

Improved Proportional Fairness Algorithm in Visible Light Communication / WiFi Hybrid Networks

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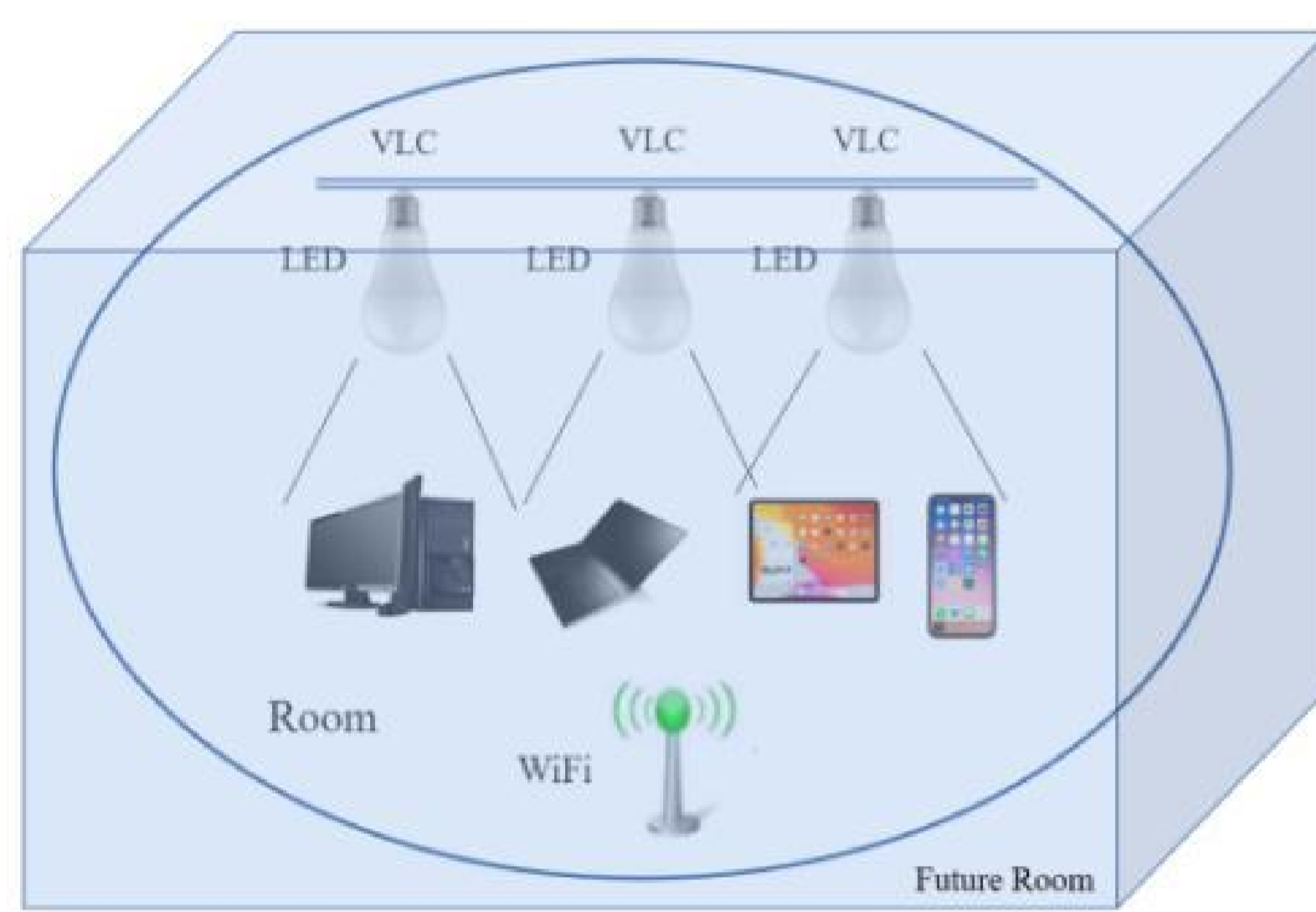
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Abstract: In the visible light communication (VLC) / WiFi hybrid network, an improved proportional fairness (PF) algorithm is proposed, which improves fairness when allocating resources in different areas.

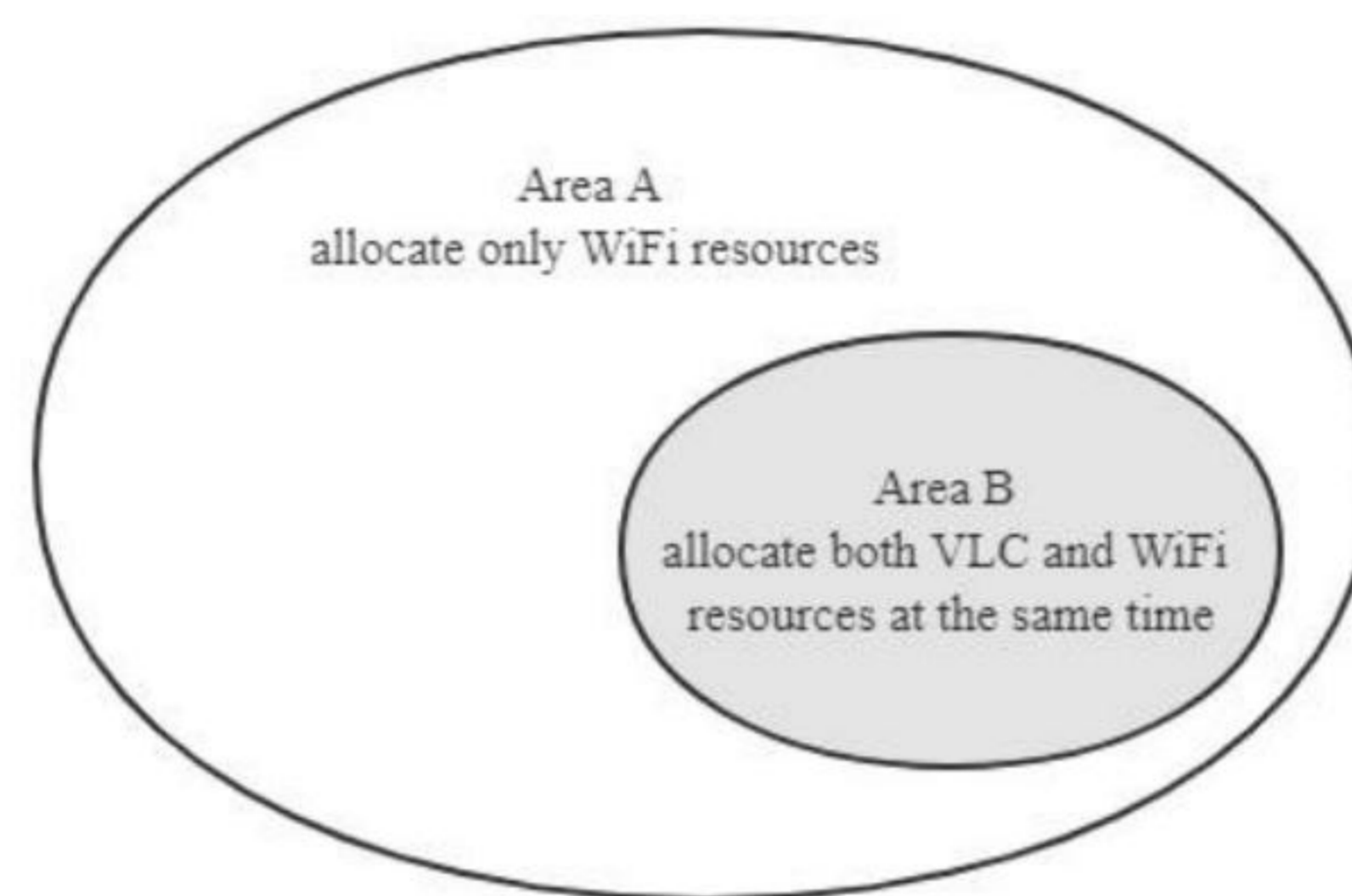
1. Introduction

- ◆ Visible light communication (VLC) is a wireless communication technology which realizes high-speed communication based on light emitted by light-emitting diodes (LED).
- ◆ VLC / WiFi hybrid network can achieve seamless wireless network coverage, and provide excellent solutions for many types of data services. VLC and WiFi coexist in one room to provide services for users respectively.
- ◆ In order to engage with such hybrid networks, practical resource allocation algorithm has become a key issue. An improved PF algorithm is proposed, which can improve the ability of users to obtain resources from different areas.

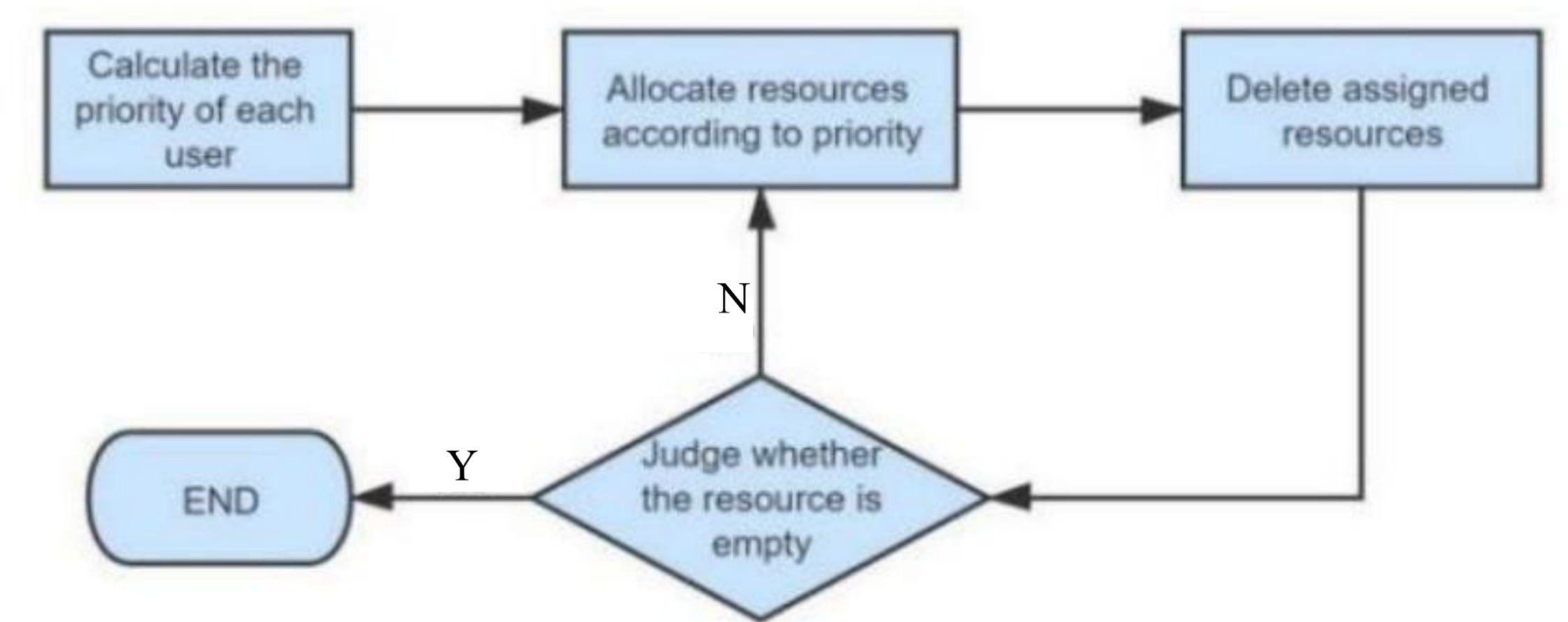
2. Simulation Model



▲ Indoor VLC/WiFi hybrid networks.



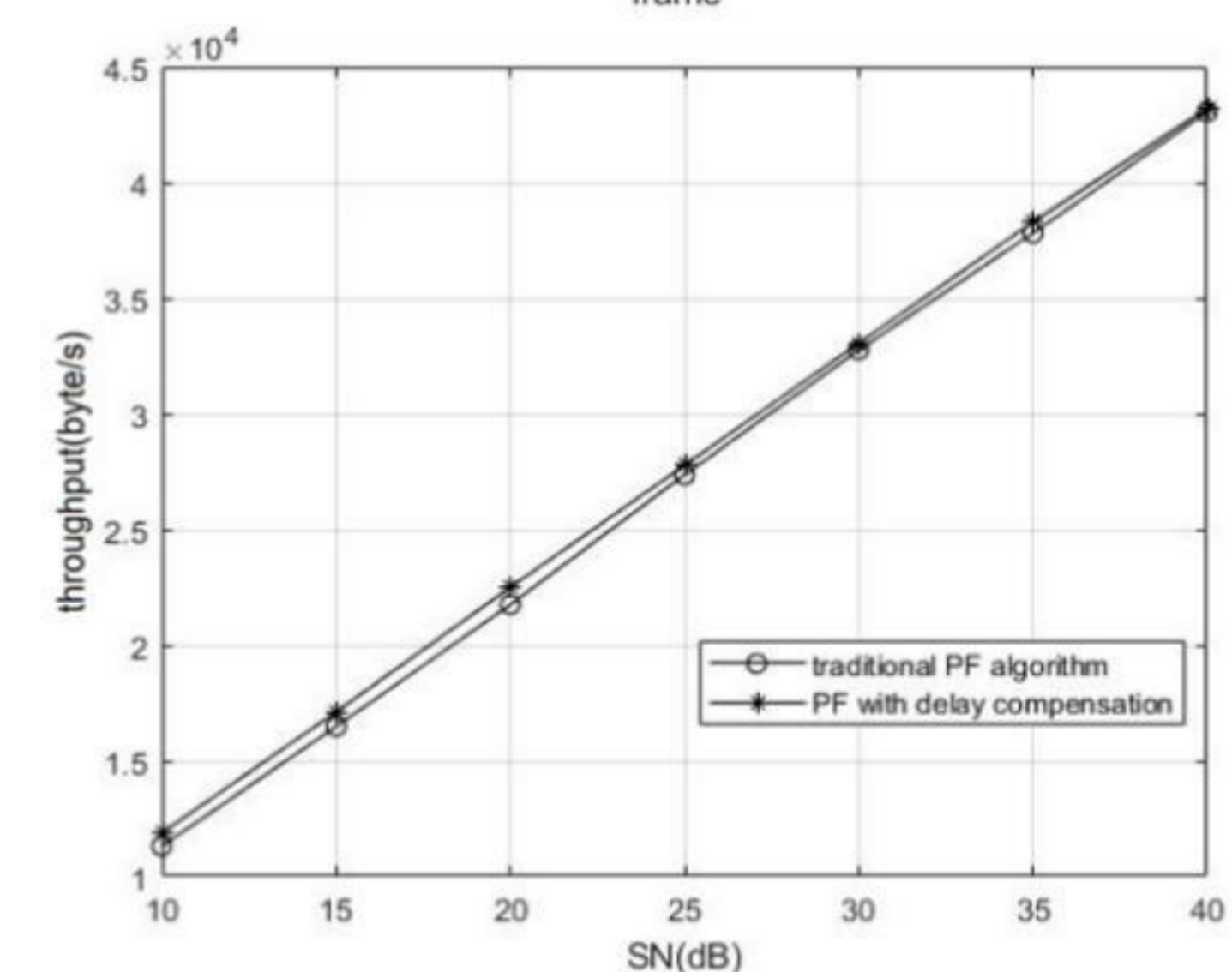
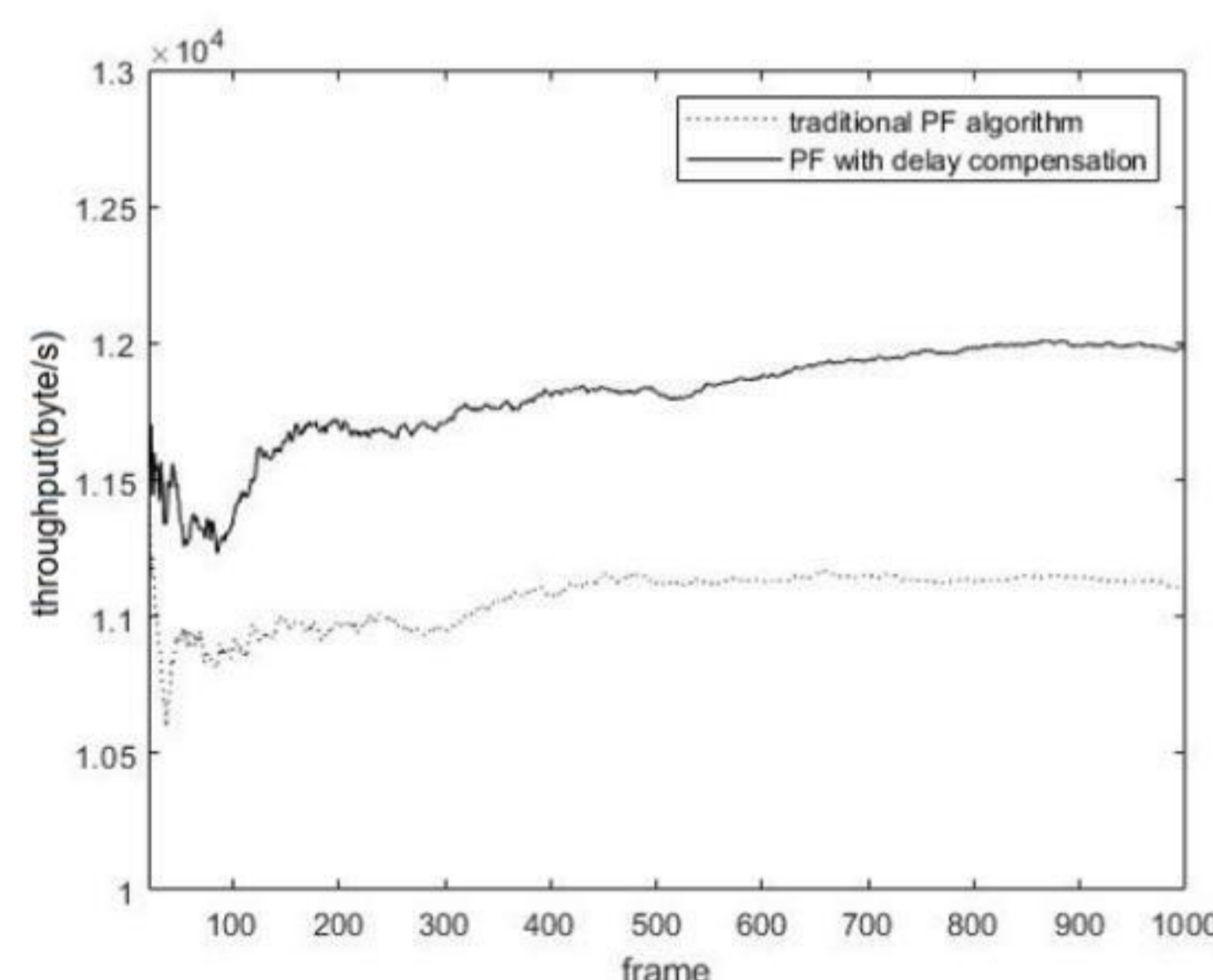
▲ Basic model of VLC/ WiFi hybrid network



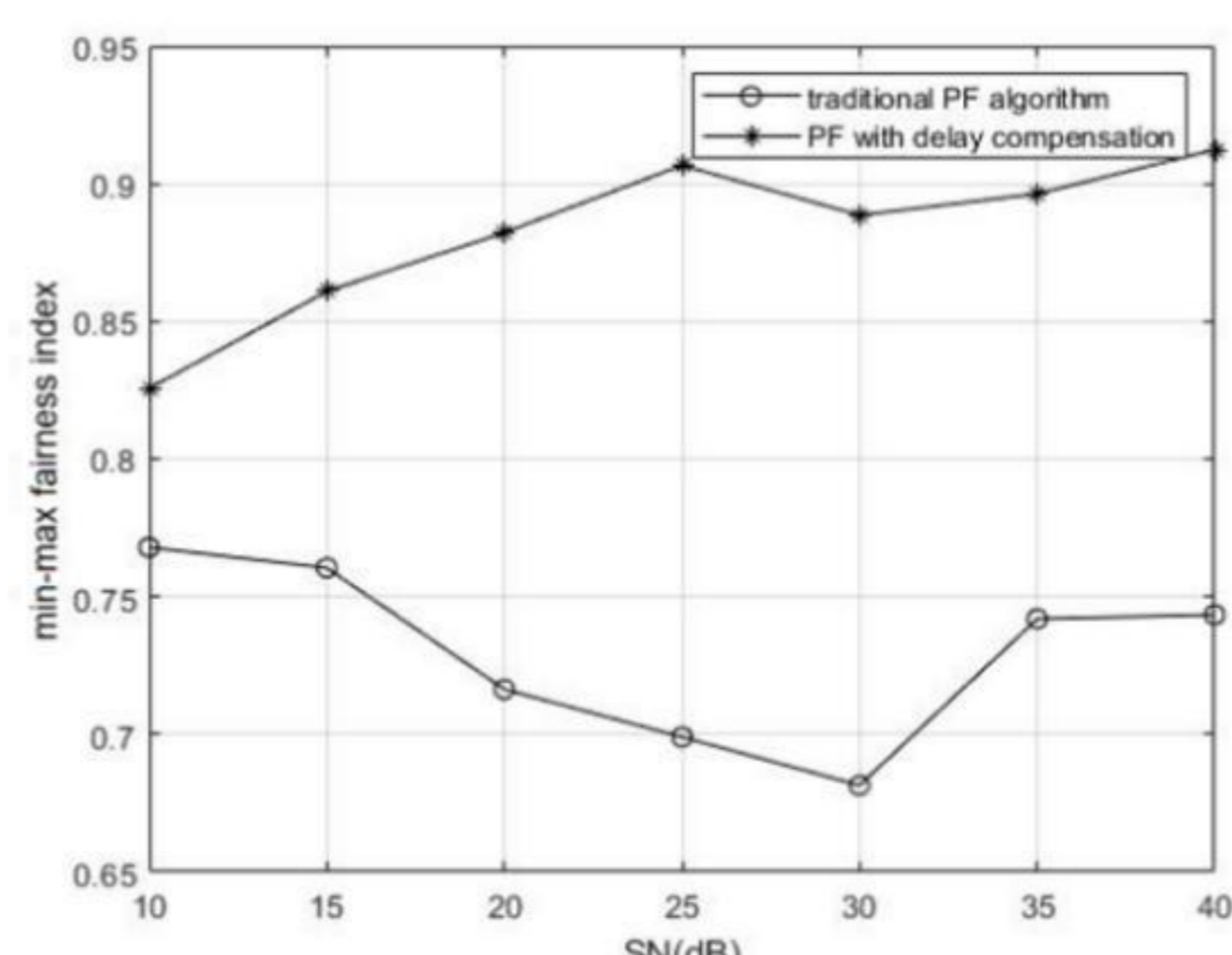
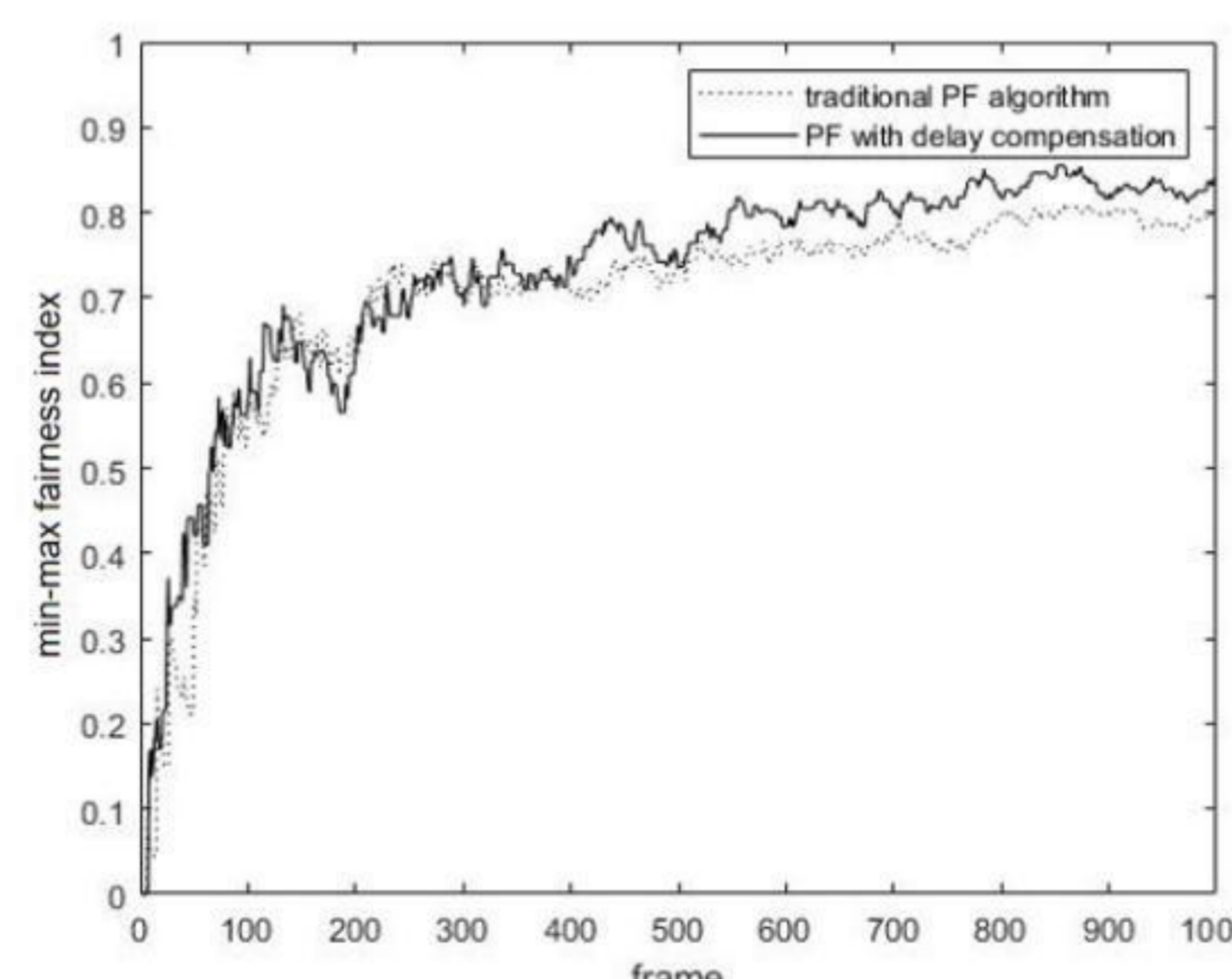
▲ Program flow of PF algorithm.

- ◆ VLC / WiFi heterogeneous network can be used in indoor environment. VLC and WiFi coexist in one room; VLC covers a smaller area and has a higher data rate, while WiFi covers a larger area and has a lower data rate.
- ◆ The most common scenario of VLC and WiFi heterogeneous network is in a resource block, which contains area B that can provide VLC resources and WiFi resources, and there is also area A that can only provide WiFi resources.
- ◆ As shown in the program diagram, we mainly improve the priority calculation method. After the first frame, users are sorted in reverse order according to delay, and the priority of each user is adjusted to increase the priority of users with the increase of delay.

3. Results and Discussion



▲ Simulation Results



- ◆ It can be seen that the throughput of the improved algorithm has been effectively improved. And the fairness of improved algorithm is higher than traditional algorithm
- ◆ After several simulation experiments, with the improvement of SNR, the throughput of the two algorithms are both steadily improved. And the throughput of the improved algorithm is higher than that of the traditional PF algorithm under the same SNR.
- ◆ And as SNR increases, the min-max fairness index of the improved algorithm is more than 0.8, which is higher than the traditional. In the case of different SNR, the improved algorithm can improve throughput and ensure fairness.

4. Conclusion

This paper proposes an improved PF algorithm, which compensates delay. It can be seen from the simulation results that the improved algorithm can effectively improve the throughput on the basis of ensuring fairness. Therefore, the improved algorithm can improve the user experience and system quality of service.