AWARD TITLE: IEEE SPS 2012 Technical Achievement Award

NOMINEE: Dr. John Apostolopoulos

SUGGESTED CITATION:

For contributions to multimedia communication and networking, video signal processing, and secure media communications.

NOMINATING TECHNICAL COMMITTEE:

Image, Video, and Multidimensional Signal Processing TC (IVMSP TC)

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PLEASE ATTACH A SUCCINCT STATEMENT SUPPORTING THE NOMINATION:
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SUPPORTING STATEMENT

Dr. John Apostolopoulos is Director of the Mobile & Immersive Experience (MIX) Lab, within HP Labs, where he directs the research of about 50 researchers in USA and UK in areas of video and audio signal processing, computer vision and graphics, 3D, display technology, wireless, streaming, and user experience design. In addition to his leadership role at HP, John is internationally known for his own work on the principles and practice of video communication. His technical contributions have improved the reliability, fidelity, scalability, and security of video communication over wired and wireless networks. John's individual technical innovations have resulted in 57 granted US patents, 25 pending patents, and over 100 publications including 23 invited papers and 5 best paper awards. John's recognitions include being named "one of the world's top 100 young innovators in science and technology" (TR100) by Technology Review. He received his BS, MS, and PhD in EECS from MIT.

Secure media communication: John solved (with Susie Wee) the open problem of media transcoding in the middle of a network while preserving end-to-end security. John and his colleague solved this problem through careful co-design of the compression, security, and packetization, and provided an algorithm that enables transcoding within the network without requiring decryption. The resulting approach, referred to as Secure Scalable Streaming (SSS), was first published in an invited paper at ICASSP 2001 and it helped shape the secure streaming protocol for the JPEG-2000 standard (2006). Follow on developments were published in a series of invited papers including joint authentication/ distortion/rate-aware streaming algorithms (ICME'06 Best Paper Award, with Zhang, Sun, Wong, Wee).

Video communication over wired and wireless networks: John has developed novel techniques for communicating video reliably over lossy packet networks including designing one of the first multiple description (MD) video coders, methods for exploiting the use of multiple network paths to provide path diversity, and discovery of the appropriate combination of these two techniques. John's initial work (*VCIP*'01 Best Paper Award) has stimulated much research activity including Ph.D. theses at Stanford, MIT and other schools. John continued this work with a series of contributions on accurate models for predicting the performance of these systems and on designing a content delivery network (CDN) optimized for delivering content from multiple servers to each requesting client (e.g., with Wong, Tan, and Wee, *INFOCOM* '02), and provided solutions for the associated best path and best server selection problems. He recently developed joint channel/deadline/distortion-aware scheduling for video over wireless (IEEE Com Soc 2011 Best Journal Paper Award, with Dua, Chan, Bambos). His HP Labs Technical Report (with Tan, Wee) on "Video Streaming: Concepts, Algorithms, and Systems" has over 30,000 downloads.

Impact of John's work: ***At Hewlett-Packard:*** John has developed a strong technology portfolio for HP in multimedia networking and processing, and is HP's leading expert on multimedia cloud computing. In addition, John has developed a significant associated patent portfolio for HP, with 57 granted US patents. In 2000-04 he was part of the HP/NTT collaboration on designing a mobile streaming media content delivery network to enable large-scale streaming to DoCoMo's mobile clients. In 2004-07 John co-led the HP-Labs/HP-OpenCall Business Unit collaboration on identifying, designing, developing, and deploying multimedia functionalities for Next-Generation Network / IP Multimedia Subsystem systems for 4G "All-IP" mobile networks. Results of this effort included the OpenCall Media Platform Video 1.0 product in 2006, followed by video transcoding and fixed-to-mobile convergence products in 2007-08. John also contributed to the creation of HP's Halo high-quality "telepresence" conferencing system introduced in 2005, and 2-3 years later Cisco, Tandberg, and Polycom introduced similar products. In 2010-11 John led a pan-HP effort to develop a common architecture for HP's video communication portfolio, spanning across HP's Halo high-quality video conferencing system, SkyRoom and VRoom desktop products, and mobile devices. Recently, John initiated a new effort at HP Labs on interactive mobile multimedia client/cloud computing.

In Academia: John's work attracts considerable interest in universities. His work has been the basis of research for several professors and their students at MIT, Stanford, and U. Penn. He regularly teaches classes and co-supervises Ph.D. research at MIT and Stanford as Consulting Associate Professor in EE (e.g., www.stanford.edu/class/ee392j).

On industry standards: The JPEG-2000 Security (JPSEC) standardization committee invited HP to submit John's work on SSS for possible adoption to the standard in 2003. John and co-inventor Susie Wee submitted the technology to JPSEC and then helped redesign the standard to support this new, non-traditional, security service. JPSEC became an official ISO/IEC international standard in 2006. John also initiated and served as technical liaison expert on security between industry and government entities, and he was the technical liaison between the JPSEC committee and outside security groups for "proofing" the JPSEC standard. In 2011 John received an ISO/IEC Certificate of Appreciation.

While he was a graduate student at MIT, John helped design MIT's video coder (with P. Monta) for the U.S. Digital TV standardization effort. He received a Technical Emmy Certificate in recognition of his contributions.

IEEE Activities: John became a Fellow of IEEE in 2008. He was chair of the Image, Video and Multidimensional Signal Processing TC; member of the Multimedia SP TC; technical co-chair of ICIP '07, IEEE MMSP 2011 and IEEE ESPA (and co-founder); guest co-editor of IEEE special issues on "Immersive Communication", "Multimedia over Broadband Wireless Networks" and "Network-Aware Multimedia Processing and Communications"; Associate Editor of *IEEE Trans. IP* and *SP Letters*; and he has served on several IEEE and ACM program committees and boards.