Reviewer 2

Remark#1: The paper represents a thorough study on the role of emerging technologies on QoS/QoE in m-Health multimedia applications.

Response: Thank you for your comment.

Remark#2: The paper is an extensive literature review aimed at summarizing some important problems in m-Health QoS/QoE.

Response: Thank you for your comment.

Comment#1: The abstract is well-written and summarizes the problems but the authors should clearly state in the abstract that the paper is a review of the literature.

Response: Thank you for your comment. As per your suggestion, the abstract is revised and the aim is mentioned in the abstract as providing the first thorough review/survey linking topics of 6G, QoE and m-health. The manuscript was revised as follows:

This article aims to provide the first thorough review/survey of the literature on a promising research subject that exists at the intersection of two well-established domains, i.e., QoE and m-health, and is driven by the continuing efforts to define 6G. This review/survey, in particular, creates a link between these two seemingly distinct domains by identifying and discussing the role of 6G in m-health applications from a QoE viewpoint.

Comment#2: In the Introduction, the most important notions such as m-health, Quality of Service (QoS), Quality of Experience (QoE), etc. The Introduction is excellent and many important sources are cited. I recommend to the authors to explain in more details the notions of QoS/QoE and to include references to the documents International Telecommunication Union for example the QoS regulations (ITU-T Supp. 9 of E.800 Series), the vocabulary for performance, quality of service and quality of experience, etc.

Response: Thank you for your comment. We agree the given source is essential to be included in the definitions of QoS and QoE. This explanation is given in the revised manuscript and cited.

2.3 QoE of Multimedia Communications in M-health

To ensure that the quality of video transmission is maintained, a quality assessment needs to be carried out at the destination. Quality assessment is a process that employs methods to measure the quality of the video received at the destination compared to that of the video at the original source. **There are two approaches to quality assessment; one is measuring the Quality of Service (QoS), and the other is Quality of Experience (QoE) [16]. In networking and communication applications, the QoS is a method of assessing the service quality that the**

network provides [17]. It is a network-centric measure that measures the quality of the data transmission provided by the communication network. The QoS measurement includes metrics that measure the key performance indicators (KPIs) of a communication system. These KPIs include metrics such as the percentage of data transmitted, the amount of data lost during transmission, channel throughput, speed of data transfer, system fairness, etc. On the other hand, QoE is a user-centric evaluation approach that reflects the degree of delight or annoyance of the user with the service used [18]. In the case of video transmission, the QoE of a user is the perception of the video quality by the end-user [19,20]. The QoE puts the focus of quality assessment on the user's perspective and typically considers many factors surrounding the context of the application [21]. There are two broad categories of QoE evaluation: subjective and objective evaluations. Subjective evaluation methods are based on the Human Visual System (HVS), which largely depends on observation by human subjects. The subjective evaluation method uses an evaluation score known as the Mean Opinion Score (MOS), a mean score of the users' opinions about their perception of the video's quality. On the other hand, objective evaluation methods use mathematical models that act as quality metrics to measure the audio or video received quality, such as Peak Signal to Noise Ratio (PSNR), Mean Square Error (MSE), etc. A list of subjective and objective QoE assessment metrics are listed in Table 1 and Table 2, where more details and explanations about all these metrics can be found in [22]. Given that QoS primarily focuses on the technical elements, whereas QoE is centered around customer service and satisfaction, it is plausible to include QoS as an inherent component within the definition of QoE.

17. ITU. Guidelines on regulatory aspects of quality of service, 2021. Accessed June 5, 2023.

Comment#3: Also, in recent years there are studies on QoS and QoE in overall telecommunication systems, addressing important problems related to determining the QoS. For example, an overall normalization approach for determining the QoS in overall telecommunication systems is described in:

S. A. Poryazov, et al., "Overall Model Normalization towards Adequate Prediction and Presentation of QoE in Overall Telecommunication Systems," 2019 14th International Conference on Advanced Technologies, Systems and Services in Telecommunications (TELSIKS), Nis, Serbia, 2019, pp. 360-363, doi: 10.1109/TELSIKS46999.2019.9002295.

Response: Thank you for your comment. We agree with the reviewer, this citation can prove to be valuable for the readers. In the revise manuscript it can be found as follows:

4.4. The correlation between QoS and QoE in m-health applications

QoE cannot be separated from QoS metrics as the network's state influences the user experience [9]. However, the tendency to view the network as the primary element in determining QoE should be addressed. Research has been conducted on finding QoS parameters affecting QoE in telecommunication systems **[**61,**62]**, for example, authors in [63] show how QoE has a logarithmic relationship with the throughput in transmission. Studies like [64] improve the modelling of QoE–QoS interactions, but QoE consideration is still limited to what can be measured and managed through the network.

62. Poryazov, S.A.; Saranova, E.T.; Andonov, V.S. Overall Model Normalization towards Adequate Prediction and Presentation of QoE in Overall Telecommunication Systems. In Proceedings of the 2019 14th International Conference on Advanced Technologies, Systems and Services in Telecommunications (TELSIKS). IEEE, 2019, pp. 360–36

Comment#4: The relations between QoS and QoE are also studied in the above paper.

In the paper:

Mutichiro, B.; Tran, M.-N.; Kim, Y.-H. QoS-Based Service-Time Scheduling in the IoT-Edge Cloud. *Sensors* 2021, *21*, 5797. https://doi.org/10.3390/s21175797.

a mechanism that improves the cluster resource utilization and Quality of Service (QoS) in an edge cloud cluster in terms of service time is proposed. Containerization provides a way to improve the performance of the IoT-Edge cloud by factoring in task dependencies and heterogeneous application resource demands.

Response: Thank you for your comment. We believe that the given reference can add value to the paper. We have appropriately cited it in the revised manuscript.

4.1 5G limitation for m-health

The network resources must be coordinated end-to-end and cross-layer to meet the needs and expectations of individual users [42]. A 6G mobile network is anticipated to provide QoS, QoE, and quality of physical experience (QoPE), as well as reliability and security [34, 43]. Due to rate-reliability-latency and sensitive m-health applications like telepresence, telesurgery, etc., QoE is a critical performance metric for 6G.

42. Mutichiro, B.; Tran, M.N.; Kim, Y.H. QoS-based service-time scheduling in the IoT-edge cloud. Sensors 2021, 21, 5797.

Comment#5: Also, in recent years an extension of the Petri Nets - Generalized Nets – has been successfully used in telecare/telehealth to reduce the costs and improve the quality of the service provided. This approach is described in the paper:

Stefanova-Pavlova, M., et al. (2016). Generalized Nets in Medicine: An Example of Telemedicine for People with Diabetes. In: Angelov, P., Sotirov, S. (eds) Imprecision and Uncertainty in Information Representation and Processing. Studies in Fuzziness and Soft Computing, vol 332. Springer, Cham.

The GNs approach is a promising new direction with many applications and advantages.

Response: Thank you for your comment. The given reference has been appropriately cited in the revised manuscript. We believe this citation gives a good support to the introduction section as it shows how the latest technologies are impacting the healthcare industry and facilitating the population. It can be found in the revised manuscript as follows:

1. Introduction

The healthcare industry has constantly adopted the latest technologies with the goal of improving the overall healthcare of the global population. **The use of technology has significantly changed the way in which healthcare is provided [1]**, and it has had far-reaching impacts on delivering healthcare facilities to the general population, including those living in remote locations and in underdeveloped countries [2].

1. Stefanova-Pavlova, M.; Andonov, V.; Tasseva, V.; Gateva, A.; Stefanova, E. Generalized nets in medicine: an example of telemedicine for people with diabetes. Imprecision and Uncertainty in Information Representation and Processing: New Tools Based on Intuitionistic Fuzzy Sets and Generalized Nets 2016, pp. 327–357.

Comment#6: The Conclusion is rather short and must be extended. Despite the numerous studies conducted in this field, medical data transmission using a standard format that is universally compatible with other wireless devices remains lacking. Future telemedicine designs need to address issues such as scheduling, data security and privacy, and medical video streaming employing modern compression techniques. Another issue is that the design of wearable medical devices needs to take cognizance of energy efficiency, the absorption rate of radiation from wireless sensors, and the need for skin protection.

Response: Thank you for your comment. As per the suggestion, the conclusion has been extended.

Remark#3: The paper is of high quality. I recommend that the paper to be published once the authors address adequately my critical remarks.

Response: Thank you for your comment.