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Availability and reliability analysis in 5G communication scenarios in IoT applications

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Due to the increasing usage of wireless communication devices, the demand for fifth-generation (5G) cellular network access is growing rapidly. Facilities that might be seen with 5G technology include, far better levels of connectivity and coverage. 5G cellular networks provide dynamic coverage with respect to time and enduring overlapped cell areas. Due to this reason, 5G network users can be covered by numerous cells and Radio Access Technology (RATs). This could be done, especially by taking full advantage of network capability to facilitate extreme performance that includes supporting hugely inter-tethered devices attributed to IoT applications in 5G. The main challenge in IoT applications is that scalable and efficient connectivity for a massive number of devices sending very short packets, is not done adequately. In such scenarios, IoT devices are expected to select the most appropriate cell based on the channel availability information of each cell. Therefore, efficient cell selection is needed in 5G. Additionally, in a heterogeneous network with overlapping cells, cell selection could be a critical decision for 5G users. The proposed research is aimed at implementing two schemes for cell selection based on the availability and reliability performance in 5G. The study proposes an algorithm by considering two schemes. The first scheme is contingent on the distance. That is the distance to the base-stations must be considered. If the base stations are close to devices, signal strength is high. The second scheme is based upon the channel availability and the distance while priority goes to the channel availability of each cell. These two schemes were simulated by using a simulation program, which was developed in MATLAB. For cell selection, scheme 2 is much fairer than scheme 1 because by using scheme 2, channels availability is balanced through cells. Despite this, the nearest device is allocated to the nearest place by scheme 1 and as a result of that, signal strength is higher in those devices. By considering all the results obtained, it can be concluded that the proposed schemes are efficient cell selection schemes, which can be used to improve the overall system performance.

Keywords: 5G, Cell selection, Channels availability, Signal strength