

## **Meeting Report of IEEE Software Defined Ecosystem Standards Working Meeting**

April 25, 2014, Friday, Newark Liberty International Airport Marriott, Newark, NJ USA

This one-day working meeting was sponsored by the Standards Activities Council of IEEE Communications Society as the first test of a Rapid Reaction Standardization Activity in order to speed up the creation within the IEEE of new technology standards.

### **Attendees:**

Prodip Sen – Verizon	Spilios Makris - Palindrome Technologies, USA
Cagatay Buyukkoc – AT&T Labs	Stefano Galli – ASSIA, Inc, New York
Ashutosh Dutta – AT&T Labs	Kenneth Kerpez –ASSIA, Inc, New York
Tetsuya Nakamura – NTT-DoCoMo	Fabrizio Granelli – University of Trento, Italy
Barak Ulman – ASOCS, Israel	Steven Nurenberg – AT&T Labs
M. Asad R. Chaudry – Green Comm. TC	Mehmet Ulema – Manhattan College, IEEE ComSoc
Colin Khan – Alcatel Lucent Bell Labs	Alex Gelman – Netovation, IEEE ComSoc
Niranth Amogh – Huawei, India	Rob Fish – Netovation, IEEE ComSoc

The target of this particular meeting was to identify primary standards development opportunities in SDN/NFV and related areas; in order to demonstrate and document the steps necessary to establish an early IEEE presence in key areas of opportunity. The meeting did a "gap" analysis to determine standardization opportunities in Software Defined Networking (SDN) and Network Functions Virtualization (NfV) and related areas, with the objective of launching new standards activities in these areas under ComSoc sponsorship.

The meeting began with an introduction of the attendees followed by a brief discussion of the objectives and expected outcomes which was standardization under IEEE ComSoc sponsorship. Then each participant made a brief presentation discussing their ideas and suggested areas of standardization. The ideas presented in these presentations are as follows:

1. Interfaces identified in the NFV Framework
2. SBI for Network Controller with Layered Abstractions
3. Virtualization friendly MAC Enhancements; L1/L2 Virtualization; what to virtualize?
4. NFV- layered, conceptual abstractions
5. SDN for Devices (End user, consumer equipment) Device programmability
6. Data Path Programmability
7. SDN and Wireless Optimization
8. PNF-VNF Interconnections; Abstractions? Management?
9. Global View of Network Data
10. Virtualized Broadband Access Interfaces; Access networks, home networks
11. Interoperable Autonomous Systems (ASs)
12. Wireless NfV Composition
13. 5G Management
14. Security in Virtualized Environments; Hypervisor, orchestration, certification
15. Reliability/Availability Framework in Virtualized Environments; Metrics?
16. Virtualized Base Stations; Programmable Data Path – LI; L - L12/L3; BB-RRH
17. Service Functions Virtualization/Programmability; Service Routing

Then the ideas presented were grouped in three categories, each of which was assigned to a group. Each group met separately to further discuss, clarify, and crystallize potential topics. This was followed by an outcome report from each group:

### **Group 1: Security, Reliability and Performance for Software Defined and Virtualized Ecosystems**

**Ideas:** 11, 14, 15

**Members:** Asad Chaudry, Ashutosh Dutta, Spilios Makris

**Outcome:** The following tasks were identified:

- Review other standards activities: ETSI NFV, ONF, 3GPP, ATIS (TOPS), IETF, ITU-T, ATIS (PRQC), NIST, OMG (SDN)
- Identify the overlaps
- Perform Gap analysis (WP) for each security, reliability, performance
- Prioritize potential tasks based on the gap analysis
- Roadmap to address the GAPS: (i) Define the scope & framework, (ii) Transition to standardization (iii) Address Issues , requirements, use-cases
- Recruit contributors
- Framework Details:
  - o Priority Class of Service virtualization: Intersection of reliability, security, and performance circles
  - o Use case & application driven; regulated industry
  - o Metrics
    - Security KPIs
    - Performance: QoS (Network, GOE, minimum b/w guarantees)
    - Reliability; availability, MTTR
    - Predictability

### **Group 2: Software Defined and Virtualized Wireless Access**

**Ideas:** 5, 6, 7, 12, 13, 16

**Members:** Cagatay Buyukkoc, Fabrizio Granilli, Colin Khan, Barak Ulman

**Outcome:** The group itemized the outcomes under two categories:

Category 1:

- Extending SDN to devices (mobile) at the network edge; separation of data and control planes
- Joint optimization of transport and RAN

Category 2:

- a) Use of SDN to control and program network resources (eg, SDN – SDN Network Controller)
- b) Heterogenous multi-owner multi-vendor RAN control and Management (eg, CRAN, Ethernet Based included, softRAN)
- c) Interoperability among layers 1 to 3 (programmable data path)
  - Extracting and managing information to enable wireless networks control; mechanisms (how); what? KPIs

**Group 3:** This group decided to tackle two separate but related areas together:

#### **Services Functions Virtualizations**

**Ideas:** 11, 17

**Members:** Niranth Amogh, Tetsuya Nakamura

**Outcome:**

- NGSON, SDN, NFV1 Coordination

- Programmability
- Service Routing
  - o Not limited to Data packets
  - o Triggers based on contexts from users, device, service, and network

### **Structured Abstractions for Software Defined and Virtualized Ecosystem**

**Ideas:** 1, 2, 3, 4, 5, 8, 9, 10

**Members:** Cagatay Buyukkoc, Ken Kerpez, Stefano Galli, Tetsuya Nakamura

**Outcome:** Two approaches were identified:

Bottom-up:

- PNF Descriptor
- Network Model (OSI Equivalent; BBF to ETF)
- Data Model

Top-down

- Define common high level taxonomy, structure
- Object model
- Service model

Investigate related SDOs: TMF, DMTF, ODL, OpenStack

Participants discussed possible future steps to make further progress on each group. It was decided to form the following activities leading to standardization:

1. A Study Group on Security, Reliability and Performance for Software Defined and Virtualized Ecosystems
2. A Research Group on Software Defined and Virtualized Wireless Access
3. A Research Group on Structured Abstractions
4. A task group within P1903 MGSON on Service Virtualization

The IEEE ComSoc Standards Activities Council will take the necessary steps to begin the process of forming the above mentioned Study Groups and Research Groups.

For those who are not familiar with the IEEE Study Group and Research Groups, the following provides a brief explanation:

Study Group (SG):

*A Study Group (SG) is formed when enough interest has been identified in a particular area of study. Formation and operation of the Study Group is governed by an approved IEEE-SA Standards Sponsor, e.g. the ComSoc Standards Development Board or a ComSoc Standards Committee. A SG work typically continues for 3-6 months with the objective of drafting a Project Authorization Request (PAR) for consideration by the Sponsor. The PAR outlines the scope of the standards development project. If the PAR is approved, the SG is disbanded and a Working Group (WG) is formed to carry out the standardization process within the scope authorized in the approved PAR. A SG is a formal entity whose activities are governed by the Policies and Procedures of the Sponsor:*

<http://www.comsoc.org/files/About%20Comsoc/Documents/Policies%20and%20Procedures/flip/ComSoc%20Standards%20Development%20Board%20Policies%20and%20Procedures/HTML/index.html#>

*Guidelines related to formation and operation of a study group can be found here:*

<http://standards.ieee.org/develop/corpchan/studygrp.pdf>

## Research Group (RG):

*A Research Group (RG) is formed under IEEE. ComSoc when substantial interest has been established in a particular area of study. The objective of a RG is to identify and address research issues that need to be solved on the way to standardization of technology.*

*The output of a research group can take various forms, such as vision documents, research reports, white papers, collective publications in ComSoc Magazines and/or Journals, conference papers, tutorials, etc.*

*In the process of the RG operation, a Research Group may identify specific standardization opportunities and may recommend forming one or more Study Groups.*

*If the Research Group's consensus is that the opportunity is sufficiently mature for standardization, the RG can directly generate a PAR and propose formation of a WG to carry out the standardization work.*

*Research Groups are formed and operate in ComSoc under the Standardization Programs Development Board according to its Policies and Procedures:*

*<http://www.comsoc.org/about/documents/pp/5.15>*