

# A complete analysis on Manets and various types of attack

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**ABSTRACT:** Node misbehavior due to selfish or malicious intention could significantly degrade the performance of MANET because most existing routing protocols in MANET are aiming at finding most efficiency path. To deal with misbehavior in MANET, an incentive mechanism should be integrated into routing decision making. However manets are vulnerable to various attack .in this paper we present introduction to manets and types of attack.

## I.INTRODUCTION

In MANETs, each node acts as router/network manager for other nodes. MANETs are vulnerable due to their basic characteristics which include topological changes, no point of network management, restriction of resources, no certifiable or centralized authority, etc. Threats to personal and company privacy and assets by attacks upon networks and computers continue inspite of efforts of network administrators and IT vendors to safeguard such environments. Secured transmission and communication in MANET is a major challenge as this network is open to many types of attacks. Understanding probable security attacks to MANETs is a serious issue as they are targeted by attacks including Flooding attack, Wormhole attack, Black hole attack, Denial of Service (DoS), Selfish-node misbehaving, Routing table overflow attack, Impersonation attack, etc. Earlier studies reveal the different attack categories on MANETs like Passive/Active attacks, Internal/External attacks and Routing and Packet Forwarding attacks. Some of the attacks aim at single nodes and others aim at multiple nodes. Malicious and selfish nodes are other types of attack which severely degrade the security and performance of the network. MANETs use IEEE 802.11 architecture components as described in The Basic Service Set (BSS) defines an architecture in which all stations can communicate between themselves using IEEE 802.11 wireless LAN technology. A BSS consists of an access point (AP) and all the stations associated with it. Figure 1 shows the alternative ad hoc network architecture using the IEEE 802.11 independent basic service set (IBSS). In this mode, no access point is required, and nodes communicate in a distributed peer-to-peer manner. The minimum requirement for IBSS operation is that two nodes be within radio range of each other.

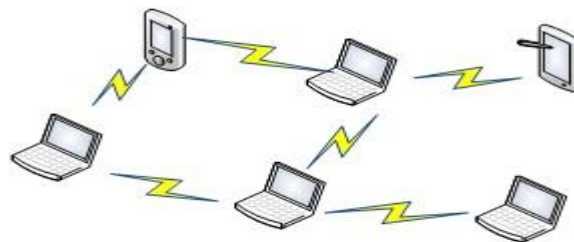


Fig. 1. Ad hoc architecture using IEEE 802.11 IBSS



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## A. Points of interest and inconveniences:

MANETs have wide applications in various fields. For example, they have been used in a military context since the 1970s to ensure the timely flow of information and command in battle, contributing to the success of a mission. Another major application of MANETs is on-the-fly collaborative computing outside an office environment, for example during fieldwork, in a team project offsite, or during an offsite meeting. Even when machines are not mobile, wireless networks are not burdened with cables between them. In contrast, setting up a wireless network is simpler and faster. It may be impossible to lay cables because of the nature of the terrain such as search-and-rescue operations, battlefields, standard communication needs in public exhibitions and inter-building areas. Mutating wireless network topology such as to add, to remove or to displace a machine can also be easy.

Inconveniences:

Depending on the limited and possible interference, the data rate is often lower than wired Networks. Now some standards offer data rates comparable to Ethernet

## II. ATTACKS IN MANETS

Various types of network layer attacks or intrusions are known for MANETs. In this Section, we first present a classification of major network layer attacks and introduce some individual attacks. MANETs can be divided into two main categories, namely passive attacks and active attacks

**A. Passive Attacks:** Passive attacks are those where the attacker does not disturb the operation of the routing protocol but attempts to seek some valuable information through traffic analysis. Some examples of passive attacks are as follows:

### **Eavesdropping:**

Because of the wireless links in MANETs, a message sent by a node can be heard by every device equipped with a transceiver and within radio range, and if no encryption is used then the attacker can get useful information

**Traffic Analysis and Location Disclosure:** Attackers can listen to the traffic on wireless links to discover the location of target nodes by analysing the communication pattern, the amount of data transmitted by nodes and the characteristics of the transmission. Even if the data in a message is protected by encryption, traffic analysis can still be performed to extract some useful information.

**B. Active Attacks:** : In active attacks, intruders launch intrusive activities such as modifying, injecting, forging, fabricating or dropping data or routing packets, resulting in various disruptions to the network. Some of these attacks are caused by a single activity of an intruder and others can be caused by a sequence of activities by colluding intruders. Active attacks (as compared to passive attacks) disturb the operations of the network and can be so severe that they can bring down the entire network or degrade the network performance significantly, as in the case of denial of service attacks. Active attacks can be further divided into malicious packet dropping attacks and routing attacks.



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**Malicious Packet Dropping:** A path between a source node and a destination node in a MANET is established using a route discovery process. The source node starts sending the data packet to the next node along the path; this intermediate node identifies the next hop node towards the destination along the established path and forwards the data packet to it. To achieve the desired operation of a MANET, it is important that intermediate nodes forward data packets for any and all source nodes. Packet dropping attacks differ from the black hole and gray hole attacks.

**C. Routing Attacks:** Both the reactive and proactive routing protocols are vulnerable to routing attacks because they route based on the assumption that all nodes cooperate to find the best path. In particular, the on-demand (reactive) MANET routing protocols, such as AODV and DSR allow intruders to launch a wide variety of attacks.

**Sleep Deprivation Attack:** Sleep deprivation (SD) is a distributed denial of service attack in which an attacker interacts with the node in a manner that appears to be legitimate.

**Malicious RREQ Flooding 1:** An intruder broadcasts an RREQ with a destination IP address that is within the network address range but where the corresponding node does not exist. This forward the request message because no one has the destination path.

**Malicious RREQ Flooding 2:** After broadcasting an RREQ an intruder does not wait for the ring traversal time, but it continues resending the RREQ for the same destination with higher TTL values.

**D. Black Hole Attack:** Intruders can exploit the vulnerability in route discovery procedures of on-demand routing protocols, such as AODV and DSR when a node requires a route towards the destination. The node sends an RREQ and an intruder advertises itself as having the fresh route. By repeating this for route requests received from other nodes, the intruder may succeed in becoming part of many routes in the network. The way the intruder initiates the black hole attack and captures the routes may vary in different routing protocols. When a malicious node impersonates the destination node or forges a route reply message forwarded to the source node which does not contain a real route to the destination, then it is called black hole attack. When a malicious node (Black hole node) affects one or more nodes, making them malicious as well, then this attack is labeled multiple node attack or collaborative attack.

**E. Grey Hole Attack:** A gray hole attack (GH) is a special case of the BH attack, in which an intruder first captures the routes, i.e. becomes part of the routes in the network (as with the BH attack), and then drops packets selectively. As we noted above, BH and GH attacks are different in nature from packet dropping attacks, where the attacker simply fails to forward packets for some reason. BH and GH attacks, on the other hand, comprise two tasks: the attacker first captures routes and then either drops all packets (BH attack) or some packets (GH attack).

**F. Rushing Attack:** In order to limit the control packet overhead, an on-demand protocol only requires nodes to forward the first RREQ that arrives for each route discovery. An attacker can exploit this property by spreading RREQ packets quickly throughout the network to suppress any later legitimate RREQ packets.

**G. Sybil attack:** A Sybil attack is where a malicious node acts like two or more nodes. The Sybil nodes are formed by imitation, false identities, or impersonation of nodes in a network. These additional node identities can be generated by a physical device. These attacks as can be launched in three ways as follows:

**Direct or Indirect Communication:** In direct communication, Sybil nodes get in touch with quiet nodes directly. A malicious tool in the Sybil node listens to messages sent from the quiet node to the Sybil node.



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**Stolen or Fabricated Identity:** Two alternatives used by a Sybil node to get a node's identity for itself are either through identity theft of node or by devising a fresh identity. Stolen identity by a Sybil node is the general method as this can be achieved by using node impersonation.

**Simultaneous or Non-Simultaneous:** In the simultaneous type of Sybil attack, the attacker tries to launch all available node identities simultaneously or one after the other in the MANET. In such cases, a hardware or node entity may act as identity one time then switch through other identities to make them appear concurrently.

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