Contribution ID: **115** Type: **Oral Presentation**

Optimization of the Common Wealth Planning and Sharing based on Knowledge Value Transformation Theory

Thursday, 25 March 2021 14:00 (30 minutes)

Since the advent of ICT, information and communication resources become the common wealth and the method dealing with the resource planning and sharing becomes the fundament of the ICT services. For the common wealth planning and sharing, I have carried out the paradigm of Organic Ecology, viz. HyQVIS (Hyper Quality and Value of ICT Systematics), which is inspired by the EU FP3-ESPRIT Project HyQIS. Within HyQVIS, the governmental authority and the participants are organic elements of the ecosystem. Based on the systematics, the Knowledge Value Transformation Theory is proposed.

According to the theory, the task of common wealth planning and sharing is to optimize the behavior of the organic elements and the ecosystem as a whole with respect to appropriate laws or de facto consensus. And, the whole system is a transformer from knowledge on semantic level to the value on the pragmatic level. For the cases up-to-date, three kinds of most significant optimization techniques, viz. Random Optimization(RO), Simulated Annealing(SA) and Genetic Algorithm(GA) are adopted. Since the techniques comes from different scientific disciplines, they have different moral background, so they represent different strategies for resource planning and sharing. We have aggregated the techniques to optimize the organic behaviors that the ecosystem can take.

In recent years, one of the most important issues of resource sharing and utilization is the spectrum splitting and sharing of mobile communication. Optimally splitting spectrum can lead the mobile operators to increase communication capacity and allow users to take advantage from Quality of Services(QoS). 5G/6G mobile technique can accomplish enhanced devices and communication capabilities with higher throughput, higher efficiency and lower latency for mobile services. This study starts from finding available 5G spectrum and the regulation law in Taiwan/ROC, and estimate the values of the bands in the available spectrum. Then, the study copes with the market share of the operators, the major investing factors as the financial constraints of operators and the construction cost as input variables, and then simulate different bidding rounds in the auction process and combinations of segments to maximize the gain of the 5G ecosystem. The result proves that spectrum splitting and auction is an optimization process through the dynamic organic behaviors of the operators in the auction process. Further, the result reveals the differences of two resource sharing strategies based on different backgrounds, i.e. SA from Physics, which seeks for the equilibrium of the system, and GA from biology, that emphasizes mutation and elitism. The 2nd case deals with the collaboration framework for the API and Platform Economy. At first, a framework for the API and Platform Economy is presented. Further, we analysed the complexity of different topologies of the ecosystem. The result shows the federation of multiple centralized groups, e.g. Grids, is most efficient as well as less of complexity, more robust for security and thus federated computing becomes the next edge of the collaboration and information resource sharing. The theory and the systematic approach presented in this article can serve as a well-formed referral guideline for planning and sharing of common wealth in the regions of different cultures.

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Session Classification: Infrastructure Clouds and Virtualisation Session