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Detecting Node Failures in Mobile Wireless Networks: A Probabilistic Approach

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ABSTRACT - The detection of contract failures in mobile wireless networks is a major challenge because network topology can be very dynamic, the network may not always be connected, and resources are limited. In this paper, we take a probabilistic approach and propose two contract error detection systems that systematically combine local monitoring, site assessment and contract collaboration. The large-scale simulation results in both connected and non-connected networks show that our plans achieve high maximum detection rates (close to the upper limit), low false positive rates, and low communication costs. Compared to approaches that use centralized monitoring, our approach has up to 80% reduction in communication, 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 offline networks while centralized monitoring applies only to connected networks. Compared to other approaches that use local monitoring, our approach has similar detection rates, up to 57% reduction in connection level and much lower false positive rates (eg, 0.01 versus 0.27 in some settings).

Indexes - mobile wireless networks, contract failure, contract failure detection, network management, fault management.

Introduction

Mobile wireless networks have been used in many mission-critical applications, including search and rescue [17], environmental monitoring [11], [20] disaster relief [25] and military operations [18]. These mobile networks are typically configured in a dedicated way, either with a continuous or intermittent network connection. The nodes in such networks are prone to failure due to battery discharge or hardware defects or harsh environment. Detecting contract errors is important for maintaining tabs on the network. It is even more important when mobile devices are

transported by humans and used as the main / only communication mechanism (see discussion in section III). The discovery of contract failure in mobile wireless networks is a major challenge as network topology can be very dynamic due to node movements. Therefore, technologies designed for static networks are not applied. Second, the network may not always be connected. Therefore, methods that rely on network connectivity are limited to application. Third, limited resources (account, connectivity, battery life) require that the failure of the contract be performed in a resource-saving manner. One of the approaches adopted by many current studies relies on central monitoring. Each node needs to send periodic "heartbeat" messages to a central device, which uses a lack of heartbeat messages from a node (after a certain timeout) as an indication of node failure [5], [12], [19]. This method assumes that there is always a path from a node to the central monitor, and then applies only to networks with a fixed connection. In addition, since the node can be multiple hops away from the central screen, this method can lead to a large amount of network-level traffic, in contrast to limited resources in mobile wireless networks. Another method relies on local surveillance, where the nodes transmit messages to the heartbeat to neighbors and hoppers from hops in one neighborhood through heart messages. Local monitoring only generates local traffic and has been successfully used to detect contract failure in fixed networks [15]. However, when applied to mobile networks, this approach suffers from inherent ambiguity - when node A stops hearing heart messages from another node B, A does not conclude that B has failed because the heartbeat messages do not appear because of node B that moved out The scope instead of the node fails.

Existing System:

 Adopts one approach adopted by several studies based on central surveillance. Each node needs to send periodic "heartbeat" messages to a central monitor, which uses a lack of heartbeat messages from a node (after a certain timeout) as an indication of the node's failure.

 This approach assumes that there is always a path from node to central monitor, and then applies only to networks with fixed connection.

 Another technique is based on local surveillance, where the nodes transmit heartbeat messages to their neighbors and

nodes in one living device in a live monitor in each other through heartbeat messages. Localized traffic only results in local traffic and has been successfully used to detect contract failure in fixed networks

Disadvantages of existing system:

 The current approach can result in a large amount of traffic at the network level, in contrast to limited resources in mobile wireless networks.

 When applied to mobile networks, the current approach suffers from inherent ambiguity - when node A stops hearing heartbeat messages from another node B, A does not conclude that B has failed because the heartbeat messages are not present because node B has moved from a range instead From a node failure.

 A common defect in the methods of verification, ACK, heart, pulse and gossip is that it is applicable only to connected networks. In addition, it leads to a large amount of network-level monitoring traffic.

Proposed System:

 In this paper, we propose a new, potentially wise approach between local monitoring, site assessment and contract collaboration to detect contract failures in mobile wireless networks. Specifically, we suggest two diagrams.

 In the first chart, when node A can not hear the adjacent node B, it uses its own information about B and binary comments from its neighbors to determine if B has failed.

 In the second diagram, A collects information from its neighbors and uses the information jointly for decision-making. The first system causes low overhead for the second schema. On the other hand, the second chart fully utilizes information from neighbors and can perform better in detecting errors and false positive rates.

Advantages of the proposed system:

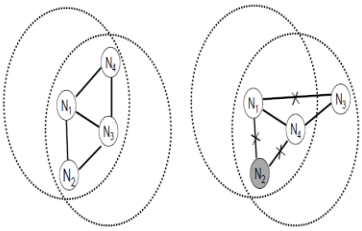
Demonstrate simulation results show that both systems achieve high detection rates, low false positive rates, and low communication costs.

 Our approach has the advantage that it is applicable to both connected and offline networks.

 Compared with other approaches that use local monitoring, our approach has a confusing detection rates for failure, a low level of contact and a much lower false positive rate.

 Our approach generates only local control traffic and applies to both connected and offline networks

SYSTEM ARCHITECTURE:



CONCLUSION AND FUTURE WORK In this paper, we presented a probability approach and designed two nodes error detection systems that combine local monitoring, site evaluation and collaboration in the mobile wireless node. The large-scale simulation results show that our plans achieve high detection rates, low false positive rates, and low communication charges. We also showed exchanges between bilateral and non-bilateral feedback programs. As a future work, we plan to evaluate our plans using the real-world navigation effects and in scenarios with irregular transmission bands. Our method is based on estimating the location and using the heartbeat messages of the contract to observe each other. Therefore, it does not work when location information is unavailable or there is a disconnect in the connection (for example, due to weather conditions). Development of effective approaches to these scenarios and future work is left.

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