

Conceptualization of a Wireless Mesh Network Model for E-Learning in Remote Areas

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Technologies brought in tools and techniques into education, resulting in the development of new concepts such as E-Learning. E-Learning is a broad term that refers to distance education or distance learning via technology. Following the coronavirus disease outbreak (COVID-19), school closures and a sudden shift to online learning have increased the risk of poor children falling further behind in their studies. Not all children have the necessary facilities or access to the internet during extended curfews, lockdowns, or when schools are closed indefinitely. The broadband internet facilities are also limited in remote areas, and teachers and students find it difficult to conduct and access real-time educational sessions. Therefore, sending recorded lessons will be the only solution for them. However, this should be done under minimum internet facilities. Sri Lanka is a country which is a high mobile penetration as 141.7% in 2021. Thus, this paper proposes a mesh network-based model for distance learning, especially where there is a lack of internet access. Mesh networking is a way to send and receive data between all nodes. It makes continuous connections through paths by moving from one node to another until the destination is reached. These mesh network nodes are all connected in a fully connected network. Wireless Mesh Network solution is a new, enhanced WLAN architecture that redefines the boundaries of WLAN technology, enabling wireless connectivity for end-users. In this model, we assume the maximum distance between one node to another node is 150 feet because the full Wi-Fi range is 150 feet. A unique mobile app developed for this purpose will connect the users. That mobile app has user activities as well as background activities. The students can request lessons through the app. For that, students need to select grades and lessons first. Then the app will automatically request a lesson chosen from the nearest node. After receiving data, it will save in the app storage folder. Mesh network needs connectivity with other nodes even users don't use the app. Therefore, app always runs background activities to make connectivity. Also, if another user request data from the network, the app automatically checks app storage to find that data itself. If information is available on storage, it will send to the requested node. Only teachers can publish lessons on the network. The teacher can upload lessons to relevant categories on their app storage folder. The administrator is the only person who can add new users or content categories to the app. This model will help the students and teachers to easily share the lessons in the areas where internet connection is limited and ensure the access to the educational materials continuously.

Keywords: *E-learning, Mesh Network, Mobile App, Remote Areas, Wireless*