**深 圳 大 学 实 验 报 告**

**课程名称：­ 计算机网络（Computer Networks）**

**实验名称： Network Layer Assignment**

**学院： 电子与信息工程学院**

**专业： 电子信息工程**

**指导教师： 毕宿志**

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**实验时间： 2023 12 4**

**实验报告提交时间： 2023 12 6**

**教务部制**

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| 1. **Purpose of experiment**   **①Better understand and master the shortest distance and shortest path programming implementation method of dijkstra algorithm and distance vector algorithm in routing table;**  **②Master the basic principles of the two algorithms;**  **③Implement route selection in actual network scenarios**   1. **Experimental principle**   **This experiment is divided into two algorithms:**  **（1）Dijkstra algorithm:**   * **Initialization.** * **Iterative selection of nearest node.** * **Update Minimum distance.** * **Repeat iteration.** * **Output.**     Figure 1 Flowchart of Dijkstra's algorithm  **（2）Distance vector algorithm:**  **Each node periodically (or when its routing table changes) sends its own distance to neighboring nodes**  **Distance from a vector (i.e. its distance from all other nodes)**  **When a node receives a distance vector from a neighboring node, it updates its own using Bellman-Ford**  **Distance vector and next-hop router**   * **If the next-hop router to a node changes, the next-hop router with the least cost is selected. If the minimum cost is the same, the old one remains unchanged；** * **If the next-hop router to a node does not change, the routing table is updated regardless of the current cost；**  1. **Content：**   **图片1**  **Figure 1 Initial topology**    **Figure 2 Example Initialize the routing table**   1. **Dijkstra algorithm:**   **First initialize the input and output arrays: define the relevant variables:**    **Outermost loop:**    **The first inner loop: select the node closest to the starting point of the unvisited node as the next access node;**    **the second inner loop: Update the distance of other nodes:**    **Output my result: (Take node 0 as an Example):**    **Figure 3 The result of Dijkstra algorithm**  **(2)Distance vector:**  **Create an initial routing table:**    **Definition function: distance\_vector(node,graph)**    **Function body:**    **Output my result: (Take node 3 as an example):**    **Figure 4 The result of the distance vector algorithm** |
| 1. **Conclusion and discussion**   **Conclusion：**  **In this experiment, Dijkstra algorithm and distance vector algorithm are used to calculate the routing table corresponding to the network topology. And the path corresponding to the shortest distance of each node;**  **Discussion:**  **Both algorithms have their own advantages and disadvantages:**  **Dijkstra's algorithm:**  **The node advertises an incorrect local link cost**  **Each node computes only its own routing table**  **The impact of error messages is small, local, and the route is robust**  **Distance vector algorithm:**  **A node may advertise an incorrect path cost to all nodes in the network**  **The routing table of each node may be used by other nodes** |
| 指导教师批阅意见：  成绩评定：  指导教师签字：  年 月 日  备注： |

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2、教师批改学生实验报告时间应在学生提交实验报告时间后10日内。