

**DYNAMIC PATH TO STABILITY IN LTE-UNLICENSED  
WITH USER MOBILITY: A MATCHING FRAMEWORK**

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# ABSTRACT

- LTE-Unlicensed, has recently captured intensive attention from both academic and industrial fields. By integrating the unlicensed spectrum with the licensed spectrum, using carrier aggregation, LTE-Unlicensed users can experience enhanced transmission, while maintaining the seamless mobility management and predictable performance.
- However, due to different transmission regulations, the coordination between LTE and Wi-Fi systems requires careful design. Especially, it's important to understand how to guarantee the transmission quality for LTE users and reduce Wi-Fi users' performance degradation, under the impact of the co-channel interference. In other words, how can we solve the unlicensed resource allocation problem under both LTE and Wi-Fi transmission requirements? In this work, we propose a matching theory framework to tackle this problem.

## CONT...

- Specifically, the coexistence between LTE and Wi-Fi systems, i.e., the interaction between LTE and Wi-Fi users, is modeled as the stable marriage (SM) game. The coexistence constraints are interpreted as the preference lists.
- Two semidistributed solutions, namely the Gale-Shapley (GS) and the Random Path to Stability (RPTS) algorithms are proposed. What's more, to address the external effect in matching, the Inter-Chanel Cooperation algorithm is introduced. Last but not least, the resource allocation problem is studied with network dynamics, and the proposed mechanisms are evaluated under two typical user mobility models.



## EXISTING SYSTEM

There are some existing works on the resource allocation problem in the LTE-Unlicensed. For example, a joint user association and unlicensed resource allocation problem is proposed, and the performance is measured by the average packet sojourn time.

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# PROPOSED SYSTEM

The external effect that occurs in many wireless resource allocation problems, which refers to instability caused by the inter-dependence of the matching players' preference lists, is addressed by the proposed Inter-Channel Cooperation (ICC) mechanism. The ICC procedure not only re-stabilize the system but also further improves network throughput.

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# HARDWARE REQUIREMENTS

- Processor - Pentium-IV
- Speed - 1.1 Ghz
- RAM - 256MB(min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

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## SOFTWARE REQUIREMENTS

- Tool - Network Simulator-2
- Operating system - LINUX
- Front end - OTCL (Object Oriented Tool Command Language)

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# REFERENCES

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- [2] 3GPP, “LTE in Unlicensed Spectrum,” Jun. 2014. [Online]. Available: <http://www.3gpp.org/news-events/3gpp-news/1603-lte-in-unlicensed>
- [3] Alcatel-Lucent, Ericsson, Q. T. Inc., S. Electronics, and Verizon, “LTEU Technical Report: Coexistence Study for LTE-U SDL V1.0,” Tech. Rep., Feb. 2015.

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