

Point-to-point response to reviewer 1 comments

The comments of the reviewer are written in Red colour.

Our responses are written in Blue colour.

Review Report (Reviewer 1)

Comments and Suggestions for Authors

The paper proposes a three-phase handover management and access point transition to control and reduce handover rates in hybrid VLC/WiFi Networks. The topic is interesting and actual.

I have few comments:

1. When the authors consider the related works, they mainly focus on indoor solutions avoiding to consider how hybrid solutions can help also outdoor, see, e.g., Vehicular visible light networks for urban mobile crowd sensing, 2018, Li-Wi: An upper layer hybrid VLC-WiFi network handover solution, 2021, Investigating the performance of a vehicular communication system based on visible light communication (VLC), 2022.

Answer: Dear reviewer, thank you for your comment. We believe our related works section is sufficient and accurate regarding our method, problem, objectives and contribution. We cannot include the suggested articles for the following reasons:

- 1- Our work focuses on the indoor scenario only inspired by the previous works. All related works mainly focus on the indoor settings. Previous studies related to Handover, APA, and Load balancing consisted on user assignment, user selection, and/or access point selection as indoor solutions.
 - 2- In case of including the outdoor solutions, the related work will be significantly different in terms of methods, parameters, and/or factors included.
 - 3- Interesting works suggested by the reviewer that are related to visible light communication. However, the 1st and 3rd articles are related to vehicular sensing/communication, and that is another research direction. Our work is not related to Vehicular communications at all.
 - 4- Moreover, the 2nd article suggested by the reviewer is interesting, but consists of handover in vehicular communication as well. Their related works were related to indoor as well.
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2. The authors define a data rate threshold (DRT) which is represented as data rate achieved from the optical gain to identify whether users should be served by a LiFi AP or a WiFi AP. Have the authors considered that it is necessary to estimate the channel load independently on the number of users and, on that base, evaluate a handover? On the other side, the authors consider different aspects and parameters and this is the strong aspect.

Answer: Interesting POV for making a decision for the Handover process. However, we can not change our work based on this idea.

The following points explain our opinion:

1. The DRT is one of the conditions in our Three-phase process.
2. Load balancing among users is considered in our work but it is not the factor considered in our technique for the Handover decision.
3. Moreover, balancing the load for all connected users is something and considering the unbalanced load for making a Handover decision is something else.
4. Some previous works have taken the problem of resource allocation, some other works considered the user data rate requirements.
5. Considering the load on each access point AP, or the load on a single AP by its users for making a Handover decision is another idea to be developed, maybe in the future.
6. For the estimation of Handover rates, our work focused on calculating and analyzing the Handover rates in each state in the whole system for all connected users.
7. Our work does not consider the Quality of the Handover (the Handover efficiency) nor the latency of the Handover. It considered the Handover rates in a sophisticated way and in an accurate manner.
8. The necessity of evaluating and estimation of the Load on each AP for the sake of developing a Handover management/decision would be another technique.
9. Since our technique relies on three types of thresholds (data rate, user mobility speed, and receiver FOV) for making a decision, adding another perspective/idea for making a Handover process would change the nature of our technique.
10. The suggested idea by the reviewer means the system will make a Handover decision after the congestion on the AP (overload), while OUR technique aims to avoid this situation at the first place where the objective is to reduce the load on each AP, reduce the number of LiFi users on each AP, save resources, and insure higher data rates for connected users.

3. Can the authors at least discuss which would be the impact of (sun) light interference in outdoor environment?

Answer: Thank you for this comment. The interference and the outdoor should not be included, explained as follows:

1. Our work is exclusively built and developed for the indoor environment.
2. Talking about the importance or the impact of sunlight, ambient light, or other light resources will push the attention of the main idea of our work.
3. Our work does not take the problem of interference into consideration, nor solving any type of interference.
4. The objectives of some existing works focus on interference mitigation, interference issue, and/or interference caused by shadowing.
5. Our work does not consider the shadowing problem at all. The only interference included in our technique is the signal-to-interference-plus-noise ratio (eq. 4 and 5).

However, in general, the paper is well presented and interesting.

Thank you for supporting our work and for the constructive comments.