



## 1st International Workshop on the Future Evolution of Internet Protocols (IPFuture 2020)

### Session 1: Invited Talks

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13:40 – 14:40 • Virtual Room #3

**Chair:** *Ian Akyildiz*

**Title:** Can we use CubeSats as the Backbone Network for Next Generation Communications Systems?

**Speaker:** Ian Akyildiz (Georgia Tech, USA)

As the Internet evolves to support over 30 billion connected devices by 2021, the reach and connectivity offered by the traditional wired backbone is fast becoming a bottleneck. Nanosatellites, or CubeSats, are envisioned as a promising solution for future backbone communication networks because of their low costs and short deployment cycle. A new generation of CubeSats equipped with multi-band radios for communication in radio frequencies, millimeter wave and terahertz bands has made terabit per second (Tbps) links possible. A dense network of CubeSats worldwide offering Tbps-level connectivity provides an excellent opportunity for realizing the backbone network for next generation communications. Furthermore, this next-generation CubeSat backbone has much to benefit from Software-Defined Networking and Network Function Virtualization which provide fine-grained control over the system hardware, improve network resource utilization, and simplify network management. In this talk, a complete system architecture for global CubeSat networks coupled with a ground-based control and management framework is presented, along with novel solutions for large-scale network topology design and low-overhead routing.

**Title:** Innovating at the Network Layer -- How to (Not) Make the Internet Better

**Speaker:** Dirk Kutscher (University of Applied Sciences Emden/Leer)

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control over the system hardware, improve network resource utilization, and simplify network management. In this talk, a complete system architecture for global CubeSat networks coupled with a ground-based control and management framework is presented, along with novel solutions for large-scale network topology design and low-overhead routing

**Title: Network protocols are dead, long live networking abstractions!**

**Speaker: Theophilus Benson (Brown University, USA)**

The ossification of the networking layer has long limited the evolution of networking services and applications. The emergence of programmable data planes and their inherent flexibility has enabled the broader community to revisit the network's role. However, this flexibility is limited, and we lack sufficient primitives to harness and manage this flexibility effectively. This talk will discuss challenges that arise when the network is extended to support rich distributed systems abstractions, i.e., in-network computing, and sketch out a broad set of primitives for enabling in-network computing effectively. I will also describe ongoing work to extend our abstractions to manage traditional accelerators, e.g., GPUs and FPGAs.

## **Session 2: Invited Talks & Technical Paper Presentations**

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**15:00 – 16:20 • Virtual Room #3**

**Chair: *Enrico Natalizio***

**Title: Evolving IP to support Emerging Applications?**

**Speaker: KK Ramakrishnan (University of California, Riverside)**

The Internet protocol suite has withstood numerous challenges that emerging applications have continually posed over the last several decades and has admirably served the needs of our information driven society. The fundamental principles behind the design continue to serve us well even in these challenging times. Given this background, is there a reason to reconsider enhancements to the network layer in the context of even newer applications that are likely to emerge as we grow more and more dependent on networking. This will discuss a few applications that are gaining traction that can be substantially helped by a network layer more responsive to application needs in terms of latency, flexible naming and service features. Vehicular applications, rich 360-degree video distribution and augmented reality are emblematic of such emerging applications, and I will discuss the network layer features that these applications could use to improve their capabilities.

**Title: The Problem with IP**

**Speaker: Stewart Bryant (Futurewei Technologies & University of Surrey, UK)**

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### **PCE-Based Framework for Future Internet Deterministic and Time-Sensitive Networks**

Daniel King (Lancaster University, United Kingdom (Great Britain)); Adrian Farrel (Old Dog Consulting, United Kingdom (Great Britain))

### **A formal approach for automatic detection and correction of SDN switch misconfiguration**

Wejdene Saied (Carthage University, SUP'COM, Tunisia); Adel Bouhoula (Arabian Gulf University, Bahrain)

## **Session 3: Invited Talks & Technical Paper Presentations**

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**16:40 – 17:40 • Virtual Room #3**

**Chair:** *Marie-José Montpetit*

**Title:** TCP/IP replacement: an overview of potential options.

**Speaker:** Caterina Scoglio (Kansas State University, USA)

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**Title:** Future IP: which network programmability challenges?

**Speaker:** Giuseppe Bianchi (Univ. Roma Tor Vergata)

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### **Connection-Free Reliable and Efficient Transport Services in the IP Internet**

JJ Garcia-Luna-Aceves (University of California at Santa Cruz, USA); Abdulazaz Albalawi (UC Santa Cruz, USA)