CLAIMS

1. A cooperative vehicle-infrastructure system, comprising:

a road side facility;

a plurality of on-road vehicles; and

at least one map server corresponding to the plurality of on-road vehicles, wherein the road side facility includes a road side map processor deployed adjacent to the road side facility that is configured to load peripheral road network information of the road side facility, the road side map processor converting absolute elevation information of a plurality of roads around the road side facility into road side map-based relative elevation representations according to the peripheral road network information of the road side facility, the road side map-based relative elevation representation being used for describing a spatial location relationship between the plurality of roads around the road side facility, wherein the road side map processor is configured to perform perception positioning of a traffic object by detecting the traffic object using a camera or radar module and, after the detecting, converting an absolute elevation of the traffic object to a road side map-based relative elevation representation according to the peripheral road network information of the road side facility, wherein the traffic object is different from the plurality of on-road vehicles;

the plurality of vehicles each comprising a map processor that is configured to load the peripheral road network information of the plurality of vehicles, the map processors converting absolute elevation information of a plurality of roads around the vehicle into the map-based relative elevation representations according to the peripheral road network information of the vehicle, the map-based relative elevation representation being used for describing a spatial location relationship between the plurality of roads around the vehicle; and

the at least one map server communicating with the road side map processor and the map processors, updating and maintaining a conversion relationship between the road side map-based relative elevation representation and the map-based relative elevation representation of the same road, and synchronizing an updated conversion relationship to the map processors,

wherein the plurality of roads around the road side facility are represented by directed road sections in the peripheral road network information of the road side facility, and

wherein a road side elevation representation in the road side map processor is different than a road side elevation representation in an onboard processor of a vehicle from the plurality of vehicles

for a same directed road section from the plurality of roads.

2. The system according to claim 1, wherein the plurality of vehicles, communicate with the at least one map server, and

the road side map processor is in communication with the at least one map server, and when a road side map-based relative elevation representation of a designated road is updated in the road side map processor, the road side map processor transmits an updated relative elevation representation of the designated road to the at least one map server.

3. The system according to claim 2, wherein each road comprises a corresponding identifier that is consistent in both the map processors of the plurality of vehicles and the road side map processor.

4. The system according to claim 2, wherein the designated road refers to a road whose road side map-based relative elevation representation has been updated, and comprises a newly added road or an existing road in the road side map processor.

5. The system according to claim 1, wherein the road side map processor determines the road side map-based relative elevation representation of each of the plurality of roads around the road side facility according to a preset first relative elevation representation rule, wherein the first relative elevation representation rule is used for describing a manner of determining the relative elevation representation of each road according to the spatial location relationship between the plurality of roads around the road side facility, and the relative elevation representations corresponding to the plurality of roads are different from each other.

6. The system according to claim 5, wherein a direction of the directed road section is used for representing a driving direction of a lane, the directed road section is formed by two road section nodes, and a center of the directed road section represents a road reference point on the directed road section.

7. The system according to claim 6, wherein a relative elevation representation of a road section endpoint of the directed road section is the same as a relative elevation representation of the road reference point on the directed road section, and in a case that at least two directed road sections in the same direction have road section nodes with overlapping longitude and latitude locations, the road section nodes with overlapping longitude and latitude locations have at least two relative elevation representations.

8. The system according to claim 1, wherein the map processor determines the map-based relative elevation representation of each of the plurality of roads around the vehicle according to a

preset second relative elevation representation rule, wherein the second relative elevation representation rule is used for describing a manner of determining the relative elevation representation of each road according to the spatial location relationship between the plurality of roads around the vehicle, and the relative elevation representations corresponding to the plurality of roads are different from each other.

9. The system according to claim 8, wherein the second relative elevation representation rule is transmitted by the map server to the map processor, wherein the map server does not notify the road side map processor in a case that the map server has updated the second relative elevation representation rule, but directly updates the conversion relationship corresponding to the same road, and synchronizes an updated conversion relationship and an updated second relative elevation representation rule to the map processor.