INCESSANT NEIGHBOR DETECTION IN ASYNCHRONOUS SENSOR NETWORKS

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Abstract:A sensor network may contain a huge number of simple sensor nodes that are deployed at some inspected site. In large areas, such a network usually has a mesh structure. In this case, some of the sensor nodes act as routers, forwarding messages from one of their neighbors to another. The nodes are configured to turn their communication hardware on and off to minimize energy consumption. Therefore, in order for two neighboring sensors to communicate, both must be in active mode.

In the sensor network model considered in this paper, the nodes are placed randomly over the area of interest and their first step is to detect their immediate neighbors - the nodes with which they have a direct wireless communication - and to establish routes to the gateway. In networks with incessantly heavy traffic, the sensors need not invoke any special neighbor
detection protocol during normal operation. This is because any new node, or a node that has lost connectivity to its neighbors, can hear its neighbors simply by listening to the channel for a short time. However, for sensor networks with low and irregular traffic, a special neighbor detection scheme should be used.

Key words: Sensor,Inspect,SYNC,Immediate neighbor, Hello,Hidden.

1.INTRODUCTION

A sensor network may contain a huge number of simple sensor nodes that are deployed at some inspected site. In large areas, such a network usually has a mesh structure. In this case, some of the sensor nodes act as routers, forwarding messages from one of their neighbors to another. The nodes are configured to turn their communication hardware on and off to minimize energy consumption. Therefore, in order for two neighboring sensors to communicate, both must be in active mode.

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II. SYSTEM ANALYSIS

EXISTING SYSTEM

Initial neighbor detection is usually performed when the sensor has no clue about the structure of its immediate surroundings. In such a case, the sensor cannot communicate with the gateway and is therefore very limited in performing its tasks.

Disadvantages:

1. In networks with incessantly heavy traffic.
2. Long-term process.
3. Greater expense of energy than required in our scheme.

PROPOSED SYSTEM

We distinguish between neighbor detection during sensor network initialization and incessant neighbor detection. We focus on the latter and view it as a joint task of all the nodes in every connected segment. Each sensor employs a simple protocol in a coordinate effort to reduce power consumption without increasing the time required to detect hidden sensors.

Advantages:

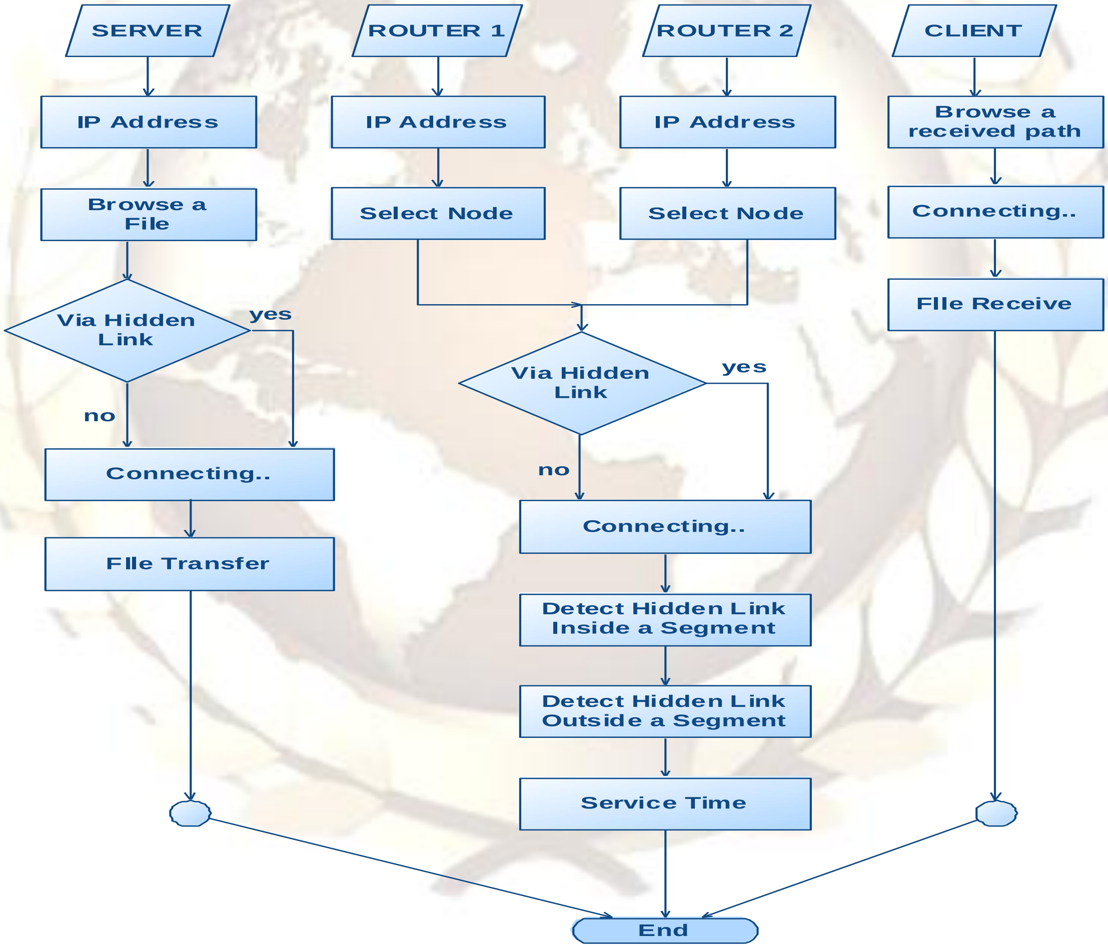
1. Detect their immediate neighbors.
2. Message does not collide with another.
3. Every node discovers its hidden neighbors independently.

III. SYSTEM DESIGN

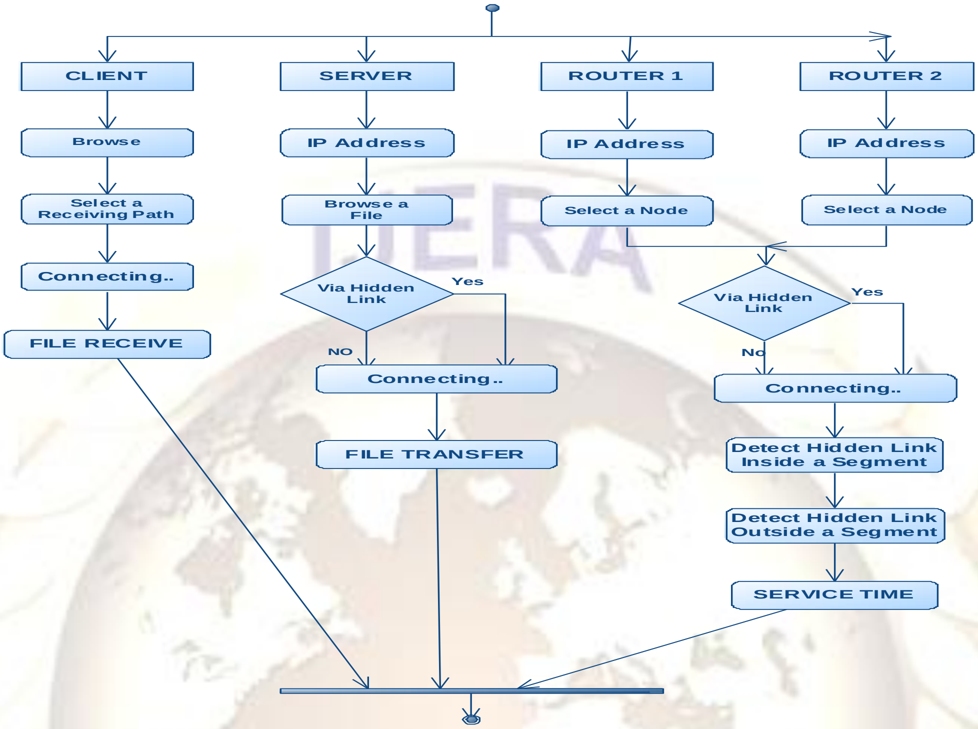
Data Flow Diagram / Use Case Diagram / Flow Diagram

The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of the input data to the system, various processing carried out on these data, and the output data is generated by the system.

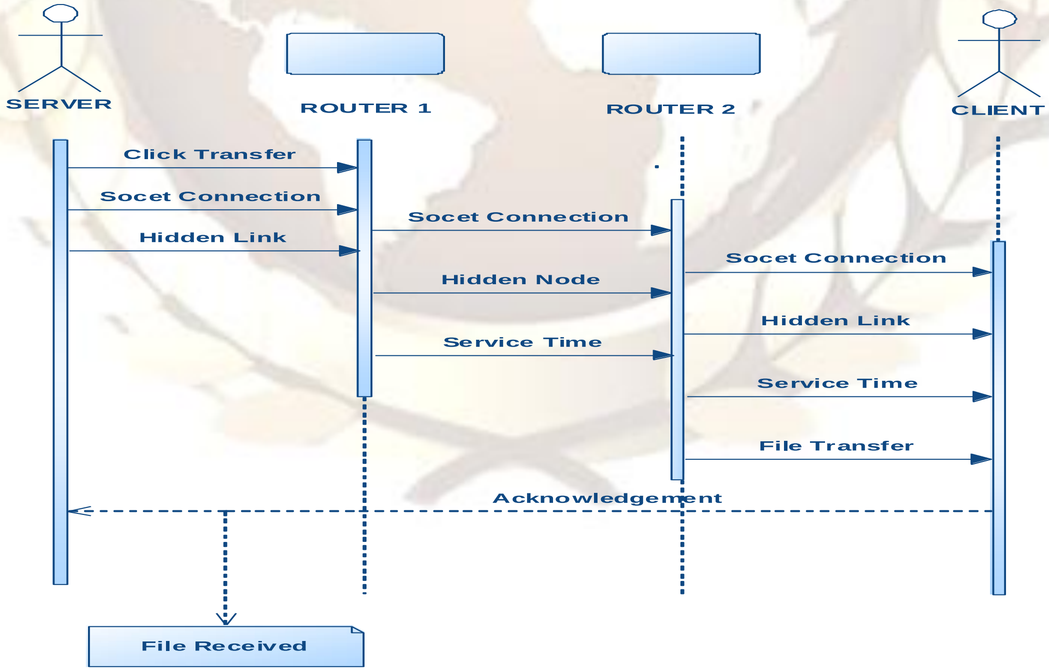
Dataflow Diagram:



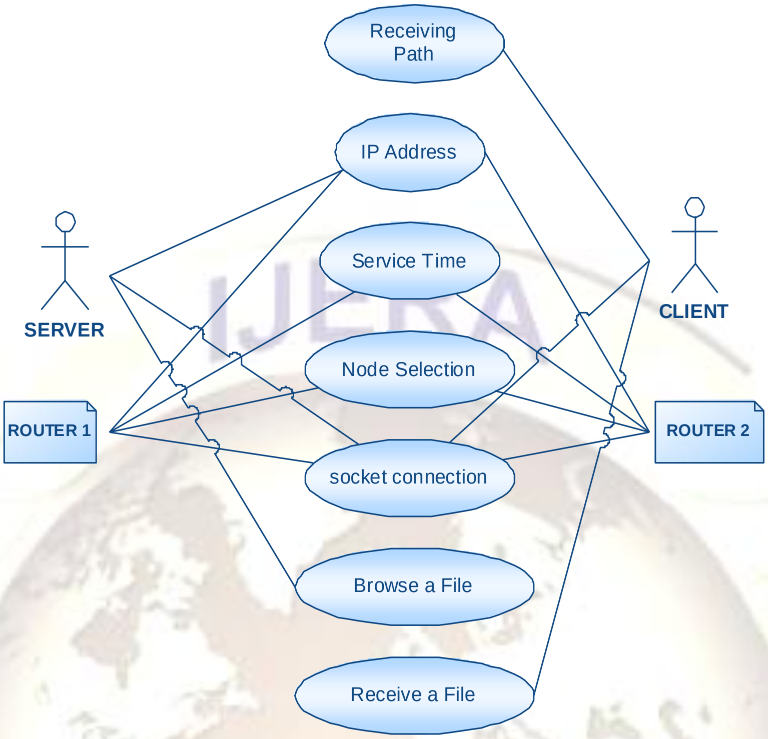
Activity diagram:



Sequence Diagram:



Use Case Diagram:



IV. IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective.

The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

A PROFICIENT INCESSANT NEIGHBOR DETECTION ALGORITHM:

In this section we present an algorithm for assigning HELLO message frequency to the nodes of the same segment. This algorithm is based on *detecting all hidden links inside a segment*. Namely, if a hidden node is discovered by one of its segment neighbors, it is discovered by all its other segment neighbors after a very short time. Hence, the detection of a new neighbor is viewed as a joint effort of the whole segment. One of the three methods presented in Section is used to estimate the number of nodes participating in this effort.

Suppose that node u is in initial neighbor detection state, where it wakes up every TI seconds for a period of time equal to H, and broadcasts HELLO messages. Suppose that the nodes of segment S should discover u within a time period T with probability P.

Modules:

1. Detecting all hidden links Inside a segment
2. Detecting all hidden links Outside a segment
3. Estimation of hidden nodes in both segments

1. Hidden link participate Inside a segment:

This scheme is invoked when a new node is discovered by one of the segment nodes. The discovering node issues a special SYNC message to all segment members, asking them to wake up and periodically broadcast a bunch of HELLO messages. This SYNC message is distributed over the already known wireless links of the segment. Thus, it is guaranteed to be received by every segment node. By having all the nodes wake up .almost at the same time. for a short period, we can ensure that every wireless link between the segment's members will be detected.

2. Hidden link participate Outside a segment:

A random wake-up approach is used to minimize the possibility of repeating collisions between the HELLO messages of nodes in the same segment. Theoretically, another scheme may be used, where segment nodes coordinate their wake-up periods to prevent collisions and speed up the discovery of hidden nodes. Since the time period during which every node wakes up is very short, and the HELLO transmission time is even shorter, the probability that two neighboring nodes will be active at the same time.

3. Estimation of hidden nodes in both segments:

Neighbor Discovery is studied for general ad-hoc wireless networks. A node decides randomly when to initiate the transmission of a HELLO message. If its message does not collide with another HELLO, the node is considered to be discovered. The goal is to determine the HELLO transmission frequency, and the duration of the neighbor discovery process.

V.CONCLUSION

We exposed a new problem in wireless sensor networks, referred to as ongoing continuous neighbor discovery. We argue that continuous neighbor discovery is crucial even if the sensor nodes are static. If the nodes in a connected segment work together on this task, hidden nodes are guaranteed to be detected within a certain probability P and a certain time period T, with reduced expended on the detection.

We showed that our scheme works well if every node connected to a segment estimates the in-segment degree of its possible hidden neighbors. We then presented a continuous neighbor discovery algorithm that determines the frequency with which every node enters the HELLO period. We simulated a sensor network to analyze our algorithms and showed that when the hidden nodes are uniformly distributed in the area.

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