CVIS - FOAM

Framework for Open Application Management

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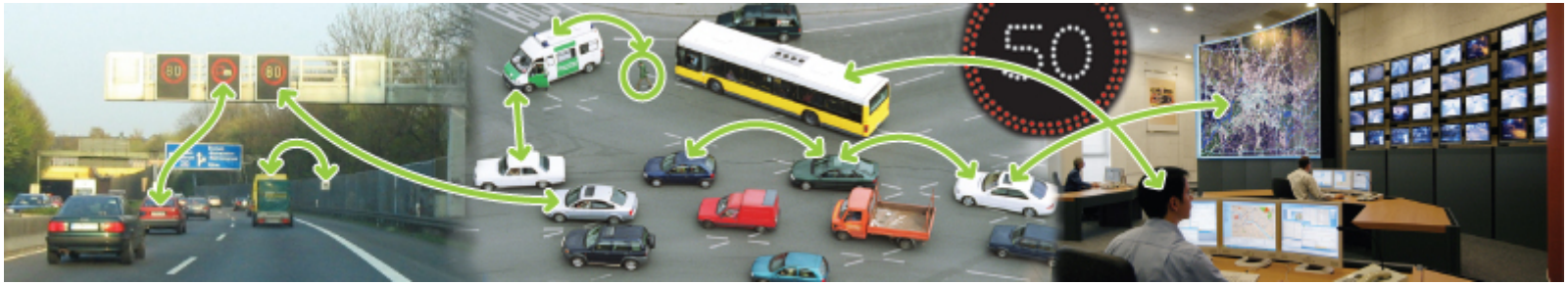
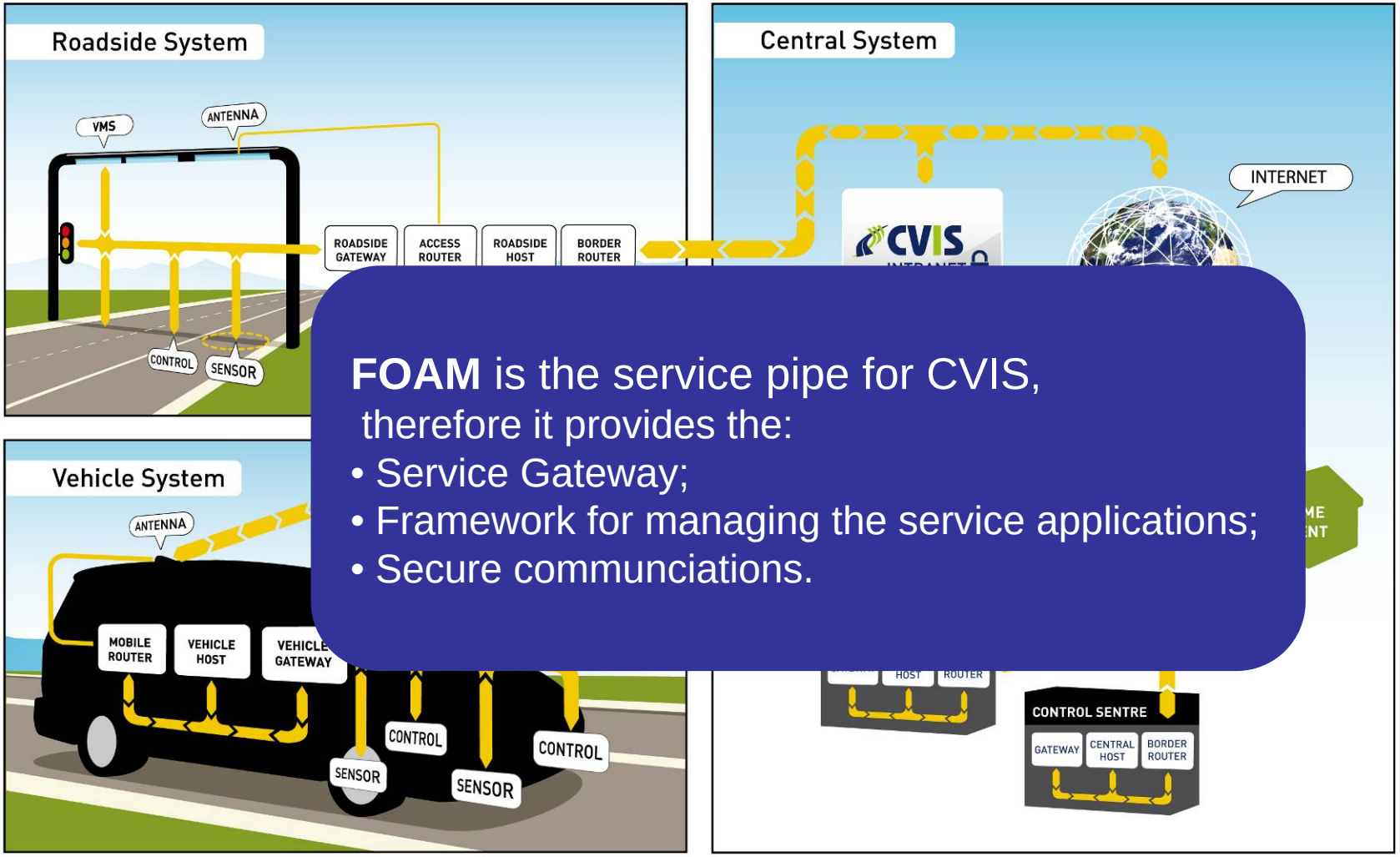


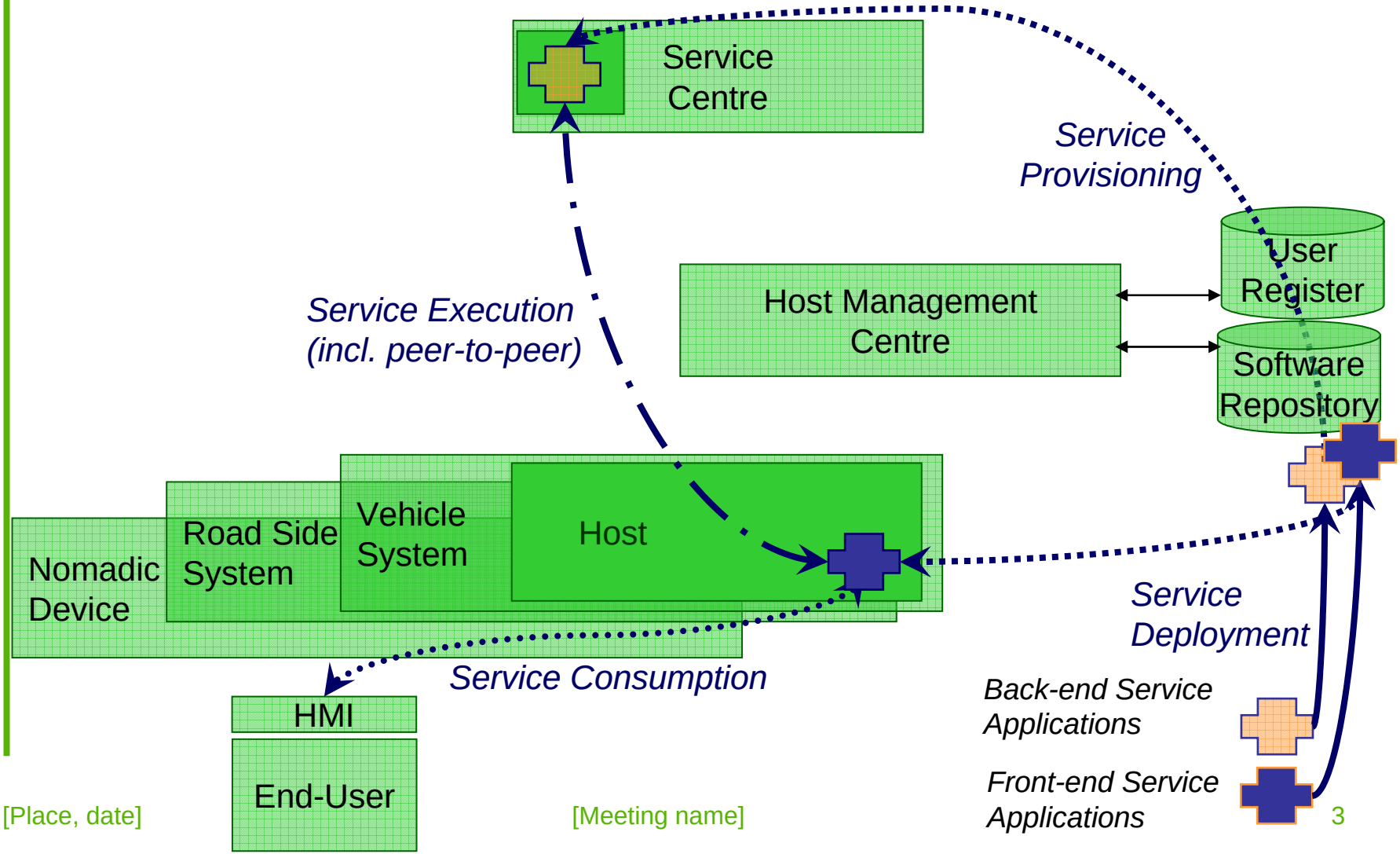
Top Level Architecture



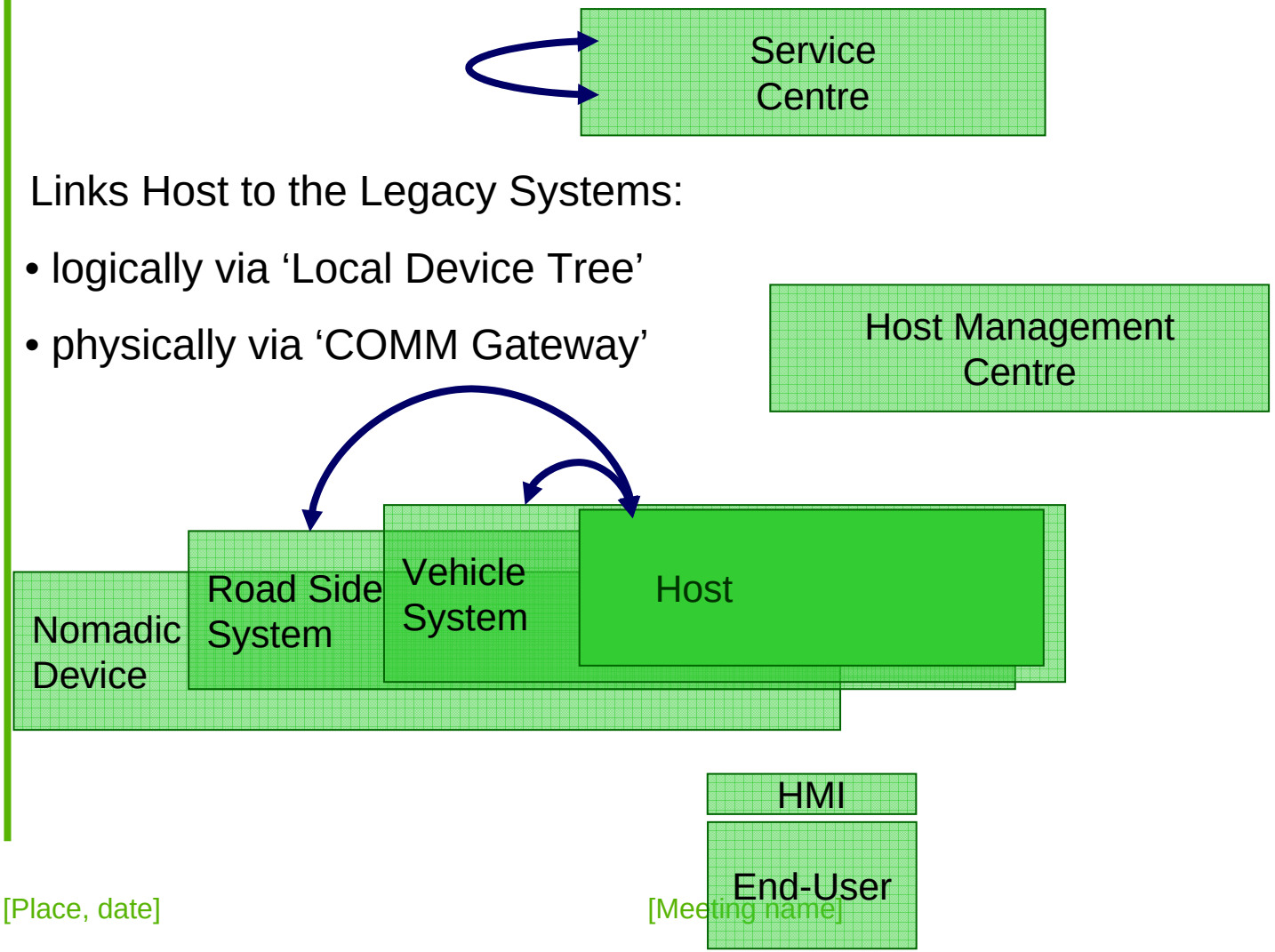
FOAM is the service pipe for CVIS,
therefore it provides the:

- Service Gateway;
- Framework for managing the service applications;
- Secure communciations.

FOAM Service Gateway

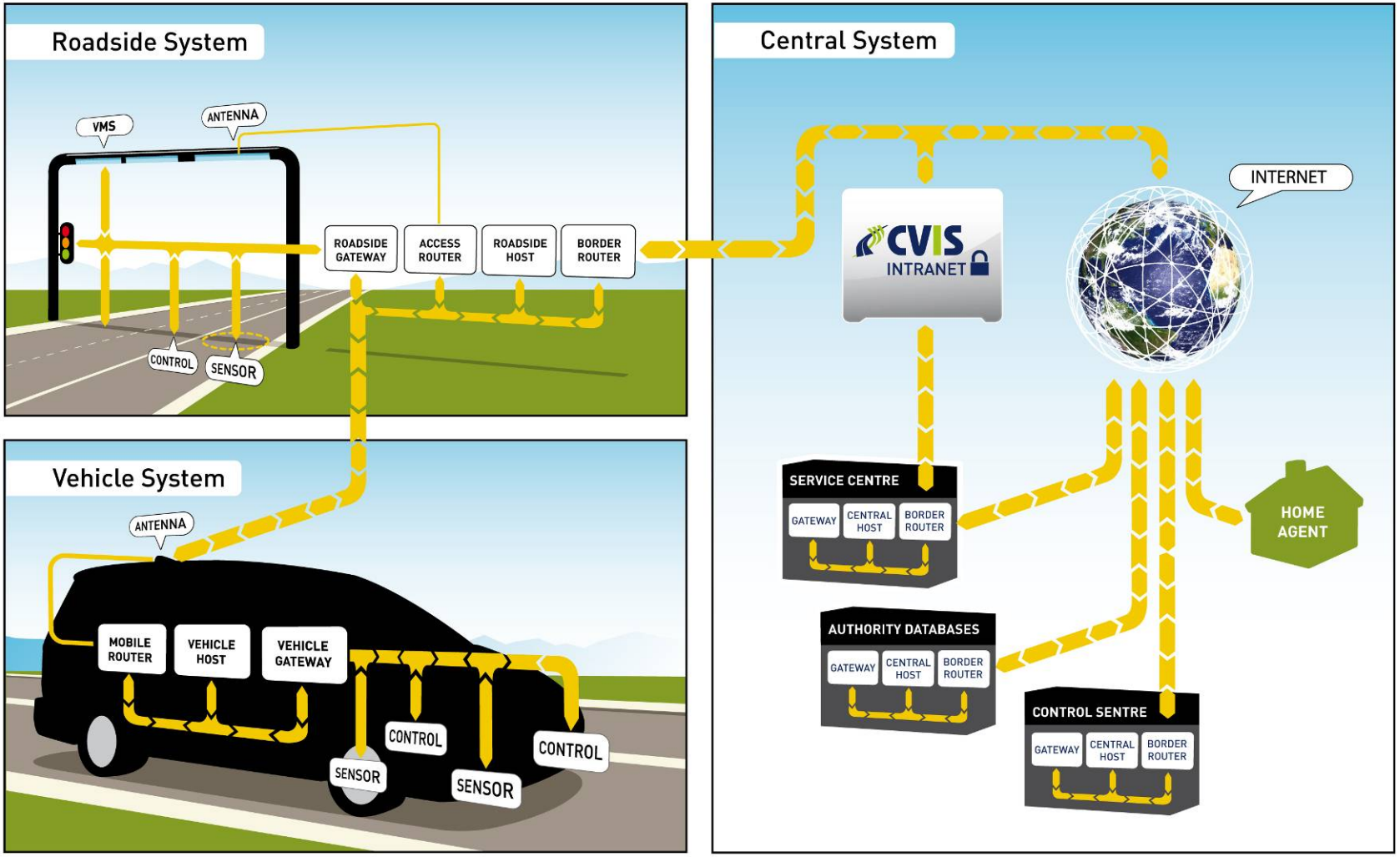


FOAM Legacy Gateway



Top Level Architecture

FOAM Run-time Environment:
Virtual Machine + OSGi Framework



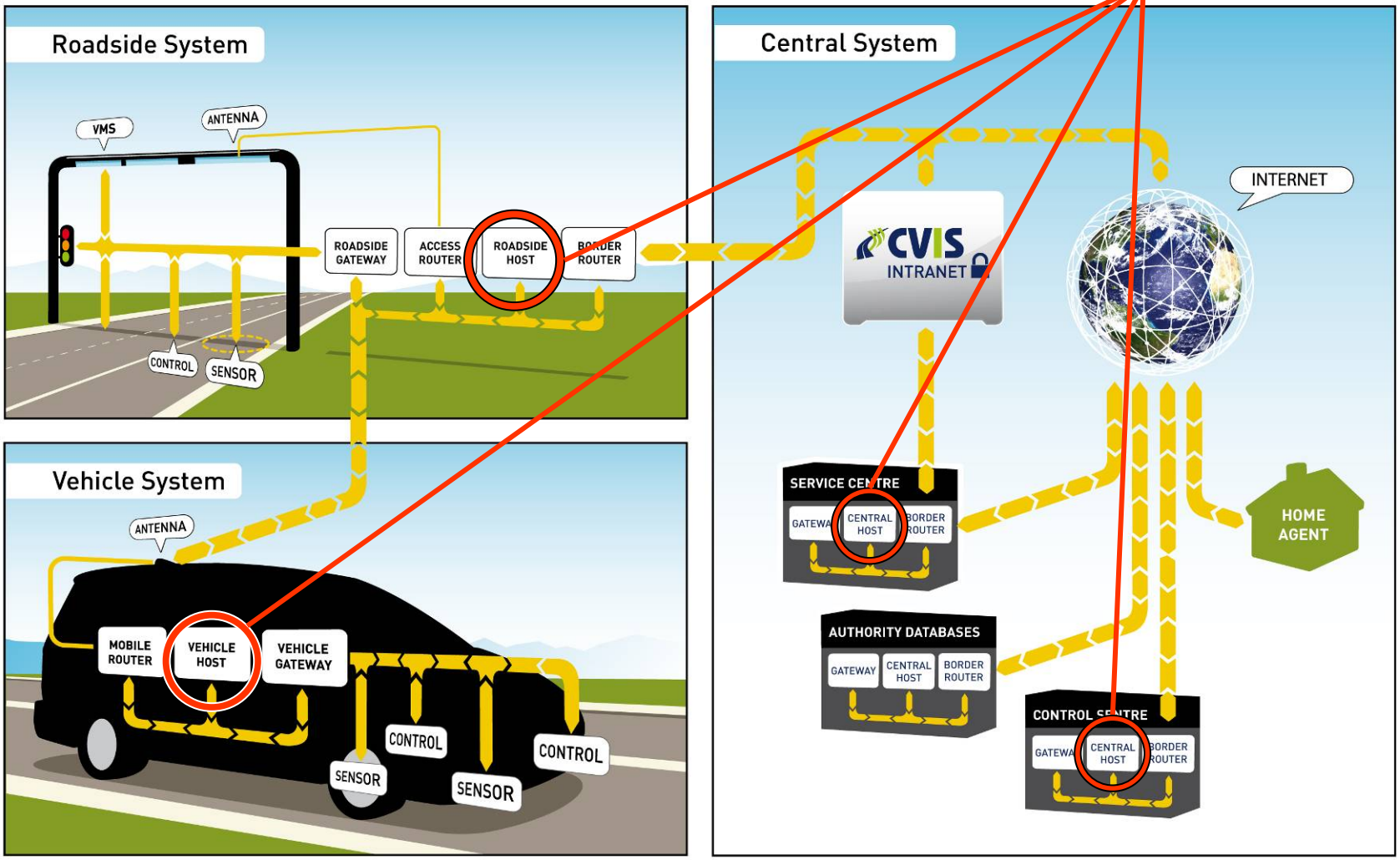
FOAM DDS, LDT and HMI:
Completion of the gateway

FOAM Security:
Security functions

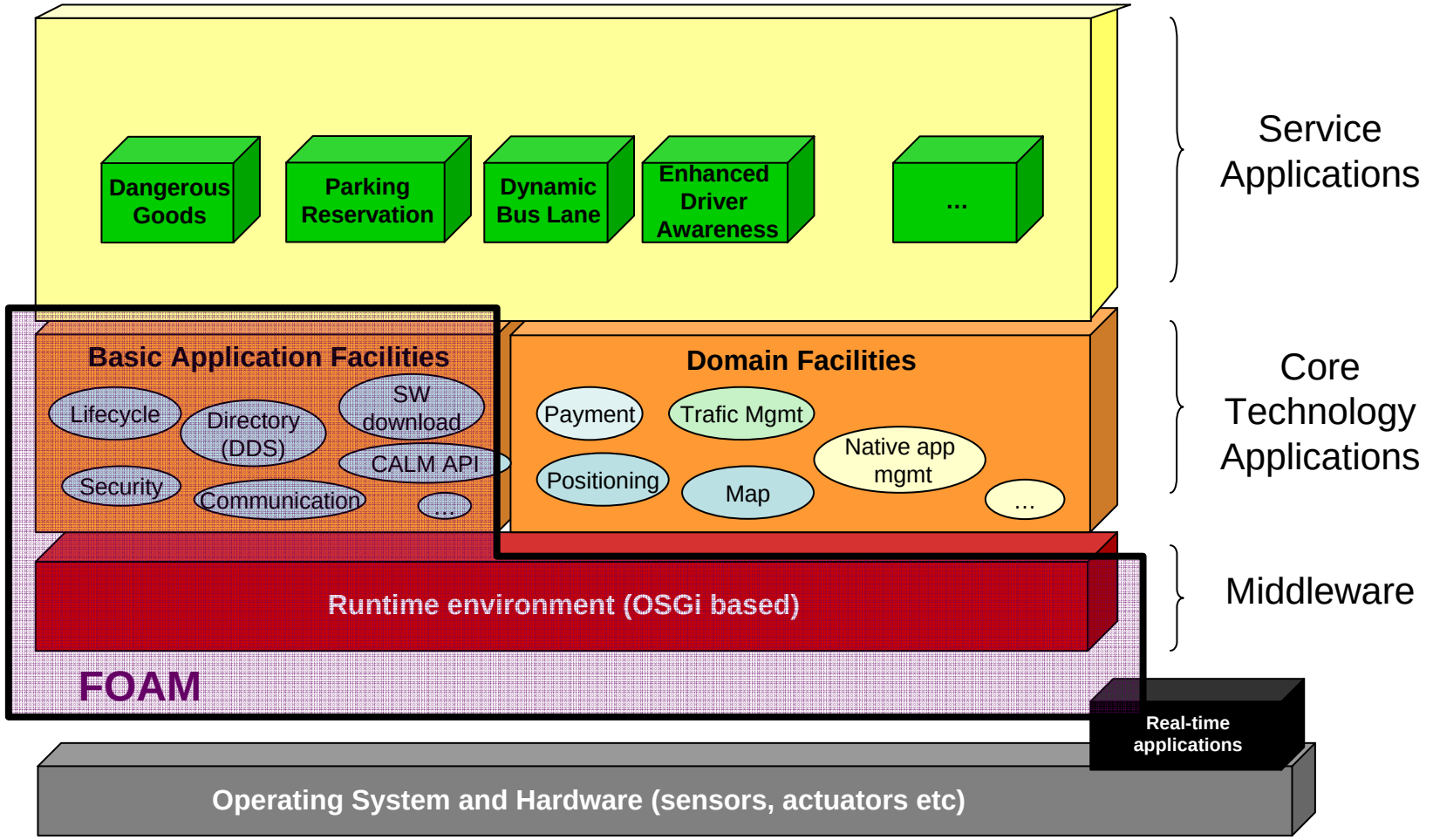
FOAM HMC:
Deploy & Provision

Top Level Architecture

FOAM Run-time Environment:
Virtual Machine + OSGi Framework



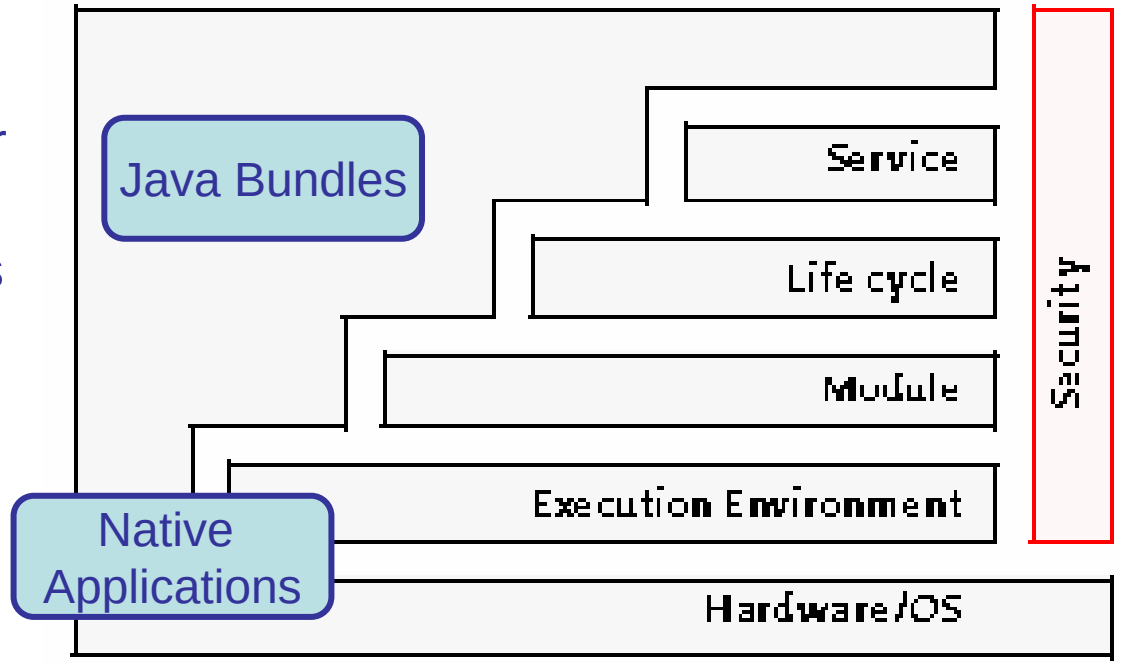
CVIS Host


Dangerous Goods
Parking Reservation
Dynamic Bus Lane
Enhanced Driver Awareness
...
Service Applications
Basic Application Facilities
Lifecycle
Directory (DDS)
SW download
CALM API
Security
Communication
...
Domain Facilities
Payment
Trafic Mgmt
Native app mgmt
Positioning
Map
...
Core Technology Applications
Runtime environment (OSGi based)
Middleware
FOAM
Real-time applications
Operating System and Hardware (sensors, actuators etc)

Service Gateway Functionality
FOAM Runtime Environment

The OSGi Framework can be divided into the five layers.

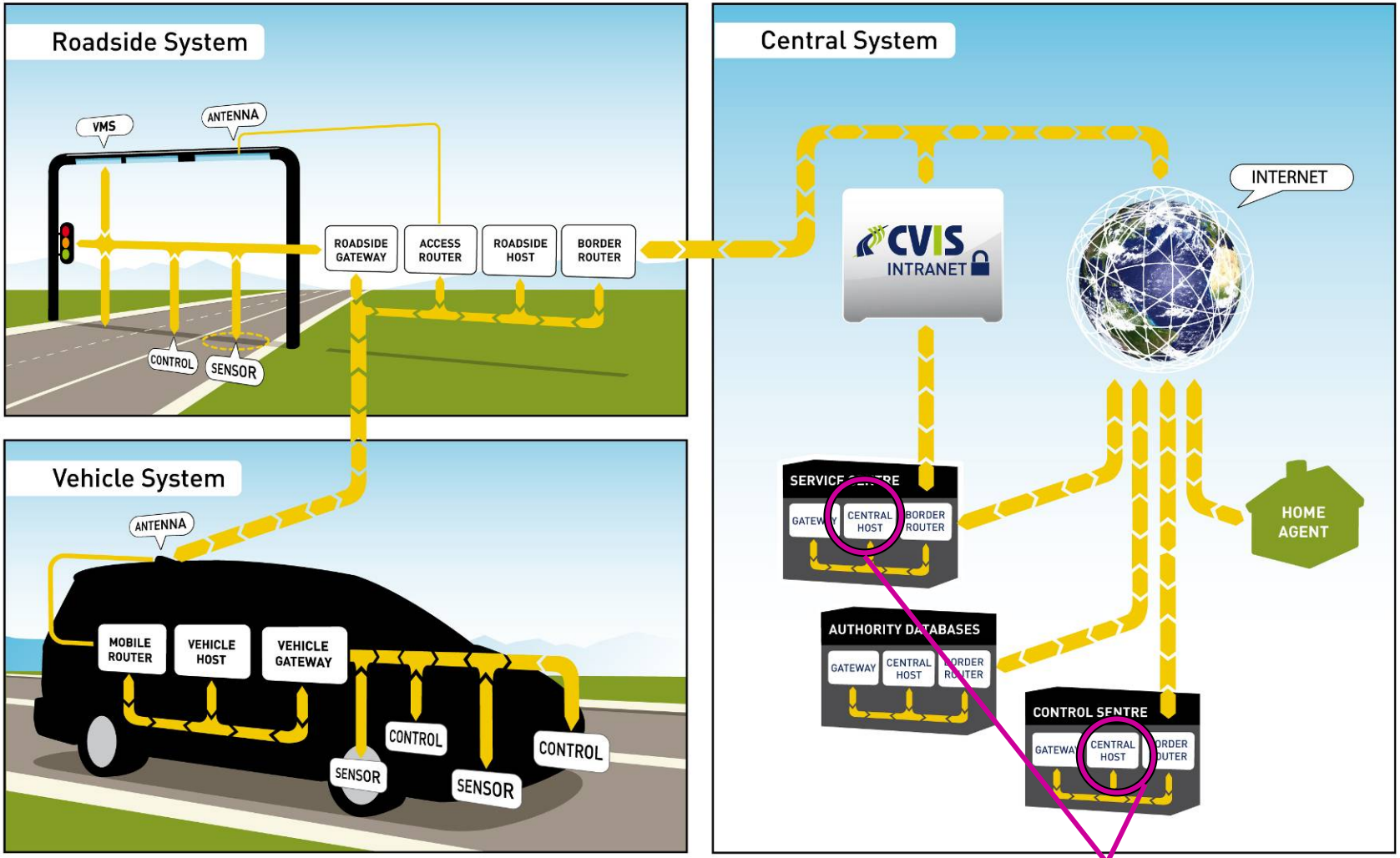
1. Security Layer
2. Module Layer
3. Life cycle Layer
4. Service Layer
5. Actual Services



Captured in FOAM-SDK:

- OSGi Framework, including:
  - The Life cycle Layer API's
  - The Service Layer API's

Top Level Architecture

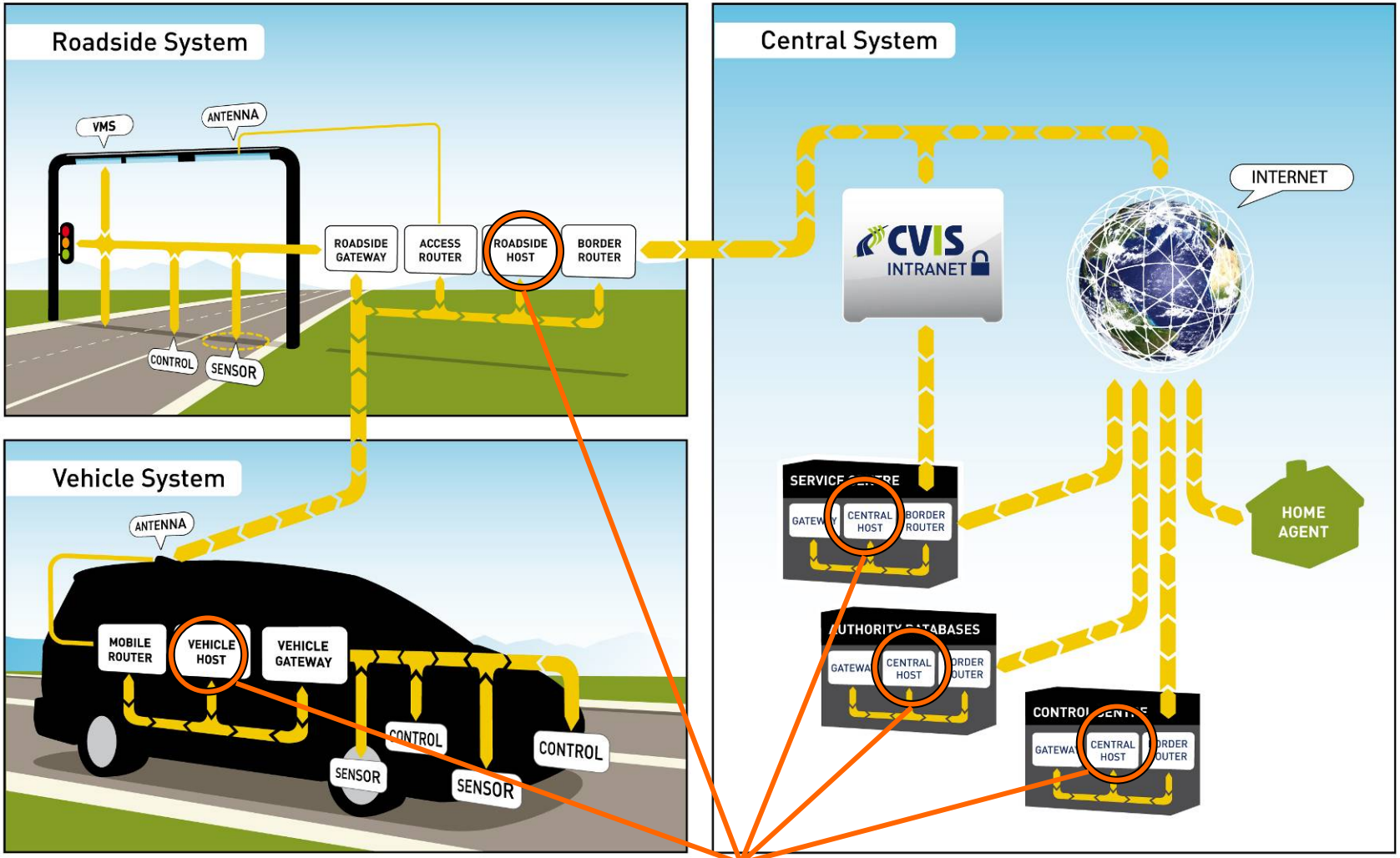


FOAM HMC:
Deploy & Provision

FOAM Host Management Center

- **Service Deployment:** which facilitates making a service available at an HMC
- **Service Provisioning:** which facilitates life cycle management of OSGi based applications using remote software download mechanisms. Limited support of native management may also be supported.
- FOAM-SDK: Deployment API in HMC.

Top Level Architecture



FOAM Security:
Security functions

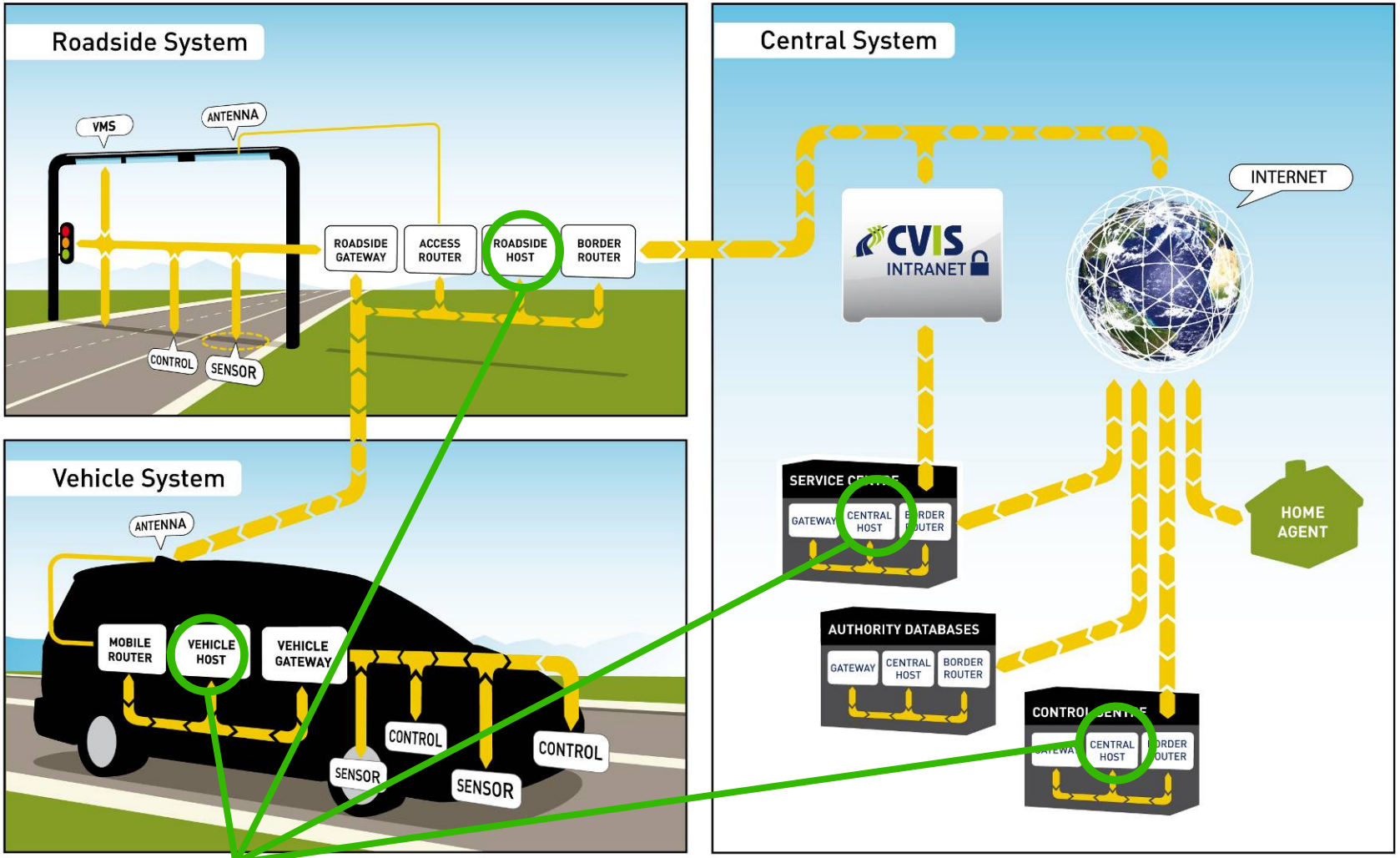
FOAM Security

- Security for CVIS OSGi-enabled Applications
- Built on GST Security model
  - Identity (as part of the security framework); which performs the identity management to allow identification with ***authenticated pseudonyms (coming from SeveCom)***
  - End-user authentication, authorization (incl. distributed authorization) and single sign-on;
  - Secure communications between hosts.
- FOAM-SDK: Security API

Secure CALM Communications

- FOAM Services for CALM communication
  - ConnectionManager & CalmConnections (where CALM enables the point-to-point communication between hosts);
  - In addition two peer-to-peer communication mechanisms:
    - Service Announcement;
    - Databroadcast.
- FOAM-SDK: communication API

Top Level Architecture



FOAM DDS, LDT and HMI:
Completion of the gateway

Distributed Directory Service

- Discovery function
  - Yellow Pages for a CVIS system
- Allows applications to search for other applications
  - Search based on criteria, e.g.:
    - Applications in an area
    - Applications in vehicles carrying (a particular class of) dangerous goods;
    - Applications in roadside systems in a particular area;
    - Applications in roadside systems along a particular road segment.
  - Search returns a communication handle
- How applications interact / communicate is application specific
  - There is no magic here!

- FOAM SDK: DDS API

Local Device Tree

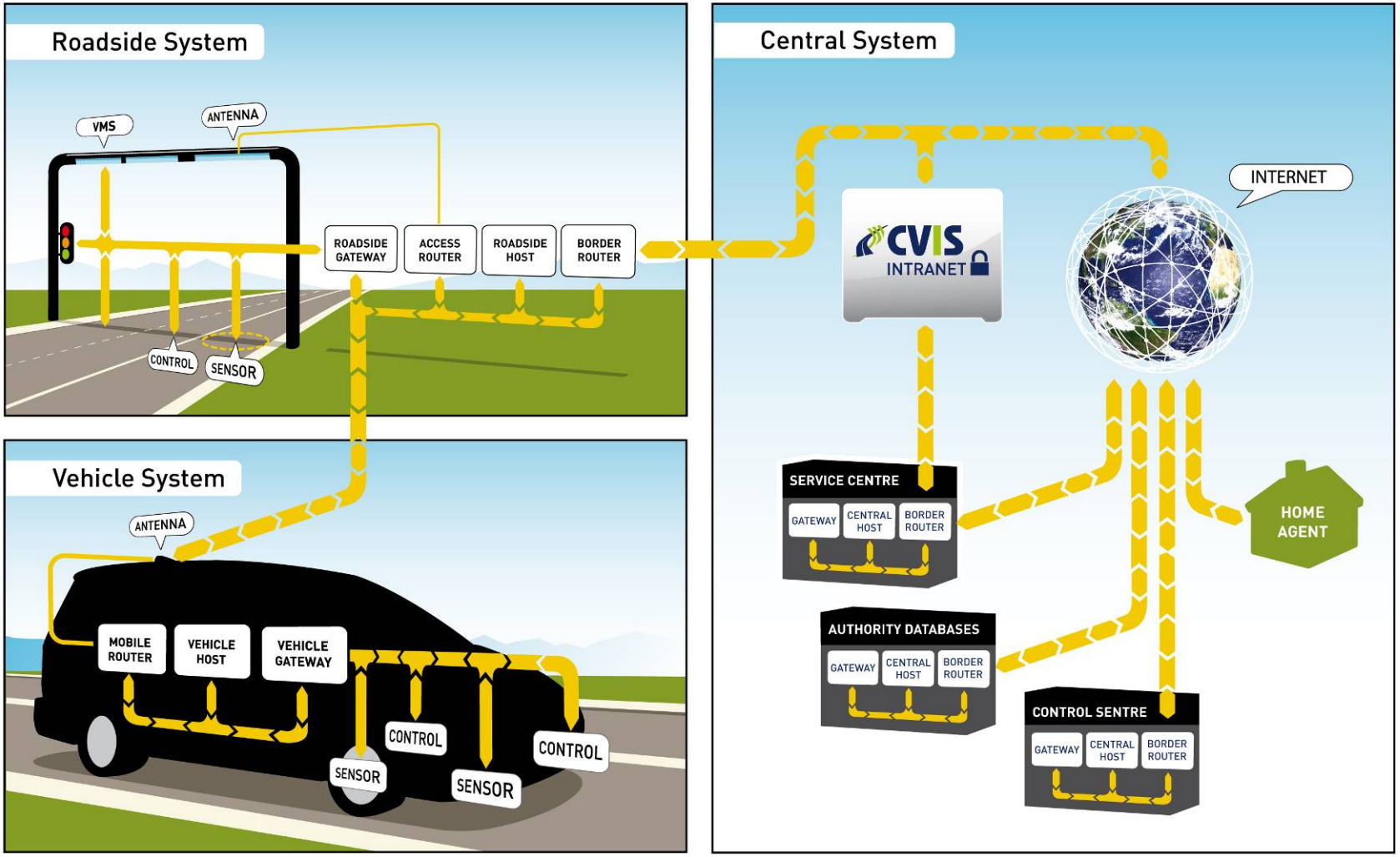
- Gives applications secure access to the vehicle and road-side sensor data (Vehicle Tree / Road Side Tree) interface in the Host
- Synchronous Request / Response or asynchronous Subscribe / Publish interface to access individual parameters / sensor values
- Read-only implementation in CVIS; the Local Device Tree however allows for more advanced functions like enabling / disabling access to certain sensor sub-systems and even actuator access (”Write” mode)
- The physical realisation of the Gateways will be performed mainly by the vehicle manufacturers and road side system manufacturers .
- FOAM SDK: LDT API

HMI / Application Manager

- There is no HMI library defined by CVIS
- Provisional solution:
  - The applications are given a drawing area (’canvas’)
  - The application itself is solely responsible for filling this canvas with content
- FOAM SDK: HMI ‘canvas’ API

FOAM SDK: APIs + relevant Javadoc

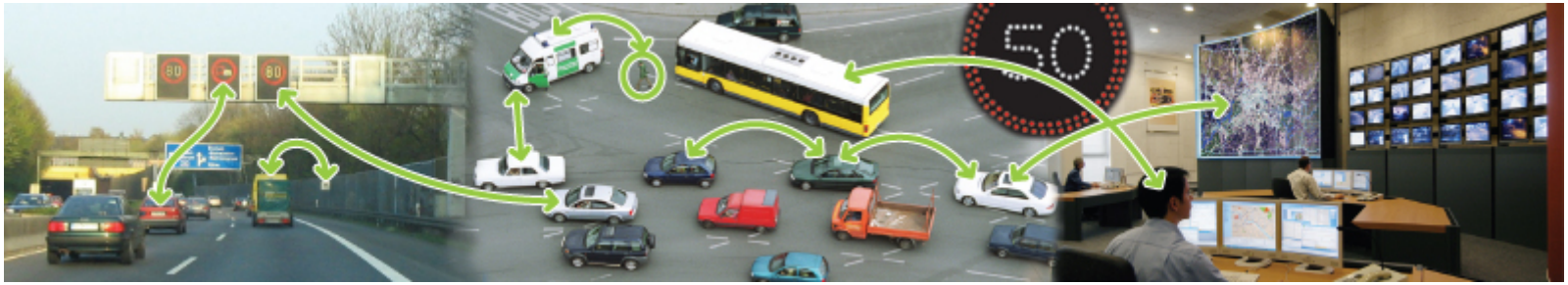
FOAM Run-time Environment:
OSGi Framework



DDS API, LDT API and HMI API

Security API and communication API

FOAM HMC:
Deployment API

Thanks for your attention…

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