Joseph D. Touch, Ph.D.

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https://www.strayalpha.com/ (a short CV digest and this CV)

Experience

Expert in Internet protocols, network architecture, distributed systems architecture, network virtualization, high-speed networking, network security, quantum nets, optical computing, and optical networking.

The Aerospace Corporation (8/2017 – present)

Principal Scientist (2/2021-present)
Previously Sr. Distributed Systems Data Architect 8/2017 – 2/2021.

Supporting the Engineering and Technology Group (ETG) Information Systems and Cyber Division (ISCD) by participating in and advising projects throughout the Aerospace portfolio on networking and distributed systems architecture, including protocols, cloud systems, hardware interfaces, and software services. Leads and supports the development of proliferated LEO hosted constellations, space backbone network architectures, satellite networking programs, cloud and ground systems, and quantum communications.

Independent Consultant (3/1992-present)

Consultant

Assessing the technological feasibility of Internet and distributed systems concepts.

USC / Information Sciences Institute (6/1992 – 8/2017)

Postel Center Director (10/2000 – 8/2017)
Previously: Project Leader 10/1995 – 10/2000, Computer Scientist 6/1992 – 10/1995.

Lead teams to develop large-scale proof-of-concept computer networks, distributed systems, and optical computers in software and hardware. Performed original research in the evolution of network and systems architecture. Experienced with Internet protocol standards, network virtualization, high-speed nets, network security, and optical networking.

- NSF INSPIRE Optical Turing Machine project to compute on in-transit data
- NSF FIND Recursive Network Architecture (RNA): a future Internet architecture
- DARPA DARPA F6 DynaSat: Internet overlays stack for distributed satellite clusters
- DARPA POW and OCDMA: optical Internet WAN and LAN architectures.
- NSF OptIPuter: high-speed security supporting optical high-performance computing.
- NSF NetFS: a file system interface for network configuration.
- NSF X-Tend: development of the X-Bone system for academic and research use.
- NSA Agile Tunnels (ATP): using floating tunnel links to avoid DDOS attacks.
- DARPA ALN: using automated machine learning to tune transport protocols.
- DARPA X-Bone and DynaBone: automated deployment and management of IP overlay networks and multilayer overlays to resist denial-of-service attacks.
- DARPA Large-Scale Active Middleware: low-latency multicast web system.

- DARPA ATOMIC-2: analyzed MD5 (code in Cisco IOS), developed a high-speed host gateway, dynamic routing for experimental LANs.
- DARPA PC-ATOMIC: a high-speed i486 VL-bus interface for the ATOMIC LAN.

Also participated on optical aggregation as Working Group 2 Co-Lead of the NSF Engineering Research Center for Integrated Access Networks (CIAN), the system architecture of the LA DWP Smart Grid, the room sensor prototype of the Building Level Energy Management System (BLEMS), the design of a space Internet (TCA), and the user interface for ISI's *mmcc* teleconference tool, ported Bellcore's Touring Machine.

Research Associate Professor (CS 6/2002-8/2017, EE joint 6/2003-8/2017)
Previously: CS Assistant 2/1994 – 6/2002.

Revised and taught a new "First Principles" approach to EE450 Computer Networks (Spring 2015-Fall 2016). Previously revised and taught CSCI555 Advanced Operating Systems (Springs 1994-1996), CSCI558L Internetworking and Distributed Systems Lab (Summer 2001) and ISI's Summer Graduate Research Experience Program (SGREP) (1999-2004).

US Air Force (10/2006 – 9/2010) on-loan via Intergovernmental Personel Act (IPA)

Space and Missile Center (SMC) MCTG TSAT Sr. Network Engineer

Advised the Transformational Communications Satellite (TSAT) program, serving as a subject expert on Internet and optical networking issues for two concurrent $500M risk-reduction efforts coordinated with ground/network architecture and terminals.

SMC MCTG Advanced Concepts Group (ACG) Network Chief

Advised the ACG on future satellite network architectures and Internet issues.

Education

University of Pennsylvania

Ph.D., 5/1992, Computer and Information Science,
Advisor: David J Farber, Dissertation Title: *Mirage: A Model for Latency in Communication*.
Supported by DARPA's Info. Science and Tech. Office, contract NAG-2-639 entitled "Mirage" and AT&T Grad. Research Fellowship #111349.

Cornell University

M.S., 8/1987, Computer Science, Advisor: Ken Birman.

University of Scranton

B.S., 8/1985, *Summa cum Laude* with Honors, Biophysics and Computer Science, Presidential I (full-tuition, 4-year) Scholarship, Award for Excellence in Computer Science.

Honor societies: Alpha Sigma Nu (general, Jesuit; secretary), Sigma Pi Sigma (physics), Upsilon Pi Epsilon (CS; chapter founder), Sigma Xi (sci. research, Assoc. 1984, Full 1993).

Memberships

ACM (student 1983, member 1992, senior 2010, distinguished scientist 2010), Sigcomm.

IEEE (student 1983, member 1992, senior 2002) Comm. Society, Computer Society.

OSA (member 2013, senior 2014).

Honors:

ACM Distinguished Scientist (2010), Senior Member (2010).

DARPA Fault Tolerant Networking Award for Excellence in Academic Research (2003).

IEEE Senior Member (2002), ComSoc Distinguished Lecturer (2013-2014),
Tech. Committee on Computer Communications (TCCC) Outstanding Service Award
(2013), Internet Tech. Committee (ITC) Outstanding Service Award (2016).

OSA Senior Member (2014), Traveling Lecturer (2016-present).

PTI Tech. Achievement Winner (with Santa Monica's Public Electronic Network) (1996).

USAF TSAT Space Segment Civilian of the Quarter (1Q2007), Civilian of the Year (2007).

Funding

Role	Agency	Project	Period
PI	DARPA	PC-ATOMIC	1994-1995 (1 year, $340K)
PI	DARPA	ATOMIC-2	1994-1997 (4 years, $2.1M)
Co-author, PI	DARPA	LSAM	1995-1998 (3 years, $3M)
Author, PI	DARPA	X-Bone	1998-2001 (3 years, $2.5M)
Author, PI	DARPA	DynaBone	2001-2004 (3 years, $2M)
Author, PI	NSF	NetFS	2001-2006 (4.5 years, $480K)
Author, PI	NSF	X-Tend	2002-2006 (3.5 years, $500K)
Co-author, co-PI	DARPA	ALN	2005-2006 (1 year, $400K)
Author, PI	NSA	Agile Tunnels	2005-2006 (1 year, $75K)
Author, PI	NSF	RNA	2006-2012 (6 years, $350K)
Author, PI	USAF	PROS	2006-2010 (4 years, $1.4M)
Co-author, Co-PI	NSF ERC	CIAN	2008-2015 (7 years, $600K)
Author, PI	NSF	RNA-Suppl	2010-2012 (2 yrs, $80K)
Author, PI	DARPA	DynaSat	2011 (0.5 yrs, $850K)
Author, PI	NSF	INSPIRE-OTM	2013-2017 (3.5 years, $750K)
Co-author, Co-PI	NSF	HUMAN REU	2017-2020 (3 years, $360K)

Research Areas

Virtual and overlay networks (incl. multilayer overlays, application deployment)

Optical network interfaces, switching architectures, computation, and devices

High performance / zero configuration network security protocols

Automated Internet configuration and deployment

High-speed protocols and networks and network architecture

Empirical protocol, algorithm, and system performance (esp. TCP performance)

Web cache design and performance (incl. multicast web caches)

Latency reduction (reducing various sources of time delay and the use of anticipation)

Professional Activities

Society/Organization Officer:

ACM Sigcomm: Secretary/Treasurer (2002-03), Conference Coordinator (2003-07), Conference Coordinator Emeritus (2007-11)

IANA Port Expert Review Team leader (2008-present)

IEEE Comunications Society: TC on Gigabit Networking (TCGN) (chair 1999-2001, vice-chair 1996-99), Internet TC (co-chair 2000-04), TC on Computer Communications (TCCC) (chair 2008-12), Director of Conference Operations (2012-13)

IETF Area Review Triage (ART)/Directorate member: Transport (2008-present), SmartPower (2011-14)

IRSG member (2010-12)

IRTF Virtual Networks Research Group (VNRG) (co-creator, chair 2010-12)

OSA TC on Nonlinear Optics (chair 2017, vice-chair 2016-17, tech event chair 2015-16)

Sigma Xi membership reviewer (2015-present)

Editorial Board member:

Elsevier's Journal of Computer and Systems Sciences 2007-15

Elsevier's Computer Networks (and ISDN Systems, formerly) 1999-2006

IEEE Network 1997-2012

Conference Steering Committees:

ACM Sigcomm Conext ReArch Steering Committee 2008-10

AsiaFI Board 2015-present

Global Future Internet Summit 2011-present

IARIA Int'l Conf. on Internet Surveillance & Protection (ICISP) Advisory Committee 2006

IEEE FutureNet Steering Committee 2011-12

IEEE Infocom Standing Committee 2005-12

IEEE Global Internet Steering Committee 2000-12 (Chair)

IEEE Workshop on Internet Applications Steering Committee 1999-2005

Conference Leadership:

ACM Sigcomm (Publicity Chair 2000, Finance Chair 2001, Registration/Finance Chair 2012)

ACM Sigcomm CoNext ReArch Workshop (Chair 2008)

AsiaFI Conference on Future Internet (CFI) (Tech. Co-Chair 2011, Co-Chair 2012)

DOE Network 2025 Challenges (organizing committeee, 2016)

IEEE Computer Communications Workshop (Finance Chair 2009, Chair 2010)

IEEE Global Internet Workshop (Chair 2005)

IEEE High-Speed (fmr. Gigabit) Netw. Workshop (CoChair 1997, 1999; Chair 1998)

IEEE ICCCN Network Arch. and Protocols (Chair 2009)

IEEE Infocom (Internet Co-chair 1999, TPC Chair 2006)

IEEE ICC FutureNet IV (Chair 2011)

IFIP Protocols for High-Speed Networks (Co-chair 1999)

Optical Internet Workshop (Chair 1997)

SPIE Opticomm (Vice General Chair 2001)

Conference Conference/Workshop Technical Program Committees:

ACM Sigcomm Asia Workshop 2005

ACM Sigcomm 2001

ACM Dynamic Interconnection of Networks Workshop (at Mobicom) 2005

Asia Internet Engineering Conference (AINTEC) 2012, 2018

Conference on Comm. Systems and Networks (COMSNETS) 2012

ENext CoNext Workshop 2006-2007

IARIA Int'l Conf. on Internet Surveillance & Protection (ICISP) 2006

IEEE Conference on High Speed Networks 1999, 2000

IEEE Conference on Networks for Grid Applications (GridNets) 2007

IEEE Global Internet Workshop 1996-1999, 2001-2006, 2008-12

IEEE High-Speed (fmr. Gigabit) Netw. Workshop 1996-2012

IEEE ICC (was Globecom) FutureNet Workshop 2009-12

IEEE ICCCN Future Internet Arch. and Protocols 2008

IEEE Infocom 1994-2003, 2005-14

IEEE Infocom Works in Progress 2010

IEEE International Conference on Network Protocols (ICNP) 2002-03, 2005-06

IEEE Openarch 2002-03

IEEE Network Storage Symposium 1999

IEEE Symposium on Internet Services and Enabling Technologies (ISET) 2006

IEEE Workshop on Computer Communications 1997

IEEE Workshop on Internet Applications 1999-2001

IEEE Workshop on Long-Delay Broadband Networks 1997

IFIP Networking 2016

IFIP Protocols for High-Speed Networks 1994-2002

IFIP/IEEE International Symposium on Integrated Network Management (IM) 2019

IRTF Applied Network Research Prize (ANRP) Committee 2013-present

OSA Photonics in Switching 2012-2014

Physics of Computation Workshop 1994

Protocols for Future, Large-Scale and Diverse Network Transports (PFLDNeT) 2009-10

Internal Activities

Advisor to USC Joint Educational Project (JEP) on Internet/computer literacy (2014-15)

USC Ambassador (2005-17)

USC Faculty Senate Research Committee (2015-16) and International Collaborations.

USC Faculty Senate Committee on Non-Tenure-Track Faculty Affairs (2011-13, 2014-15)

USC Viterbi Engineering Faculty Council NTT Participation Committee (2013-14)

Publications

[G/general, I/Internet, O/optical, P/performance, Q/quantum, S/security, V/virtualization]

Patents

Received:

O   J. Touch, J. Bannister, S. Suryaputra, "Packet Switch with Separate Look Ahead, Computation, and Shift Phases," U.S. Patent #8,306,047, Univ. of Southern California, July 2010 (granted Nov. 2012).

I   J. Touch, Y. Wang, L. Eggert, "Routable Network Subnet Relocation System and Methods," U.S. Patent #7,653,746, University of Southern California, Aug. 2002 (granted Jan. 26, 2010).

O   P. V. Kumar, R. Omrani, J. Touch, A. E. Willner, P. Saghari, "Code cycle modulation in optical code division multiple access systems," U.S. Patent #7,616,618, Univ. of Southern California, Nov. 2005 (granted Nov. 10, 2009).

O   J. Bannister, J. Touch, P. Kamath, A. Patel, J. McGeehan, A. E. Willner, "A Method to Forward Internet Packets Without Conversion from an Optical to an Electronic Format," U.S. Patent #7,369,766, University of Southern California, Sept. 2001 (granted May 6, 2008).

P   J. Touch, D. Farber, "Memory-side driven anticipatory instruction transfer interface with processor-side instruction selection," U.S. Patent #5,353,419, Univ. of Penn., Sept. 1991 (granted Oct. 4, 1994).

Pending:

I   J. Touch, Y. Wang, L. Eggert, "Cooperative Network Boundary Traversal," U.S. Patent Disclosure, University of Southern California, Dec. 2003.

Books/Special Issues/Published Tutorials

O   J. Touch, A.-H. Badawy, V. Sorger, "Optical Computing," Special issue, *Nanophotonics* V6, N3, May, 2017, pp. 503-505.

G   J. Touch, "Understanding Latency - a Root Cost and Mitigation Approach," Tutorial at IEEE Globecom 2014, IEEE CCNC 2016, ACM Sigcomm 2017.

GVI J. Touch, "A First-Principles Approach to Computer Networking," Tutorial at IEEE CCNC 2017, IEEE CCNC 2018.

I   J. Quittek, J. Touch, "Recent Advances in IETF Standards," Special Issue, *IEEE Network*, V49 N4, Apr. 2011, pp. 76-77.

O   J. Touch, "Components developed for all-optical Internet router," SPIE Newsroom article (PDF also available), Sept. 24, 2008.

G   A. Azcorra, J. Touch, Z. Zhang, "Selected Papers on Wireless and Mobility from IEEE INFOCOM," *IEEE Transactions on Mobile Computing*, V6, N6, June 2007, pp. 577-578.

P   K. Kobayashi, P. Vicat-Blanc, J. Touch, Guest Editors, Special Issue on the Protocols for Fast, Long-Distance Networks, *Computer Networks,*V51 I7, May 2007, pp. 1745-1747.

V   J. Touch, "Virtual and Overlay Networks," Tutorial available at IEEE Tutorials Now, 2005, also presented at IEEE ICNP 2004 and IEEE Infocom 2005.

V   J. Touch, "Overlay Networks," Chapter in *Practical Handbook of Internet Computing*, ed. M. P. Singh, CRC Press, Sept. 2004, ISBN 1-58488-381-2.

G   M. Hofman, R. Kravets, J. Touch, Guest Editors, Special Issue on the Global Internet, *Computer Networks,*V45 I1, May 2004, pp. 1-3.

G   J. Touch, J. Postel, "Network Infrastructure," Chapter in *The Grid 2: Blueprint for a New Computing Infrastructure,* ed. I. Foster, C. Kesselman, Morgan Kaufmann/Elsevier, Nov. 2003, ISBN 1-55860-933-4.

V   J. Touch, Guest Editor, Special Issue on Overlay Networks, *Computer Networks*, V36 I2-3, July 2001, pp. 115-116.

O   J. Bannister, J. Senior, J. Touch (eds.), *OptiComm 2001: Optical Networking and Communications*, Proceedings of the SPIE, V4599, August 2001.

P   J. Sterbenz, J. Touch, *High Speed Networking: A Systematic Approach to High-Bandwidth Low-Latency Communication*, Wiley, May 2001.

P   J. Touch, J. Sterbenz (eds.), *Protocols for High Speed Networks VI*, Kluwer, August 1999.

G   J. Postel, J. Touch, "Network Infrastructure," chapter in *Computational Grids: The Future of High-Performance Distributed Computing*, ed. I. Foster and C. Kesselman, Morgan Kaufmann, Aug. 1998, ISBN 1-55860-475-8.

P   J. Touch, *Mirage: A Model for Latency in Communication*, Ph.D. Dissertation, Univ. of Pennsylvania, Dept. of Computer and Information Science (CIS) Tech. Report MS-CIS-92-42, DSL-11, Jan. 1992.

Refereed Journals

O   A. Fallahpour, F. Alishahi, Y. Cao, A. Mohajerin-Ariaei, A. Almaiman, P. Liao, C. Bao, M. Ziyadi, B. Shamee, J. Touch, M. Tur, A. E. Willner, "Experimental demonstration of tunable de-aggregation from 16-QAM to 4-PAM for two wavelength multiplexed channels using wave mixing in a single nonlinear element to map constellation onto axes," *Optics Communications*, V451, Nov. 2019, pp. 74-79.

O   F. Alishahi, A. Mohajerin-Ariaei, A. Fallahpour, Y. Cao, A. Almaiman, P. Liao, C. Bao, B. Shamee, H. Zhou, A. N. Willner, J. Touch, M. Tur, C. Langrock, M. Fejer, A. E. Willner, " Optical Mitigation of Interchannel Crosstalk for Multiple Spectrally Overlapped 20 Gbaud QPSK/16-QAM WDM Channels using Nonlinear Wave Mixing," *IEEE/OSA Journal of Lightwave Technology*, (invited paper), V37 N2, Jan. 2019, pp. 548-554.

O   Y. Cao, H. Song, Y. Akasaka, P. Liao, A. Almaiman, F. Alishahi, A. Fallahpour, C. Bao, A. Mohajerin-Ariaei, T. Ikeuchi, D. Starodubov, J. Touch, M. Tur, A. E. Willner, "Raman-assisted phase sensitive amplifier using fiber Bragg grating based tunable phase shifter," *Optics Letters*, V24 N16, Aug 2018, pp. 3949-3952.

O   A. Almaiman, Y. Cao, A. Mohajerin-Ariaei, M. Ziyadi, P. Liao, C. Bao, F. Alishahi, A. Fallahpour, B. Shamee, Y. Akasaka, T. Ikeuchi, S. Wilkinson, J. Touch, M. Tur, A. E. Willner, "Phase-sensitive QPSK channel phase quantization by amplifying the fourth-harmonic idler using counter-propagating Brillouin amplification," *Optics Communications*, V423, Sept. 2018, pp. 48-52.

O   Y. Cao, A. Almaiman, M. Ziyadi, A. Mohajerin-Ariaei, C. Bao, P. Liao, F. Alishahi, A. Fallahpour, Y. Akasaka, C. Langrock, M. Fejer, J. Touch, M. Tur, A. E. Willner, "Reconfigurable Channel Slicing and Stitching for an Optical Signal to Enable Fragmented Bandwidth Allocation Using Nonlinear Wave Mixing and an Optical Frequency Comb," *IEEE/OSA Journal of Lightwave Technology*, (invited paper), V36 N2, Jan. 2018, pp. 440-446.

O   Y. Cao, M. Ziyadi, A. Almaiman, A. Mohajerin-Ariaei, P. Liao, C. Bao, F. Alishahi, A. Fallahpour, B. Shamee, A. J. Willner, Y. Akasaka, T. Ikeuchi, S. Wilkinson, C. Langrock, M. Fejer, J. Touch, M. Tur, A. E. Willner, "Pilot-tone based self-homodyne detection using optical nonlinear wave mixing," *Optics Letters*, V42 N9, May 2017, pp. 1840-1843.

O   J. Touch, Y. Cao, M. Ziyadi, A. Almaiman, A. Mohajerin-Ariaei, A.E. Willner, "Digital optical processing of optical communications: Towards an Optical Turing Machine," *Nanophotonics,* Spec. issue on Optical Computation, V6, N3, May, 2017, pp. 507-530.

OI   J. Touch, J. Bannister, S. Suryaputra, A. E. Willner, "A Design for an Internet Router with a Digital Optical Data Plane," *Applied Sciences*, Spec. Issue on Optical Modulators and Switches, V7 N2, 143, Feb. 2017, pp. 1-19, doi:10.3390/app7020143.

O   A. Almaiman, Y. Cao, M. Ziyadi, A. Mohajerin-Ariaei, P. Liao, C. Bao, F. Alishahi, B. Shamee, A. Fallahpour, B. Shamee, N. Ahmed, A.J. Willner, Y. Akasaka, T. Ikeuchi, S. Takasaka, R. Sugizaki, S. Wilkinson, J. Touch, M. Tur, A.E. Willner, "Experimental Demonstration of Phase-Sensitive Regeneration of a BPSK Channel without Phase-Locked Loop using Brillouin Amplification," *Optics Letters*, V41 N23, Dec. 2016, pp. 5434-5437.

O   A. Mohajerin-Ariaei, M. Ziyadi, A. Almaiman, Y. Cao, F. Alishahi, M.-R. Chitgarha, A. Fallahpour, C. Bao, P. Liao, B. Shamee, Y. Akasaka, J.-Y. Yang, M. Sekiya, J. Touch, M. Tur, C. Langrock, M. Fejer, A. E. Willner, "Simultaneous all-optical phase noise mitigation and automatically locked homodyne reception of an incoming QPSK data signal," *Optics Letters*, V41 N20, Oct. 2016, pp. 4779-4782.

O   Y. Cao, M. Ziyadi, A. Mohajerin-Ariaei, A. Almaiman, P. Liao, C. Bao, F. Alishahi, A. Fallahpour, B. Shamee, J.-Y. Yang, Y. Akasaka, M. Sekiya, M. Tur, C. Langrock, M. Fejer, J. Touch, A. E. Willner, "Reconfigurable Optical Inter-Channel Interference Mitigation for Spectrally Overlapped QPSK Signals using Nonlinear Wave Mixing in Cascaded PPLN Waveguides," *Optics Letters*, V41 N14, July 2016, pp. 3233-3266.

O   A. Almaiman, M. Ziyadi, A. Mohajerin-Ariaei, Y. Cao, M.-R. Chitgarha, P. Liao, C. Bao, B. Shamee, N. Ahmed, F. Alishahi, A. Fallahpour, Y. Akasaka, J.-Y. Yang, M. Sekiya, J. Touch, M. Tur, C. Langrock, M. Fejer, A. E. Willner, "Experimantal demonstration of tunable homodyne detection of WDM and dual-polarization PSK channels by automatically locking the channels to a local pump laser using nonlinear mixing," *Optics Letters,* V41 N12, June 2016, pp. 2680-2683.

O   Y. Cao, M. Ziyadi, Y. Akasaka, A. Mohajerin-Ariaei , J.-Y. Yang, A. Almaiman, P. Liao, S. Takasaka. R. Sugizaki, J. Touch. M. Sekiya, M. Tur, A. E. Willner, "All optical signal level swapping and multi-level amplitude noise mitigation using different regions of optical parametric gain," *Optics Letters*, V41 N4, February 2016, pp. 677-680.

O   M. Ziyadi, M.-R. Chitgarha, A. Mohajerin-Ariaei, Y. Cao, S. Khaleghi, A. Almaiman, J. Touch, L. Paraschis, M. Tur, C. Langrock, M. Fejer, A. E. Willner, "Optical Channel Deaggregation of Quadrature-phase-shift-keying and Eight-phase-shift-keying Data Using Using Mapping onto Constellation Axes," *Optics Letters*, V40 N21, November 2015, pp. 4899-4902.

O   M. Ziyadi, A. Mohajerin-Ariaei, M.-R. Chitgarha, S. Khaleghi, A. Almaiman, Y. Cao, A. Abouzaid, M. Tur, L. Paraschis, C. Langrock, M. Fejer, J. Touch, A. E. Willner, "Tunable RF Photonics Filter using a Comb-based Optical Tapped-Delay-Line with an Optical Nonlinear Multiplexer," *Optics Letters*, V40 N14, July 2015, pp. 3284-3287.

O   A. Mohajerin-Ariaei, M. Ziyadi, M.-R. Chitgarha, A. Almaiman, Y. Cao, J.-Y. Yang, Y. Akasaka, M. Sekiya, J. Touch, M. Tur, C. Langrock, M. Fejer, A. E. Willner, "Phase noise mitigation of QPSK signal utilizing phase-locked multiplexing of signal harmonics and amplitude saturation," *Optics Letters*, V40 N14, July 2015, pp. 3328-3331.

O   A. Almaiman, M.-R. Chitgarha, W. Daab, M. Ziyadi, A. Mohajerin-Ariaei, S. Khaleghi, M. Willner, V. Vusirikala, X. Zhao, D. Kilper, L. Paraschis, A. Ahsan, M. Wang, K. Bergman, M. Tur, J. Touch, A. E. Willner, "Experimental demonstration of robustness and accuracy of a DLI-based OSNR monitor under changes in the transmitter and link for different modulation formats and baud rates," *Optics Letters*, V40 N9, May 2015, pp. 2012-2015.

O   M.-R. Chitgarha, Y. Cao, A. Mohajerin-Ariaei, M. Ziyadi, S. Khaleghi, A. Almaiman, J. Touch, C. Langrock, M. Fejer, A. E. Willner, "Tunable Homodyne Detection of an Incoming QPSK Data Signal using Two Fixed Pump Lasers," *IEEE/OSA Journal of Lightwave Technology*, (invited paper), Apr. 2015, pp. 1344-1350.

O   M.-R. Chitgarha, S. Khaleghi, M. Ziyadi, A. Almaiman, A. Mohajerin-Ariaei, O. Gerstel, L. Paraschis, C. Langrock, M. Fejer, J. Touch, A. E. Willner, "Demonstration of tunable optical generation of higher-order modulation formats using nonlinearities and coherent frequency comb," *Optics Letters*, V39 N16, August 2014, pp. 4915-4918.

O   M.-R. Chitgarha, S. Khaleghi, W. Daab, M. Ziyadi, A. Mohajerin-Ariaei, D. Rogawski, M. Tur, J. Touch, V. Vusirikala, W. Zhao, A. E. Willner, "Demonstration of in-service WDM OSNR performance monitoring and operating guidelines for coherent data channels with different modulation formats and various baud rates," *Optics Letters*, V39 N6, March 2014, pp. 1605-1608.

O   M.-R. Chitgarha, S. Khaleghi, M. Ziyadi, W. Daab, A. Mohajerin-Ariaei, D. Rogawski, J. Touch, M. Tur, C. Langrock, M. Fejer, A. E. Willner, "Demonstration of all-optical phase noise suppression scheme using optical nonlinearity and conversion/dispersion delay," *Optics Letters*, V39 N10, May 2014, pp. 2928-2931.

O   M. Ziyadi, M.-R. Chitgarha, A. Mohajerin-Ariaei, S. Khaleghi, A. Almaiman, M. Willner, J. Touch, Y. Akasaka, J.-Y. Yang, M. Sekiya, M. Tur, L. Paraschis, C. Langrock, M. Fejer, A. E. Willner "Optical Nyquist Signal Channel Generation using a Comb-based Tunable Optical Tapped-Delay-Line," *Optics Letters*, V39 N23, Dec. 2014, pp. 6585–6588.

O   M.-R. Chitgarha, M. Ziyadi, S. Khaleghi, A. Mohajerin-Ariaei, A. Almaiman, J. Touch, M. Tur, C. Langrock, M. Fejer, A. E. Willner, "Reconfigurable 2-D optical tapped-delay-line to perform correlation on images," *Optics Letters,* V39 N23, Dec. 2014, pp. 6573–6576.

O   M. Ziyadi, M.-R. Chitgarha, S. Khaleghi, A. Mohajerin-Ariaei, A. Almaiman, J. Touch, M. Tur, C. Langrock, M. Fejer, A. E. Willner, "Tunable Optical Correlator using an Optical Frequency Comb and a Nonlinear Multiplexer," *Optics Express*, V22, N1, Jan. 2014, pp. 84-89.

O   S. Khaleghi, M.-R. Chitgarha, M. Ziyadi, W. Daab, A. Mohajerin-Ariaei, D. Rogawski, J. Touch, M. Tur, C. Langrock, M. Fejer, A. E. Willner, "Simultaneous and independent processing of multiple input WDM data signals using a tunable optical tapped-delay-line," *Optics Letters*, V28, N21, Nov. 2013, pp. 4273-4276.

QV   R. Van Meter, J. Touch, "Designing Quantum Repeater Networks," *IEEE Computer Communications*, V51, N8, Aug. 2013, pp. 64-71.

V   J. Touch, I. Baldine, R. Dutta., G. Finn, B. Ford, S. Jordan, D. Massey, A. Matta., C. Papadopoulos, P. Reiher, G. Rouskas, "A Dynamic Recursive Unified Internet Design (DRUID)". *Computer Networks*, V55 N4, Mar. 2011, pp. 919–935. A local copy is available here.

QV   R. Van Meter, J. Touch, C. Horsman, "Recursive Quantum Repeater Networks," *Progress in Informatics*, N8, Mar. 2011, pp 65-79.

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- J. Touch, "Experiments in Flat-Glass Cutting Optimization," in *Proc. Symposium on the Complexity of Approximately Solved Problems*, at Columbia University, NY, Apr. 1985.

Other Conferences:

O J. Touch, "The Optical Turing Machine", IEEE Rebooting Computing Workshop 2016 (abstract and poster).

I J. Touch, ""Computer Networking: A First Principles Approach," SoCalPLS Workshop, Los Angeles, 2016.

P J. Touch, "Two Ways to Trade Bandwidth for Latency," ISOC Latency Workshop, London, 2013.

O J. Touch, "An Optical Turing Machine for Native Computing of Modulated Network Data," IEEE Computer Communications Workshop (CCW), Sedona, AZ, Nov. 2012.

O   J. Touch, "Future Directions & Metrics in Aggregation Networks", OIDA Optical Data Comms Workshop, panel chair, Oct. 2011.

G   M. Orosz, P. Marshall, G. Roesler, T. Kichkaylo, T. Ryutov, J. Touch, B Bercerik-Gerber, C. Fern, "Behavior Driven Building Energy Management System," SERDP/ESTCP Partners in Environmental Technology Technical Symposium & Workshop poster, Nov. 2011.

V   J. Touch, Panel Chair, "The Transport Tussle," PfLDNet 2010, Lancaster, PA, Nov. 2010.

V   J. Touch, "Recursion and the Transport Tussle", PfLDNet 2010, Lancaster, PA, Nov. 2010.

O   S. Suryaputra, J. Touch, J. Bannister, "Lookahead Forward Shift Optical Packet Switch," Proc. IEEE Infocom Student Poster Session, Mar. 2010.

V   J. Touch, "From Shannon to Recursive Nets: Multihop/Multiparty Influences on Network Architecture," IEEE Computer Communications Workshop (CCW), Lenox, MA, Oct. 2009.

V   J. Touch, "Next Steps in Enabling A Virtual Internet," IEEE Computer Communications Workshop (CCW), Lenox, MA, Oct. 2009.

V   V. Pingali, J. Touch, "Dynamic Network Renaming using Space-Time Contexts," (extended abstract and poster), Proc. IEEE Infocom 2007 Student Poster Session, May 2007

V   J. Touch, "Recursive Network Architecture," IEEE Workshop on Computer Communications (CCW), Pittsburgh PA, Feb. 2007.

V   Y. Wang, J. Touch, J. Sylvester, "Adding Selection into Protocol Stacks – Communication with Choices," (ext. abstract, poster), Proc. IEEE ICNP Student Poster Session, Nov. 2006.

G   P. Galiotos, J. Touch, J. Train, "NetFS-Network Configuration Through the File System," ICNP 2005 student poster.

G   J. Touch, "OCS: An Open Communicating System," IEEE Workshop on Computer Communications (CCW), Irvine, CA, Oct. 2005.

G   J. Touch, "The Need for a 'Communicating System'," (white paper), NSF Workshop on Grand Challenges in Distributed Systems, Cambridge, MA, Sept. 29-30, 2005.

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V   J. Touch, Y. Wang, L. Eggert, G. Finn, "Virtual Internet Architecture," Future Developments of Network Architectures (FDNA) at ACM Sigcomm, August 2003. Available as ISI-TR-570.

O   J. Touch, "An Optically Turbocharged Internet Router," IEEE Workshop on Computer Communications (CCW), Charlottesville, VA, Oct. 2001.

P   A. Hughes, J. Touch, "Expanding the Scope of Prefetching through Inter-Application Cooperation," Web Cache Workshop, Boston, June 2001.

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P   S. Walton, A. Hutton, J. Touch, "High Performance IP Forwarding Using Host Interface Peering," (extended abstract) Proc. 9th IEEE Workshop on Local and Metropolitan Area Networks (LANMAN), Banff, Alberta, Canada, May 17-20, 1998 (slides also available).

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P   J. Touch, "Web Transport Requirements," presented at the Web Transport BOF at IETF '96, March, Los Angeles.

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G   J. Touch, "Communication Middleware," (slides only), Presented as a member of the "High Level Communications" panel at the Sigcomm '95 Middleware Workshop, Boston. Based on the white paper "Intelligent Bandwidth."

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P   J. Touch, "Progress on the GBN '94 'Five Challenges That Define High-Speed Protocols'," (slides and abstract only) IEEE Gigabit Networking Workshop, Boston, MA, 1995.

Technical Reports:

Q   J. Touch, L. Gordon, "Quantum Key Distribution in Space," Center for Space Policy Game-Changer, The Aerospace Corp., Nov. 2020.

G   DOE (as member of the organizing and authoring committee), "DOE Network 2025: Network Research Problems and Challenges for DOE Scientists," DOE Workshop Report, Feb. 2016 (released Mar. 2017).

I   J. Touch, "Middlebox Models Compatible with the Internet," USC/ISI Technical Report ISI-TR-711, Oct. 2016.

I   H. Trieu, J. Touch, T. Faber, "Implementation of the TCP Extended Data Offset Option," USC/ISI Technical Report ISI-TR-696, Mar. 2015.

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O S. Suryaputra, J. Touch, J. Bannister, "The Tetris Switch," USC/ISI Technical Report ISI-TR-662, Aug. 2009.

O P. Kamath, J. Touch, J. Bannister, "State Estimation in Optical CDMA Networks," USC/ISI Technical Report ISI-TR-644, June 2007.

V J. Bannister, W.-M. Shen, J. Touch, F. Hou, V. Pingali, "Applied Learning Networks," USC/ISI Technical Report ISI-TR-637, Apr. 2007.

V J. Touch, Y. Wang, V. Pingali, "A Recursive Network Architecture," USC/ISI Technical Report ISI-TR-626, Oct. 2006.

O P. Kamath, J. Touch, J. Bannister, "Algorithms for Transmission Scheduling in Optical CDMA Networks," USC/ISI Technical Report ISI-TR-617, May 2006.

V V. Pingali, J. Touch, Y. Wang, "Decentralized Virtual Internet Deployment using DANSE," USC/ISI Technical Report ISI-TR-641, Dec. 2005.

V Y. E. Yang, J. Touch, G. Finn, "The X-Bone API," USC/ISI Technical Report ISI-TR-611, Dec 2005.

V N. Fujita, J. Touch, V. Pingali, Y. Wang, "P2P-XBone: A Virtual Network Support for Peer-to-Peer Systems," USC/ISI Technical Report ISI-TR-607, Sept. 2005.

G L. Peterson, et al. (eds.), (as member of authoring committee), "Overcoming Barriers to Disruptive Innovation in Networking," NSF Workshop Report, Jan. 2005.

O P. Kamath, J. Touch, J. Bannister, "Media Access Control Protocols for Communication on an Optical CDMA Physical Layer," USC/ISI Technical Report ISI-TR-597, Sept 2004.

V Y. Wang, J. Touch, J. Silvester, "A Unified Model for End Point Resolution and Domain Conversion for Multi-Hop, Multi-Layer Communication,", USC/ISI Tech. Report ISI-TR-590, June 2004.

O P. Kamath, J. Touch, J. Bannister, "Algorithms for Interference Sensing in Optical CDMA Networks," USC/ISI Technical Report ISI-TR-583, Nov. 2003.

- J. Touch, "SIGCOMM Treasurer's Report," ACM Computer Communications Review, Nov. 2003.

G J. Train, J. Touch, L. Eggert, Y. Wang, "NetFS: Networking through the File System," USC/ISI Technical Report ISI-TR-579, 2003.

V J. Touch, Y. Wang, L. Eggert, G. Finn, "Virtual Internet Architecture," Future Developments of Network Architectures (FDNA) at Sigcomm, August 2003. Available as USC/ISI Technical Report ISI-TR-570.

O P. Kamath, J. Touch, J. Bannister, "The Need for Media Access Control in Optical CDMA Networks," USC/ISI Technical Report ISI-TR-575, July 2003.

I J. Touch, V. Pingali, "DataRouter: A Network-Layer Service for Application-Layer Forwarding," USC/ISI Technical Report ISI-TR-578, May 2003.

G J. Touch, A. S. Hughes, Y. Wang, L. Eggert, "The ISI Summer Graduate Research Experience Program (SGREP)," USC/ISI Technical Report ISI-TR-563, Aug. 2002. (in 2002 Sigcomm Education Workshop).

V J. Touch, Y. Wang, L. Eggert, "Virtual Internets for Lab and Class Experiments" USC/ISI Technical Report ISI-TR-562, Aug. 2002. (in 2002 Sigcomm Education Workshop).

V G. Finn, J., Touch, "Network Construction and Routing in Geographic Overlays," USC/ISI Technical Report ISI-TR-564, July 2002.

V J. Touch, Y. Wang, L. Eggert, "Virtual Internets," USC/ISI Technical Report ISI-TR-558, July 2002.

V G. Finn, J. Touch, "X-Bone Application Programmers Interface : X-Bone Overlay Language (XOL) Specification," USC/ISI Technical Report ISI-TR-549, Nov. 2001.

P L. Eggert, J. Touch, "End-System Support for Idle-Time Networking," USC/ISI Technical Report ISI-TR-559, May 14, 2001.

O S. Suryaputra, J. Touch, J. Bannister, "Simple Wavelength Assignment Protocol," USC/ISI Research Report ISI-TR-473, Oct. 26, 1999.

P G. Finn, J. Touch, et. al, "Netstation Architecture and Advanced Atomic Network," USC/ISI Technical Report ISI-TR-469, Oct. 1998.

P J. Touch, J. Heidemann, K. Obraczka, "Analysis of HTTP Performance," USC/ISI Technical Report ISI-TR-463, Aug. 1998 (original report dated Aug. 1996).

P J. Touch, "Board for Realizing Active Intelligence in Networks (BRAIN)," USC/ISI Technical Report ISI-TR-462, July 1998 (original report dated May 1997).

P J. Touch, "Multicast web push using interest-groups: the LSAM Proxy Cache (LPC)," IPMI Member Newsletter, Aug. 1998, pp. 2-6.

P J. Touch, "PC-ATOMIC," USC/ISI Technical Report, ISI-TR-407, June 1995.

P C. Partridge, Ed., (as member of authoring committee), "Report of the ARPA/NSF Workshop on Research in Gigabit Networking," Washington DC, July 20-21, 1994.

G J. Touch, "Zoned Analog Personal Teleconferencing (ZAPT)," USC/ISI Technical Report ISI-TR-374, Feb. 1994.

P J. Touch, "Mirage: A Model for Latency in Communication - A Proposal for Dissertation Research," U. Penn. Dept. of Computer & Info. Science (CIS) Technical Report MS-CIS-90-74, DSL-3, Oct. 1990.

G J. Touch, D. Farber, "Replication and Reduction in Multistage Interconnection Networks," Univ. of Penn. Dept. of Computer & Info. Science (CIS) Technical Report MS-CIS-89-80, DSL-2, Dec. 1989.

Invited Panels, Talks:

Q J. Touch, "Cyber Security in and for Space Operations," Panel at AFCEA Europe Workshop, Sep. 2020.

O   J. Touch, "One Ring to Rule Them All: Unifying Computation and Communication," Panel at IEEE Rebooting Computing Workshop, Oct. 2016.

O   "The Case for Weaker Network Security," keynote, IEEE Computer Communications Workshop (CCW), Niagara Falls, Canada, Nov. 2013.

O   "An Optical Turing Machine for Network Processing," invitied presentation at the Global Future Internet Summit, Seoul, S. Korea, Sept. 2012.

G   "Internet Policy and Piracy: the Good, the Bad, and the Practical," USC Annenberg Graduate Fellow Microseminar, Sept. 2012.

O   "Designing All-Optical Routers and Interfaces," invited presentation at the Conference on Future Internet Technologies, Seoul, S. Korea, June 2011.

S   "The Case for Weaker Network Security," invited presentation to the Korean Internet Security Agency (KISA), Seoul, S. Korea, June 2011.

V   "Recursive Networking," invited presentation to the Asia Future Internet (AsiaFI) Summer School, Yokohama, Japan, August 2010.

V   "Recursion in Networking," invited keynote presentation at the Conference on Future Internet Technologies, Seoul, S. Korea, June 2010.

V   "The Past, Present, and Future of Virtual Networks," invited keynote presentation at IEEE FutureNet II Workshop at Globecom, Honolulu, Dec. 2009.

V   "The Science of Networking," session chair at IEEE Computer Communications Workshop (CCW), Lenox, MA, Oct. 2009.

V   "US Future Internet Research," invited presentation to the ISOC Future Internet Research meeting, IETF Stockholm, July 2009.

V   "Recursive Network Architecture," invited presentation to the Future Internet Summer School, Univ. Bremen, July 2009.

V   "Recursive Network Architecture" invited presentation in the plenary panel on "Clean Slate Architectures" at Infocom, April 2009, Rio de Janiero.

V   "Recursive Network Architecture" at Network Achitecture, Ascona, Switzerland, March 2009.

V   "The X-Bone & its Virtual Internet Architecture - 10 Years Later" (presented by Lars Eggert), Workshop on Overlay and Network Virtualization, Kassel, Germany, March 2009.

V   "X-Bone + 10: A Decade of International Collaboration" at the NSF US-Japan Collaboration Workshop, Palo Alto, CA Oct. 2008.

I   "One Packet Only' and Other Curiosities: Alternate Axioms that Shake Up the Hourglass," with J. Day at IEEE Workshop on Computer Communications (CCW), Steamboat Springs, CO, Oct. 2008.

G   "The Paper Chase," at "How to Write a Good Paper" panel at IEEE Infocom 2006 Student Workshop, April 24, 2006.

G   "Getting OUT of Grad School," at "Job Hunting Around the World: Prospects Tips, and Other Advice" panel at IEEE Infocom 2005 Student Workshop, Mar. 14, 2005.

I   "Internet Bill of Rights," Preventing the Internet Meltdown Conf., Westchester, CA, July 27, 2004.

O   "Optical Internet Router," CENIC, Los Angeles, March 16, 2004; Internet-2, Columbus, OH, July 20, 2004.

I   "Internet & Politics," USC Annenberg TV News television spot, Nov. 3, 2003.

S   "Network Trust Issues," NSF ANIR Network Trustworthiness panel, Jan. 9-10, 2003.

G   "Peer Networks – High Speed Solution or Challenge?" Protocols for High-Speed Networks, Berlin, Germany, Apr. 2002.

I   "TetherNet & Postel Center," CENIC, San Diego, May 10, 2001.

I   "Peer Nets – reinventing the Internet" OpenArch 2001 Panel, Anchorage, AK, Apr. 2001.

I   "E2E YATA (End2end – yet another talk about)" Opensig 2000, Napa, CA, Oct. 2000.

V   "X-Bone demo," EDUCAUSE/CENIC, Long Beach, CA, Oct. 26, 1999.

P   "10 Years of PfHSN - where have we been, where are we going?" IFIP Protocols for High-Speed Networks 1999, Salem, MA, Aug. 1999.

O   "Summary Report on the Optical Internet Workshop," 40th IETF (plenary), Wash., D.C., Dec. 1997.

P   "High-Performance Web," IFIP Protocols for High-Speed Networks 1996, Sophia-Antipolis, France, Oct. 1996.

G   "High Level Communications," ACM Sigcomm 1995 Middleware Workshop, Boston MA, Aug. 1995.

Radio, TV, Newspaper, and other interviews:

Q   "The Space Policy Show: Space QKD Tech and Policy for Muggles," The Aerospace Corp., Oct. 29, 2020.

I   "Our Apps Are Tracking Us 24 Hours a Day", How Stuff Works, Jan. 31, 2018.

I   "The Next Revolution of Search", Econsultancy, Feb. 2018.

I   "A massive cyberattack blocked your favorite websites; FBI and Homeland Security are investigating", LA Times, Oct. 21, 2016.

I   "Este "patriarca hippie" fue el "dios de internet" durante casi tres décadas (This "hippie patriarch" was the "Internet God" for nearly three decades)", Hoja de Router, 2015.

I   "Digital Life in 2025", Pew study, 2014.

I   "Define Your Digital Footprint," Real Business, Oct. 9, 2014.

I   "SOPA Legislation and Internet Piracy Solutions," WMAL FM radio, Patriot Lemonade segment hosted by Kevin Dalton, Jan. 28, 2012.

I   "ICANN and New Generic TLDs," CBS Boston FM radio, interview by Mike Epstien and Athony Silba, June 21, 2011.

I   "Your '.brand' coming soon," ("ICANN is letting thousands of domain names bloom"), Los Angeles Times, interview by David Sarno, pp. B1 & B4, June 21, 2011.

I   "Future Internets," Science & Vie magazine, Vincent Nouryrigat interview, Sept. 2009.

I   "Will GENI Be a Magic Lamp or a Dim Bulb?," G. Goth, IEEE Internet Computing, V9 N6, Nov.-Dec. 2005.

I   "9/11 Online," "9/11 Remembrances," KTLA TV 'Kurt the Cyberguy' interviews, Sept. 9 & 11, 2002.

Pending publications

I   J. Touch, T. Faber, "TCP SYN Extended Option Space Using an Out-of-Band Segment," (RFC in progress), Jan. 2018.

I   J. Touch, W. Eddy, "TCP Extended Data Offset Option," (IETF TCPM Standards Track RFC in progress), Jan. 2018.

IV   J. Touch, M. Townsley, "Tunnels in the Internet Architecture," (IETF INTAREA Best Current Practice RFC in progress), Jan. 2018.

IS   J. Touch, "Transport options for UDP," (IETF INTAREA Standards Track RFC in progress), Jan. 2018.

I   J. Touch, "Resolving Multiple Time Scales in the Internet," (RFC in progress), Jan. 2018.

IS   J. Touch, "A TCP Authentication Option Extension for Payload Encryption," (RFC in progress), Jan. 2018.

I   J. Touch, "The TCP Service Number Option (SNO)," (RFC in progress), Jan. 2018.

IS   U. Chunduri, A. Tian, J. Touch, "A framework for RPs to use IKEv2 KMP," (RFC in progress), Feb. 2014.

IS   U. Chunduri, A. Tian, J. Touch, "Using IKEv2 with TCP-AO," (RFC in progress), Feb. 2014.

IS   M. Jethanandani, B. Weis, K. Patel, D. Zhang, S. Hartman, U. Chunduri, A. Tian, J. Touch, "Negotiation for Keying Pairwise Routing Protocols in IKEv2," (RFC in progress), Nov. 2013.

I   J. Touch, "Automating the Initial Window in TCP,"(RFC in progress), Jul. 2012.

I   R. Penno, S. Raghunath, V. Gurbani,R. Woundy, J. Touch, "LEDBAT Practices and Recommendations for Managing Multiple Concurrent TCP Connections," (RFC in progress), Feb. 2010.

I   A. Hughes, J. Touch, J. Heidemann, "Issues in TCP Slow-Start Restart After Idle," (RFC in progress).

Ph.D. Students

Chair:

Amy S. Hughes, "Enhancing Network Object Caches through Cross-Domain Cooperation," Oct. 2002, USC CS (chair).

Lars René Eggert, "Background Use of Idle Resource Capacity," Oct. 2003, USC CS (chair).

Puroshutham Kamath, "Media Access Control Protocols for Optical CDMA Networks," May 2006, USC EE (co-chair w/Joseph Bannister).

Yu-Shun Wang, "A Unified Model for Endpoint Resolution and Domain Conversion for Multi-hop, Multi-layer Communication," Dec. 2006, USC CE (co-chair w/John Silvester).

Venkata Pingali, "Addressing Uncertainty during Renaming using Space-time Contexts," Jan. 2009, USC CS (chair).

Committee:

Salman Khaleghi, "High-Speed and Recongurable All-Optical Signal Processing for Phase and Amplitude Modulated Signals," USC EE (Alan Willner, EE, chair), May 2013.

Reza Chitgarha, "Reconfigurable High-Speed Optical Signal Processing and High-Capacity Optical Transmitter," USC EE (Alan Willner, EE, chair), June 2014.

Mark Harrison, "Integrated Optical Waveguide Splitter Devices for Biosensing and Communications," USC EE (Andrea Armaini, EE, chair), quals (proposal) Sept. 2013.

Yan Yan, "Spatial-Division-Multiplexing Utilizing Orbital Angular Momentum (OAM) in Optical and Millimeter-Wave Communication System", USC EE (Alan Willner, EE, chair), quals (proposal) Apr. 2014.

Hao Huang, "High Speed Optical Communication Using Spatially Multiplexed Orbital Angular Momentum Laser Beams," USC EE (Alan Willner, EE, chair), Nov. 2014.

Morteza Ziyadi, "Reconfigurable High Speed Optical Signal Processing For High-Capacity, Spectrally Efficient Fiber Optic Systems and Networks," USC EE (Alan Willner, EE, chair), quals (proposal) Aug. 2015, defense Feb. 2017.

Amirhossein Mohajerin-Ariaei, "Reconfigurable High-Speed Optifcal Signal Processing and Flexible High Capacity Optical Transciever", USC EE (Alan Willner, EE, chair), quals (proposal) May 2016, (later defense May 2018).

Ahmed Almaiman, "Optical Wave Mixing for Tunable Delays and High-Speed Signal Processing", USC EE (Alan Willner, EE, chair), quals (proposal) Nov. 2016 (later defense Apr. 2018).

Areas of Research and Collaborators (*=active)

Network Architecture

    *Satellite network architecture (DynaSat)

    *Recursive network architectures (RNA) (BU, Col. State)

    *Virtual nets via 2-layer tunneling for dynamic routing, IPsec, revisitation, multilayer DDoS protection (X-Bone, DynaBone, Agile Tunnels) (Penn State, Purdue, GMU)

    *Automation, abstractions for network management (Instant Infrastructure,TetherNet,Turnkey Nets)

    *IP header options to support network layer peer services (DataRouter)

    Geographic networks (GONet) (Finn)

    Network control API as a file system (NetFS) (Eggert, Wang)

    IPsec transport and tunnel mode interactions (Eggert, Wang, Kent, Hagino)

    Application deployment on virtual overlay networks (Wang, Ardaiz)

    Architecture for smart spaces (Personal Node) (Finn)

    Implications of link protocol capabilities on support for Internet protocols (Karn)

    Configuring end hosts for fault-tolerant routing (Faber)

Protocol Performance:

    *Low-effort/high-performance network security

    *Latency reduction (Hughes)

    *Configurations for high-performance (Faber)

    *TCP and UDP extension (Faber)

    Slow-start restart avoidance mechanism (Hughes, Floyd)

    Control block sharing and multiplexing to coordinate parallel connections (Heidemann, Eggert, Welzl)

Network Hardware:

    *Digital optical computer design (Willner)

    *Optical router design (Bannister, Kamath, Patel, Hauer, McGeehan, Suryaputra, Willner)

    Peer DMA for high-speed host-based routers (Hutton)

    IP checksum hardware implementation (Parham)

    Performance limits of MD5 authentication hash

    Network interface design (LaCoss)

Web Caching:

    Inter-application sharing for advanced prefetching (Hughes)

    Web performance over TCP (Eggert, Hiedemann, Obraczka)

    Self-organizing cache hierarchies and multicast for self-tuning content delivery nets (Hotz, Hughes)

Community Service:

    *Maintain end2end-interest, internet-history, computer-history email lists

    Developed a tethered tunnel system to simplify DARPA demos (TetherNet) (Wang)

    Codify email and technical sponsorship procedures for IEEE TCGN, ITC, TCCC technical committees

    Codify budget procedures for ACM Sigcomm conference planning

    Codify paper submission, plagiarism, and republication policies for EDAS