



- Sharing data by means of a Local Dynamic Map

Definition of LDM

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o A C-ITS

is a subset of the overall ITS that communicates and shares data between ITS applications and between ITS Stations ^[1] to give advice or take actions with the objective of improving safety, sustainability, efficiency and comfort beyond the scope of stand-alone ITS.

[1] ITS Station defined in ETSI EN 302 665 and ISO 21217, e. g. units installed in vehicles, at the road side, in traffic control / management centres, in service centres, or in hand helds.

o C-ITS is best described in terms of ITS services ^[2] and ITS applications ^[2] rather than the hardware or software used to instantiate them.

[2] ITS services and ITS applications are defined in ISO 21217

o C-ITS have the following features:

- a common reference architecture
- the sharing of data between different ITS applications in any ITS station or in a single ITS station
 - this feature is provided by at least two standardized means:
 - publish / subscribe mechanism at the ITS-S facilities layer [CENISO TS 17429],
real-time distribution of messages received by ITS-S application processes - no storage.
 - Local Dynamic Map [CEN ISO EN 18750], [ETSI EN 302 895],
storage of LDM data objects for a given lifetime.
- the sharing of resources by applications in an ITS station
- the authorized use of information for purposes other than the original intent
- the support of multiple applications

- LDM: conceptual data store which is embedded in an ITS station containing topographical, positional and status information within a dedicated geographic area of interest
- Two non-conflicting definitions of LDM are known:
 - [CEN ISO EN 18750 Definition of a global concept for Local Dynamic Maps]
 - ✓ entity consisting of LDM data objects, services and interfaces for manipulating these LDM data objects
 - [ETSI EN 302 895]
 - ✓ facilities layer data store for storing LDM Data Objects that are time-stamped and location referenced

○ A typical LDM consists of subsystems, e.g.

- LDM management
 - content synchronizing and updating in and between LDMs
- LDM Data Storage
- LDM Security
- LDM Content Integrity
 - maintaining data integrity and quality, and decision rules on conflicting data
- LDM SAPs/Data access
 - interface for writing elements into and retrieving elements from the data storage

○ Entries in an LDM are related to a real object and consist of:

- Geo reference
(where is the object)
- Time reference
(when exists the object)
- Object type
(what is the object, e.g. a car, black-ice area, ...)
- LDM Data Object (information details, may be empty)
- Optional quality measure of information
 - raw / fused data
 - source is a trusted authority or not
 - expected lifetime, ...

- An LDM may be considered to be an overlay of a digital road map, but it does not necessarily need to be combined with a digital road map.
- For visualization purposes, mapping on a road map is beneficial for a human user.
- For road-safety applications, mapping on a road map may be necessary to achieve the purpose, e.g. collision avoidance.
- The mapping of LDM Data Objects to a digital road map is not the task of the LDM, but has to be performed by the digital road map.

O The meaning of "local" in LDM depends on the usage:

- collision avoidance: short distance around my car, mainly in driving direction, given by speed of a car.
- infrastructure purposes: area of significant size given by context, e.g. a street, a road network, a city, a region, ...

O The meaning of "dynamic" in LDM depends on the usage:

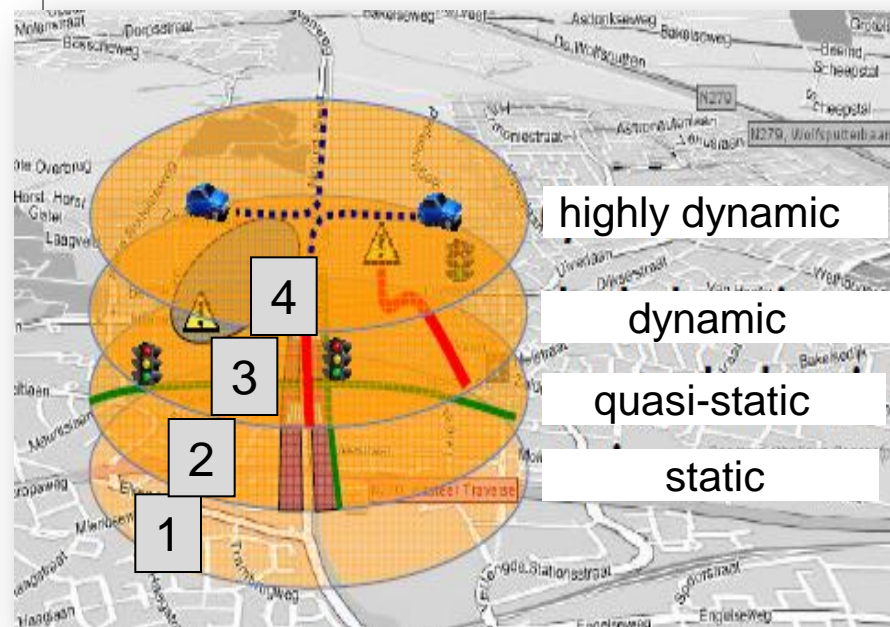
- collision avoidance: lifetime of objects is given by speed of traffic. Updates may be necessary several times a second.
- infrastructure purposes: time span of significant size given by context, e.g. minutes, hours, days, weeks, ...

LDM implementations with quite different capabilities are needed:

- small memory and very low latency in queries
- big memory and almost no time constraints

Layer Relations:

- Layer 4
Highly dynamic data
**CEN/TC278 and ISO/TC204,
ETSI TC ITS**
- Layer 3
Dynamic data
**CEN/TC278 and ISO/TC204,
ETSI TC ITS**
- Layer 1 and layer 2
Static data and quasi-static data
ISO/TC204



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