Workshop Proposal for Hot Topics in Middleboxes and Network Function Virtualization (HotMiddlebox 2016)

Motivation and Rationale for the Workshop:

While middleboxes have been an integral part of production networks for more than a decade now, they have historically not found a traditional "home" in networking research venues such as SIGCOMM, CoNEXT, NSDI etc. This absence of middlebox-specific research has only recently started to change. For instance, recent SIGCOMM, NSDI and HotNets conferences have each seen a surge of interest in middlebox-related topics.

However, to date there has not been a workshop that focuses on all issues related to middleboxes, and we believe the time is ripe for one. In a sense, HotMiddlebox would be a natural progression from previous workshops on software-based networking and virtualization on commodity hardware such as PRESTO or VISA. It would also be complementary to HotSDN (now SOSR), which also deals with programmable networks but is more oriented towards control plane issues.

There is significant interest from industry in middlebox issues, but there is currently no research avenue to showcase their innovations, and both academic/research communities are poorer as a result. As two examples of industry interest, the European standards body ETSI has a working group regarding "Network Function Virtualization" which deals with issues related to running middleboxes on commodity hardware; the group includes most of the major ISPs from around the world and has seen significant interest and activity in the past years. The IETF has recently chartered a working group called SFC that focuses on service function chaining: techniques that allow routing traffic through multiple network functions/services. Similarly, the recent research track at the Open Networking Summit has at least 25% of presentations involving middleboxes in some form or another. We believe that HotMiddlebox will present an ideal vehicle for the networking research community to reconnect with industry practitioners. We believe such a forum will facilitate discussion of real-world issues and current research efforts, and will thus help research in the area come closer to having real world impact.

Having a unified umbrella for researchers from academia and industry to share their ideas and visions for future innovative middlebox architectures would go a long way to bridge the gap between academic research and industry.

Workshop deadlines

Workshop Call for Papers (finalized):	Dec 21
Abstract due:	Mar 11
Reviewer bids:	Mar 12- 19
Full paper due:	Mar 18
Papers assignment:	Mar 20
Reviews due:	Apr 22
Notification:	Apr 30
Camera ready due:	May 15
Program online:	Jun 12

Organization details online: Jun 15

Names and affiliations of the main organizers

Our technical program committee comprises leading researchers in the field coming from the US, Europe and Asia and spanning both industry and academia.

Steering Committee Members:

Bob Briscoe, BT, UK	(**Confirmed**)
Christos Kolias, Orange, USA	(**Confirmed**)
Sylvia Ratnasamy, UC Berkeley	(**Confirmed**)
Vyas Sekar, CMU, USA	(**Confirmed**)

Program Committee Members:

Theophilus Benson, Duke, USA	(**Confirmed**)
Jon Crowcroft, Cambridge University, UK	(**Confirmed**)
Colin Dixon, Brocade, USA	(**Confirmed**)
Vijay Gopalakrishnan, AT&T Labs Research, USA	(**Confirmed**)
Dongsu Han, KAIST, Korea	(**Co-Chair**)
Volker Hilt, Bell Labs, Germany	(**Confirmed**)
Felipe Huici, NEC, Germany	(**Confirmed**)
JK Lee, Barefoot Networks, USA	(**Confirmed**)
Boon Thau Loo, UPenn, USA	(**Confirmed**)
Jitendra Padhye, Microsoft Research, USA	(**Confirmed**)
Costin Raiciu, University Politehnica of Bucharest, Romania	(**Confirmed**)
Danny Raz, Bell Labs & Technion, Israel	(**Co-Chair**)
Michael Schapira, Hebrew University of Jerusalem, Israel	(**Confirmed**)
Noa Zilberman, Cambridge University, UK	(**Confirmed**)
Mark Handley, University College London, UK	(invited/to be confirmed)
Laurent Mathy, U. of Liege, Belgium	(invited/to be confirmed)
Dina Papagiannaki, Telefonica, Spain	(invited/to be confirmed)
Elisha Rosensweig, Alcatel-Lucent	(invited/to be confirmed)
Marc Woolward, Varmour	(invited/to be confirmed)

Workshop format:

We expect to follow a similar format as SIGCOMM workshops of a similar nature (e.g., PRESTO, HotSDN, VISA, HotNets), with a number of paper presentations and keynote talks.

12 Accepted papers
1 Invited talks (Keynote)
1 Industry panel section

Expected number of participants and the expected number of submissions

Building on last year's numbers and the recent rise in industrial interest in NFV, we expect a healthy turn out, with:

30--50 paper submissions

12--15 accepted papers

50--70 attendees.

We will make an explicit effort to strong encourage industry participation in the HotMiddlebox workshop. Towards this goal, nearly half of the TPC members are from relevant industry such as middlebox vendors (Brocade) or network operators (AT&T), and our steering committee includes prominent names in NFV standardization: Bob Briscoe (BT) and Christos Kolias (Orange).

Given the nature of the topics and the size of the middlebox/NFV market, we believe that HotMiddlebox will attract a greater share of industry participants compared to other workshops sponsored by SIGCOMM/CoNEXT.

Prior history of this workshop:

The first incarnation of this workshop was held in conjunction with CoNEXT 2013, and the second one was held in conjunction with SIGCOMM 2015. The number of paper submissions in the second year was 32 (a notable increase from the first year's 22), out of which the TPC selected 12 fairly high quality papers that were presented at the workshop, and two keynote speakers from industry were invited. The workshop created a significant amount of interest, attracting around 60 participants, many of whom were outside the area and registered to understand the recent research in this field.

Since 2013, NFV has moved from being a buzzword and is closer to reality: the NFV interest group in ETSI has been very active, producing initial specifications for the NFV architecture, and its security ramifications. There is significant interest from all major network operators, some of which have already started deploying racks of commodity machines in their POPs. It appears NFV is really happening, which makes us confident that the 2016 HotMiddlebox workshop will attract a lot of interest.

We believe this workshop is appropriate to SIGCOMM for several reasons: First, the abundance of industry interest in NFV ensures that this workshop will advance SIGCOMM's goals of improving industry collaborations. Second, the workshop affords SIGCOMM attendants with a venue to explore the different dimensions of NFV-related research and opens up a field of in-depth discussion for participants. Third, research in middlebox is closely related to both traditional and new topics for SIGCOMM, including TCP performance, network virtualization,

enterprise/cellular networks, making HotMiddlebox an attractive venue to exchange new ideas for SIGCOMM attendants. Finally, given NFV's close relation to SDN (dataplane vs. control plane), we believe this workshop is a natural continuation for HotSDN that has been collocated with SIGCOMM in the past.

A list of people whom you have solicited (or plan to solicit) to participate at the workshop:

We will reach out to the people in the list below, selected as follows:

- People that have been active in middlebox-related research and have published in this field in major venues in the past few years. Members of the TPC are not included in this list.
- Key people from major companies interested in middleboxes / NFV.

Mark Allman, International Computer Science Institute
Aditya Akella, U. Wisconsin Madison
Alvin Auyoung, HP Labs
Omar Baldonado, Facebook
Hitesh Ballani, MSR
Ivan Beschastnikh, University of British Columbia
Robert Beverly, Naval Postgraduate School
Jun Bi, Tsinghua
Marco Canini, UC Louvain
Matt Caesar, Veriflow/UIUC
John Carter, IBM Research
Julian Chesterfield, OnApp
Kenjiro Cho, IIJ Research Laboratory
David Choffnes, Northeastern
Michael Collins, Redjack
Paolo Costa, MSR/Imperial
William Culhane, Purdue
Samir Das, Stony Brook
David H.C. Du, University of Minnesota
Patrick Eugster, Purdue
Nick Feamster, Princeton
Peter Feil, Deutsche Telekom
Yashar Ganjali, Toronto
Aaron Gember, U. Wisconsin Madison
Phillipa Gill, Stony Brook University
Guofei Gu, Texas A&M University
Chuanxiang Guo, MSR
David Hay, HUJI
Nikhil Handigol, forward networks

Klaus Hoffmann, NSN
Y. Charlie Hu, Purdue
Hongxin Hu, Delaware State University
Bob Iannucci, CMU Silicon Valley
Navendu Jain, Microsoft Research
Hani Jamjoom, IBM Watson Research Center
Sachin Katti, Stanford
Eric Keller, University of Colorado Boulder
Dejan Kostic, KTH
Teemu Koponen, Nicira
Arvind Krishnamurthy, U Washington
Shriram Krishnamurthy, Brown
TV Lakshman, Bell Labs
Dave Levin, UMD
Dan Li, Tsinghua University
Anders Lindgren, SICS Swedish ICT AB
Diego Lopez, Telefonica
Guru Parulkar, Stanford/ONF
Bruce Maggs, Duke
Ravi Manghirmalani, Ericsson Research Silicon Valley
Joao Martins, NEC Labs Europe
Z. Morley Mao, Michigan
Nick McKeown, Stanford
Kobus van Der Merwe, Utah
Jelena Mirkovic, USC/ISI
Alan Mislove, Northeastern University
Inder Monga, Energy Sciences Network
Jeff Mogul, Google
Kyoungsoo Park, KAIST
Adrian Perrig, ETH
K K Ramakrishnan, UCR
Mike Reiter, UNC
Robert Ricci, Utah
Luigi Rizzo, Univ of Pisa
Stefan Schmid, TU Berlin
Scott Shenker, UC Berkeley
Justine Sherry, UC Berkeley
Georgios Smaragdakis, MIT CSAIL
Joel Sommers, Colgate University
Robert Soule, Univ Lugano
Xin Sun; FIU
Peter Steenkiste, CMU
Michael Walfish, NYU

Hakim Weatherspoon, Cornell University
Timothy Wood, GWU
Geoffrey Xie, NPS
Di Yang, University of Science and Technology of China
Koji Yamazaki, NTT Microsystem Integration Laboratories
Minlan Yu, USC
Ziming Zhao, ASU
Liang Zhang, Huawei Corporation
Ying Zhang, Ericsson Research Silicon Valley

Hot Topics in Middleboxes and Network Function Virtualization (HotMiddlebox 2016) in conjunction with Sigcomm 2016, Salvador, Brazil

Scope and topics of interest

Modern networks heavily rely on advanced network processing functions for a wide spectrum of crucial functions ranging from security through traffic management, all the way to Voice over IP (just to name few). Until recently, these network functions were implemented in dedicated hardware "middleboxes" spread within the network. However, the strive to reduce cost and increase agility is motivating a major shift to a paradigm where software-based processing runs on virtualized, shared platforms built on commodity hardware servers, switches, and storage.

This trend towards virtualized middleboxes, called Network Function Virtualization, NFV, with the use of Software Defined Networks, SDN to control the network flows is gaining popularity in the telecommunication industry as well as in academia. Yet this paradigm shift is at a very early stage and many interesting questions remain open in this regard. The HotMiddlebox workshop will serve as an avenue to showcase and discuss ongoing work from both academic and industry efforts in this space and to identify key challenges and potential solutions, with the ultimate goal of providing a roadmap for practical deployment in operational networks.

We encourage the submission of work-in-progress papers in the area of (virtualized) middlebox design, implementation, measurement, management, deployment, as well as Internet architecture implications of middleboxes. We look for submissions of previously unpublished work on topics including, but not limited to, the following:

- Performance optimizations of network stacks on virtualized systems
- Verification of unknown code running on shared middlebox platforms
- Security issues regarding middleboxes
- Extensible software stacks for rapid implementation of new middlebox functions
- Mechanisms for migration of stateful middleboxes
- Resource allocation mechanisms for shared/virtualized middlebox platforms
- Integrating new software middleboxes into legacy networks
- Backend storage/memory architectures for middleboxes
- Management abstractions and policy language frameworks for middleboxes
- Experiences and best-practices in deploying software-based middleboxes in operational networks
- Deployment and use of middleboxes in the cloud
- Measurements of middleboxes in enterprise, ISP, and data center networks.
- Novel security, performance, and monitoring applications atop middleboxes
- Challenges for policy verification in the context of middlebox services.
- Internet architecture implications of middleboxes.

Important Dates

Abstract registration:	March 11
Submission:	March 18
Notification:	April 30
Camera ready:	May 15
Workshop Date:	Aug 22/26 (Salvador, ACM SIGCOMM)

Workshop Co-Chairs:

Dongsu Han, KAIST, Korea
Danny Raz, Bell Labs & Technion, Israel

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Michael Schapira, Hebrew University of Jerusalem, Israel
Noa Zilberman, Cambridge University, UK

More details in the workshop web page.