

CLAIMS

1.-A message transmission method for transmitting messages in an ad hoc network comprising at least two transmitter-receiver nodes that are capable of receiving and transmitting messages and communicating with each other through the dispatch of messages within random access time slots organised in frames, the nodes of the network being distributed into groups in accordance with a basic distribution rule, with the nodes in each group having the right to send messages in one time slot per frame of a predefined subset of frames specific to the group in accordance with the basic distribution rule,

characterised in that:

- the messages include at least messages having a low priority level and messages having a high priority level;
- each of the nodes transmits the low priority level messages only in one time slot per frame of the predefined subset of frames specific to its own group;
- each of the nodes transmits the high priority level messages in one time slot (c1; c1') per frame of the predefined subset of frames specific to its own group (T2; T2') and in at least one other time slot (c2, c3; c2', c3'), the node transmitting any message having a high priority level a greater number of times than any message having a low priority level;
- each node defines (24) a constraint (*neighbourConstraint*) for the neighbouring nodes,
- each node transmits (24) the defined constraint (*neighbourConstraint*) to the neighbouring nodes, and
- each node (26) defines the group to which it belongs in accordance with the distribution rule based on the constraints (*neighbourConstraint*) received from the neighbouring nodes.

2.-A method according to claim 1, characterised in that each of the nodes transmits the high priority level messages in at least two time slots (c1, c2 c3) of a single frame (T2) of the predefined subset of frames specific to its own group.

3.-A method according to claim 2, characterised in that the node transmitting a high priority level message transmits, based on the probability P1 of the message being received by at least one of its neighbouring nodes, the high priority level message in a number of time slots m satisfying the relationship:

$$P1 = \sum_{k=1}^m \left[(-1)^{k+1} C_m^k \left(1 - \frac{k}{n} \right)^{N-T} \prod_{j=0}^{m-1} \left(1 - \frac{k}{n-j} \right)^{T-1} \right]$$

where:

- N is the number of neighbouring nodes of the node all transmitting in a same given frame,
- T is the number of neighbouring nodes of the node having available a high priority level message to be transmitted, and
- n is the number of time slots per frame.

4.-A method according to claim 1, characterised in that each of the nodes transmits the high priority level messages in a single time slot (c1', c2', c3') of at least two distinctly separate frames (T2', T3', T5').

5.-A method according to claim 4, characterised in that the node transmitting a high priority level message transmits, based on the probability P2 of the message being received by at least one of its neighbouring nodes, the high priority level message in a number of frames q satisfying the relationship:

$$P2 = \sum_{k=1}^q \left[(-1)^{k+1} C_q^k \left(1 - \frac{1}{n} \right)^{k(N-1)} \right]$$

where:

- N is the number of neighbouring nodes of the node all transmitting in a same given frame,
- T is the number of neighbouring nodes of the node having available a high priority level message to be transmitted, and
- n is the number of time slots per frame.

6.-A method according to claim 1, characterised in that each of the nodes transmits the high priority level messages in at least two time slots of at least two distinctly separate frames.

7.-A method according to claim 6, characterised in the node transmitting a high priority level message transmits, based on the probability P3 of the message being received by at least one of its neighbouring nodes, the high priority level message in a number of time slots m and a number of frames q satisfying the relationship:

$$P3 = \sum_{k=1}^q \left[(-1)^{k+1} C_q^k p(Y)^k \right]$$

$$\text{with } p(Y) = \sum_{k=1}^m \left[(-1)^{k+1} C_m^k \left(1 - \frac{k}{n} \right)^{N-T} \prod_{j=0}^{m-1} \left(1 - \frac{k}{n-j} \right)^{T-1} \right]$$

where

- N is the number of neighbouring nodes of the node all transmitting in a same given frame,
- T is the number of neighbouring nodes of the node having available a high priority level message to be transmitted, and
- n is the number of time slots per frame.

8.-A method according to any one of claims 4 to 7, characterised in that only one frame is included in the predefined subset of frames.

9.-A method according to any one of claims 1 to 8, characterised in that the distribution rule of a node in a group takes into account the number of neighbouring transmitter nodes or interfering nodes that the neighbouring nodes of the node considered have.

10.-An ad hoc network comprising a set of transmitter - receiver nodes that are capable of receiving and transmitting messages and communicating with each other through the dispatch of messages in random access time slots organised in frames, characterised in that each node includes the means for implementation of the method according to any one of the preceding claims.