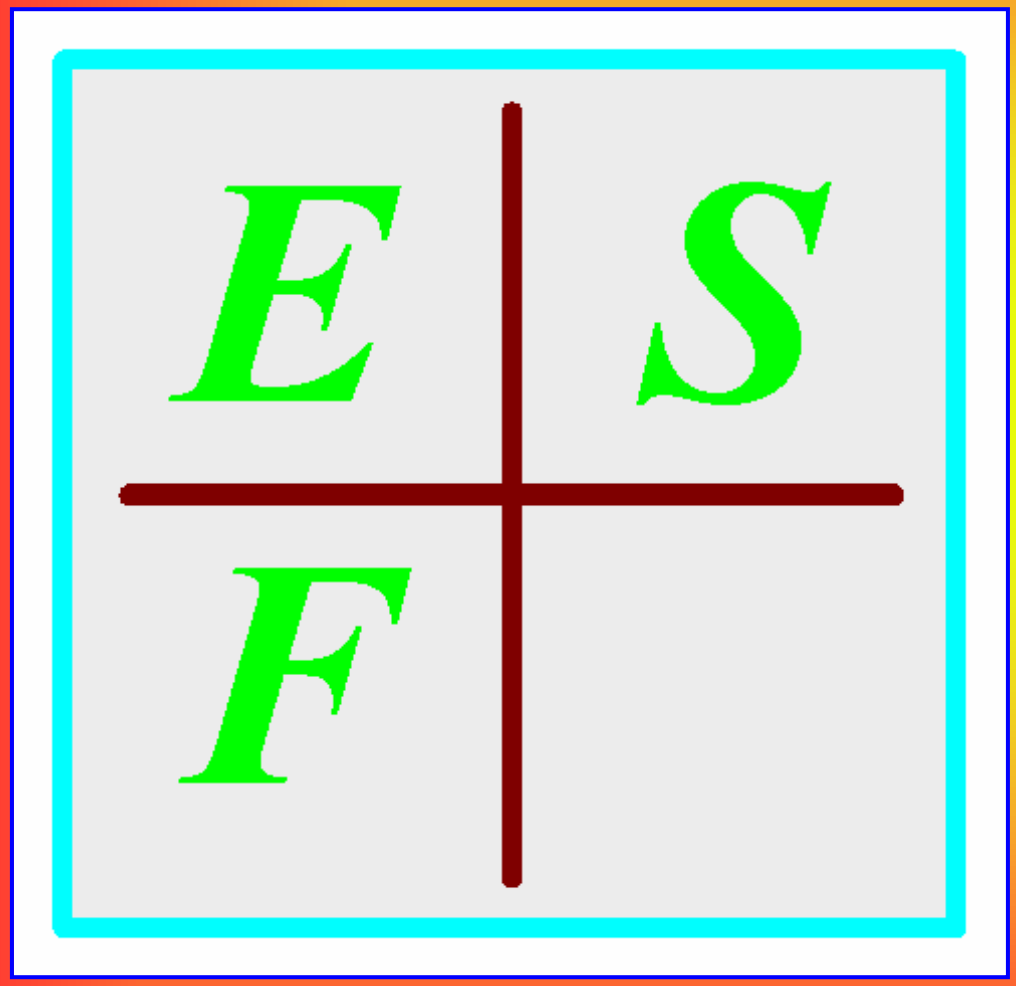

Tutorial for IEEE

ISO CALM Lower Layers and FAST mode

November 2006, Dallas

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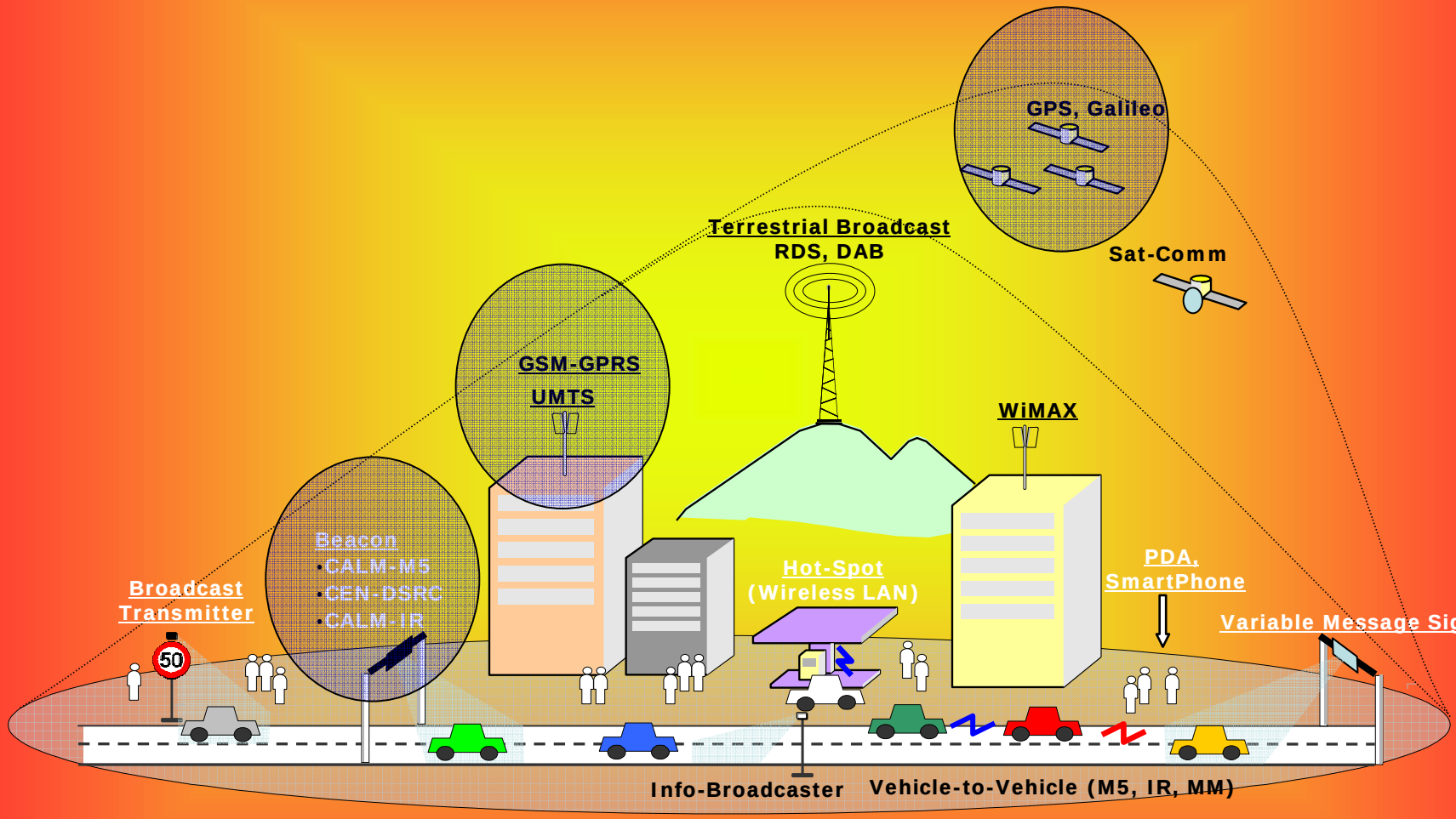
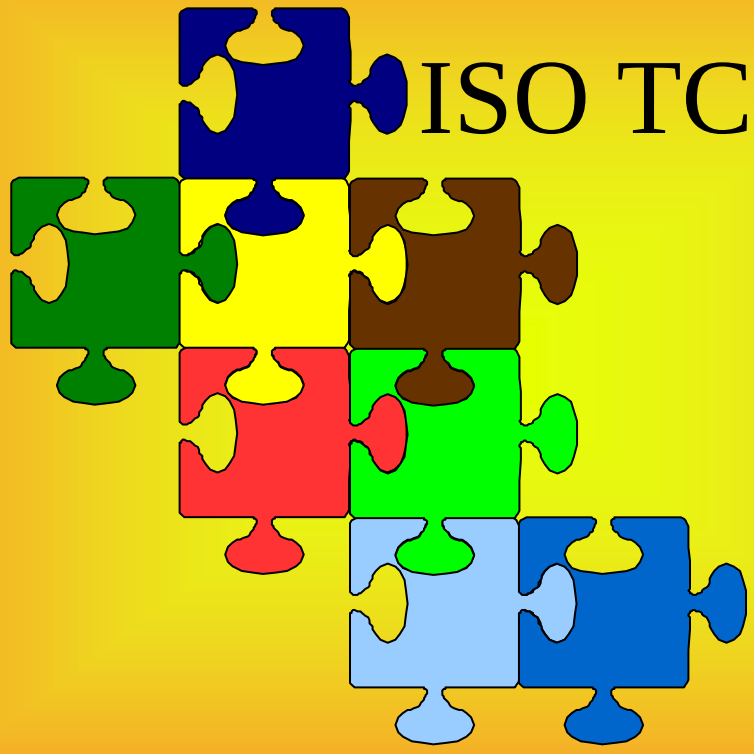
Communications Architecture for Land Mobile environment

CALM Architecture



Putting puzzles together



ISO TC204 WG16

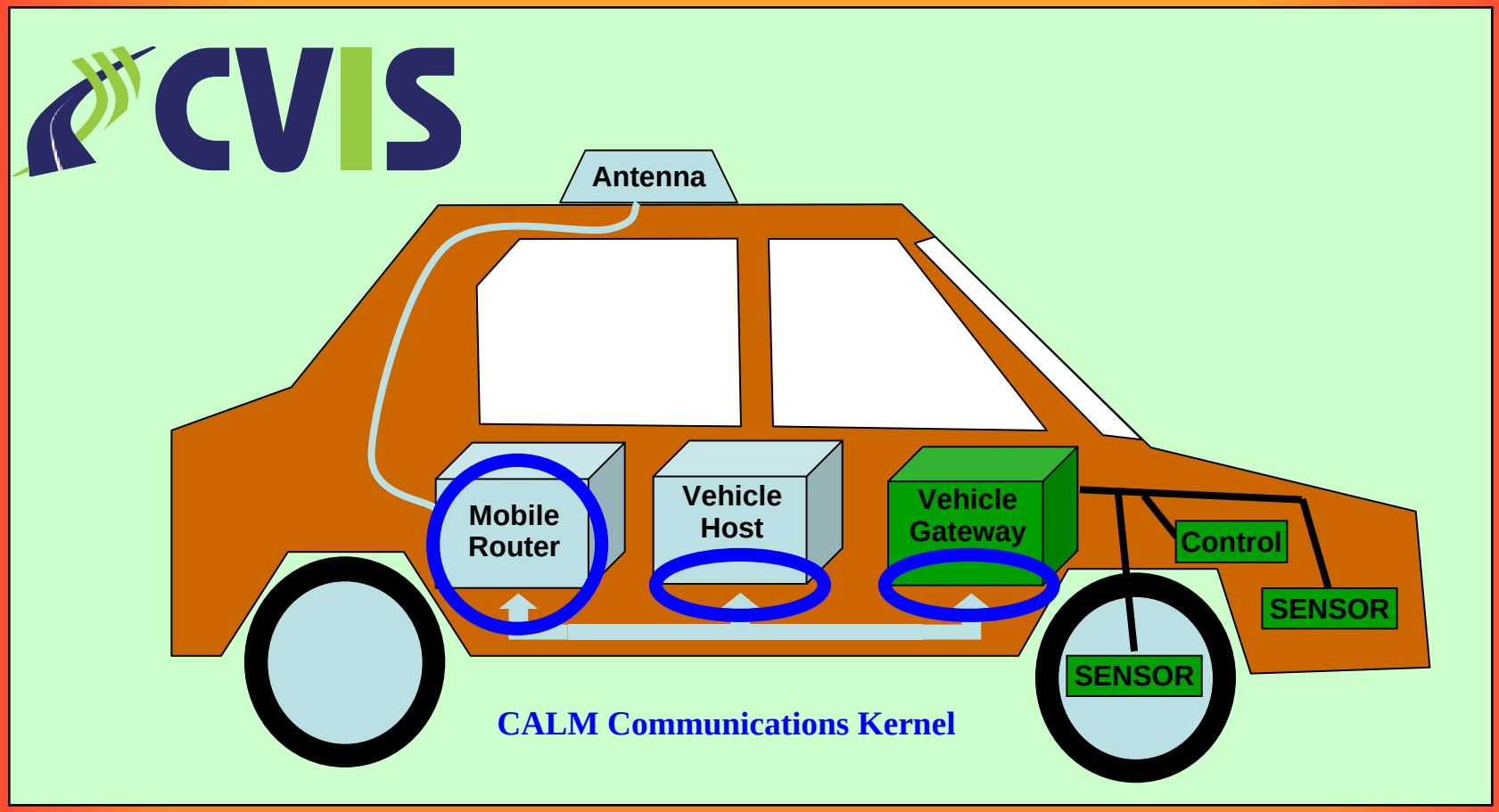
EU project CVIS

Content

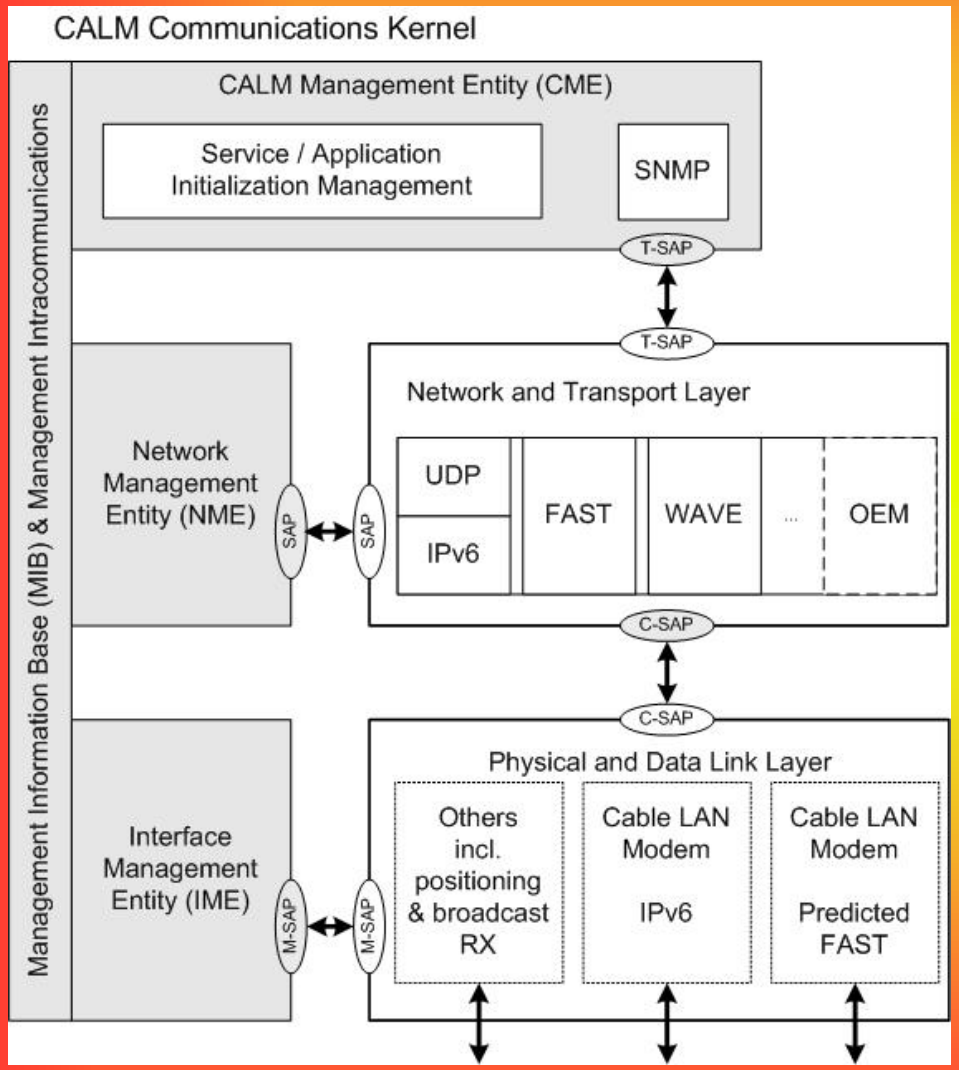
- CALM Communications Kernel
- The concept of "Virtual Interfaces"
- CALM Management Entity
- FAST Communications Scenarios
- FAST Services
- FAST DLL and Networking Details

CALM
Communications Kernel

CVIS Vehicle System



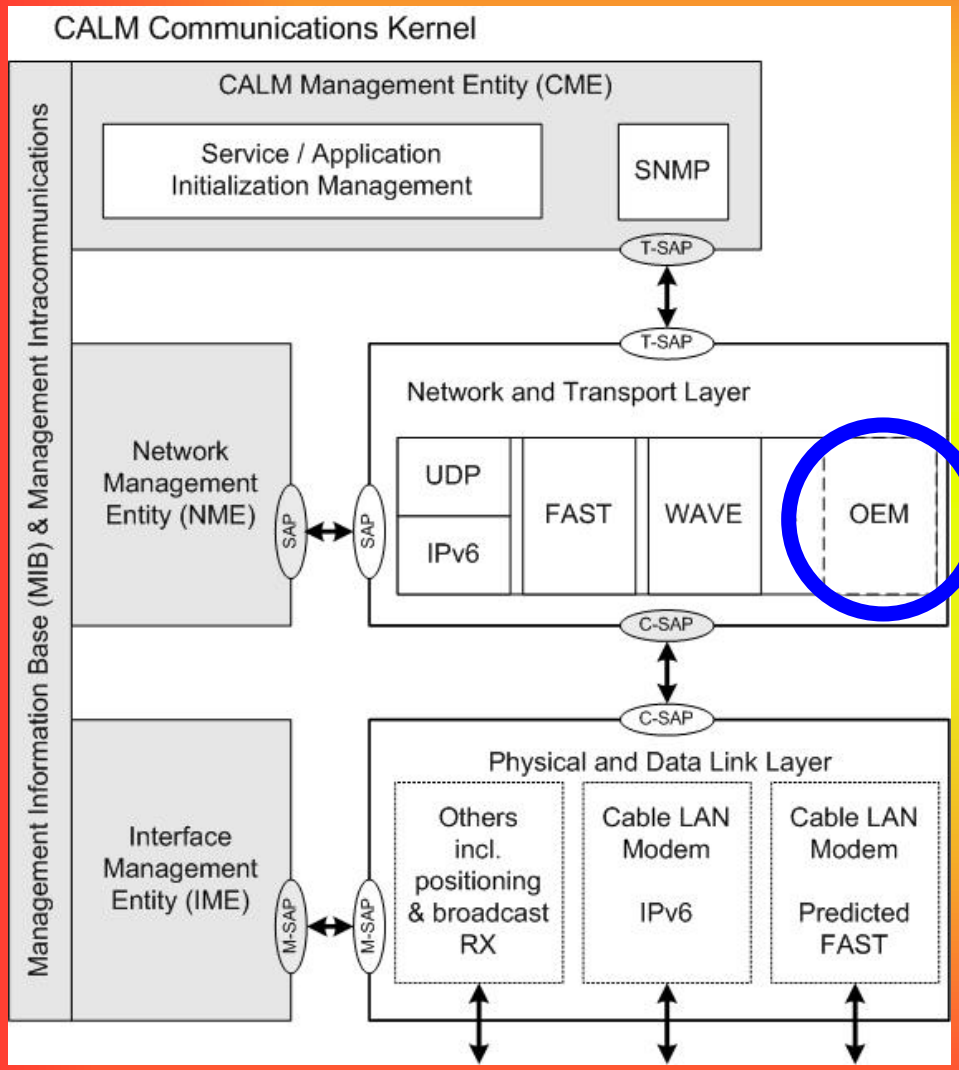
CALM Communications Kernel



The CCK constitutes a CVIS mobile router.

The CCK is part of every CVIS host.

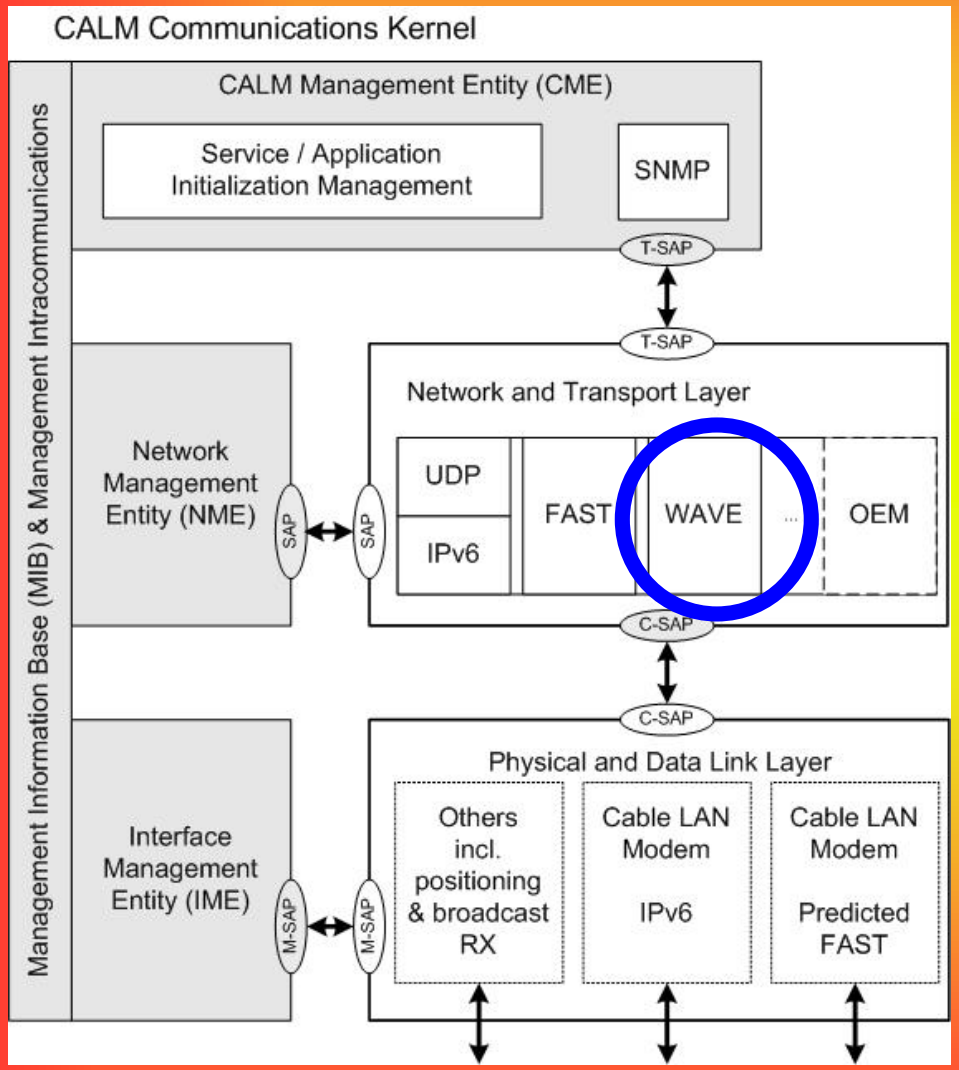
CALM Communications Kernel



Car-to-Car Communications Consortium Network

The CCK constitutes a CVIS mobile router.
The CCK is part of every CVIS host.

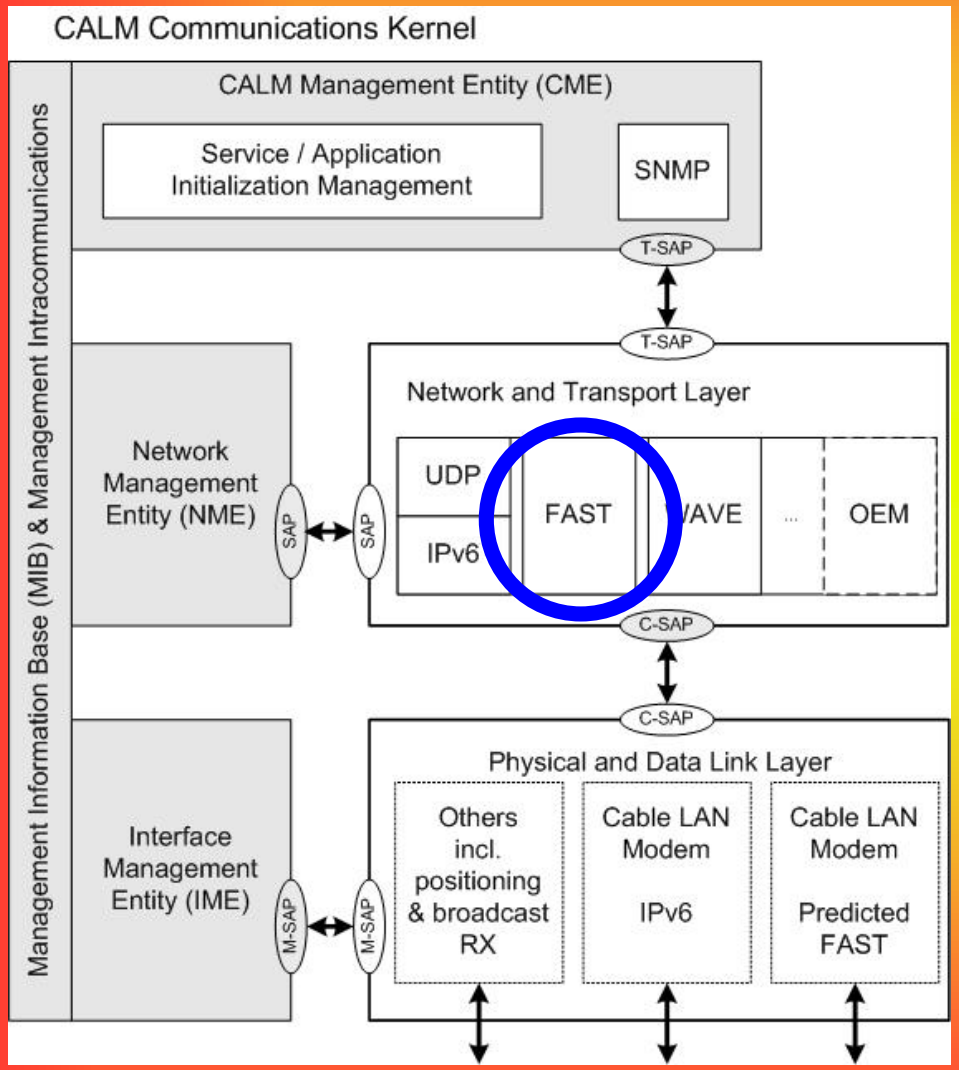
CALM Communications Kernel



WAVE Network

As specified in IEEE P1609.3

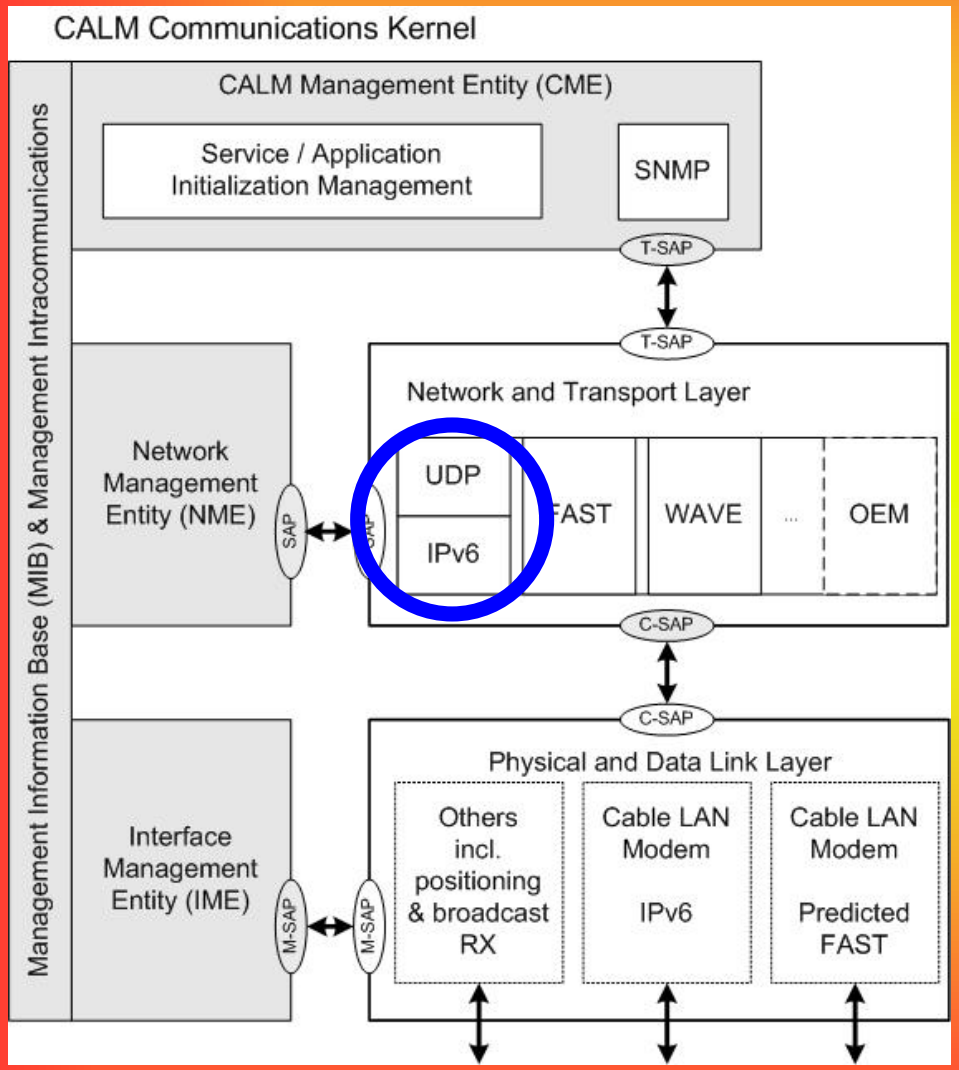
CALM Communications Kernel



ISO CALM FAST Network

It is intended to harmonize WAVE and CALM FAST as much as possible!

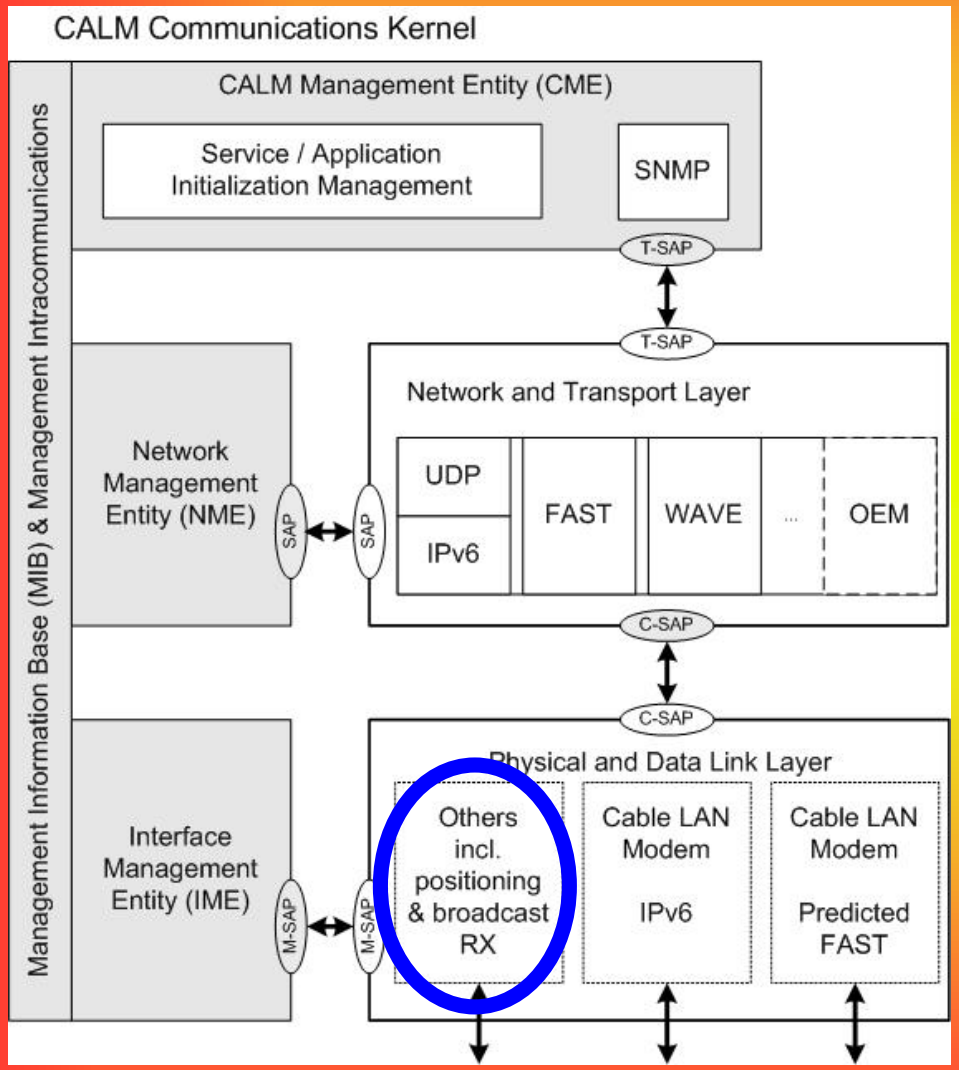
CALM Communications Kernel



ISO CALM IPv6 Network

Developed in cooperation with IETF

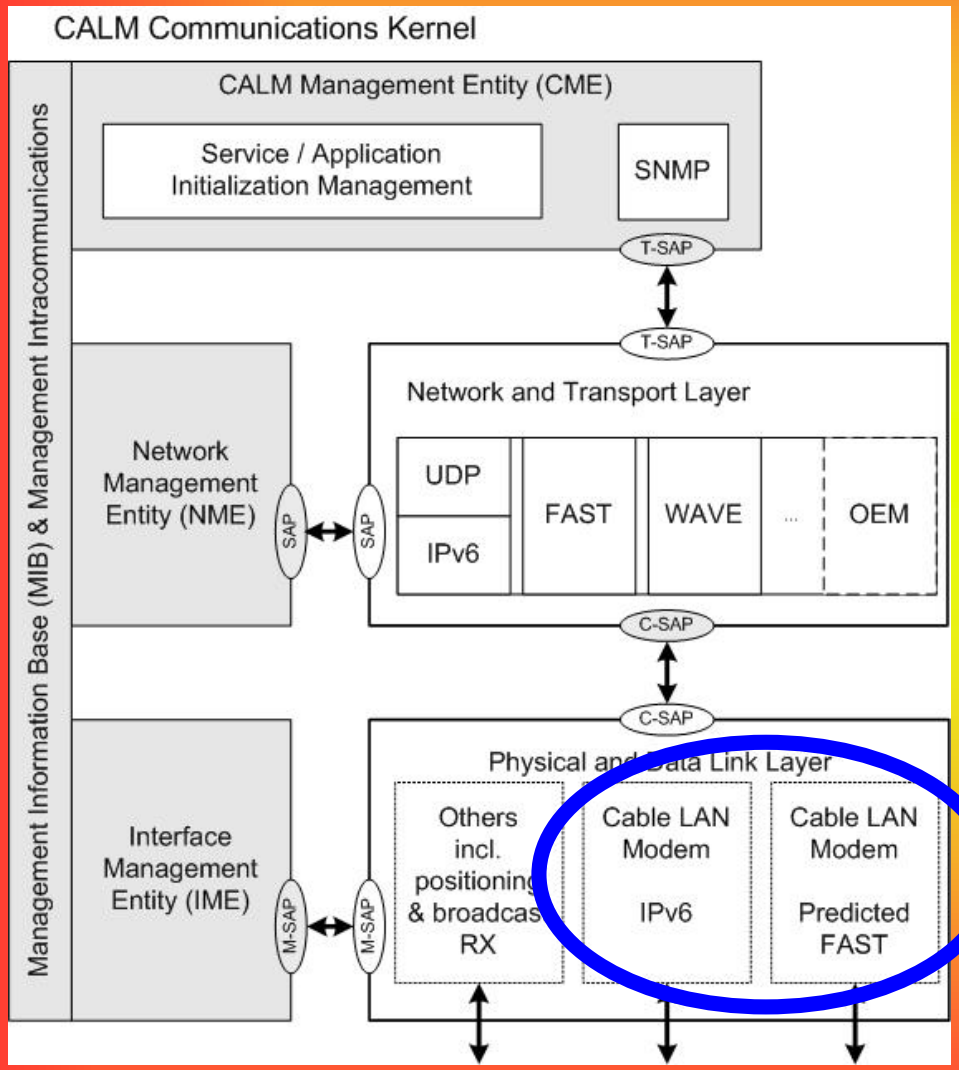
CALM Communications Kernel



Such as:
G2 / G3, WiMax, ...
CALM-M5 /-MM /-IR
WAVE IEEE P1609.4 – 802.11p
...
Broadcast receivers
GPS / GALILEO
...
Bluetooth

Wireless Communications Interfaces

CALM Communications Kernel



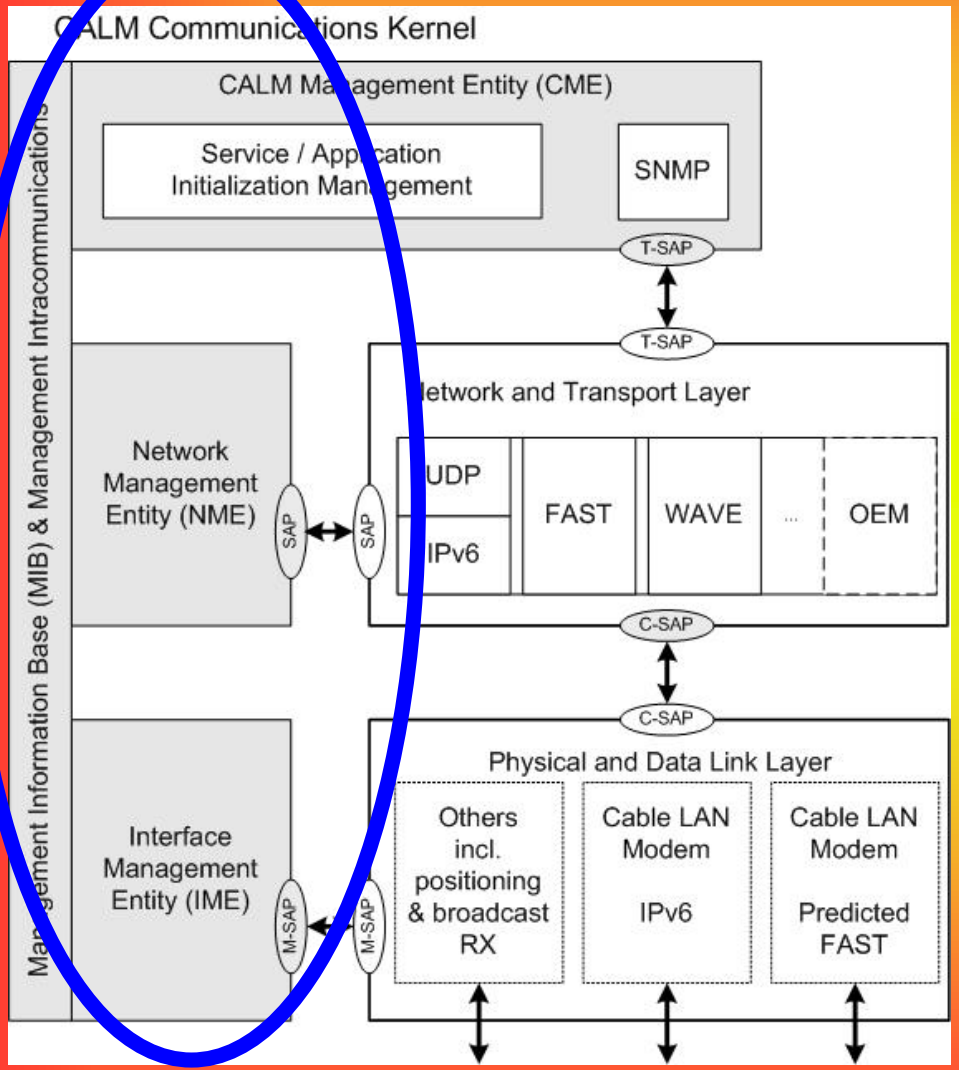
Technology not defined so far:

- IP based network
- predicted FAST network

Wired Communications Interfaces – In-car LAN

CALM Communications Kernel

Station Management



- **CME**
  (supervisor and adjuncts)
  > SNMP
  > Service Initialization
  see P1609.4 WSA

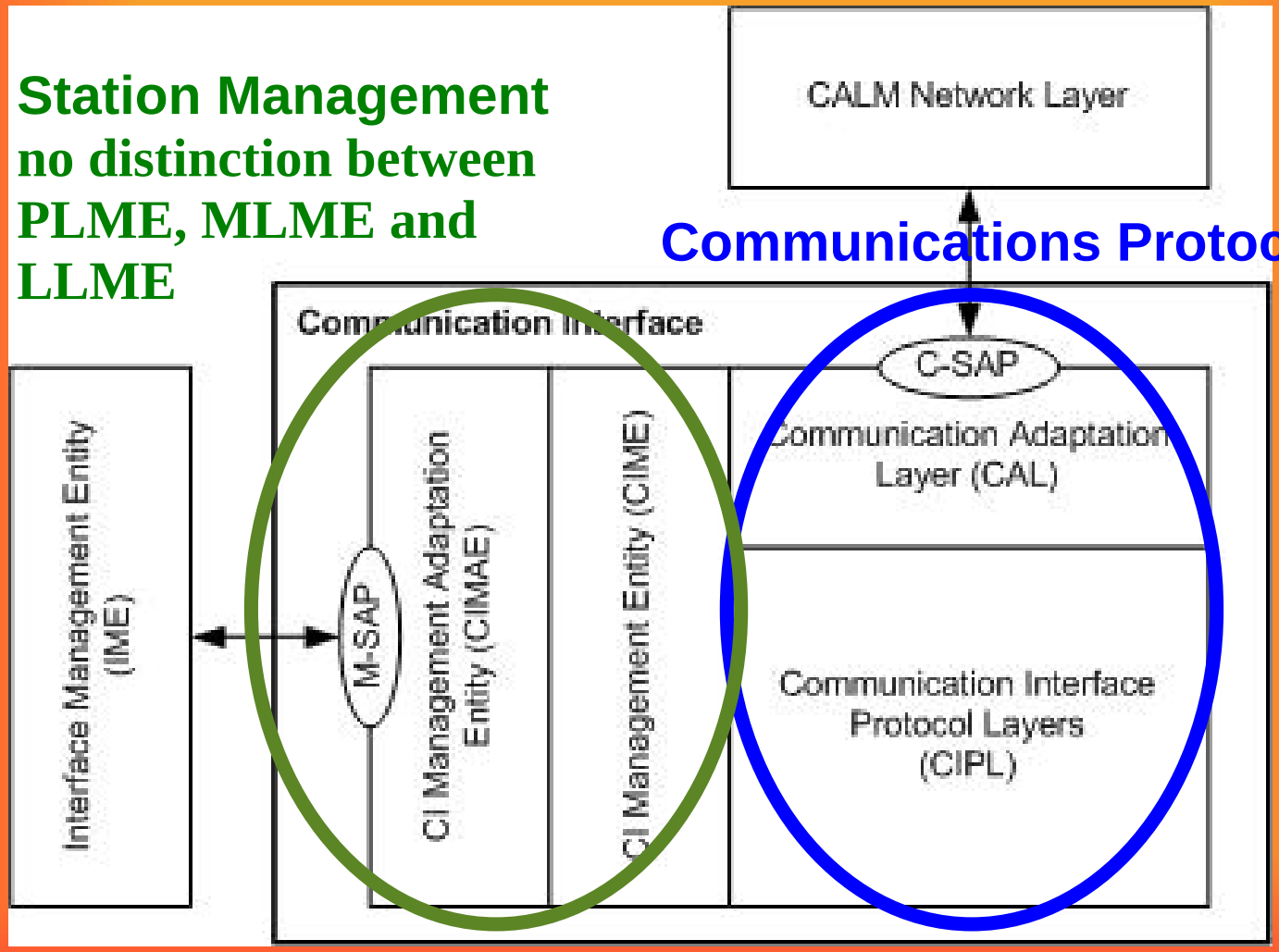
- **NMEs**
  > Routing

- **IMEs**
  > Virtual Interfaces

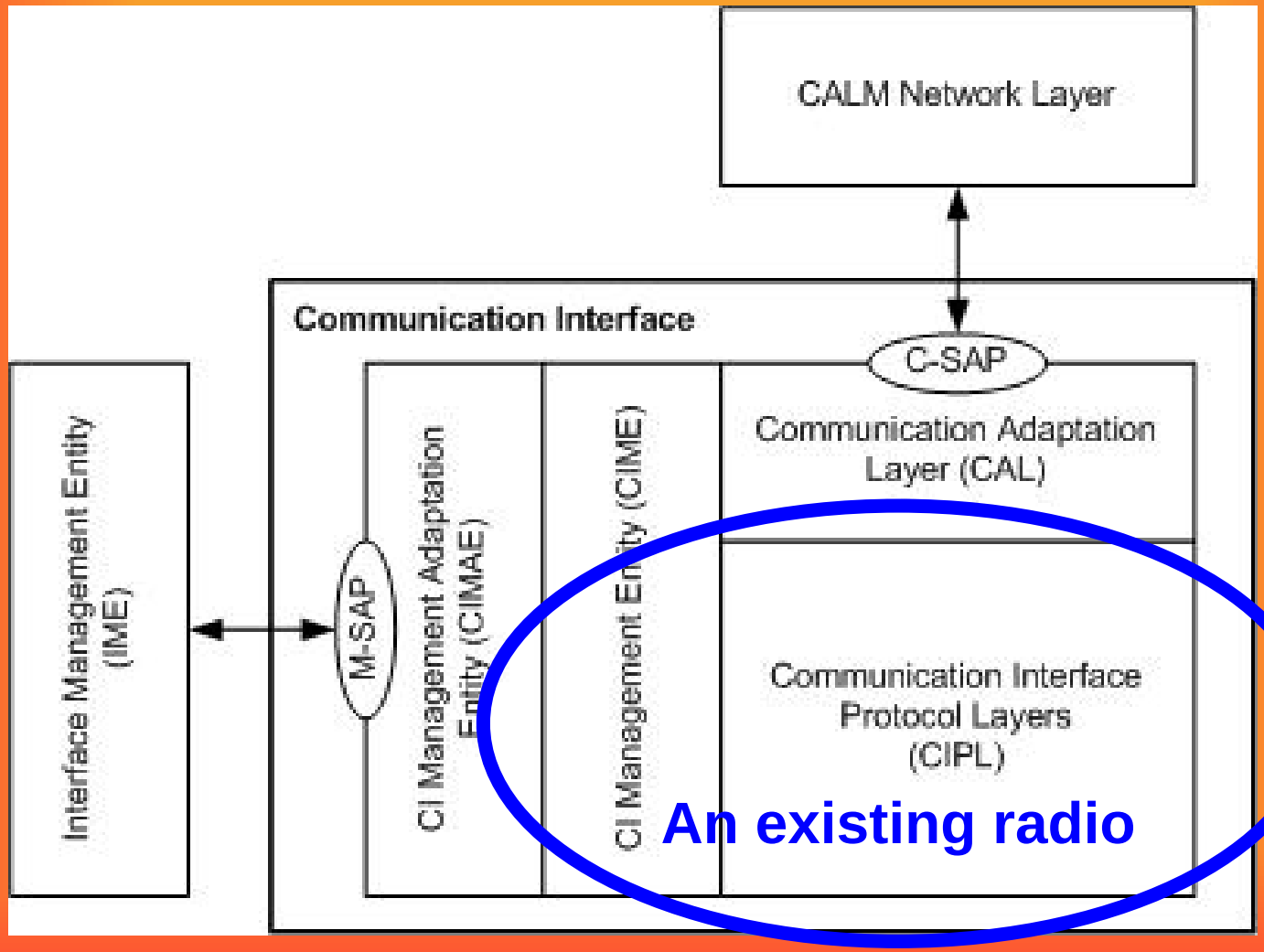
CALM
Communication Interface (CI)

CALM communication interface wired / wireless

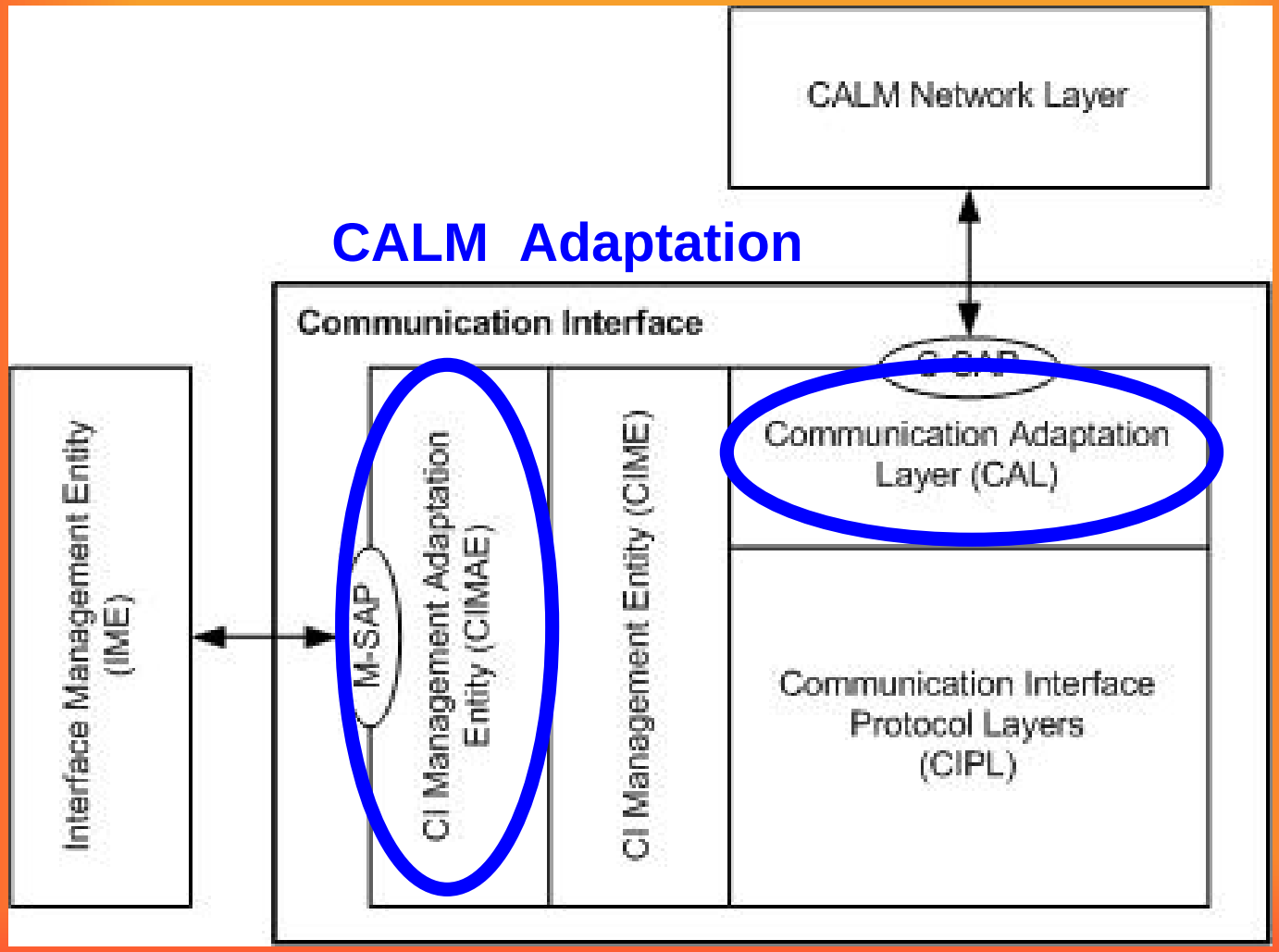
Station Management
no distinction between PLME, MLME and LLME



CALM communication interface wired / wireless



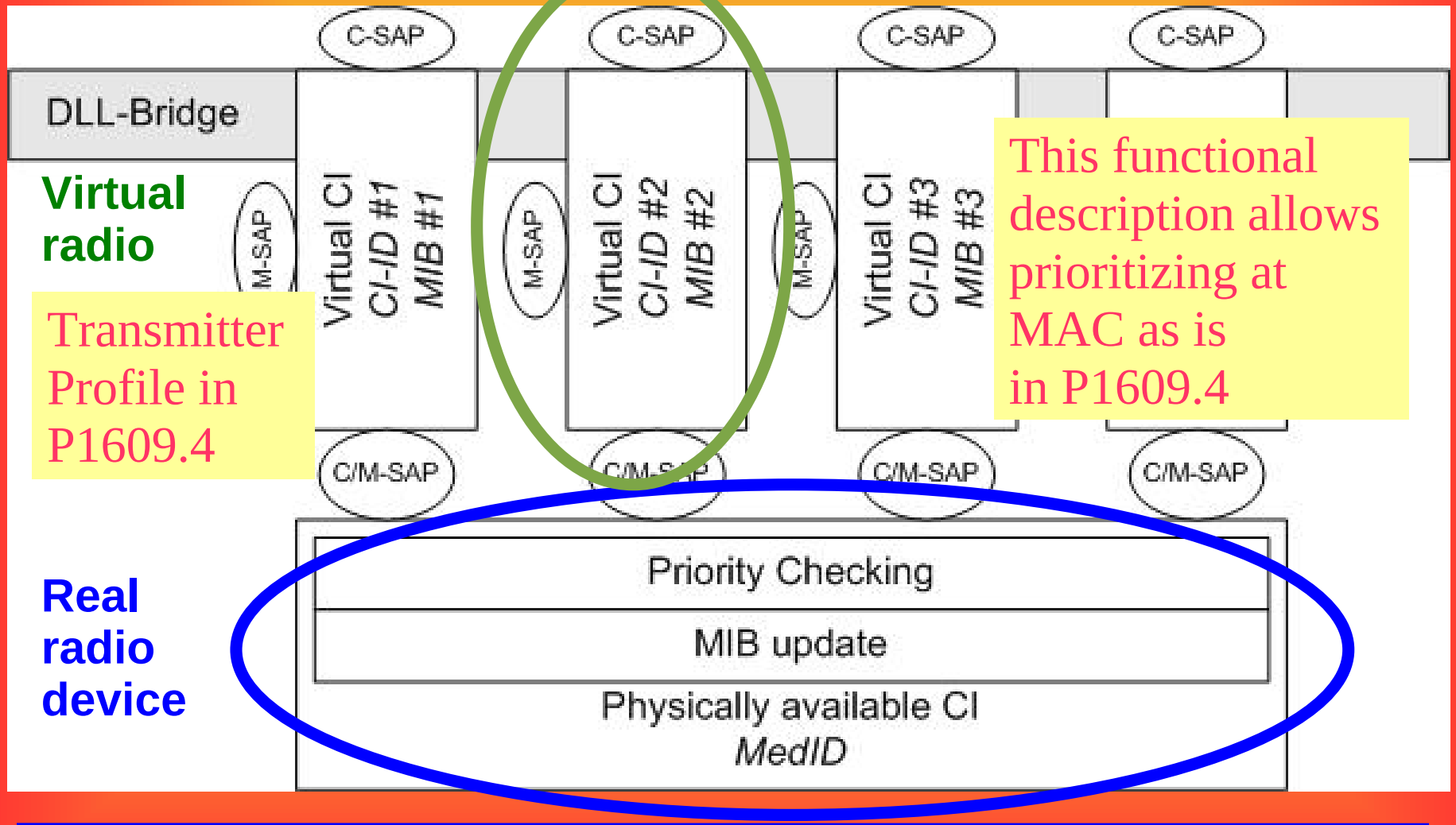
CALM communication interface wired / wireless



CALM Virtual CI

CALM Virtual CI

Compare with MAC channel coordination in P1609.4



Transmitter Profile in P1609.4

This functional description allows prioritizing at MAC as is in P1609.4

CI Identifier

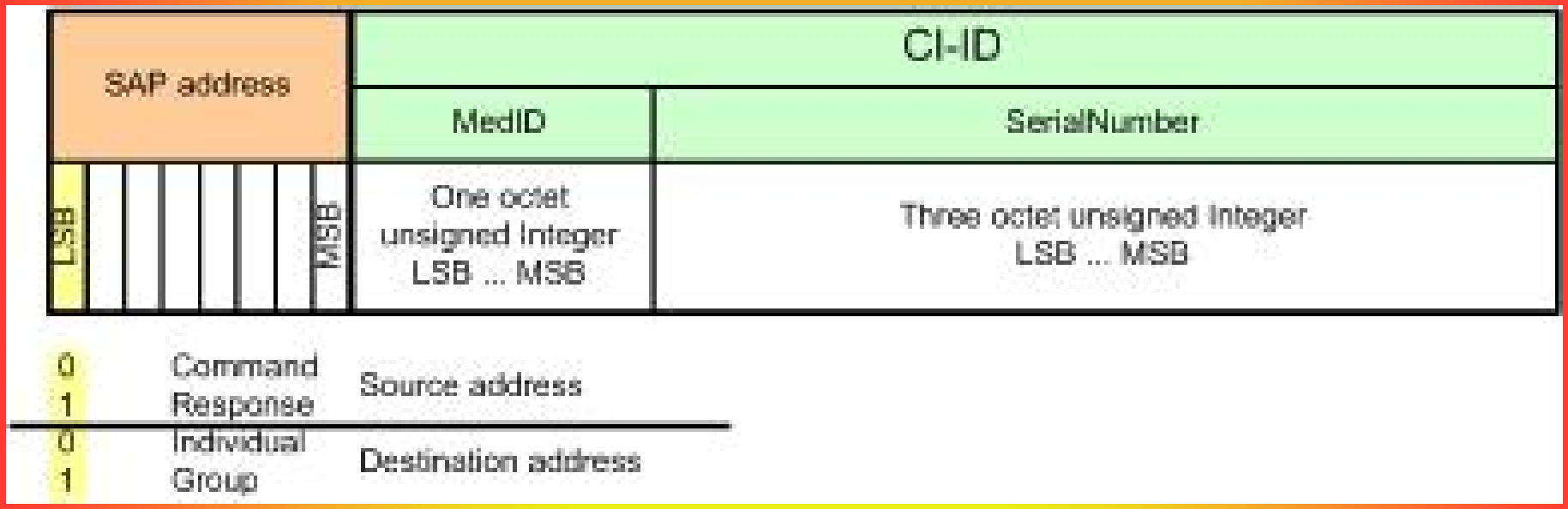
CI-ID	
MedID	SerialNumber
One octet unsigned Integer LSB ... MSB	Three octet unsigned Integer LSB ... MSB

MedID: Randomly assigned unique identifier of medium, e.g. IR, M5, MM, G2 / G3, ...

SerialNumber:
- 0 - physically available CI
- >0 - virtual instance of CI

CALM Communications SAP

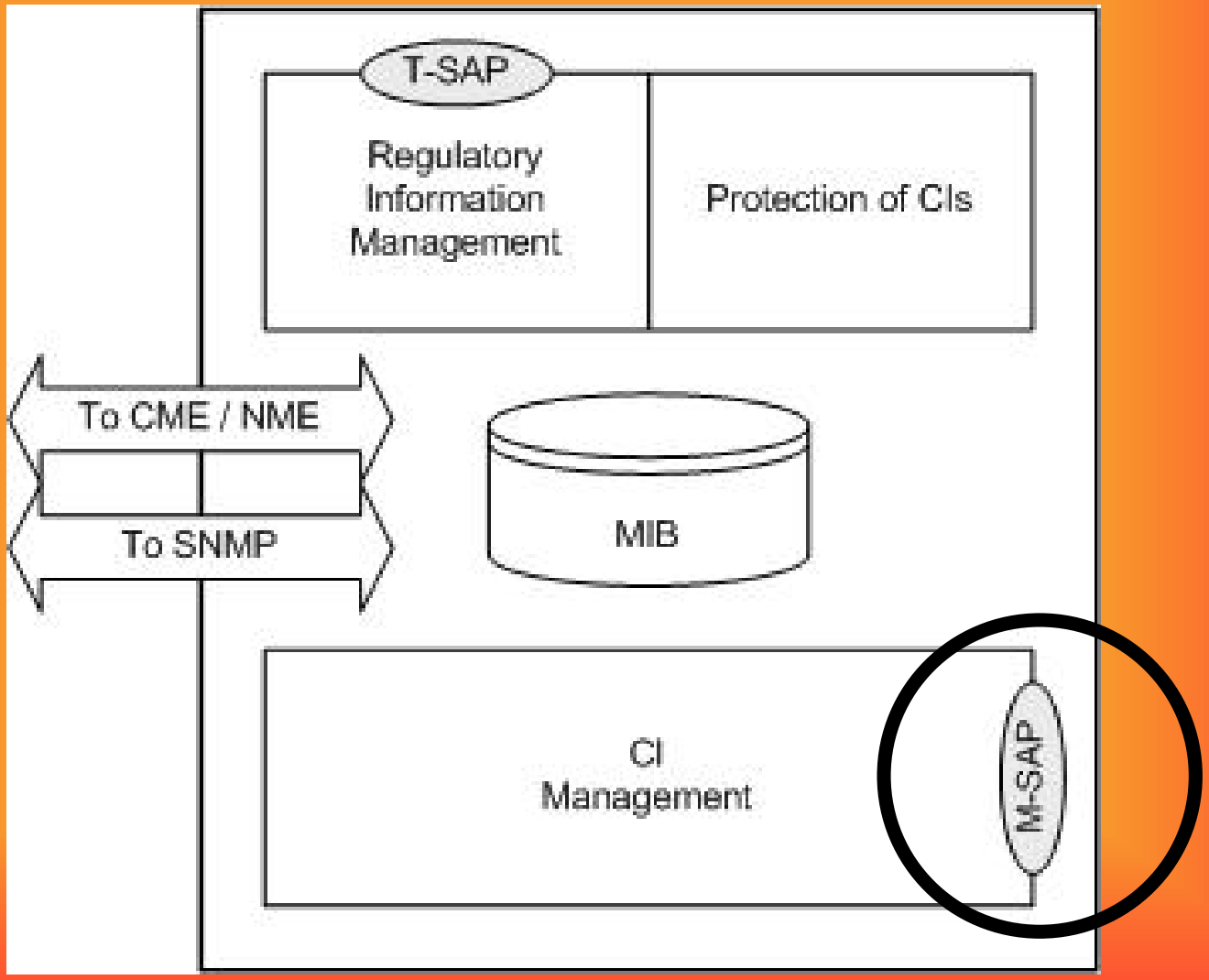
Addressing in DL-UNITDATA service



SAP address: Used to identify the used / select the required networking protocol, e.g. IPv6, FAST IPv6, CALM FAST, WSMP, position based addressing, OEM, ...

CALM
Interface Management Entity

CALM Interface Management Entity



CALM
CI Management SAP

CALM management services
Set parameters

CIMAE-**SETPARAM.request** (
CI-ID,
Sequence of Param
)

Used also to trigger action at Communication Interface.

CIMAE-**SETPARAM.confirm** (
CI-ID,
Sequence of Result OPTIONAL
)

CALM management services
Get parameters

CIMAE-**GETPARAM.request** (
CI-ID,
Sequence of Param.No
)

CIMAE-**GETPARAM.confirm** (
CI-ID,
Sequence of Param
)

Param.No = 255 used for error notification

CALM management services
Get parameters

Param	SEQUENCE (SIZE (1..255)) OF SEQUENCE { Param.No INTEGER(1..255), Param.Value OCTET STRING	parameter number syntax and semantics depends on }
parameter		
Result	SEQUENCE (SIZE (1..255)) OF SEQUENCE { Result.No INTEGER(1..255),	parameter number for which Result.Code
applies		Result.Code Enumeration
	0: SUCCESS }	1-5: specified failures 6-255: reserved for future use

Used in CIMAE-SETPARA.confirm

CALM management services SERVICE parameters

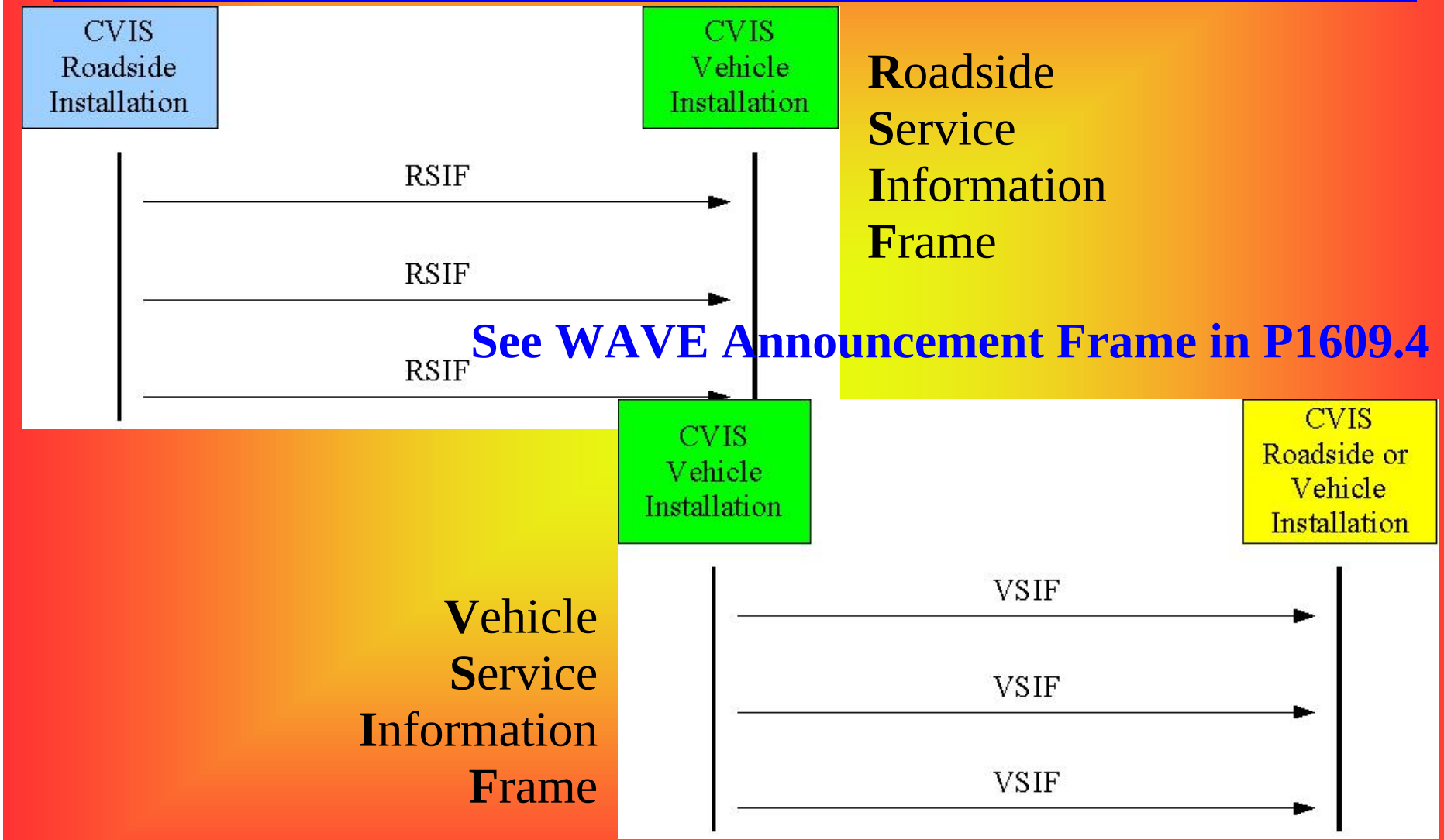
CIMAE-**SERVICE**.**request** (
CI-ID,
<medium specific parameters>
)

CIMAE-**SERVICE**.**confirm** (
CI-ID,
<medium specific parameters>
)

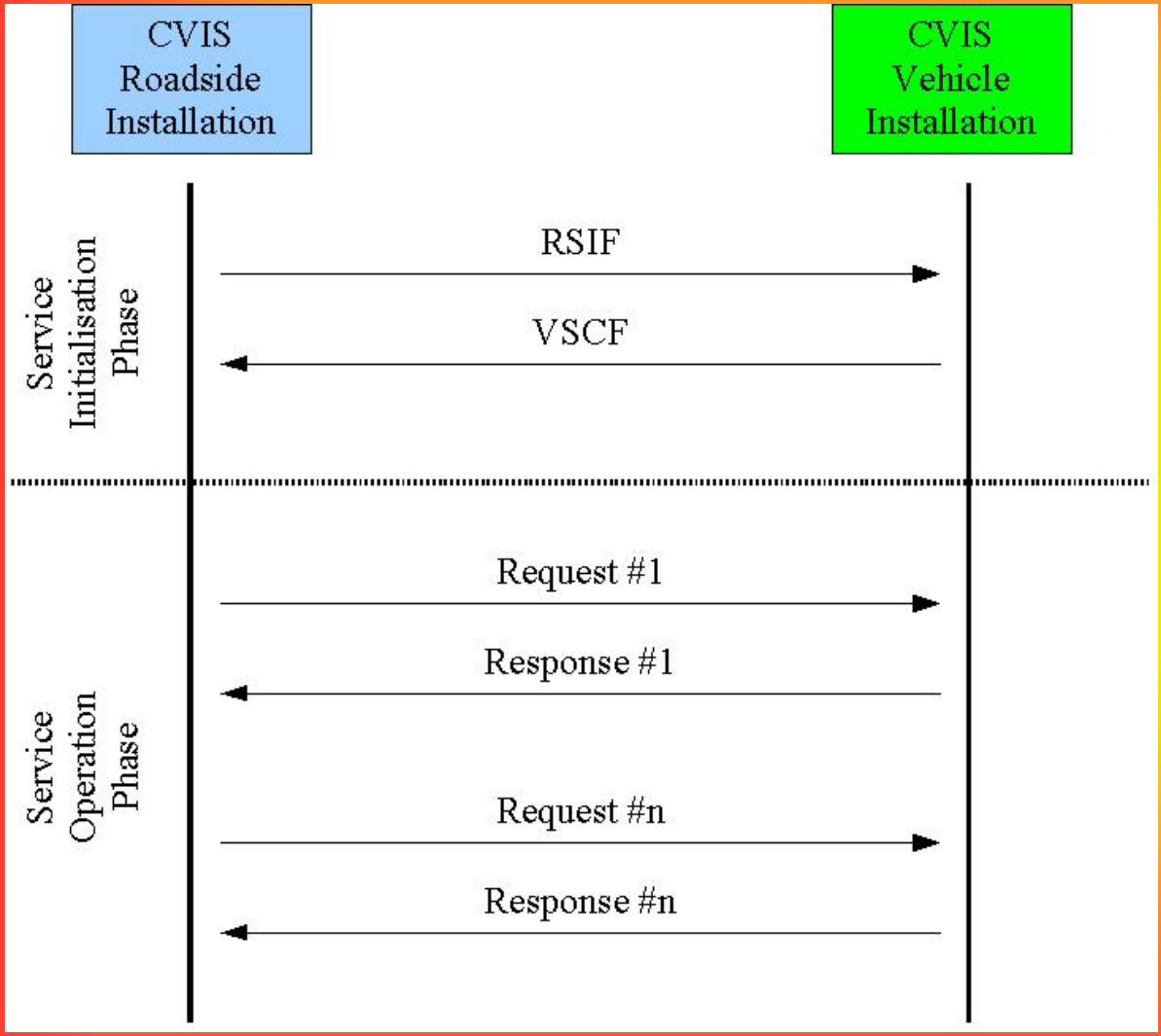
Medium-specific management service. Enabling future media with specific management needs.

CALM FAST scenarios

CALM FAST broadcast



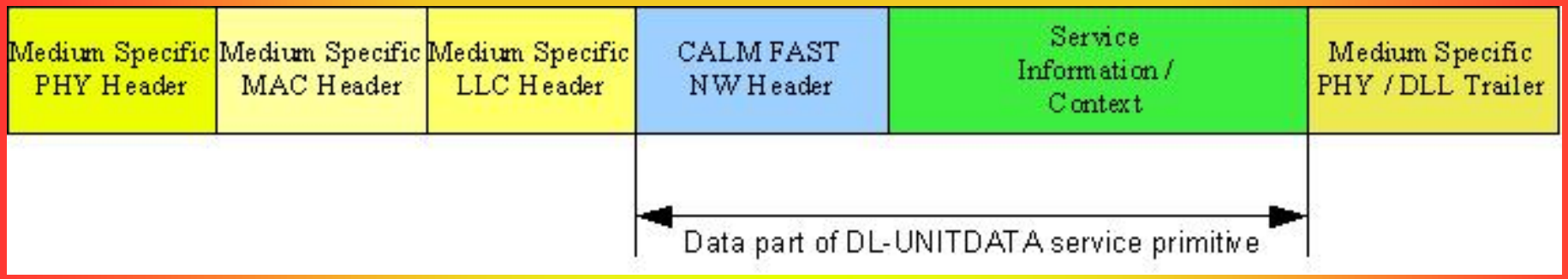
CALM FAST exchange of data



Vehicle
Service
Context
Frame

CALM FAST frame details

CALM FAST mode
Service Information Frame



Instead of the CALM FAST NW header, a NW header for other FAST protocols, such as WSMP, can be applied.

CALM FAST mode
Service Information / Context details

Service **I**nformation **T**able

Service Information			
Optional Geographical Source Location	Optional Probe Data	Optional SIT	Optional IP-based Service Advertisement

Service **C**ontext **T**able

Service Context			
Optional Geographical Source Location	Optional Probe Data	Optional SCT	Optional IP-based Service Response

CALM FAST mode
Service information table

Element	Type	Description
messageType	*BIT STRING (SIZE(2))*	*'00': **SIT***
stationType	*BOOLEAN*	*0: Mobile station* *1: Fixed station*
stationID	*BIT STRING (SIZE(48))*	*a unique station identifier (e.g. MAC address)*
serviceList	SEQUENCE (SIZE (0..255)) OF SEQUENCE {	list of services offered
	serviceID INTEGER(0..127,...),	(registered) unique SID
	serviceData OCTET STRING optional,	
	serviceNWref INTEGER(0..255)	optional NW header information for data exchange
	serviceChannel INTEGER(0..255) }	optional channel info for data exchange phase, medium specific

CALM FAST mode
Service context table

Element	Type	Description
messageType	*BIT STRING (SIZE(2))*	*'01': **SCT***
stationType	*BOOLEAN*	*0: Mobile station* *1: Fixed station*
stationID	*BIT STRING (SIZE(48))*	*a unique station identifier (e.g. MAC address)*
contextList contexts	SEQUENCE (SIZE (0..255)) OF {	List of service SEQUENCE
	serviceID INTEGER(0..127,...),	(registered) unique SID
	serviceContext OCTET STRING,	context of the related service.
	serviceNWref INTEGER(0..255) }	NW header information for data exchange

CALM FAST mode
Data exchange

Element	Type	Description
messageType	*BIT STRING (SIZE(2))*	*'10': **Request*** *'11': **Response***
data	OCTET STRING	Data dedicated to service / application

CALM FAST mode DLL details

CALM FAST mode
RSIF / VSIF - DLL details

MAC source address: Individual address, either universal or locally administered.

MAC Destination Address: Broadcast address.

SAP Source Address: e.g. FAST: 0xBA
WSMP: 0xF6

0xF6 corresponds to EtherType 0x88DC, see P1609.4

SAP Destination Address: e.g. FAST: 0xBA
WSMP: 0xF6

CALM FAST mode
RSCF / VSCF - DLL details

MAC source address: Individual address, either universal or locally administered.

MAC Destination Address: Individual address, either universal or locally administered.
Same value as MAC Source Address received in RSIF / VSIF.

SAP Source Address: e.g. FAST: 0xBA
WSMP: 0xF6

0xF6 corresponds to EtherType 0x88DC, see P1609.4

SAP Destination Address: e.g. FAST: 0xBA
WSMP: 0xF6

CALM FAST mode
Exchange of Data - DLL details

MAC source address: Individual address, either universal or locally administered.
Value as known from Service Initialisation Phase.

MAC Destination Address: Individual address, either universal or locally administered.
Value as known from Service Initialisation Phase.

SAP Source Address: e.g. CALM FAST: 0xBA
WSMP: 0xF6

0xF6 corresponds to EtherType 0x88DC, see P1609.4

SAP Destination Address: e.g. CALM FAST: 0xBA
WSMP: 0xF6

CALM FAST mode Networking details

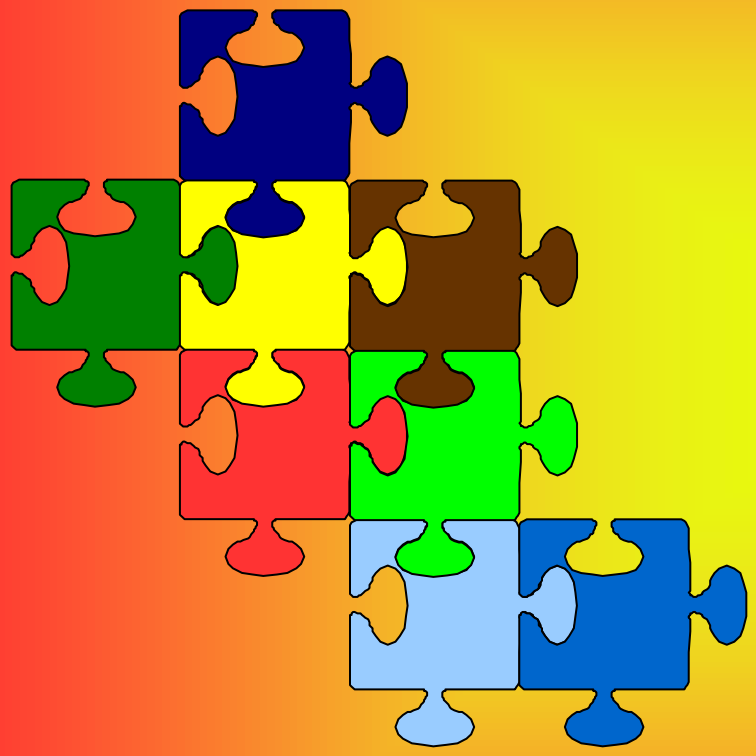
CALM FAST mode
CALM FAST network header

Source Network Header - serviceNWref:
Efficient single octet header, acting as a reference pointer.
0: Entity located in IME that is in charge of managing RSIF / VSIF, and optionally RSCF / VSCF
All other values may be assigned dynamically at run-time. This assignment shall be done under control of the CME supervisor upon registration of applications (services) and modems.

Destination Network Header:
See above for source network header.

The mechanism / protocol used to forward a packet through a possible local network is not defined here. Just the reference pointer is specified. A dynamically managed look-up table in the network layer shall provide all information needed to forward packets, i.e. including optional network protocol conversion. The details are implementation specific.

Putting puzzles together



Thank you for listening

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