

Mobile Ad Hoc Networking Terminology
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Abstract

This document presents conventional definitions for many terms to be used during the discussion of various algorithms for enabling ad hoc networks of mobile computers, particularly over wireless media.

1. Introduction

This document presents conventional definitions for many terms to be used during the discussion of various algorithms for enabling ad hoc networks of mobile computers, particularly over wireless media. With commonly agreed definitions, it is expected that protocol designers will be able to discuss more clearly the advantages and disadvantages of their algorithms.

2. Definitions for Mobile Ad Hoc Network Terms

asymmetric link

A link with transmission characteristics which are different depending upon the relative position or design characteristics of the transmitter and the receiver of data on the link. For instance, the range of one transmitter may be much higher than the range of another transmitter on the same medium.

bandwidth

The total capacity of a link to carry information (typically bits).

bandwidth utilization

The actual amount of information delivered over a link, expressed as a percent of the available bandwidth on that link.

base station

A centralized node coordinating the channel access of a population of mobile nodes within its transmission range.

beacon

A control message issued by a node (especially, a base station) informing all the other nodes in its neighborhood of the continuing presence of the node, possibly along with additional status information.

channel

A subdivision of the physical medium allowing possibly shared independent uses of the medium. Channels may be made available by subdividing the medium into distinct time slots, or distinct spectral bands, or decorrelated coding sequences.

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channel access protocol

A protocol for mediating access to, and possibly allocation of, the various channels available within the physical communications medium. Nodes participating in the channel access protocol can communicate only when they have uncontested access to the medium, so that there will be no interference.

cluster

A group of nodes located within close physical proximity, typically all within range of one another, which can be grouped together for the purpose of limiting the production and propagation of routing information.

cluster head

A cluster head is a node (often elected in the cluster formation process) that has complete knowledge about group membership and link state information in the cluster. Each cluster should have one and only one cluster head.

cluster member

All nodes within a cluster EXCEPT the cluster head are called members of that cluster.

communications medium

A communication channel such as free space, cable or fiber through which data can be transmitted

communications technology

The means employed by two nodes to transfer data

control message

Information passed between two or more network nodes for maintaining protocol state which is not associated to any specific application.

convergence

The process of approaching a state of equilibrium in which all nodes in the network agree on a consistent collection of state about the topology of the network, and in which no further control messages are needed to establish the consistency of the network topology.

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convergence time

The time which is required for a network to reach convergence after an event (typically, the movement of a mobile node) which changes the network topology.

distance vector

A style of routing protocol in which, for each desired destination, a node maintains information about the distance to that destination, and a vector (next hop) towards that destination.

fairness

A property of channel access protocols whereby a medium is made fairly equal to all eligible nodes on the link. Fairness does not strictly imply equality, especially in cases where nodes are given link access according to unequal priority or classification.

flooding

The process of delivering data or control messages to every node within the ad hoc network.

forwarding node

A node within an ad hoc network which performs the function of forwarding datagrams from one of its neighbors to another.

goodput

The total bandwidth used, less the volume of control messages and protocol overhead from the data packets.

hidden-terminal problem

The problem whereby a transmitting node can fail in its attempt to transmit data because of destructive interference which is only detectable at the receiving node, not the transmitting node.

home address

An IP address that is assigned for an extended period of time to a mobile node. It remains unchanged regardless of where the node is attached to the Internet [9]. If a node has more

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than one home address, it SHOULD select and use a single home address when participating in the ad hoc network.

host

Any node that is not a router.

interface

A node's attachment to a link.

interface index

An 8-bit quantity which uniquely identifies an interface among a given node's interfaces.

laydown

The relative physical location of the nodes within the ad hoc network.

link

A communication facility or physical medium that can sustain data communications between multiple network nodes, such as an Ethernet (simple or bridged). A link is the layer immediately below IP.

link-layer address

A link-layer identifier for an interface, such as IEEE 802 addresses on Ethernet links.

link state

A style of routing protocol in which every node within the network is expected to maintain information about every link within the network topology.

link-level acknowledgement

A protocol strategy, typically employed over wireless media, requiring neighbors to acknowledge receipt of packets (typically unicast only) from the transmitter. Such strategies aim to avoid packet loss or delay resulting from lack of, or unwanted characteristics of, higher level protocols.

local broadcast

The delivery of data to every node on a link (i.e., within range of the transmitter).

loop-free

A property of routing protocols whereby the path taken by a data packet from source to destination never transits the same intermediate node twice before arrival at the destination.

MAC-layer address

An address (sometimes called the link address) associated with the link interface of a node on a physical link.

mobility factor

The relative frequency of node movement, compared to the convergence time of the routing protocols used in the ad hoc network.

mobility security association

A collection of security contexts, between a pair of routers, which may be applied to protocol messages exchanged between them.

neighbor

a "neighbor" is any other node to which data may be propagated directly over the communications medium without relying the assistance of any other forwarding node

neighborhood

All the nodes which can receive data on the same link from one node whenever it transmits data.

next hop

A neighbor which has been designated to forward packets along the way to a particular destination.

node

A device that implements IP.

packet

An IP header plus payload.

pathloss

A reduction in signal strength caused by traversing the physical medium constituting the link.

pathloss matrix

A matrix of coefficients describing the pathloss between any two nodes in an ad hoc network. When the links are asymmetric, the matrix is also asymmetric.

payload

The actual data within a packet, not including network protocol headers which were not inserted by an application.

prefix

A bit string that consists of some number of initial bits of an address.

route table

The table where ad hoc nodes keep routing (including next hop) information for various destinations.

route entry

An entry for a specific destination (unicast or multicast) in the route table.

route establishment

The process of setting up a route between a source and a destination.

route activation

The process of putting a route into use after it has been set up.

router

A node that forwards IP packets not explicitly addressed to itself.

scalability

Wide applicability of a protocol to large as well as small populations of nodes participating in the protocol.

scenario

The tuple <laydown, pathloss matrix, mobility factor, traffic> characterizing a class of ad hoc networks.

security context

A security context between two routers defines the manner in which two routers choose to mutually authentication each other, and indicates an authentication algorithm and mode.

Security Parameter Index (SPI)

An index identifying a security context between a pair of routers among the contexts possible in the mobility security association.

signal strength

The detectable power of the signal carrying the data bits, as seen by the receiver of the signal.

source route

A source route from node A to node B is an ordered list of home addresses, starting with the home address of node A and ending with the home address of the node B. Between A and B, the source route includes an ordered list of all the intermediate hops between A and B, as well as the interface index of the interface through which the packet should be transmitted to reach the next hop.

spatial re-use

Simultaneous use of channels with identical or close physical characteristics, but located spatially far enough apart to avoid interference (i.e., co-channel interference)

system-wide broadcast

Same as flooding, but used in contrast to local broadcast.

throughput

The amount of data from a source to a destination processed by the protocol for which throughput is to be measured for instance, IP, TCP, or the MAC protocol.

topology

A network can be viewed abstractly as a "graph" whose "topology" at any point in time is defined by set of "points" connected by "edges."

triggered update

An unsolicited route update transmitted by an router along a path to a destination.

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