## CLAIMS

1. A device for simulating (100) a railway system, characterised in that the device includes:

- a memorisation member (102) for storing a model (M) of the railway system, said model comprising a plurality of unitary components (C1 to C8) resulting from a breakdown into functional blocks of the railway system to be simulated, each unitary component incorporating a model of the behaviour of the associated functional block, having input parameters (E1 to E8) and delivering output parameters (S1 to S8), the output parameters of at least one unitary component being able to make up input parameters of another unitary component, each unitary component being characterised by a running period (p1 to p8) of the behaviour model that it incorporates; and
- a computing member (101), able to simulate an time evolution of the model (M) of the railway system from an initial state, by running the behaviour model incorporated into each unitary component with a periodicity corresponding to the running period that characterises it, using current values of the input parameters to calculate updated values of the output parameters;

wherein the railway system comprises a network of railroad tracks, at least one power supply device, at least one railway vehicle, at least one traffic regulating unit, at least one signalling device and at least one control member of the or each railway vehicle, the model (M) including the following unitary components:

- an infrastructure unitary component modelling the power supply device and able to determine each running period of electrical properties of the network in particular from position and electrical power values called by each railway vehicle; and
- a railway vehicle unitary component modelling the configuration of the railway vehicle and/or a kinematic railway vehicle unitary component modelling the dynamical behaviour of the railway vehicle and/or a control unitary component of the or each railway vehicle; and
- a signalling unitary component able to model the security devices of the railway system relative to the travel and switching of each railway vehicle; and
- a traffic regulation unitary component able to model the algorithms used by railway supervision systems to manage delays and the movement of each railway vehicle; and advantageously
- an environment unitary component describing outside parameters affecting the railway system wherein the running period associated with each component being a multiple of a minimum reference period.

2. The device according to any one of the preceding claims, wherein the computing member is able to run an import module (125) capable of configuring the initial state of the model by loading an initial state file (Ei) from the memorisation member, the initial state preferably comprising values of the input parameters for each unitary component.

3. The device according to any one of the preceding claims, wherein the computing member is configured to evaluate operating properties of the railway system simulated, from values of the output parameters.

4. The device according to any one of the preceding claims, wherein the computing member is configured to evaluate an energy consumption of the railway system simulated, from values of the output parameters.

5. The device according to any one of the preceding claims, wherein the device includes a publishing unit (122) allowing an operator to define the model.

6. The device according to any one of the preceding claims, wherein the device includes a unit (126) for interpreting a results file (R) generated by the computing member (101) at the end of the simulation.

7. The device according to any one of the preceding claims, wherein the computing member is able to run an engine of the holistic type to simulate the evolution over time of the model.

8. A simulation method carried out by a simulation device according to any one of the preceding claims, characterized in that said method includes the following steps:

- storing a model (M) of the railway system, said model associating a unitary component (C1 to C8) with each agent resulting from a functional breakdown of the railway system to be simulated, each unitary component incorporating a model of the behaviour of the associated agent, having input parameters (E1 to E8) and delivering output parameters (S1 to S8), the output parameters of at least one unitary component being able to make up input parameters of another unitary component, each unitary component being characterized by a running period (p1 to p8) of the behaviour model that it incorporates; and

- simulating an evolution over time of the model (M) of the railway system from an initial state, by running the behaviour model of each unitary component with a periodicity corresponding to the running period that characterises it, using current values of the input parameters to calculate updated values of the output parameters.