DETECTING FAILURE NODES IN MOBILE WIRELESS NETWORKS: A PROBABILISTIC APPROACH

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ABSTRACT

Detecting node failures in mobile wireless networks is very challenging because the network topology can be highly dynamic, the network may not be always connected, and the resources are limited. In this paper, we take a probabilistic approach and propose two node failure detection schemes that systematically combine localized monitoring, location estimation and node collaboration. Extensive simulation results in both connected and disconnected networks demonstrate that our schemes achieve high failure detection rates (close to an upper bound) and low false positive rates, and incur low communication overhead. Compared to approaches that use centralized monitoring, our approach has up to 80% lower communication overhead, and only slightly lower detection rates and slightly higher false positive rates. In addition, our approach has the advantage that it is applicable to both connected and disconnected networks while centralized monitoring is only applicable to connected networks. Compared to other approaches that use localized monitoring, our approach has similar failure detection rates, up to 57% lower communication overhead and much lower false positive rates

I. INTRODUCTION

1. Wireless Networks, which might be used to sense the physical world, will play an essential function in the next new release networks. Because of the range and complexity of applications strolling over Wireless Networks, the QoS warranty in such networks gains growing concentration within the research group.

2. As part of an information infrastructure, Wireless Networks should be able to support quite a lot of purposes over the identical platform. One of kind functions might have distinctive Quo specifications. For illustration, in a fire monitoring application, the occasion of a fire alarm will have to be mentioned to the destination as soon as possible. However, some purposes require most of their packets to successfully arrive on the destination irrespective of after they arrive. For instance, in habitat monitoring functions, the arrival of packets is allowed to have extended, but the destination will have to receive many of the packets. Wireless Networks have two

general QoS necessities: low delay and excessive knowledge integrity, leading to what are referred to as delay sensitive functions and excessive-integrity purposes, respectively. Usually, in a community with mild load, both requirements can be effectively convinced. Nevertheless, a heavily loaded network will get congestion, which raises the end-to-end delay. This work aims to concurrently enhance the fidelity for top-integrity functions and shrink the top-to-finish extend for extend-touchy ones, even when the network is congested. We borrow the thought of abilities field from the discipline of physics and design a novel potential based routing algorithm, which is called integrity and delay differentiated routing (IDDR).

3. Improve fidelity for high-integrity applications.

4. The elemental thought is to search out as much buffer house as feasible from the idle and/or under-loaded paths to cache the excessive packets that perhaps dropped on the shortest direction. For this reason, the first assignment is to search out these idle and/or under loaded paths, then the second challenge is to cache the packets efficiently for subsequent transmission. IDDR constructs a knowledge area in keeping with the depth and queue size expertise to seek out the below-utilized paths. The packets with high integrity requirement shall be forwarded to the subsequent hop with smaller queue size. A mechanism called Implicit Hop-by-Hop rate control is designed to make packet caching extra efficient.

5. Each utility is assigned a weight, which represents the measure of sensitivity to the delay. By means of constructing neighborhood dynamic abilities fields with distinctive slopes in line with the weight values carried through packets, IDDR makes it possible for the packets with greater weight to choose shorter paths. Additionally, IDDR also employs the precedence queue to extra diminish the queuing delay of lengthen touchy packets.

6. IDDR inherently avoids the conflict between high integrity and low delay: the high-integrity packets are cached on the under loaded paths alongside which packets will undergo massive end-to-end extend given that of extra hops, and the delay-sensitive packets travel along shorter paths to process the destination as soon as possible. Utilizing the Lyapunov go with the flow theory, we show that IDDR is steady. Additionally, the outcome of a sequence of simulations carried out on the TOSSIM platform displays the effectively and feasibility of the IDDR scheme.

Representation Of Activity Diagram

Action State is represented as a shape with straight top and bottom and with convex areas on the two sides.
Diamond shape symbol represents branching.

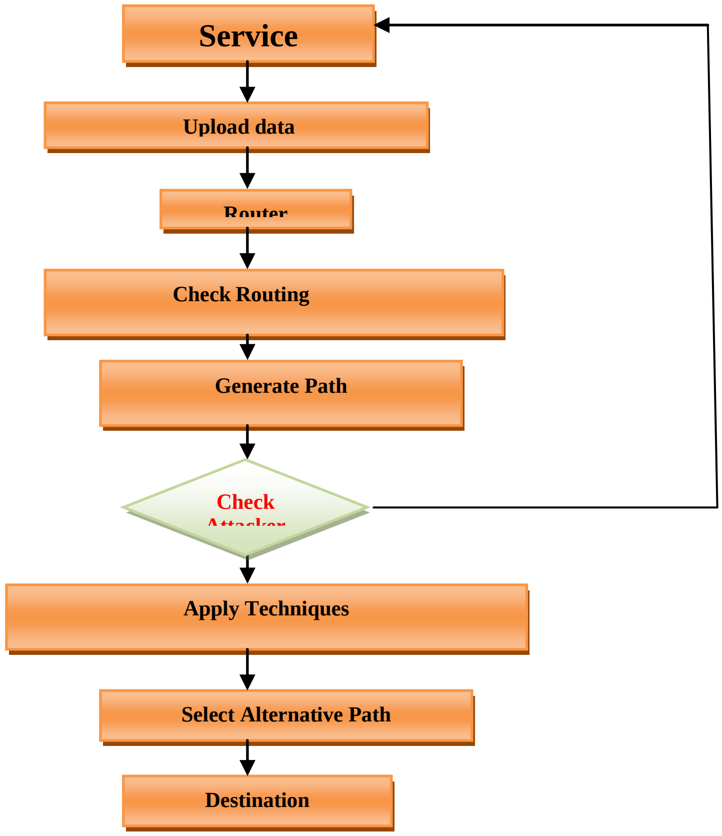


Figure illustrates a small part of a Wireless Networks. Feel node 1 is a hotspot and there are both high integrity packets (hollow rectangles) and delay-sensitive packets (solid rectangles) from supply nodes A, B and C. A commonly used routing algorithm will select the top-rated route for all of the packets. For illustration, the ordinary shortest path tree (SPT) routing will ahead all of them to node 1 as prove in Figure. This will cause congestion and thus leads to many high integrity packets loss and large end-to-end delay for delay sensitive packets. A multipath routing algorithm as proven in Figure can utilize extra paths to avoid hotspots. However, the low lengthen and excessive throughputs are hardly ever met concurrently. The factors are:

- Delay-sensitive packets occupy the limited bandwidth and buffers, worsening drops of high-integrity ones.
- High-integrity packets block the shortest paths, compelling the delay-sensitive packets to travel more hops before reaching the destination, which increases the delay.
- High-integrity packets occupy the buffers, which additionally increases the queuing delay of delay-sensitive packets.

To beat the above drawbacks, we intend to design a mechanism which allows for the delay-sensitive packets to move along the shortest path and the packets with fidelity requirements to detour avoiding possible dropping on the hotspots. In this approach, the data integrity and delay differentiated services will also be furnished in the identical network. Encouraged by using this understanding, we suggest the IDDR scheme, a capabilities-founded multi-route dynamic routing algorithm.

II. NEED AND IMPORTANCE OF RESEARCH PROBLEM

Limitations of existing system

❖ The existing approach can lead to a large amount of network-wide traffic, in conflict with the constrained resources in mobile wireless networks.

❖ When being applied to mobile networks, the existing approach suffers from inherent ambiguities—when a node A stops hearing heartbeat messages from another node B, A cannot conclude that B has failed because the lack of heartbeat messages might be caused by node B having moved out of range instead of node failure.

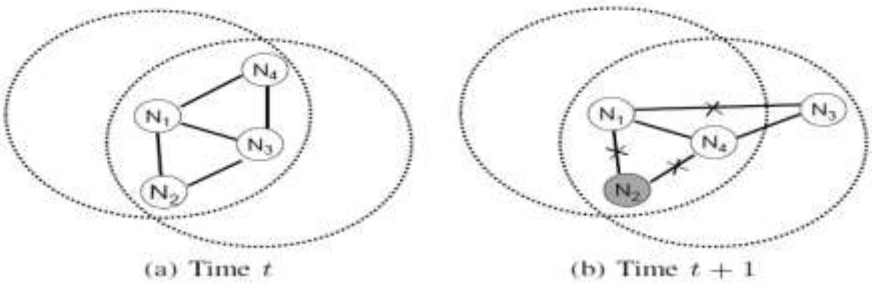
❖ A common drawback of probe-and-ACK, heartbeat and gossip based techniques is that they are only applicable to networks that are connected. In addition, they lead to a large amount of network-wide monitoring traffic.

Proposed System

❖ It is proposed a novel probabilistic approach that judiciously combines localized monitoring, location estimation and node collaboration to detect node failures in mobile wireless networks. Specifically, we propose two schemes.

❖ In the first scheme, when a node A cannot hear from a neighboring node B, it uses its own information about B and binary feedback from its neighbors to decide whether B has failed or not.

❖ In the second scheme, A gathers information from its neighbors, and uses the information jointly to make the decision. The first scheme incurs lower communication overhead than the second scheme. On the other hand, the second scheme fully utilizes information from the neighbors and can achieve better performance in failure detection and false positive rates.



System Architecture

III. OBJECTIVES

The main objective of study is to improve the fidelity for high integrity applications and the end-to-end delay need to be decreased for delay sensitive applications. These two requirements should be fulfilled when the network is congested. From the idle path and the under loaded path buffer space are found so that excessive packets are cached easily to find the data integrity and delay differentiated services in wireless networks. Delay-sensitive packets occupy the limited bandwidth and buffers, worsening drops of high-integrity ones. High-integrity packets block the shortest paths, compelling the delay-sensitive packets to travel more hops before reaching the destination, which increases the delay. High-integrity packets occupy the buffers, which also increases the queuing delay of delay-sensitive packets. Applications running on the same Wireless Networks platform usually have different Quality of Service (QoS) requirements. Two basic requirements are low delay and high data integrity. However, in most situations, these two requirements cannot be satisfied simultaneously. On the concept of potential in physics, we propose IDDR, a multi-path dynamic routing algorithm, to resolve this conflict. Constructing a virtual hybrid potential field, The algorithm separates packets of applications with different QoS requirements according to the weight assigned to each packet, and routes them towards the destination through different paths to improve the data fidelity for integrity-sensitive applications as well as reduce the end-to-end delay for delay-sensitive ones.

IV. METHODOLOGY

Implementation of algorithms: A commonly used routing algorithm will select the top-rated route for all of the packets. For illustration, the ordinary shortest path tree (SPT) routing will ahead all of them to node 1 as prove in Fig. This will cause congestion and thus leads to many high integrity packets loss and large end-to-end delay for delay sensitive packets. A multipath routing algorithm as proven in Fig. can utilize extra paths to avoid hotspots. However, the low lengthen and excessive throughputs are hardly ever met concurrently. The factors are:

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Testing

In software engineering, performance testing is processed to check the workload, usage of system, memory, processing, network and other system functionalities. It can also serve to investigate measure the program structure and its process activities inside the system.

Test Cases

S.No	Test cases	Pass/fail
1	If there is no fake data in browsing file then it successfully reaches to destination	pass
2	We select one node and modify the data node then node detects errors	fail
3	Select another path to reach destination	pass

V. CONCLUSION

A dynamic multipath routing algorithm IDDR is proposed based on the concept of potential in physics to satisfy the two different QoS requirements, high data fidelity and low end-to-end delay, over the same Wireless Networks simultaneously. The IDDR algorithm is proved stable using the Lyapunov drift theory. Moreover, the experiment results on a small test bed and the simulation results on TOSSIM demonstrate that IDDR can significantly improve the throughput of the high-integrity applications and decrease the end-to-end delay of delay sensitive applications through scattering different packets from different applications spatially and temporally. IDDR can also provide good scalability because only local information is required, which simplifies the implementation. In addition, IDDR has acceptable communication overhead.

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