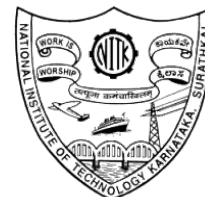




**MHRD**  
Ministry of Human  
Resource Development  
Government of India



## Software Based Networks:

# SDN and Integration of Virtualization in Networks

December 19 - 23, 2017

National Institute of Technology Karnataka (NITK), Surathkal, India

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## Overview

Managing networks is becoming increasingly complex. This has fostered research in the area of network management and led to the development of new approaches to efficiently manage networks. Software Defined Networking (SDN) is a promising approach, focusing on efficiently managing networks by using a logically centralized control plane. It is an emerging architecture, cost effective and highly suitable for managing networks, especially datacenters.

Network Function Virtualization (NFV) is another new technology enabling network services to be provided as software running in Virtual Machines (VM) or containers instead of having purpose-built hardware appliances for each network resident function. Recently, there has been considerable focus on adopting SDN and NFV for efficiently managing the network and the services they provide. Both these technologies are crucial in managing complex networks and services (e.g., Data Center Networks and Cloud Services).

## Objectives

The primary objectives of the course are:

- a. Expose participants to the fundamentals of Software Based Networks: SDN and NFV.
- b. Discuss SDN protocols (e.g., OpenFlow), programming models (e.g., P4), simulation and modeling tools (e.g., ns-3, Mininet) and open source platforms (e.g., OpenNetVM) for studying and analyzing the effectiveness of SDN and NFV.
- c. Provide exposure to SDN and NFV implementation issues and their solutions through case studies and demonstrations.

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## Course Details

### Tuesday, 19 December 2017

Introduction: Traditional IP Control Plane and Router Implementation

Introduction to Software Defined Networking

Mininet: Basics, OpenFlow and SDN Controllers

### Wednesday, 20 December 2017

OpenFlow Protocol and Applications

Network Virtualization and FlowVisor: A Network Virtualization Layer

ns-3: Basics, OpenFlow and Network Topologies

### Thursday, 21 December 2017

Programming SDN: Pyretic, Frenetic, P4; Open Network Operating System (ONOS)

Software Based Data Plane: Network Middleboxes

Programming with ONOS

### Friday, 22 December 2017

Introduction to Virtualization (VMs and Containers)

Introduction to Network Function Virtualization (NFV)

Enhancing the Data Plane: Flow Tags, Function Placement and Routing

Designing Virtual Networks

### Saturday, 23 December 2017

OpenNetVM – A platform for NFV

Enhancements to OpenNetVM; Comparison with ClickOS, Netmap

Using NetVM

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## The Faculty

### Dr. K. K. Ramakrishnan



Dr. K. K. Ramakrishnan is Professor of Computer Science and Engineering at the University of California, Riverside. Previously, he was a Distinguished Member of Technical Staff at AT&T Labs-Research. He joined AT&T Bell Labs in 1994 and was with AT&T Labs-Research since its inception in 1996. Prior to 1994, he was a Technical Director and Consulting Engineer in Networking at Digital Equipment Corporation. Between 2000 and 2002, he was at TeraOptic Networks, Inc., as Founder and Vice President.

Dr. Ramakrishnan is an AT&T Fellow, recognized for his fundamental contributions on communication networks and lasting impact on AT&T and the industry, including his work on congestion control, traffic management and VPN services. He is an IEEE Fellow, and has received other awards. His work on the “DECbit” congestion avoidance protocol received the ACM Sigcomm Test of Time Paper Award in 2006. He has published nearly 250 papers and has 165 patents issued in his name. K.K. has been on the editorial board of several journals and has served as the TPC Chair and General Chair for several networking conferences and has been a member of the National Research Council Panel on Information Technology for NIST. He is currently Co-Editor in Chief for CCF Transactions on Networking, published by Springer, and the Steering Committee Chair for the IEEE ICNP conference. K. K. received his MTech from the Indian Institute of Science, Bangalore, India (1978), MS (1981) and Ph.D. (1983) in Computer Science from the University of Maryland, College Park, USA.

### Dr. Mohit P. Tahiliani (Host Faculty)



Dr. Mohit P. Tahiliani is an Assistant Professor of Computer Science and Engineering at the National Institute of Technology Karnataka, Surathkal. Dr. Tahiliani is a recipient of EMC Young Achiever Award from EMC Corporation for his all-round achievements in the field of Computer Science and Engineering. Mohit is an active member of the ns-3 development community, and has built an automated framework based on RFC 7928 to evaluate ns-3 queue disciplines. He was a mentor for one of the ns-3 projects during Google Summer of Code 2017. He is a reviewer for IEEE Communication Letters and has received an Outstanding Reviewer Award from Elsevier Journal of Network and Computer Applications. He has published 32 papers and has served as a TPC member for networking conferences such as: ACM Workshop on ns-3 (WNS3), IEEE LCN, IEEE ANTS and others. Mohit received his Ph.D (2013) from NITK Surathkal, India.

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## Who can Attend?

- a. Executives, engineers and researchers in networking from industry and government organizations, including R & D Laboratories.
- b. Students at all levels (B.Tech/M.Tech/M.Sc./MCA/Ph.D) or Faculty members from academic institutions or technical institutions.

## Registration Fees

The following registration fee includes all instructional materials, use of laboratory facilities for tutorials, access to the Internet and lunch and tea on all days. The participants will be provided with on campus accommodation on payment basis.

Students and Faculty from NITK Surathkal	Free
UG and PG Students from other Institutes	INR 2000
Ph.D, Post Doctoral Fellows and Faculty members from other Institutes	INR 3000
Participants from industry	INR 5000
Foreign Participants	USD 200

## Course Coordinator Contact Details

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