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Wireless Industry Voices—Rysavy: Virtualization will transform the wireless industry

by **Peter Rysavy** | Dec 19, 2019

5G standards themselves assume a virtualized network framework. (Getty Images)

Originally published at: https://www.fiercewireless.com/wireless/industry-voices-rysavy-virtualization-will-transform-wireless-industry

Although 5G features such as gigabit-per-second throughput and the ability to compete with wireline broadband generate the most attention, the cloudification of 5G networks will have the greatest impact on the wireless industry.

As the network becomes a distribution of data centers based on technologies such as software-defined networking (SDN) and network-function virtualization (NFV), operators and customers will reap huge rewards. Operators will have increasingly scalable, adaptable, intelligent, and secure networks while customers will see a broader range of innovative applications arriving sooner and operating on more powerful networks.

This 5G network cloudification received in-depth analysis at a Georgetown University School of Business workshop, Software Defined Networking and Network Function Virtualization–A Primer on What They Mean for 5G and Beyond, held recently in Washington D.C. I moderated a technical panel with experts from Cisco, Ericsson, Intel, and Verizon—companies integral to the creation of this virtualized future.

As discussed at the workshop, a number of technologies and standards are coalescing to make cloud-based 5G a reality. 5G standards themselves assume a virtualized network framework. For example, virtualization is the foundation for network slicing, in which network quality-of-service can be fine-tuned for specific types of applications.

Other standardization work includes specifications for a virtualization framework from the European Telecommunications Standards Institute (ETSI). Meanwhile, the Open Network and Automation Platform (ONAP) orchestrates and automates virtual network functions, and the Open Radio Access Network (O-RAN) virtualizes the RAN using open, interoperable interfaces.

O-RAN transforms the radio access network by breaking up radio processing into a combination of distributed and centralized functions, with well-defined interfaces between them and extending to other parts of the network. This approach makes it possible for vendors to concentrate on those portions of the network in which they have greatest expertise, while the smaller pieces involved allows lower barriers to entry, thus broadening vendor diversity. As a growing portion of the U.S. economy integrates 5G, the security, stability, and trustworthiness of the 5G vendor supply chain becomes essential. This architecture should also make it easier for U.S. software-centric technology companies to participate.

Many operators have committed to this new software-oriented architecture, one that decouples hardware implemented on commercial off-the-shelf computers, from the functionality implemented in software. For example, AT&T plans to have 75% of its network virtualized by 2020. Vodafone just issued a request for quotes for an open RAN solution for its entire European footprint of 100,000 sites.

The virtualized framework will allow operators to deploy computing power elastically where needed. As the load on the network grows from increased traffic and connections, the network will not only scale easily to address demand, but operators will

also roll out new services and capabilities faster, encouraging innovation. The network will become a massively distributed computing platform with antennas at the edge.

This framework is also compatible with edge computing, in which applications that serve wireless devices operate at the edge of the network, reducing both latency and traffic flow through the core network. Edge computing will make many new applications feasible, such as cloud gaming, extended reality, autonomous driving, and factory automation. Chetan Sharma, in his report Edge Internet Economy, projects that edge computing will generate $4.1 trillion of revenue globally by 2030.

Virtualized networks will also be more secure. An AT&T report states that “virtualization can help to complement and enable a flexible response against unknowable future threats,” and that security “virtualization could be the most crucial advancement related to 5G security, for both the provider and their enterprise customers.” AT&T also sees virtualized security as able to aid in threats that materialize from edge computing.

The virtualized network will have another massive advantage: the integration of AI. Researchers and engineers are planning multiple roles for AI. 3GPP already has work underway, incorporating automation and machine learning into its architecture by introducing a network data analytics function into the 5G core. Another role for AI is elastic management and network orchestration, dynamically applying resources to rapidly changing demands. ETSI refers to such a capability as Experiential Networked Intelligence (ENI) in which closed-loop network operations and management leverages AI. ETSI’s goal is to achieve Zero-Touch Network and Service Management (ZSM), meaning fully automated network management in a complex, multi-vendor environment. With a virtualized RAN, AI can also augment radio-level computation, optimizing functions such as massive MIMO and spectrum sharing.

Is there a downside? One panelist at the workshop mentioned complexity; reimagining networks that are already some of the most complex creations of humanity by instituting new interfaces and introducing new vendors is not a trivial undertaking. Hiccups will occur. The benefits, however, are so great that this new, software-oriented network strategy is rapidly becoming reality.

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