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Diagnostics process and place of some standard

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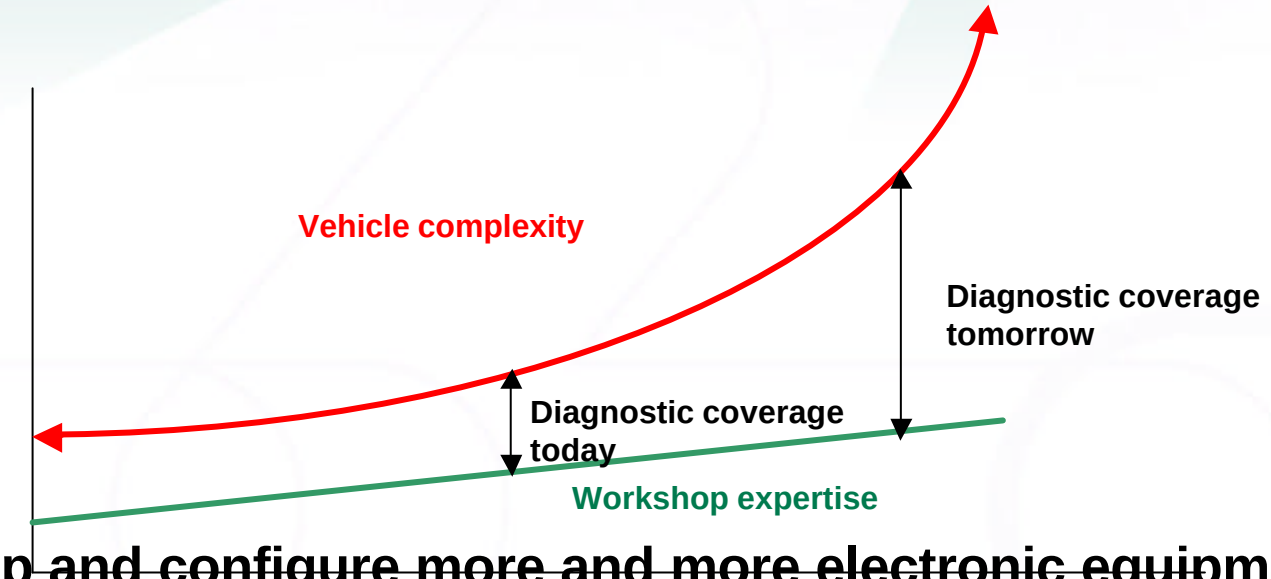
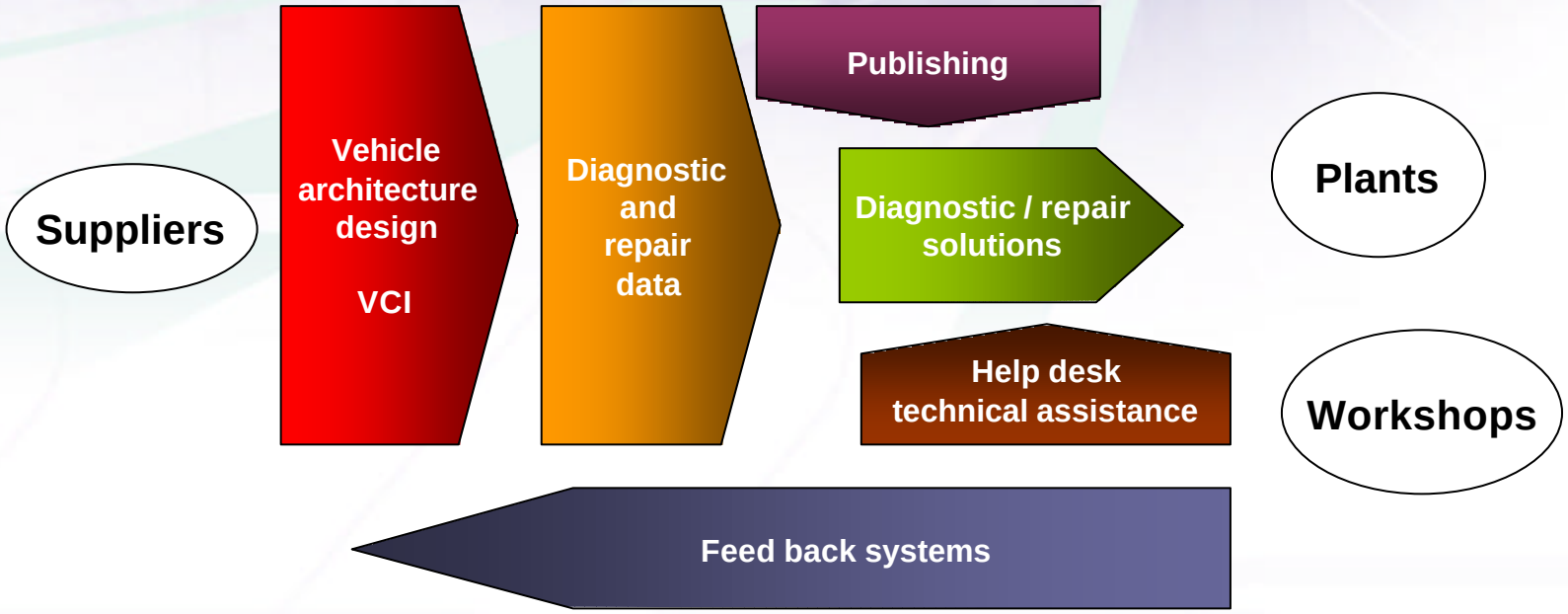
Face new challenges with diagnostic equipments

- **Reduce the increasing gap between vehicle complexity and workshop expertise in order to:**
  - avoid unsolved problems
  - avoid parts mistakenly taken down
  - control development and services costs



- **Set-up and configure more and more electronic equipment (ECUs) in the vehicle on the production line**

Solutions must be found at each step of the diagnostic development value chain



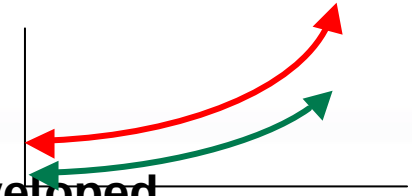
- Vehicle architecture design
- Communication with the vehicle
- Diagnostic methods and diagnostic solutions
- Diagnostic authoring systems
- Feed back systems

Vehicle architecture design

- **“Diagnosticability” must become part of the vehicle design phase**
  - diagnostic team embedded inside the engineering department to avoid re-engineering
  - diagnostic requirements has to be a part of the ECU and system specifications
- **One “unique language” by a global diagnostic rules system shared by OEM and tiers**
  - solve potential conflicts between systems designed by several tiers parts
  - insure a global coherence between systems
- **Possibility to access directly vehicle’s databus to track messages between the different systems**
- **Develop fly recorder systems to record contexts and to be able to replay**
- **Develop an auto-diagnostic approach**

Diagnostic methods / Diagnostic solutions

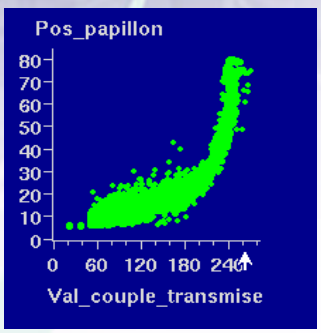
- **There is not one “Magic” method that can solve every problem**
  - be able to mix different kinds of knowledge (DTC, symptoms, functional diagrams, repair cases, tests, …) and to present them to the end user
  - be able to propose different “diagnostic philosophies” for different kind of users (guided methods, expert methods, …)
  - means that new diagnostic software architectures must be designed with a high level of modularity
- **Methods must be used also to teach the workshops better practices (learning curve)**

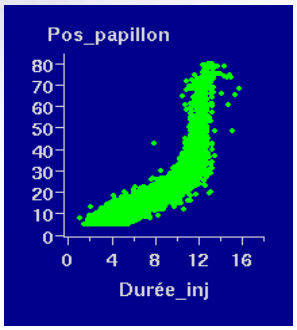


- **New methods to avoid a complete system description must be developed**
  - describing complexity has a cost / describing every thing becomes impossible
  - OEM are testing
    - case based reasoning / knowledge database methods
    - pattern recognition
    - ...

Example of a non descriptive method : Pattern Recognition Technology

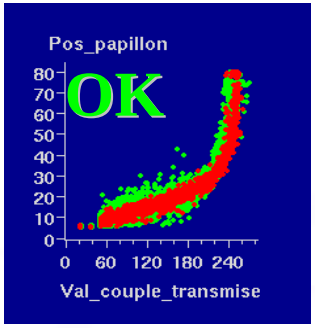
Good Working

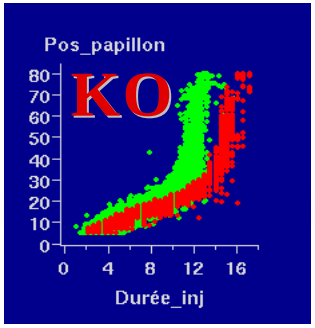




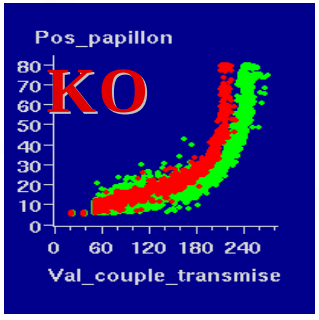
Same DTC / same symptom as problem on air admission

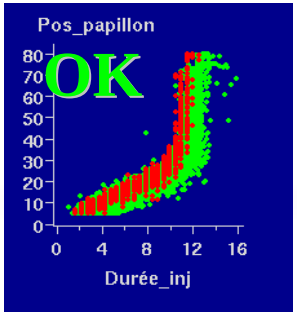
Failure on turbo pressure sensor on vehicle





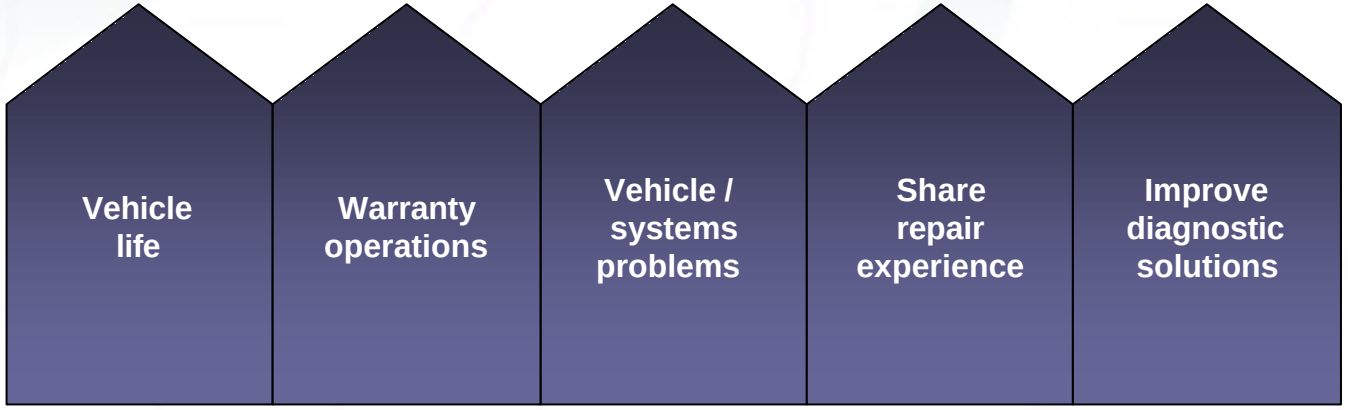
Air admission blocked on vehicle



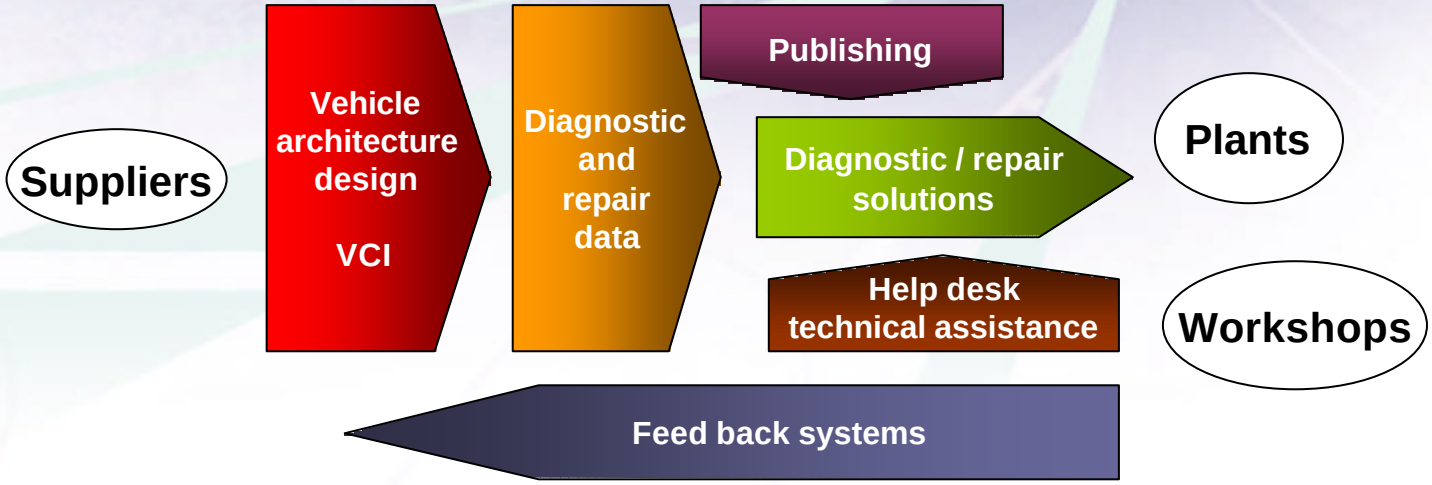


Technical assistance and feed back systems

- **Sharing experience becomes strategic**

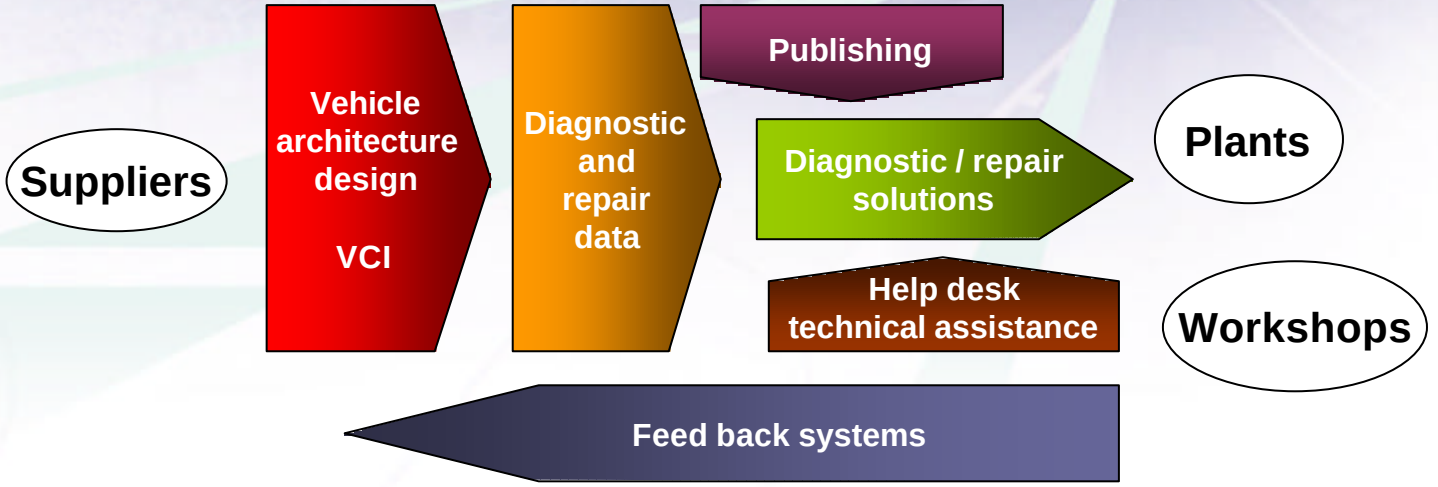


Place of some standard 1/2



- **Communication with vehicle :**
  - ISO 15031 - 3 : diagnostic connector
  - External communication protocol : ISO 9141, 14230 ,15765,… J1850, J1939...
  - Internal communication protocol : MOST, LIN,FLEXRAY, ASRB 2.0
- **Data**
  - ODX (Open Data eXchange)
  - OASIS

Place of some standard 2/2

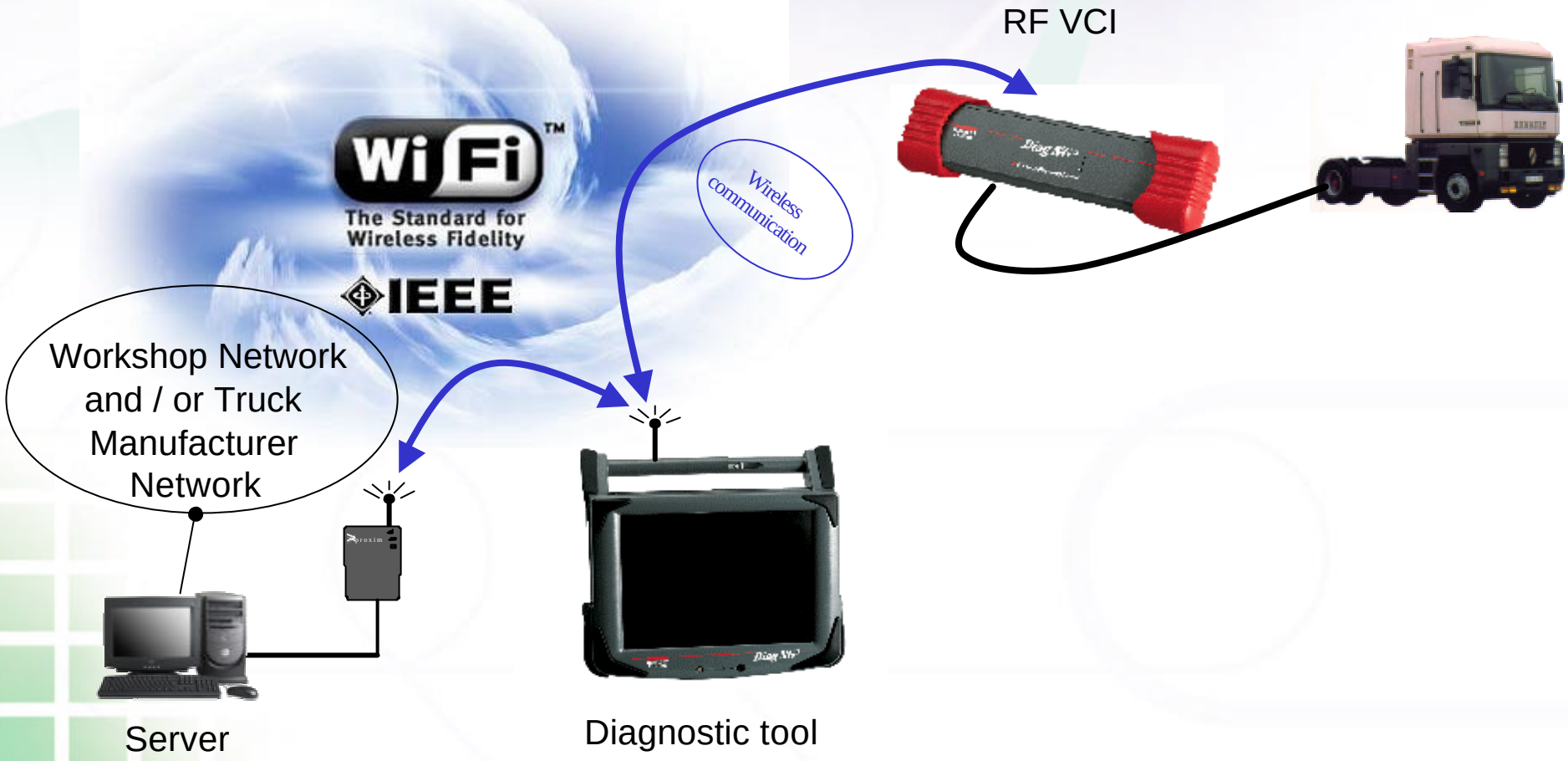


External test equipment

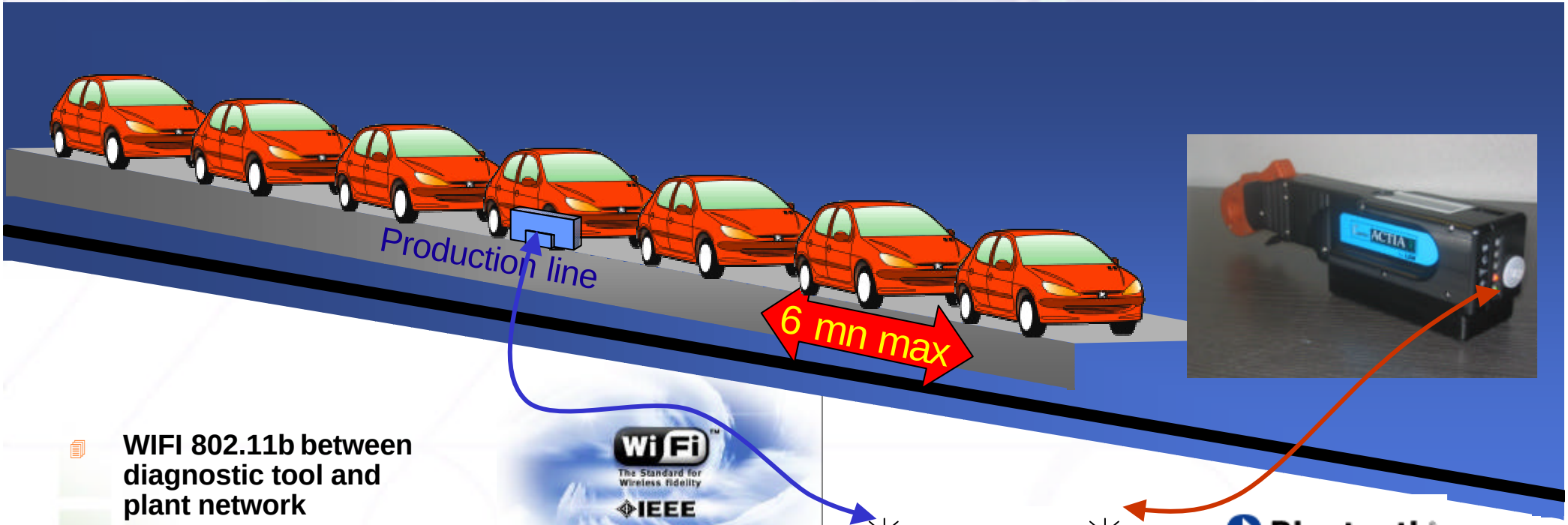
- Pass-thru
- Modular Vehicle Communication Interface

Wireless use : diagnostic, repair and maintenance

- RF communication using IEEE 802.11 b WiFi: 2.4 GHz Wireless Ethernet 11 MBps

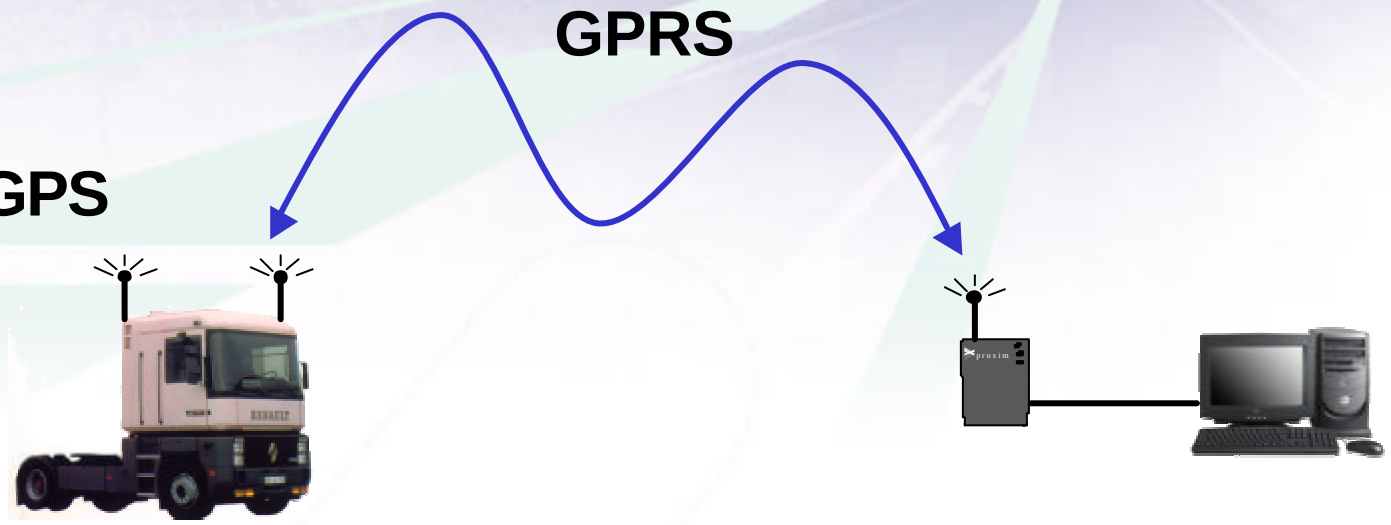


Wireless use : product in plant



- **WIFI 802.11b between diagnostic tool and plant network**
- **Bluetooth between diagnostic tool and current probe**
- **12 simultaneous communication with ECUs**

Wireless use : service



- **Embedded ECU including :**
  - GPRS communication to provide :
    - Fleet management
    - Diagnosis
    - Service : maintenance management, warning, trailor load...

Thank you

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