CLAIMS

1. A communication method (P100) within a network (N1) comprising a plurality of communicating electronic devices (10, 10i, a1,...,a8, b1,...,b8, e1,...,e8), said method (P100) being implemented by a processing unit (11) of a first communicating electronic device (10) from among said communicating electronic devices within the network (N1), said first communicating electronic device further including said processing unit (11), a data memory (12), first communication means (13) providing wireless nearby communication with a third-party communicating electronic device (10i) of the network (N1) situated within communication range, said data memory (12) and said first communication means (13) cooperating with said processing unit (11), the data memory (12) including the value of an identifier (ID, ID', IDH, IDR, IDF) dedicated to said first communicating electronic device (10) and a record (RH) to store (IDHc) the current value of an identifier (IDH) of a second communicating electronic device (d2) acting as head of a cluster (C11, C12, C13), said method (P100) including:

   - a step (101) for receiving, via the first communication means (13), an enrollment message (MH, MH') delivered and transmitted by a communicating electronic device (10i) within the network (N1), said enrollment message encoding the identifier (MH-1, IDH) of the second communicating electronic device (d2) acting as cluster head;
   - a step (102) for decoding said enrollment message (MH, MH') and deducing the value of said identifier (MH-1, IDH) of the second communicating electronic device acting as cluster head (d2) therefrom and, if applicable, the value of the identifier (ID') of a third communicating electronic device (10i) having relayed said enrollment message (MH, MH');
   - a step (103) for updating the record (RH) so that the latter stores, as current identifier value (IDHc) of the device acting as cluster head, said value of the identifier (IDH) of the second device acting as cluster head deduced from the decoded enrollment message (MH, MH') and, if applicable, said record (RH) also saves, as uplink route (Ru) toward said second communicating electronic device acting as cluster head (d2), the value of the identifier (ID') of the third communicating electronic device (10i);

   said method (P100) being characterized in that:

   - said enrollment message (MH, MH') further includes a datum TTL (MH-4) reflecting the ability of a communicating electronic device receiving said enrollment message (MH, MH') to relay the latter;

- the step for decoding (102) said enrollment message (MH, MH') further deduces the value of said datum TTL therefrom;
- the step (103) for updating the record (RH) is adapted so that said record stores the current value of said datum TTL previously decremented (102) by one unit;

and in that said method (P100) includes:

- a step for producing (106) a relayed enrollment message (MH'), said message (MH') comprising:
    a. a first field (MH-1) encoding the current identifier value (IDHc) of the device (d2) acting as cluster head recorded in the record (RH);
    b. a second field (MH-2) characterizing an uplink route (Ru) toward the second communicating electronic device acting as cluster head, and encoding the identifier (ID) of the first communicating electronic device (10);
    c. a third field (MH-4) encoding the current value of the datum TTL recorded in the record (RH);
- a step (106) for triggering the transmission by the first communication means (13) of said relayed message (MH') if (109y) a prior step (109), consisting of comparing the current value of the datum TTL recorded in the record (RH) to a determined floor value, attests that said current value of TTL is strictly greater than said floor datum.

2. The communication method (P100) according to the preceding claim, wherein:
    - the received enrollment message (MH, MH') includes a datum (CH) reflecting the capacity of the second communicating electronic device acting as cluster head to provide a given service (S);
    - the step for decoding (102) said enrollment message (MH, MH') may further deduce, from said enrollment message, said datum (CH) reflecting said capacity;
    - the step for updating (103) the record (RH) may further consist of recording, in said record (RH), the value (CHc) of said datum (CH) reflecting the capacity of the device (d2) acting as cluster head.

3. The communication method (P100) according to the preceding claim, wherein the step (103) for updating the record (RH) and recording the current identifier value (IDHc) of the communicating electronic device acting as cluster head therein may advantageously only be performed if (104-y) the

datum (CH) reflecting said capacity is greater than or equal to a determined minimum requirement threshold.

4. The communication method (P100) according to any one of the preceding claims, including:
   - a step (131) for receiving an end of relay message (MF) developed and transmitted by the third communicating electronic device (10i), said end of relay message (MF) including the identifier (IDF, ID') of said third communicating electronic device (10i);
   - a step (132) for decoding said end of relay message (MF) and for deducing the value of said identifier (IDF, ID') therefrom;
   - a step for updating (133) the record (RH) encoding the current value (IDHc) of an identifier of the device acting as cluster head, to erase said current value (IDHc) or replace it with a predetermined value reflecting an absence of identifier of the device acting as cluster head, said update (133) of the record (RH) only being done if (134-y) the value of the identifier (10', IDF) deduced from the end of relay message (MF) is comprised in the record (RH) as uplink route (Ru) toward said device acting as cluster head (d2).

5. The communication method (P100) according to any one of the preceding claims, wherein:
   - the step (109) consisting of comparing the current value of the datum TTL recorded in the record (RH) to a determined floor value further consists of producing a capacity (CR) to relay messages in favor of communicating electronic devices, said communicating electronic devices belonging to a downlink route from the first communicating electronic device (10), according to a functional parameter of said device, and comparing said produced capacity (CR) to a predetermined minimum functional threshold;
   - the step (106) for triggering the transmission by the first communication means (13) of said relayed message (MH') only being implemented if (109y) said produced capacity (CR) is strictly greater than said predetermined functional minimum threshold.

6. The communication method (P100) according to any one of the preceding claims, wherein the step (103) for updating the record (RH) following the decoding (102) of an enrollment message (MH, MH') further consists of triggering, concomitantly with the update of the record (RH), means for measuring a duration, said communication method (P100) including a step for comparing said duration to a predetermined maximum waiting period and updating (107) said record (RH) and

erasing or replacing the current identifier value (IDHc) of the communicating electronic device acting as cluster head with a predetermined value reflecting absence of identifier of the communicating electronic device acting as cluster head.

7. The communication method (P100) according to any one of the preceding claims, including:
   - an enrollment message (MH, MH') includes a field (MH-5) encoding a datum TTL-e characterizing the maximum cluster depth desired by the second communicating electronic device (d2) acting as cluster head and a field (MH-6) encoding a datum DST characterizing the distance separating the communicating electronic device sending said enrollment message (MH, MH') on a downlink route from the communicating electronic device acting as cluster head (d2);
   - the step (102) for decoding said enrollment message (MH, MH') may deduce the values of said data TTL-e and DST therefrom;
   - the step (103) for updating the record (RH) is also adapted so that said record (RH) stores the value of the datum TTL-e and the value, previously incremented by one unit, of the datum DST;

   said communication method (P100) further including a step for comparing said values TTL-e and DST recorded in the record (RH) and for updating (107) said record (RH) and erasing or replacing the current identifier value (IDHc) of the communicating electronic device acting as cluster head with a predetermined value reflecting absence of device identifier acting as cluster head.

8. The communication method (P100) according to any one of the preceding claims, including:
   - a step for determining the maximum depth (Dp) of the cluster for which the first communicating electronic device (10) wishes to be cluster head according to (112) an operating parameter of said device (10);
   - a step for encoding an enrollment message (MH) and triggering the sending (113) of said message (MH) by the first communication means (13), said message (MH) including a first field (MH-1) encoding the identifier (IDH) of said first communicating electronic device and a second field (MH-4) encoding the datum TTL whereof the value is initialized to that of the produced maximum cluster depth.

9. The communication method (P100) according to claim 7, including:

- a step for determining the maximum depth (Dp) of the cluster of which the first communicating electronic device (10) wishes to be cluster head according to (112) an operating parameter of said device (10);
- a step for encoding an enrollment message (MH) and triggering the transmission (113) of said message (MH) by the first communication means (13), said message (MH) including fields (MH-1, MH-4, MH-5, MH-6) respectively encoding:
    a. the identifier (IDH) of said device;
    b. the datum TTL whereof the value is recorded in the record (RH);
    c. the datum TTL-e whereof the value is initialized at that of the maximum depth (Dp) of the determined cluster;
    d. the datum DST whereof the value is initialized at a value indicating a zero distance in number of hops.

10. The communication method (P100) according claims 8 or 9, including a step for evaluating (111) the capacity of the first communicating electronic device (10) to perform a determined service (S), said step (111) consisting of estimating (1111) an operating parameter of said device (10) and producing (1112) a datum (CH) reflecting the capacity of said device (10) to perform said determined service (S), and for which the step for encoding an enrollment message (MH) consists of providing, within said enrollment message (MH), a field (MH-3) encoding said datum (CH) reflecting said capacity prior to triggering the transmission (113) of said message (MH) by the first communication means (13).

11. The communication method (P100) according to the preceding claim, including a step for comparing (112) the datum (CH) reflecting said capacity to a minimum functional requirement threshold and for which the step (113) for triggering the transmission of the enrollment message is only implemented if (112-y) the datum reflecting said capacity is greater than or equal to said minimum functional requirement threshold.

12. A computer program product (P) with program instructions stored on a computer readable medium for implementation of a communication method (P100) according to any one of claims 1 to 11.

13. A communicating electronic device (10) including a processing unit (11), a data memory (12), a program memory (14), first communication means (13) providing wireless nearby communication with any other communicating electronic device (10i) situated within communication range, said memories (12, 14) and said first communication means (13) cooperating with said processing unit (11), the data memory (12) including the value of an identifier (ID) dedicated to the communicating electronic device (10) and a record (RH) to include the current value of an identifier of a device acting as cluster head, said communicating electronic device (10) being characterized in that it includes, in the program memory (14), the instructions for a computer program product (P) according to the preceding claim.

14. A system including a plurality of communicating electronic devices (10, 10i) according to the preceding claim.

15. The system according to the preceding claim, including a plurality of containers of goods, solid, fluid or liquid merchandise, said containers respectively cooperating with the communicating electronic devices (10, 10i), the latter each including a sensor (15) cooperating with the processing unit (11) to measure and collect a property related to the internal and/or external environments of said containers.