The Role of Mobile Assets in Future Software Defined Infrastructure

Tim Talty, General Motors Global R&D
timothy.talty@gm.com

Annual global IP traffic will pass the zettabyte (1000 exabytes) threshold by the end of 2016, and will reach 2 zettabytes per year by 2019. By 2016, global IP traffic will reach 1.1 zettabytes per year, or 88.4 exabytes (nearly one billion gigabytes) per month, and by 2019, global IP traffic will reach 2.0 zettabytes per year, or 168 exabytes per month [1]. Conventional network topologies and routing protocols have fundamental limitations that have not scale well to the increasing network demands.

Current research, such as Lee [2] and Kim [3], focus on innovative network protocol adaptations to improve flexibility and scalability of networks. Others, such as Mamatas [4], focus on new network architectures that can significantly improve network performance. The collection of work in literature has demonstrated the significant network enhancements that are possible.

Connectivity assets that are mobile will experience significant growth over the next decade. In particular, new vehicles equipped with vehicular communication systems such as vehicle-to-vehicle communication (V2V) and vehicle-to-infrastructure (V2I) will become available in the next few years. These mobile assess will have significant computational resources and many with have access to multiple radio technologies, such as LTE/4G. And in the future, the radio technologies could grow to include emerging technologies such as 5G and Super WiFi. These mobile assets could be leveraged in numerous ways.

To date, the work on Software Defined Infrastructure has focused on physically fixed network assets. Given the pending growth in mobile assets, networks of the future will have mixed mobility mode assets with, since mobile assets come and go, selected availability. This presents additional opportunities and challenges:

1. Impact to fixed infrastructure planning and deployment. Most mobile assets will be available during peak network loading, such a morning and afternoon rush hours, when localized network traffic is highest. Hence, possible new network assets appear just as network traffic increases. The dynamic capacity of the mixed mobility network present an interesting network planning modeling problem.

2. The mobile assets will have dynamic availability; existing work on SDI and network traffic will need to expand to include the dynamic availability of network assets.

3. The mobile assets will have a diversity of radio technologies; existing work on SDI will need to expand to include multiple and adaptable radio technologies.

In summary, future Software Defined Infrastructures research should include the addition of network assets that have mixed mobility modes, selected availability and a multiple of radio technologies.

[1] The Zettabyte Era—Trends and Analysis, Cisco Visual Networking Index.

[2] Christopher P. Lee, Keshav Attrey, Carlos Caballero, Nick Feamster, Milena Mihail, John A. Copeland Schools of Electrical and Computer Engineering and Computer Science

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[3] Hyojoon Kim and Nick Feamster, Georgia Institute of Technology, Improving Network Management with Software Defined Networking, IEEE Communications Magazine, February 2013.

[4] Lefteris Mamatas, Stuart Clayman, and Alex Galis, University College London, A Service-Aware Virtualized Software-Defined Infrastructure, IEEE Communications Magazine, April 2015.