

## **Workshop on Technological Gaps and Opportunities for Realizing Open Source based end-to-end Network Architecture**

co-located with MobiCom'17 October 15-16

co-organised by PAWR Project Office Northeastern University, National Science Foundation and EU H2020 Project 5GINFIRE

### **Executive Summary**

The main aim of the workshop was to bring together researchers from both sides of the Atlantic to discuss the landscape of open-source projects across three main technical areas in the networking domain: software, hardware and platforms. This was the first effort of its kind to introduce academia, open source foundations and industry stakeholders to each other across different domains: wireless, edge, SDN-NFV, and applications. The workshop had 30 participants; 22 from USA and 8 from EU, and was co-located with ACM MobiCom on Oct 15-16 2017 at Snowbird, Utah.

The workshop was organized to address three main goals. The first was to establish the baseline of open-source project work in wireless software-hardware, cloud computing, Software Defined Networking (SDN), Network Function Virtualization (NFV) and Infrastructure for enabling Experimentation. The second goal was to conduct a gap analysis for the aforementioned work across parameters such as: availability of code, community engagement, and reliance on adopted standards, features, tools and accessibility. The third goal was to coalesce around a feasibility discussion for proposing an end-to-end, open-source reference model that ties together the three technical areas to support near-term standardization efforts as well accommodating blue-sky research on large-scale research platforms.

This report summarizes the discussions at the workshop related to open-source approaches for software and hardware to be used for future large-scale research-focused platforms. We also highlight key recommendations that emerged from the workshop as actionable items for government agencies such as NSF and European Commission. The workshop attendees (Appendix A) and Agenda (Appendix B) are provided. The website is available at <http://www.coe.neu.edu/Groups/nsfopensourceworkshop/home.html> and all presentation and discussion materials are located at <https://tinyurl.com/EU-US-Workshop>

### **Summary Recommendations**

There was general consensus at the workshop that understanding and documenting the landscape of available technologies, both software and hardware, to support future experimental infrastructure development is a necessary first step. As such, many such community efforts both in the US and EU were presented, documented and consolidated on the workshop website.

However, a critical aspect that emerged during the workshop was the need for a community wide reference architecture model with open interfaces and APIs that provides a blue print for different stakeholders (academia and industry) to leverage the future large scale infrastructure platforms being developed in the US and EU.

The opportunities exist for developing such an end-to-end networking architecture given divergence from standards, APIfication of technologies and integration at various levels of the network protocol stack driven by technological and application requirements. Following high academic, industry and networking foundations interest to exploit the promised benefits

at all levels, i.e. RAN, edge, Core and applications, a plethora of initiatives have started worldwide to deliver specifications that enable the construction, deployment and operation of large scale virtualizable infrastructures. The community is demanding the following changes and thus, now is an opportune time to mobilize the community and invest in design and development of an end-to-end network architecture.

- \* Use of common languages across different platforms.
- \* Simplify the learning curve for Radio Hardware, FPGA and SDR.
- \* Simple and light interfaces within and amongst network components devices, almost plug&play.
- \* Focus on API, not on protocols, communications or data structures.