

5<sup>th</sup> International Conference on **Wireless, Telecommunication & IoT**  
&  
**11<sup>th</sup> Euro Biosensors & Bioelectronics Congress**

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### Resource slicing and customization in 5G RAN with dueling deep Q-Network

The emerging future generation 5G technology is expected to support service-oriented virtualized networks where different network applications provide unique services. 5G networks have the potential to allow completely different slices to co-exist in a substrate network and satisfy the differentiated requirements of various users. In networks with heterogeneous traffics, operators are required to provide services in isolation since each operator has its own defined performance requirements. However, achieving an efficient resource provisioning mechanism for such traffics is very challenging. We propose a coarse resource provisioning scheme and a dynamic resource slicing refinement scheme based on dueling deep reinforcement learning for virtualized radio access network. Then, a shape-based resource allocation algorithm is proposed to customize the diverse requirements of users to improve user satisfaction and resource utilization. The results reveal that the proposed algorithm balances satisfaction and resource utilization with 80% of the available resources. The algorithm also provides performance isolation such that, a sudden change in user population in one slice does not affect the others.

### Recent Publications

1. Guolin Sun, Kun Xiong, Gordon Owusu Boateng, Daniel Ayepah-Mensah, Guisong Liu and Wei Jiang (2019) Autonomous resource provisioning and resource customization for mixed traffics in virtualized radio access network *IEEE Systems Journal* 13 (3): 2454 - 2465
2. Guolin Sun, Daniel Ayepah-Mensah, Li Lu, Wei Jiang and Guisong Liu (2019) Delay-aware content distribution via cell clustering and content placement for multiple tenants. *Journal of Network and Computer Applications* 137(1):112-126.
3. Guolin Sun, Gordon Owusu Boateng, Daniel Ayepah-Mensah and Guisong Liu (2019) Relational reinforcement learning based autonomous cell activation in cloud-RANs. *IEEE* 7(1): 63588 – 63604.
4. Guolin Sun, Zemuy Tesfay Gebrekidan, Gordon Owusu Boateng, Daniel Ayepah-Mensah and Wei Jiang (2019) Dynamic reservation and deep reinforcement learning based autonomous resource slicing for virtualized radio access networks. *IEEE Access* 7(1): 45758-45772.
5. Guolin Sun, Hisham Al-Ward, Gordon Owusu Boateng and Wei Jiang (2019) Content-aware D2D caching for reducing visiting latency in virtualized cellular networks," *KSII Transactions on Internet and Information Systems* 13(2):514-535.

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### **Biography**

Guolin Sun has completed his B.S., M.S. and Ph.D. degrees all in Communication and Information Systems from the University of Electronic Science and Technology of China (UESTC), Chengdu, China, in 2000, 2003 and 2005 respectively. Since graduated with Ph.D. in 2005, he has got eight years industrial work experience on wireless research and development for 4G/5G, Wi-Fi, Internet of Things, Cognitive radio, Localization and navigation. Before he joined the School of Computer Science and Engineering, UESTC as an Associate Professor in Aug. 2012, he worked in Huawei Technologies Sweden. He has filed over 40 patents, and published over 40 scientific conference and journal papers, acts as TPC member of conferences. Currently, he serves as a vice-chair of the 5G oriented cognitive radio special interest group of the IEEE Technical Committee on Cognitive Networks (TCCN) of the IEEE Communication Society. His general research interests include artificial intelligence, radio resource management, software defined networks, network function virtualization.

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