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## RESEARCH ARTICLE

### Flooding v/s Gossiping

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#### Abstract

Wireless Sensor networks have wider applicability in today's time whether it is information sensitive field or daily used things. In order to transmit such sensory data, a variety of protocols have been devised in the literature. This paper presents the brief review of comparison between flooding and gossiping protocols. Both these protocols undergo from reliability as well as information delay issues. Flooding protocol has a problem of implosion and overlapping while the gossiping protocol came into existence to overcome these inconvenience of flooding protocol

## INTRODUCTION

The WSN is built of "nodes" – from a few to several hundreds or even thousands, where each node is connected to one (or sometimes several) sensors. Each such sensor network node has typically several parts: a radio transceiver with an internal antenna or connection to an external antenna, a microcontroller, an electronic circuit for interfacing with the sensors and an energy source, usually a battery or an embedded form of energy harvesting. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on. The topology of the WSNs can vary from a simple star network to an advanced multi-hop wireless mesh network. The propagation technique between the hops of the network can be routing or flooding.

Energy is of primary importance in wireless sensor networks. Sensor nodes have limited energy supplies and hence must make intelligent and informed decisions that can help conserve energy.

### A). Routing

Routing is usually performed by a dedicated device called a router. Routing is a key feature of the Internet because it enables messages to pass from one computer to another and eventually reach the target machine. Each intermediary computer performs routing by passing along the message to the next computer. Part of this process involves analyzing a routing table to determine the best path.

Routing is often confused with bridging, which performs a similar function. The principal difference between the two is that bridging occurs at a lower level and is therefore more of a hardware function whereas routing occurs at a higher level where the software component is more important. Every Protocol has its limitations and delimitations. Some time they may work better and sometime not. Many of the research paper have been focused on performance metric for comparing the performance of Routing Protocols. Performance metric like Packet Delivery Ratio, Throughput, Average End-to-End Delay and Normalized Routing Overhead.[11]

### B). Reactive

These types of protocols are also called as On Demand Routing Protocols where the routes are not predefined for routing. A Source node calls for the route discovery phase to determine a new route whenever a transmission is needed. This route discovery mechanism is based on flooding algorithm which employs on the technique that a node just broadcasts the packet to all of its neighbours and intermediate nodes just forward that packet to their neighbours. This is a repetitive technique until it reaches the destination. Reactive techniques have smaller routing overheads but higher latency. Example Protocols: DSR, AODV. The reactive routing further has many types of protocols:

### 1).FLOODING

In flooding, a node wishing to distribute a piece of data across the network starts by sending a copy of this data to all of its neighbours. Whenever a node receives new data, it makes copies of the data and sends the data to all of its neighbours, except the node from which it just received the data. The sum of time it takes a group of nodes to receive some data and then forward that data on to their neighbours is called a round. The algorithm finishes, or converges, when all the nodes in the network have received a copy of the data. Flooding converge in  $O(d)$  rounds, where  $d$  is the diameter of the network, because it takes at most  $d$  rounds for a piece of data to travel from one end of the network to the other. Although flooding exhibits the same appealing simplicity as SPIN-PP, it does not solve either the implosion or the overlap problem.

### 2).GOSSIPING

Gossiping is an alternative to the flooding approach that uses randomization to preserve energy. Instead of randomly forwarding data to all its neighbours, a gossiping node only forwards data on to one randomly selected neighbour. If a gossiping node receives data from a given neighbour, it can forward data back to that neighbour if it randomly selects that neighbour. Figure 1 illustrates the reason that gossiping nodes forward data back to the sender. If node D never forwarded the data back to node B, node C would never receive the data. Whenever data travels to a node with high degree in a classic flooding network, more copies of the data start floating around the network. At some point, however, these copies may end up imploding. Gossiping avoids such implosion because it only makes one copy of each message at any node. The fewer copies made, the lower the likelihood that any of these copies will ever implode. While gossiping distributes information slowly, it dissipates energy at a slow rate as well. Consider the case where a single data source disseminates data using gossiping. Since the source sends to only one of its neighbors, and that neighbor sends to only one of its neighbors, the fastest rate at which gossiping distributes data is 1 node/round. Thus, if there are  $c$  data sources in the network, gossiping's fastest possible distribution rate is  $c$  nodes/rounds.

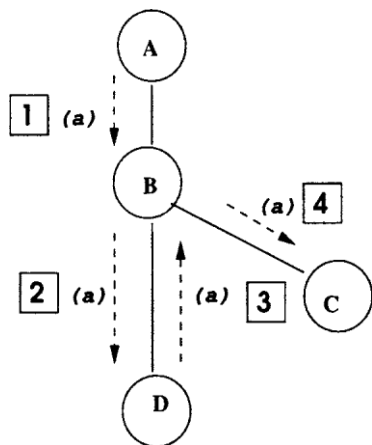


Fig1. Gossiping

At every step, each node only forwards data on to one neighbour, which it selects randomly. After node D receives the data, it must forward the data back to the sender (B), otherwise the data would never reach node C.

## II FLOODING v/s GOSSIPING

Flooding algorithms may not be suitable in the context of dense networks like wireless sensor networks. The main advantage of flooding is its simplicity while the main disadvantage is that it causes heavy traffic. Therefore,

measures should be taken to ensure that packet do not travel through the network indefinitely. Flooding face number of challenges:

A). Implosion: a situation where duplicated messages are sent to the same node. For example, if node A has  $n$  neighbours that are also the neighbours of node B, node B receives  $N$  copies of the same packet sent by node A.

B). Resource Blindness: The flooding protocol does not take into account the available resources at the node or links.

C). Reduced Network Lifetime: A variation of flooding is Gossiping; a node does not necessarily broadcast data.

Gossiping addresses some critical problems of flooding overhead. The goal of gossip protocols is to reduce the number of retransmissions by making some of the nodes discard the message instead of forwarding it. Gossip protocols exhibit both nondeterministic and probabilistic behaviour. No determinism arises as they deal with distributed networks in which the activities of individual nodes occur non deterministically. As to the probabilistic behaviour, nodes are required to forward packets with a pre-specified gossip probability  $P_{gsp}$ . When a node receives a message, rather than immediately retransmitting it as in flooding, it relies on the probability  $P_{gsp}$  to determine whether or not to retransmit. The main benefit is that when  $P_{gsp}$  is sufficiently large, the entire network receives the broadcast message with very high probability, even though only a nondeterministic subset of nodes has forwarded the message. It uses probabilistic approach. Probabilistic broadcast approaches, broadly called gossip, offer a simpler alternative to flooding. With gossiping, nodes in the network are required to forward packets with a pre-specified probability. The main advantage of gossiping protocol is that it is easy to implement and maintenance and low overhead than flooding. But there are some disadvantages also need a long time for a message to propagate throughout the network, does not guarantee that all nodes will receive a message. Gossiping consumes less energy than Flooding. It suffers from latency; information propagates slowly, one node at each step. Despite the simplicity and inefficiency of Flooding and Gossiping, they could be used for specific functions.

TABLE 1  
DIFFERENCE BETWEEN FLOODING AND GOSSIPING

S.No.	Flooding	Gossiping
1.	This protocol is easy to implement	This protocol is difficult to implement.
2.	It involves implosion problema	The problem of implosion is solved by this protocol
3.	It has overlapping problem.	There is no such problem of overlapping in this protocol.
4.	Messages or information is flooded over the network.	Messages or information is sent only to selected nodes.
5.	Packets are sent to all the nodes in the network	Packets of information are routed to only selected nodes.
6.	No route calculation takes place	Route calculation takes place

### III RELATED WORK

Wireless sensor network (WSN) is widely considered as one of the most important technologies for the twenty-first century [1].A large number of research activities have been carried out to explore and overcome the constraints of

WSNs and solve design and application issues. Therefore, routing protocols designed for WSNs should be as energy efficient as possible to prolong the lifetime of individual sensors, and hence the network lifetime.[2] the routing techniques are classified based on the network structure into three categories: flat, hierarchical, and location-based routing protocols. Furthermore, these protocols are classified into multipath-based, query-based, negotiation-based, and QoS-based routing techniques depending on protocol operation. We also highlight the design trade-offs between energy and communication overhead savings in some of the routing paradigm, as well as the advantages and disadvantages of each routing technique. Although many of these routing techniques look promising, there are still many challenges that need to be solved in sensor networks. [3] Each sensor node operates autonomously with no central point of control in the network, and each node bases its decisions on its mission, the information it currently has, and its knowledge of its computing, communication and energy resources. Compared to today's isolated sensors, tomorrow's networked sensors have the potential to perform with more accuracy, robustness and sophistication. Several obstacles need to be overcome before this vision can become a reality.

These obstacles arise from the limited energy, computational power, and communication resources available to the sensors in the network.

A).Energy. Because wireless sensors have a limited supply of energy, energy-conserving communication protocols and computation are essential.

B).Computation. Sensors have limited computing power and therefore may not be able to run sophisticated network protocols.

C).Communication. The bandwidth of the wireless links connecting sensor nodes is often limited, on the order of a few hundred Kbps, further constraining inter-sensor communication. [12]

The traditional routing scheme, flooding, uses straightforward broadcasting to deliver data packets to the destination. This property not only wastes energy but also causes broadcast storms degrading the throughput. In order to solve the problem of heavy packet overhead, the gossiping routing protocol was proposed. Although the gossiping reduces the amount of packets, it suffers longer delay. We propose the single gossiping with directional flooding routing protocol. The gradient concept is added to the design of this scheme to make packet delivery directional. Under the restrictions of sensor networks, the scheme requires only the most basic functions and reasonable resources to achieve packet delivery. It improves on both the heavy overhead and long delay time encountered in the flooding and gossiping schemes. [4]

In [5,6], gossiping is used to maintain database consistency, while in [7], gossiping is used as a mechanism to achieve fault tolerance. A theoretical analysis of gossiping is presented in [9]. Recently, such techniques have also been used for resource discovery in networks [8].

## IV CONCLUSION

In this paper, we have presented a brief review of flooding protocol and gossiping protocol [10]. Both the protocols almost use the same technique to transmit or receive the sensory information but the variation lies in the approached used to transmit or receive data. Flooding protocol just broadcasts the data over the network lacking testing the capabilities of nodes in deliberation but gossiping protocols selects a node to transmit data once testing all the nodes capability. Thus the paper has provided a comparative study of both the protocols.

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