W3C Workshop on Web Standardization for Graph Data. *ETSI ISG CIM* elevator pitch

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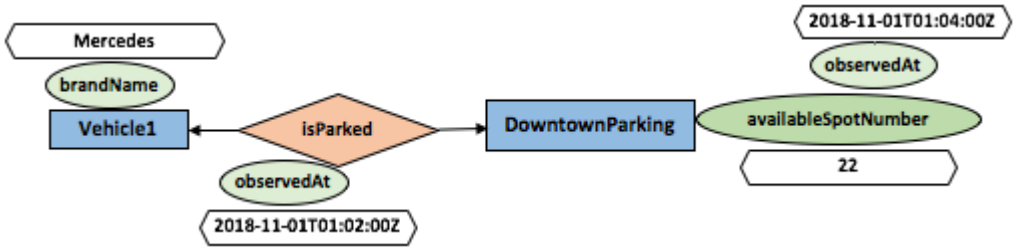
This summary outlines the consensus view and contribution of the ETSI ISG CIM (Context Information Management) to the W3C Workshop on Graph Data. *ETSI ISG CIM* is very interested in **collaborating** with W3C and the linked data community to interoperate more and make it easier for diverse systems to reliably publish and discover information[1].

Our main contribution is NGSI-LD, an information model, representation format and open API intended to make it easier for end-users, IoT devices, open data sources (for example in smart city) and 3rd-party applications to exchange information. The information model, grounded on RDF, leverages the **Property Graph** information model. The representation format chosen is **JSON-LD**, while the open API has been defined using **HTTP REST** bindings.

The NGSI-LD information model is comprised of *Entities*, *Properties* and *Relationships*. Properties and Relationships can be the subject of other Properties or Relationships, defining in practice a Property Graph. NGSI-LD has defined a **JSON-LD** representation for such property graphs. The figure below shows an instantiated example of the NGSI-LD information model, together with the corresponding JSON-LD representation. It conveys that there is an instance of an entity of type *Vehicle* which is parked at a certain parking garage (entity of type *OffStreetParking*). Different properties of these entities are provided and additional Properties of Properties and Properties of Relationships are described.




```
{
  "id": "urn:ngsi-ld:OffStreetParking:DowntownParking",
  "type": "OffStreetParking",
  "availableSpotNumber": {
    "type": "Property",
    "value": 22,
    "observedAt": "2018-11-01T01:02:00Z"
  },
  "@context": [
    "http://uri.etsi.org/ngsi-ld/v1/ngsi-ld-core-context.jsonld",
    "http://example.org/ngsi-ld/parking-context.jsonld"
  ]
}
```

```
{
  "id": "urn:ngsi-ld:Vehicle:Vehicle1",
  "type": "Vehicle",
  "brandName": {
    "type": "Property",
    "value": "Mercedes"
  },
  "isParked": {
    "type": "Relationship",
    "object": "urn:ngsi-ld:OffStreetParking:DowntownParking",
    "observedAt": "2018-11-01T01:04:00Z"
  },
  "@context": [
    "http://uri.etsi.org/ngsi-ld/v1/ngsi-ld-core-context.jsonld",
    "http://example.org/ngsi-ld/vehicle-context.jsonld"
  ]
}
```

Our contribution demonstrates the feasibility of representing Property Graphs in JSON-LD. Property Graphs require the ability to express properties about relationships, which corresponds to making statements about triple-based statements in RDF. As the RDF triple structure does not allow the attachment of information directly to properties or to complete statements, some form of reification is required. We have chosen to use the reification approach based on **blank nodes** to which additional information can be attached. When using a JSON-LD representation, the blank nodes are not directly visible, so this additional structural element can be hidden. We consider this to be a developer-friendly representation, as the developer is not exposed to elements only required for structural reasons.

[1] This summary, as well as links to whitepapers and specifications, is available at https://portal.etsi.org/CIM/OPEN