSWARE 2006

Lead Co-chair, Global Internet and Next Generation Networks Symposium, Globecom 2004

### Tutorials

Session Initiation Protocol (SIP): A protocol for supporting multimedia in next-generation networks. **ACM Multimedia** 2005. (With Archan Misra, IBM Research and Avshalom Hour, IBM)

Session Initiation Protocol (SIP): A Protocol for Managing Next Generation Networks. 13th IEEE Conference on Network Protocols (ICNP), 2005. (With Archan Misra, IBM Research and Avshalom Hour, IBM)

Session Initiation Protocol (SIP): Multimedia Signaling in Next Generation Networks. 1st Intl Conference on Communication System Software and Middleware (COMSWARE), 2006 (With A Hour, IBM)

Wireless ATM: Standards, Architectures, Protocols & Implementation. Tutorial at the ACM Annual International Conference on Mobile Computing and Networking (**Mobicom**) 1997. Jointly with L. Dellaverson and C.-K.To. H.

### Program Committees

- ACM Annual International Conference on Mobile Computing and Networking (**Mobicom**) : 1999 , 2000 , 2001 , 2002 , 2004
- 1st Intl Conference on Communication System Software and Middleware(COMSWARE), 2006
- IEEE Intl Symposium on Wireless Pervasive Computing (ISWPC), 2006
- 1st IEEE Symposium on Wireless, Mobile and Multimedia Networks (WoWMoM), 2005
- 1st IEEE International Conference on Collaborative Computing (CollaborateCom), 2005
- Intl Conference on E-business and Telecommunication Networks (ICETE): 2003, 2005
- IEEE Intl Conference on Communications (ICC) : Symposium for Next Generation Networks for Universal Services ( 2005 ), Symposium on Next Generation Mobile Networks (2006)
- 7th Intl Workshop on Distributed Computing (IWDC), 2005
- 1st Wireless Internet Conference (WICON), 2005
- Workshop on Pervasive Wireless Networking (PWN), in conjunction with Percom, 2005
- The 25th IEEE Intl Conference on Distributed Computing Systems (ICDCS) : 1999, 2005
- 1st IEEE International Conference on Mobile Ad-Hoc and Sensor Systems (MASS), 2004
- IEEE International Workshop on IP Operations and Management (IPOM) 2004
- 1st Working Conference on Wireless On-demand Network Systems (WONS) 2004 , 2005
- IFIP Personal Wireless Communications (PWC) : 2003, 2004
- IEEE Global Communications Conference (Globecom) General Conference: 2003, 2004
- 1st Intl Wkshp on Broadband Wireless Multimedia: Algorithms, Architectures and Applications (BroadWiM), 2004
- The 5th ACM Intl Workshop on Wireless Mobile Multimedia (WoWMoM) : 2002
- International Workshop on Mobile Distributed Computing (MDC) : 2003, 2004

### Working groups

Member, IFIP Working Group 6.8 on Mobile and Wireless Communications

### Panels

Panel Moderator/ Organizer, "Convergence Nirvana : Are we there yet?", COMSWARE, Jan 2006

Participants : Columbia University, IBM, Jabber, Infosys, Bharti

Invited Participant, Dagstuhl Seminar "Mobile Multimedia Communication - Systems and Networks" Schloss Dagstuhl International Conference and Research Center for Computer Science. May4 - 6, 1999.

### Selected Invited Talks

"SIP/SIMPLE: control architecture for the wired and wireless Internet?" Presentation at the 1st NSF WMPG (Wireless/Mobile Planning Group for the Future Internet) workshop, WINLAB, Rutgers University, 2nd Aug 2005

"Session Initiation Protocol: VoIP, IM and Presence", Technology Advisory Board, Brascan, Feb 17, 2005, Toronto.

"Research Activities in SIP/VoIP and Mobile Wireless Networks", IBM India Research Labs, Jan 15, 2005, New Delhi.

"SIP: What is it, and how can we leverage it for next generation networking?" IBM Networking Services Global "Coffee Class". Dec

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|                             | <p>11, 2003.</p> <p>"Medium access protocols for wireless mesh networks supporting peer-to-peer VoIP and IM", A. Acharya. Invited Presentation at Rutgers WINLAB (Wireless Information Networks Laboratory), Fall 2003 Industrial Advisory Board meeting, Nov 2003.</p> <p>"Multi-hop 802.11 wireless networks", IBM TJ Watson - Seminars in Communication. A. Acharya, Nov 2002.</p>   |
| <b>NSF PROGRAMS</b>         | <p>Member, NSF Wireless Mobile Planning Group (WMPG) for the Future Internet, May 2005 - March 2006.</p> <p>Industry Partner, ORBIT: NSF funded \$5.45 million/ 4-year project on a Testbed for Next Generation Wireless Networks and Applications. Participant in two experimental work packages :</p> <ul style="list-style-type: none"> <li>• Ad-hoc Networking in 802.11x WLAN scenarios</li> <li>• Peer-to-peer infrastructure for VoIP and IM</li> </ul> <p>National Science Foundation (NSF) Wireless &amp; Mobile Communications &amp; Networking Review Panel, 1997, Arlington.</p>  |
| <b>PHD THESIS COMMITTEE</b> | <p>External Member, PhD Dissertation Committee of Sudeept Bhatnagar<br/>Thesis title : " Distributed Admission Control in Core-Stateless Networks"<br/>Computer Science Dept, Rutgers University, April 2004</p> <p>External Member, PhD Dissertation Committee of Dragos Niculescu<br/>Thesis title : "Forwarding and Positioning problems in Ad Hoc Networks"<br/>Computer Science Dept, Rutgers University, March 2004.</p>  |
| <b>PATENTS AWARDED</b>      | <p><b><u>Storage Networks</u></b><br/>Virtualization of iSCSI Storage. US Patent 6,934,799. Co-inventors : Khalil Amiri (Imperial College, UK), Aug 2005</p> <p><b><u>IP Security</u></b><br/>Validation of network communication tunnels. US Patent 6,829,709. Co-inventors: R. Sailer, R. B. Jennings, D. C. Verma, M. S. Beigi. Dec 2004.</p> <p><b><u>Mobile Wireless Networks</u></b><br/>Handoff control for point to multipoint connections in mobile ATM networks. US Patent 6,643,279. Co-inventors: J. Li. Nov 2003.</p> <p>Handoff method for an ATM wireless network wherein both the switch and the mobile buffer cells and the mobile controls when the handoff will occur. US patent 6,023,461. Co-inventors: J. Li, D. Raychaudhuri. Feb 2000.</p> <p>Handoff-control technique for wireless ATM. US patent 5,974,036. Co-inventors: J. Li, D. Raychaudhuri, R. Yuan, S. K. Biswas. Oct 1999.</p> <p><b><u>IP Switching</u></b><br/>System and method for transferring IP packets using fast ATM cell transport. US patent 6,343,326 Co-inventors: R. Dighe. Jan 2002.</p> <p>Method for Internet Protocol switching over fast ATM cell transport. US patent 5,903,559. Co-inventors: R. Dighe. May 1999.</p>   |
| <b>PATENTS FILED</b>        | <p><b><u>SIP/ VoIP</u></b></p> <ul style="list-style-type: none"> <li>- SIP Based VoIP Multiplayer Network Games. Co-inventors: Aameek Singh Filed: Feb 2004.</li> <li>- System And Apparatus For Geographically Distributed VoIP Conference Service With Enhanced Qos. Co-inventors: R.N. Chang, Z. Shae, D. D. Kandlur. Filed Oct 2003.</li> <li>- Enabling Collaborative Applications Using Session Initiation Protocol (SIP) Based Voice Over Internet Protocol Networks (VoIP). Co-inventors: A. Singh, P. Mahadevan, Z. Shae, D.D. Kandlur. Filed Oct 2003.</li> <li>- Method, System And Service For Achieving Synchronous Communication Responsive To Dynamic Status. Co-inventors: E.H. Stern, Z. Shae, J. E. Christensen, R. Williams. Filed Jan 2004.</li> <li>- Differentiated Handling Of Sip Messages For VoIP Call Control. Co-inventors : P. Pradhan, D. D. Kandlur. Filed Nov 2003.</li> <li>- A Method And Apparatus For Providing Quality Of Service To VoIP Over 802.11 Wireless Lans. Co-inventors: Z. Shae, D. D. Kandlur. Filed Nov 2003.</li> </ul> <p><b><u>802.11 Hotspots</u></b><br/>Network-Layer Enforcement Of Differentiated Connectivity For Public Wireless Internet Access. Co-inventors:J. Gomez-castellan, Y. Ko, C. Bisdikian, M.C. Rosu, A. Misra. Filed Aug 2002</p> <p><b><u>MPLS</u></b><br/>A Method And Apparatus For Content-Aware Web Switching. Co-inventors: A.A. Shaikh, D. C. Verma, R. Tewari. Filed Oct 2001.<br/>Network Route Control. Co-inventors: A. A. Shaikh, D. Saha. Filed Oct 2003</p> <p><b><u>Service Discovery</u></b><br/>Dynamic Service Discovery. Co-inventors: J. Rubas, Y. Ko, S. Berger, N. Lee. Filed Jan 2002</p> |

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|   | <p><b>IP Security</b><br/>Validation Of Network Communication Tunnels. Co-inventors: R. Sailer, R. B. Jennings, D. C. Verma, M. S. Beigi. Filed : May 2000</p>  |   |   |
| <p><b>STANDARDS ACTIVITIES</b></p>  | <p><b>IFIP</b><br/>Nominated Member, IFIP TC6 Working Group 6.8 on Mobile and Wireless Communications, 2002- Present.</p> <p><b>IETF (Internet Engineering Task Force)</b><br/>- Overview of IP multicast in a Multi-Protocol Label Switching (MPLS) Environment, IETF RFC 3353, August 2002, MPLS working group. D. Ooms, B. Sales, W. Livens, A. Acharya, F. Griffoul, and F. Ansari.<br/>- IP Multicast Support in MPLS Networks. Internet Draft Presented to the MPLS working group, 43rd IETF, March 99. A. Acharya, R. Dighe, F. Ansari.<br/>- IPSOFACTO: IP Switching Over Fast ATM Cell Transport. Internet draft, July 1997. A. Acharya, R. Dighe, F. Ansari.</p> <p><b>ATM Forum</b><br/>- Integrated location management for mobile ATM: interworking with mobile telephony and mobile IP. Wireless ATM Working Group Contribution, ATM Forum, Sept 1997.<br/>- Comparison of location management schemes for mobile ATM. Wireless ATM Working Group contribution, ATM Forum, Feb 1997.<br/>- Primitives for location management and handoff in Mobile ATM Networks. Wireless ATM Working Group Contribution, ATM Forum, Aug 1996.</p>   |   |   |
| <p><b>SKILLS</b></p>  | <table border="0"> <tr> <td data-bbox="284 772 876 1239"> <p>SIP / SIMPLE</p> <ul style="list-style-type: none"> <li>• VoIP, Instant Messaging, Presence</li> <li>• Session Border Controllers</li> <li>• SIP Security aspects</li> <li>• Converged network design for data/voice</li> <li>• VoIP over 802.11</li> <li>• IMS</li> <li>• PacketCable</li> <li>• Open Source software</li> </ul> <p>MPLS</p> <ul style="list-style-type: none"> <li>• Multicast support</li> <li>• VPN</li> <li>• VoIP over MPLS</li> </ul> <p>IPv6</p> <p>IP Multicast (DVMRP, PIM, MBGP)</p> <p>IP Routing</p> <p>High-speed Switch/Router Architectures</p> <p>IP Security Architectures</p> </td> <td data-bbox="876 772 1557 1239"> <p>Mobile/wireless networking protocols and architectures</p> <ul style="list-style-type: none"> <li>• Mobile IP, IPv6</li> <li>• 802.11/ WLAN, GPRS/3G/4G networks</li> </ul> <p>Wireless LANs</p> <ul style="list-style-type: none"> <li>• Multi-hop/ mesh networks (802.11 MAC and layer3 protocols)</li> <li>• Public wLAN hotspots</li> <li>• Ad-hoc networking / routing</li> </ul> <p>Content Distribution Networks (CDNs)</p> <ul style="list-style-type: none"> <li>• web switching</li> <li>• content-aware request routing</li> </ul> <p>Linux, Open Source Networking Software</p> <p>HTTP, Content Distribution Networks</p> <p>ATM Signaling /Routing</p> </td> </tr> </table>   | <p>SIP / SIMPLE</p> <ul style="list-style-type: none"> <li>• VoIP, Instant Messaging, Presence</li> <li>• Session Border Controllers</li> <li>• SIP Security aspects</li> <li>• Converged network design for data/voice</li> <li>• VoIP over 802.11</li> <li>• IMS</li> <li>• PacketCable</li> <li>• Open Source software</li> </ul> <p>MPLS</p> <ul style="list-style-type: none"> <li>• Multicast support</li> <li>• VPN</li> <li>• VoIP over MPLS</li> </ul> <p>IPv6</p> <p>IP Multicast (DVMRP, PIM, MBGP)</p> <p>IP Routing</p> <p>High-speed Switch/Router Architectures</p> <p>IP Security Architectures</p> | <p>Mobile/wireless networking protocols and architectures</p> <ul style="list-style-type: none"> <li>• Mobile IP, IPv6</li> <li>• 802.11/ WLAN, GPRS/3G/4G networks</li> </ul> <p>Wireless LANs</p> <ul style="list-style-type: none"> <li>• Multi-hop/ mesh networks (802.11 MAC and layer3 protocols)</li> <li>• Public wLAN hotspots</li> <li>• Ad-hoc networking / routing</li> </ul> <p>Content Distribution Networks (CDNs)</p> <ul style="list-style-type: none"> <li>• web switching</li> <li>• content-aware request routing</li> </ul> <p>Linux, Open Source Networking Software</p> <p>HTTP, Content Distribution Networks</p> <p>ATM Signaling /Routing</p> |
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| <p><b>TRADE SHOW DEMOS</b></p>  | <p>IP multicast support in MPLS. NEC Booth at MPLS'99, Paris.<br/>Mobile ATM. Demonstrated at Mobicom'96, Interop'97, Demo '98 at MoMuC 98, Berlin.<br/>IPSOFACTO (IP Switching over Fast ATM Cell Transport). Interop'97.</p>  |   |   |
| <p><b>PUBLICATIONS</b></p>  | <p><b>SIP / VoIP</b></p> <p>SPLAT: A unified SIP services platform for VoIP applications. <i>To appear in International Journal of Communications Systems</i>, Special Issue on VoIP – Theory and Practice. A. Singh, A. Acharya, P. Mahadevan, Z.Y. Shae.</p> <p>Extending SIP-based Communication Services to Wearable Computers. A. Acharya, S. Berger and C. Narayanaswami. Submitted to Elsevier <b>Pervasive and Mobile Computing Journal</b>.</p> <p>Enabling SIP-based Session Setup in Ad Hoc Networks. N. Banerjee, A. Acharya, S. Das. IBM Research Report RC 23270. Submitted for publication to <b>ACM/Baltzer Journal of Wireless Networks (WINET)</b>.</p> <p>Multiplayer Network Gaming with the Session Initiation Protocol. A. Singh and A. Acharya. <b>Computer Networks</b>, Vol 49, Issue 1, 2005 (Special Issue on Networking Issues in Entertainment Computing).</p> <p>Seamless SIP-based Mobility for Multimedia Applications. N. Banerjee, A. Acharya, S. Das. Submitted to IEEE Network Magazine, Special Issue on Multimedia over Broadband Wireless Networks</p> <p>SIP-based Mobility Architecture for Next Generation Wireless Networks. N. Banerjee, S. Das and A. Acharya. 3<sup>rd</sup> IEEE Conference on Pervasive Computing and Communications (Percom), 2005.</p> <p>Unleashing the power of Wearable Devices in a SIP infrastructure. A. Acharya, S. Berger and C. Narayanaswami. 3<sup>rd</sup> IEEE Conference on Pervasive Computing and Communications (Percom) 2005.</p> |   |   |

Using Session Initiation Protocol to build Context-aware VoIP support for Multiplayer Networked Games. A. Singh and A. Acharya. ACM Workshop on Network and Systems support for Games (NetGames) 2004.

SIMPLE in Ad-hoc Networks. N. Banerjee, A. Acharya, S. Das. Invited Paper, Invited Paper, 1<sup>st</sup> International Workshop on Broadband Wireless Multimedia: Algorithms, Architectures and Applications (BroadWim) 2004.

Design and Implementation of SIP Network and Client Services for enabling Collaborative Applications. A. Singh, P. Mahadevan, A. Acharya, Z. Shae. 13<sup>th</sup> Intl Conference on Computer Communication and Networks (ICCCN) 2004

### **Mobile/ Wireless Networks**

PARMA: A PHY/MAC Aware Routing Metric for Ad-Hoc Wireless Networks with Multi-rate Radios. S. Zhao, Z. Wu, A. Acharya and D. Raychaudhuri. IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM) 2005.

DCMA: A Label Switching MAC for Efficient Packet Forwarding in Multi Hop Wireless Networks. A. Acharya, S. Ganu and A. Misra. Submitted for journal publication. Also appears as IBM Research Report RC 23210.

Design and Analysis of a Cooperative Medium Access scheme for High-Performance Wireless Mesh Networks. A. Acharya, A. Misra and S. Banal. 1<sup>st</sup> International conference on Broadband Networks (BroadNets) 2004 – Broadband Wireless Networking Symposium, Oct 2004.

airConn: A framework for tiered services in public wireless LAN hot-spots. IEEE Communications Magazine, Sept 2004. A. Acharya, C. Bisdikian, Young-Bae Ko and A. Misra.

ts-PWLAN: A Value-added System for Providing Tiered Wireless Services in Public Hot-spots. IEEE 2003 International Conference on Communications (ICC 2003). A. Acharya, C. Bisdikian, Young-Bae Ko and A. Misra.

High Performance Architectures for IP-based Multi-hop 802.11 networks. IEEE Wireless Communications Magazine, Special Issue on "Merging IP and Wireless Networks", Oct 2003. A. Acharya, A. Misra and S. Banal.

A Label-switching Packet Forwarding Architecture for Multi-hop Wireless LANs. **Best Paper Award** at ACM WoWMoM 2002. A. Acharya, A. Misra and S. Banal.

Challenges in high performance data forwarding in multi-hop wireless networks. IBM Research Report RC 22506 A. Acharya, A. Misra and S. Banal. Invited paper in China Communications Magazine, Vol. 1, No. 1 (2004).

MACA-P: A MAC for Concurrent Transmissions in Multi-Hop Wireless Networks. IEEE International Conference on Pervasive Computing and Communications (Percom), March 2003. A. Acharya, A. Misra and S. Banal.

MRSVP: A reservation protocol for integrated services packet networks with mobile hosts. **ACM/Baltzer Journal of Wireless Networks**, Vol. 7, Issue 1, Jan 2001. A. Talukdar, B. R. Badrinath and A. Acharya.

Integrated services packet networks with mobile hosts: architecture and performance. **ACM/Baltzer Journal of Wireless Networks**, Vol. 5, Issue 2, Mar 1999. A. Talukdar, B. R. Badrinath and A. Acharya

Rate adaptation schemes in networks with mobile hosts. The fourth annual ACM/IEEE international conference on Mobile computing and networking (**Mobicom**), Oct 1998. A. Talukdar, B. R. Badrinath and A. Acharya.

IP Switching over fast ATM cell transport (IPSOFACITO): IP multicast over wireless ATM. IEEE Intl Conference on Universal Personal Communications (ICUPC), Oct '98. A. Acharya, R. Dighe and F. Ansari.

Mobility support for IP over wireless ATM. IEEE Communications, April '98. A. Acharya, J. Li, F. Ansari and D. Raychaudhuri.

On accommodating mobile hosts in an integrated services packet network. IEEE Infocom '97. A. Talukdar, B. R. Badrinath and A. Acharya.

Mobility management in wireless ATM networks. IEEE Communications, Nov '97. A. Acharya, J. Li, B. Rajagopalan and D. Raychaudhuri.

Mobile ATM: architecture, protocols and implementation. 2nd IEEE Intl workshop on broadband switching systems, Dec '97. A. Acharya, J. Li and D. Raychaudhuri.

Design and Prototyping of Location Management and Handoff Protocols for Wireless ATM networks. IEEE Intl Conference on Universal Personal Communications (ICUPC), Oct '97. A. Acharya, J. Li, A. Bakre and D. Raychaudhuri.

Handoff and location management schemes for mobile ATM networks. 3rd International workshop on Mobile Multimedia Communications (MoMuC), Sept '96. Also appears in **Mobile Multimedia Communications**, D. J. Goodman (ed.), Plenum Press, 1997. A. Acharya, S. K. Biswas, L. J. French, J. Li and D. Raychaudhuri.

A framework for delivering multicast messages in networks with mobile hosts. **ACM Mobile Networks and Applications**, Vol. 1, Issue 2, Oct 1996. A. Acharya and B. R. Badrinath.

IP multicast extensions for mobile internetworking. IEEE Infocom '96. A. Acharya, A. Bakre and B. R. Badrinath.

Designing distributed algorithms for mobile computing networks. **Computer Communications** 19 (1996). A. Acharya and B. R. Badrinath.

Checkpointing Distributed Applications on Mobile Computers. 3rd Intl Conference on Parallel and Distributed Information Systems. Oct '94. A. Acharya and B. R. Badrinath.

Impact of mobility on Distributed Computations. **ACM Operating Systems Review**, April '93. B. R. Badrinath, A. Acharya and T. Imielinski.

Delivering multicast messages in a network with mobile hosts. IEEE Intl Conf on Distributed Computing and Systems (ICDCS), May '93. A. Acharya and B. R. Badrinath.

### **MPLS**

Overview of IP multicast in a Multi-Protocol Label Switching Environment (MPLS) Environment, IETF RFC 3353, August 2002, MPLS working group D. Ooms, B. Sales, W. Livens, A. Acharya, F. Griffoul, F. Ansari.

Web Switching using MPLS. Technical Focus, MPLSWorld. A. Acharya, A. Shaikh, R. Tewari and D. Verma.

Native IP multicast support in MPLS. Lecture notes in Computer Science 1736. Also appears in 1st Intl Workshop on Networked Group Communications, Nov '99. F. Griffoul and A. Acharya.

IPSOFACTO: IP switching over fast ATM cell transport. Internet draft <draft-acharya-ipsw-fast-cell-00.txt>, July '97. A. Acharya, R. Dighe and F. Ansari.

A framework for IP Switching over Fast ATM Cell Transport (IPSOFACTO). Proceedings of the SPIE Voice, Video and Data Communications, Oct '97. A. Acharya, F. Ansari and R. Dighe.

### **IPv6**

Using Mobility Support for Request-Routing in IPv6 CDNs. 7th Intl Workshop on web content caching and distribution (WCW-7). A. Acharya and A. Shaikh.

### **IP Security**

IPSECvalidate - A Tool to Validate IPSEC Configurations. Usenix LISA 2001 15th Systems Administration Conference, Dec '01. A. Acharya, M. Beigi, R. Jennings, R. Seiler and D. Verma.

### **P2P networks**

SRIRAM - A Scalable, Resilient Autonomic Mesh. IBM Systems Journal, Vol. 42, No. 1, 2003. D. C. Verma, S. Sahu, S. Calo, A. Shaikh, I. Chang and A. Acharya.

### **Content Distribution Networks**

MPLS based request routing, 6th Intl Workshop on Caching and Content Distribution (WCW-6), June 2001. A. Acharya, A. Shaikh, R. Tewari and D. C. Verma.

MPLS-based Web Switching, 1st New York Metro Area Networking Workshop, March 2001. A. Acharya, A. Shaikh, R. Tewari and D. C. Verma.

Local and wide-area server selection: techniques and challenges, Invited talk, Open Signaling for ATM, the Internet and Mobile Networks (Opensig) 2000. A. Acharya, A. Shaikh and R. Tewari.

### **IP Multicast**

Distributed Admission Control for Heterogeneous Multicast with Bandwidth Guarantees. 11th Intl Workshop on Quality of Service (IWQoS 2003), June 2003. S. Bhatnagar, B. R. Badrinath and A. Acharya. Also appears as Lecture Notes in Computer Science 2707.

IP switching over fast ATM cell transport (IPSOFACTO): Switching multicast flows. IEEE Globecom '97. A. Acharya, F. Ansari and R. S. Dighe.

### **Routing and RSVP**

A framework for handling route changes and aggregation in IPSOFACTO. IEEE Globecom '98, F. Ansari and A. Acharya.

Dynamic QoS for IP switching using RSVP over IPSOFACTO. Proc. SPIE Vol. 3408, Intl Symposium on Broadband European Networks and Multimedia Services, Sept '98. A. Acharya, F. Ansari, M. Ott, H. Sanneck.

### **Distributed Algorithms**

Recording distributed snapshots based on causal order of message delivery. Information Processing Letters Vol. 44, No. 6, Dec '92. A. Acharya and B. R. Badrinath.

An efficient protocol for ordering broadcast messages in distributed systems. 3rd IEEE Symposium on Parallel and Distributed Processing. Dec '91, A. Acharya and B. R. Badrinath.

### **Artificial Intelligence**

Recognition of occluded objects with heuristic search. Pattern Recognition Vol. 23, No. 6, '90. S. Chaudhury, A. Acharya and S. Subramanian.

Heuristic search in restricted memory. Artificial Intelligence Vol. 41, No. 2, Dec. '89. P. P. Chakrabarti, S. Ghose and A. Acharya.