A proposal in subtree densities and energy efficiency among the network

Introduction:

To protect the sink from isolation, air energy consumption has to be ensured among its deputy nodes (one-hop from the sink). Q-metric is proposed to convey the status of relative energy dissipation of deputy nodes to distant source nodes. Linking the status of the node’s energy exhaustion in the hotspot with the estimation of the interconnected density of source nodes is to determine the relative abnormality dissipation among these deputy nodes. Tree topology suffer severely from this phenomenon, thus more robust resolutions are needed .For more efficient resolution, we assume more realistic scenarios such as two vicinities of interest having the same size of subtree density mightdetect different volumes of events. In other words, the energy consumption of these two deputy nodes comparatively irrelevant to the sub trees densities.Thus, relative adjustment of energy dissipation among the deputy nodes is needed. In addition to that,this assumption might occur randomly across the entire network.

SAMPLE RESEARCH PROPOSAL:

A. Network Layer

1. The design of our new routing mechanism is laid on the routing protocol that is proposed by [1].
2. During routing phase, each node constructs table of some necessary information, consists of a list of parent nodes in its coverage distance and their corresponding normalized Q values.
3. Initial optimization during the first round is achieved since the best-received$\widehat{Q}$ considered to construct the tree topology
4. By the end of the first round, the energy consumption feature changes across the entire network. Thus, during the setup of the second round, our influential parameters ($\widehat{Q}$,ζ,) will be updated and the Q-based routing decision changes accordingly.
5. A comparison in term of the normalized Q values is made between anode in sub tree t_i, and its current parent list in its coverage area to assess them relatively.
6. Based on the comparison's outcome, the source node decides whether to forward its data through its current attached parent (initial route) or to switch it to another parent
7. To make a wise routing decision, the status of the stability is checked as follow,
   i. Q of the current node is same as the that of parent Qs ………Yes Stable
   ii. One of the Q's from its parent list is $better$ than Q of current node ……Not stable
8. If it is yes, that means the source node keep on sending its traffic through the initial route.

9. If it is no that means the source node alternate its attached parent with that one of the best Q and accordingly the traffic route is changed. The algorithm keeps on following the same rules whenever there is new round to send data traffic across the entire network.
10. It is not an issue which exactly deputy node that should deliver the traffic to the sink since all source nodes target the same sink.The necessity for switching as well as its rate is based on the stability of the energy consumption among these nodes in the hotspot zone.

B. MAC Layer (subtree formation)

1. Standard IEEE802.15.4 beacons are sent from the sink node through all detected deputy nodes.
2. The sink node is in charge of a centralized computational of the normalized$\hat{Q}$that is explained in our paper[2].
3. Each deputy node is assigned its corresponding normalized$\hat{Q}$value that might differ in each round. This $\hat{Q}$ is rebroadcasted synchronously with that of other deputy nodes across the entire network.
4. This $\hat{Q}$ accompanies other standard information such as the sink ID.
5. Our spanning tree construction is based on selecting node of the best normalized$\hat{Q}$value and implementing the Depth First search(DFS) to rule the parent-child relationship as well as the depth of each subtree.
6. Child node that receives more than one normalized$\hat{Q}$ values is going to follow stage 5
7. The topology has to be designed such that the number of subtrees rooted to the same sink is proportional to the number of the deputy nodes that are detected by this coordinator, as shown in level one of Fig 3.(many-to-one tree).
8. In such way, we ensure that all subtrees cover sensors all over the field.
9. As discussed in [2], there are two scenarios considered in this research. The first one is the shrank hotspot zone that handles only one-hop by the sink for the centralized computation of the normalized$\hat{Q}$. The second is the extended hotspot zone that considers an average of two consecutive nodes for the same centralized computation.
10. During stage 5, each node in its subtree $t_i$is going to get "**ζ**“value of the accumulated joint nodes (accumulated blue nodes in Fig 3), top to bottom, to estimate the density of the interconnected nodes that share the same deputy node.

11. By the end of the tree construction phase, each node has a table lists all parents in its coverage area with their corresponding local volume computation of the normalized Qs ($\hat{Q}$,ζ) value that is explained. The Q will be updated since it varies according to the terrific per each round.

Maintenance phase for efficient connectivity

To ensure there are no orphan nodes (unconnected nodes), we set expiration timer ET in each node in order to send a request for the association when no beacon received yet. The threshold of this expiration timer, Trip Time (TT) is observed empirically.

Node neither receives a reply for its beacon broadcast nor are quest from the orphan,realizes that it situates on the boundary of the tree and confirm its depth to the sink if it is necessary to do that.

C. Physical Layer

Transceiver CC2420 specification of the implemented sensors ,Pass loss (PL) transmission power & RSSI

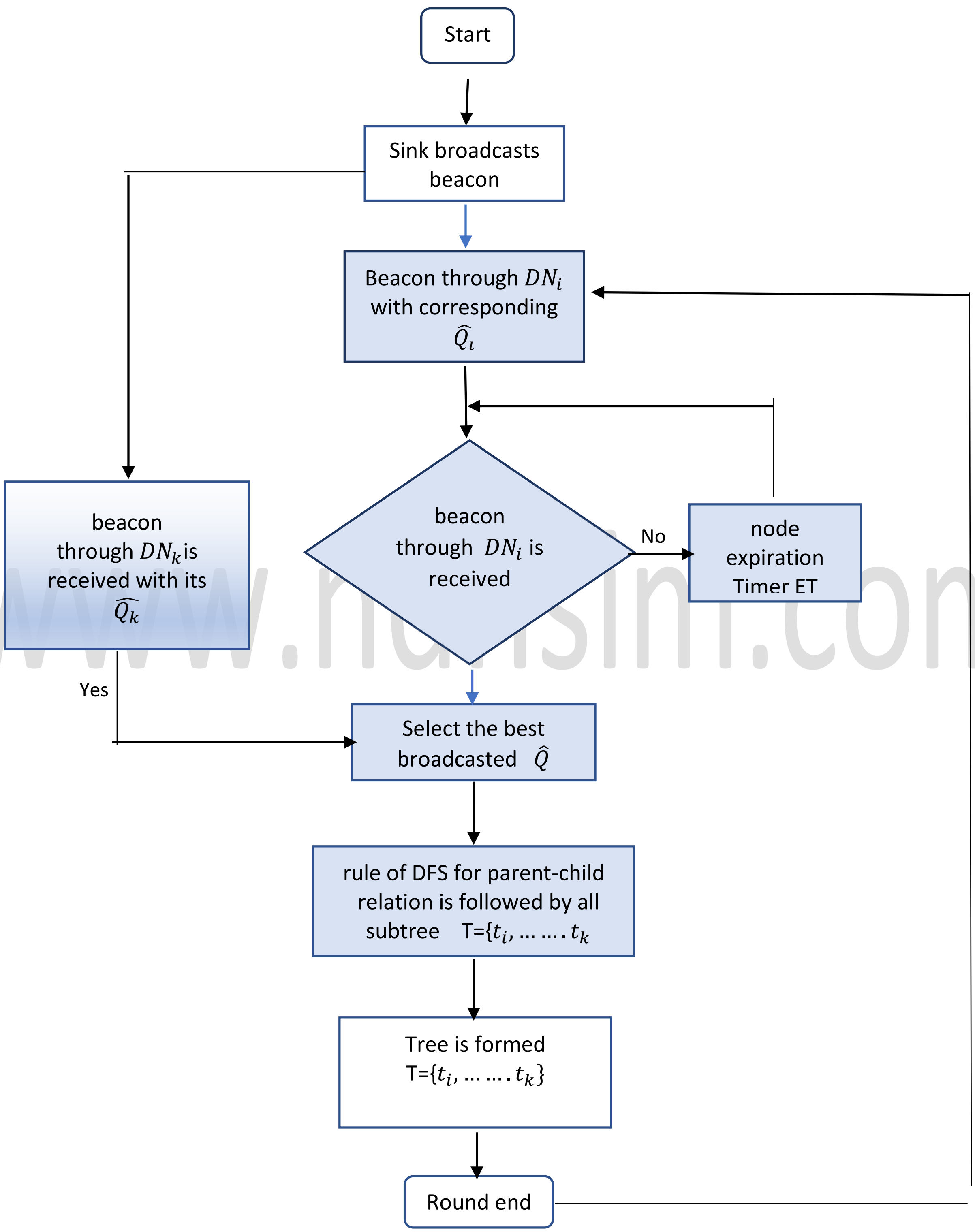

Fig 1. MAC Topology formation

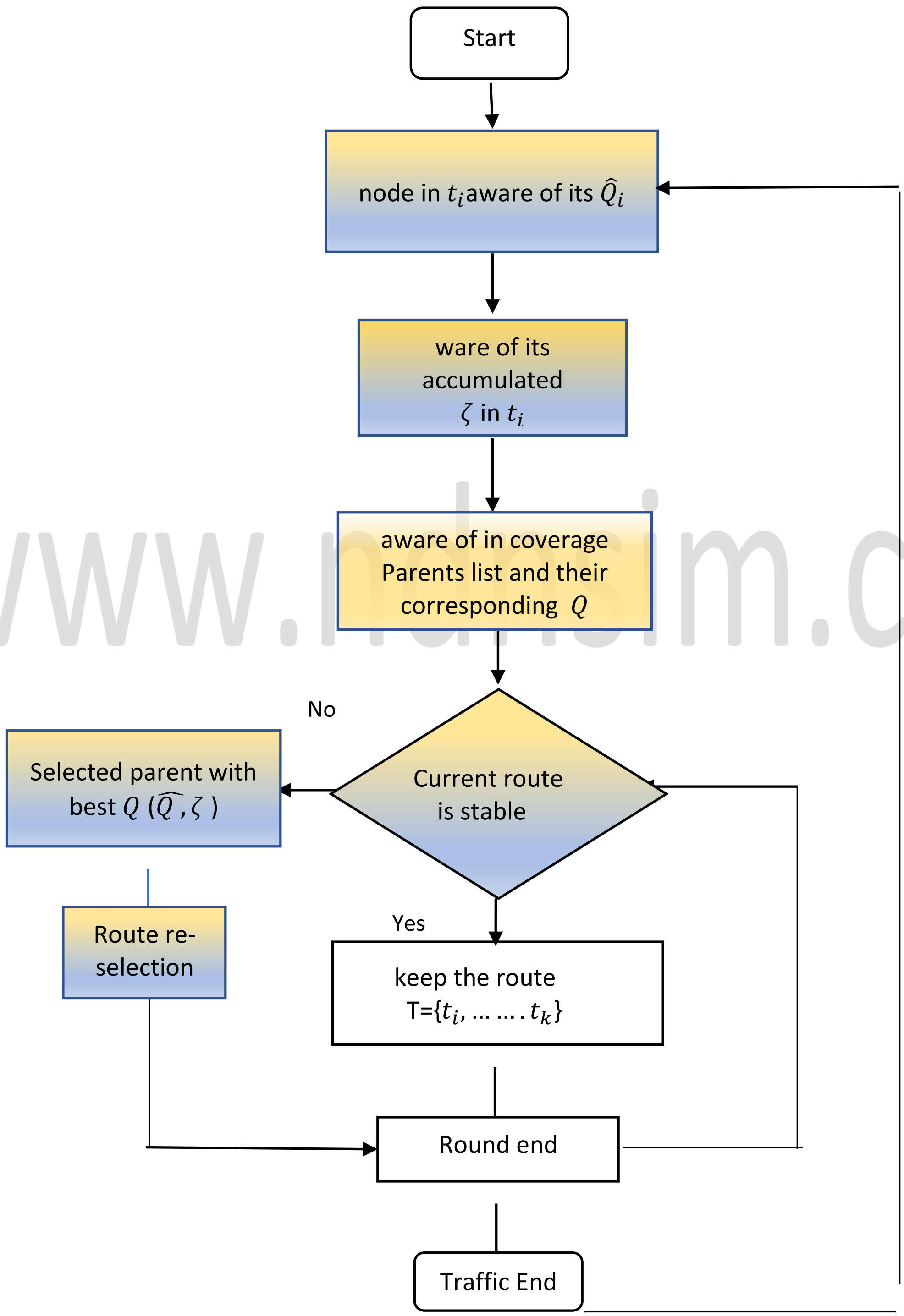
Start
node in t_i aware of its $\hat{Q}_i$
ware of its accumulated ζ in t_i
aware of in coverage Parents list and their corresponding Q
No
Current route is stable
Selected parent with best Q ($\widehat{Q}$, ζ)
Route re-selection
Yes
keep the route T={t_i, … … . t_k}
Round end
Traffic End

Fig 2. New Routing protocol

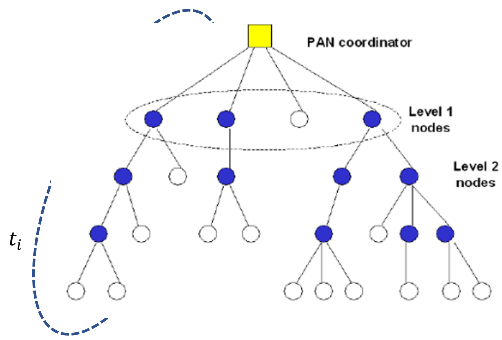

Fig 3. Setup DFS-based greedy spanning tree

Conclusion :

The same metrics will be taken for same topology before and after applying new mechanism. The method of finding the efficiency of our work is going to be compared with same problem follows the same trend of node switching mechanism according to some metrics. The results will be analyzed and showing the best efficiency in our work. The graphs of the performance measurement for both of them. In other words, the energy utilization of these two deputy nodes comparatively irrelevant to the sub trees densities.Thus, relative adjustment of energy dissipation among the switching mechanism and nodes is needed. In addition to that,this mechanism might occur best efficiency of the entire network

Bibliography

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