IEEE EMC Sweden, EMC between rolling stock and rail infrastructure (RAILCOM) project

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RAILCOM

BOMBARDIER

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- **Introduction**
  - European Commission 6th Framework Programme (FP6) Project
    - 50% funded by Commission, 50% funded by partners
  - Duration 2006-2008, 3 years
  - Total funding 2,5 MEuros
  - Main Objectives
    - To harmonise requirements for conducted interference between rolling stock and track circuits
    - To harmonise requirements for radiated interference to minimise disturbances in railway communication bands.
  - Website:- www.railcom.org

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- **Project Partners**
  - Alstom Transportation
  - Ansaldobreda
  - Bombardier Transportation
  - CD
  - CD-VUZ
  - CNTK
  - DB
  - Movares
  - INRETS
  - RFF
  - Siemens Transportation Systems
  - SBB
  - SNCF
  - UIC
  - UNIFE
  - NITEL, University of Genoa
  - University of Kaiserslautern

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- **Background**
  - Legislation
    - CENELEC European Standards (EN50121, EN50238)
    - EMC Directive, 2004/108/EC
    - High Speed Interoperability Directive, 96/48/EC
    - Conventional Rail Interoperability Directive, 2001/16/EC
  - Prior European Commission Railway EMC Projects
    - ESCARV 1998-2000
    - ESC InfoBank 2002-2004
    - EMC-ARTS 2001-2003

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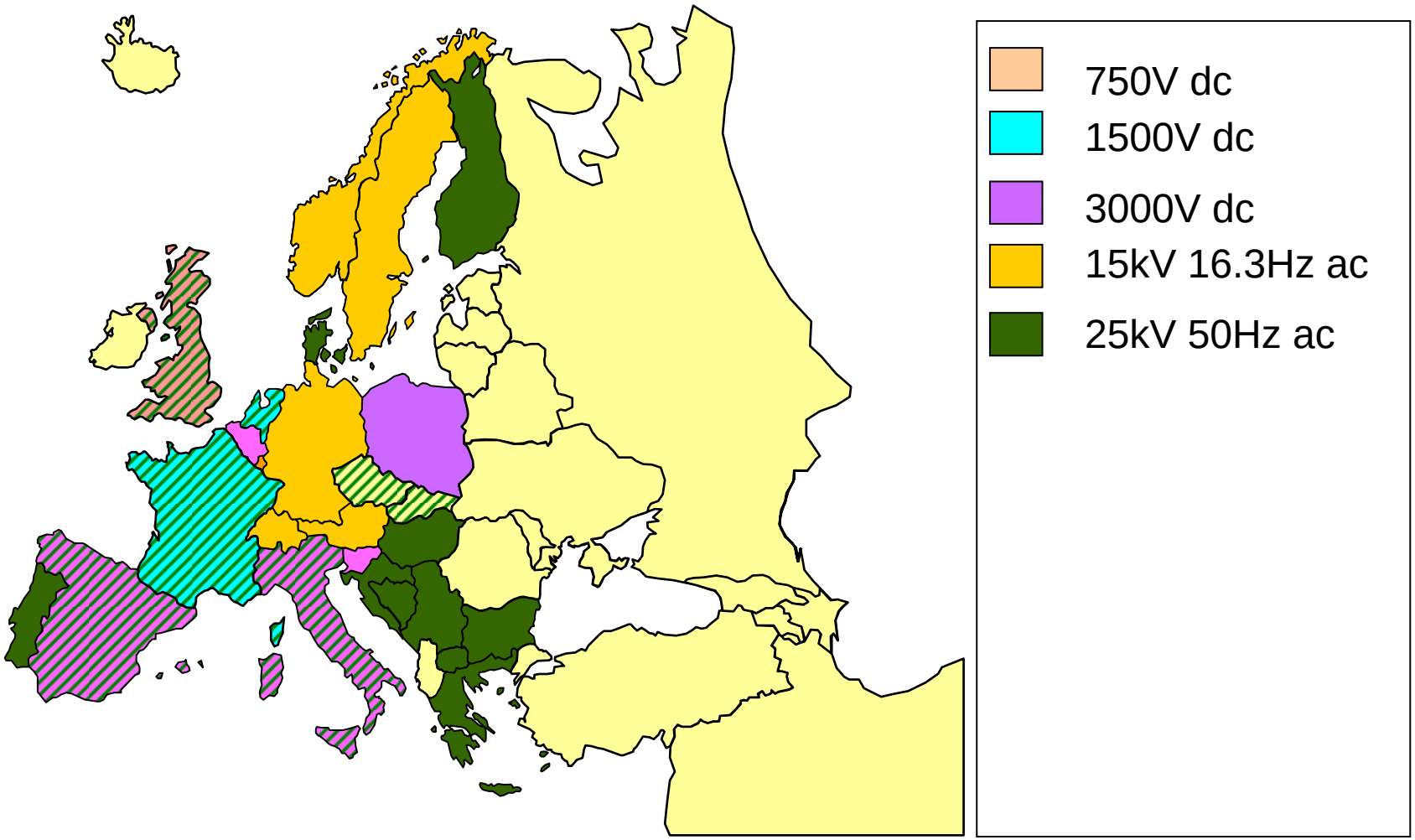
European Rail Power Supplies



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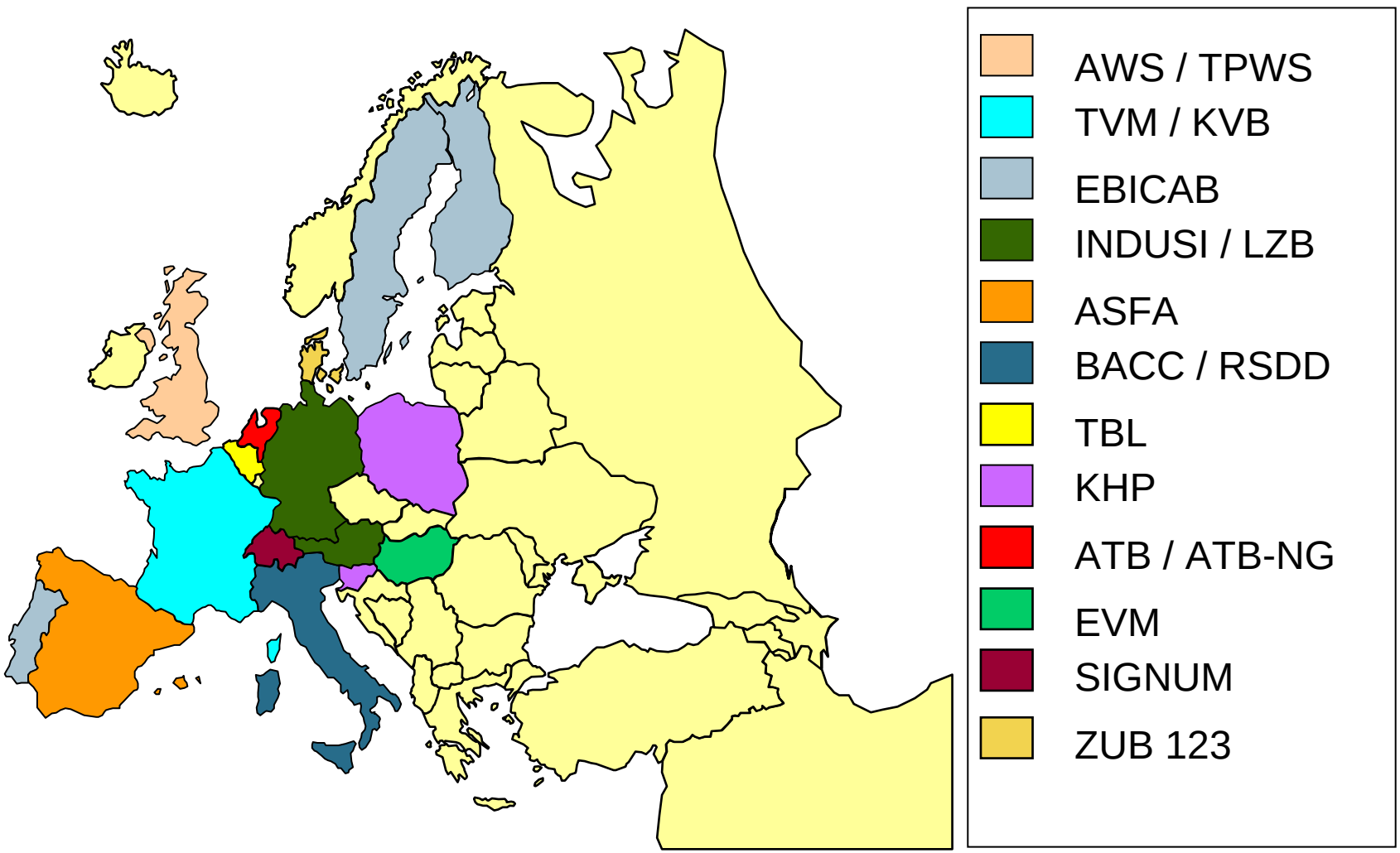

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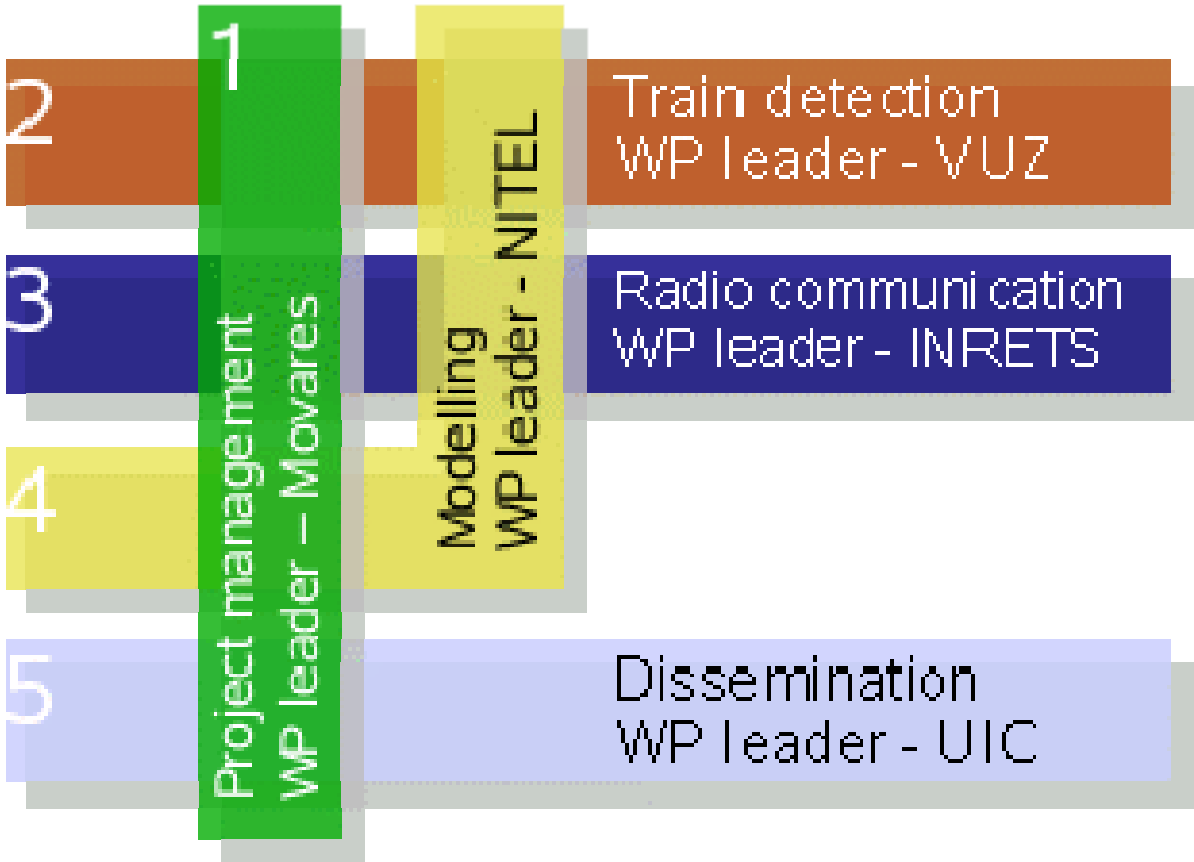
- **Project Structure**



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- **Work package 2: Compatibility between rolling stock and train detection**
  - The main objective of this work package is to provide a set of fully validated characteristics and technically sound testing methods and approaches to achieve and demonstrate electromagnetic compatibility between vehicles and track circuits for future interoperable lines.
  - The specification, models and methods shall become generally accepted and recommended tools for the design and acceptance processes defined in the relevant European Standards and TSIs as created by CENELEC.

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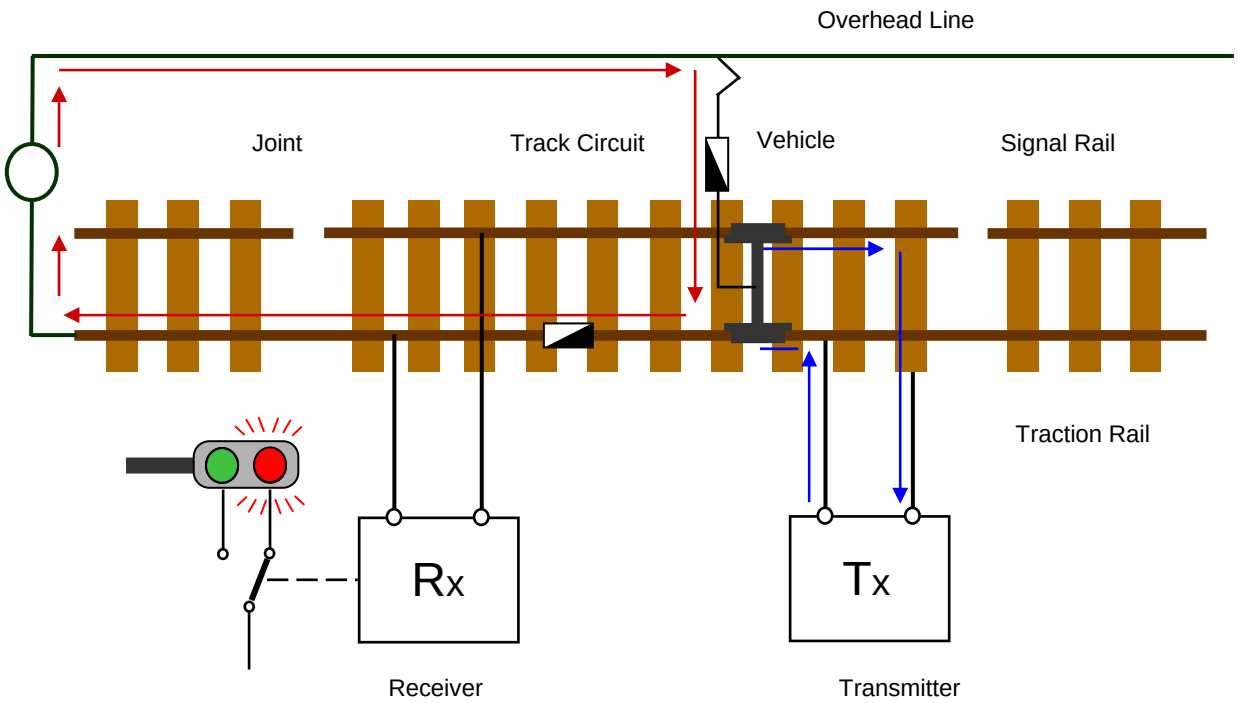

Simplified Interference Scenario of Track Circuits

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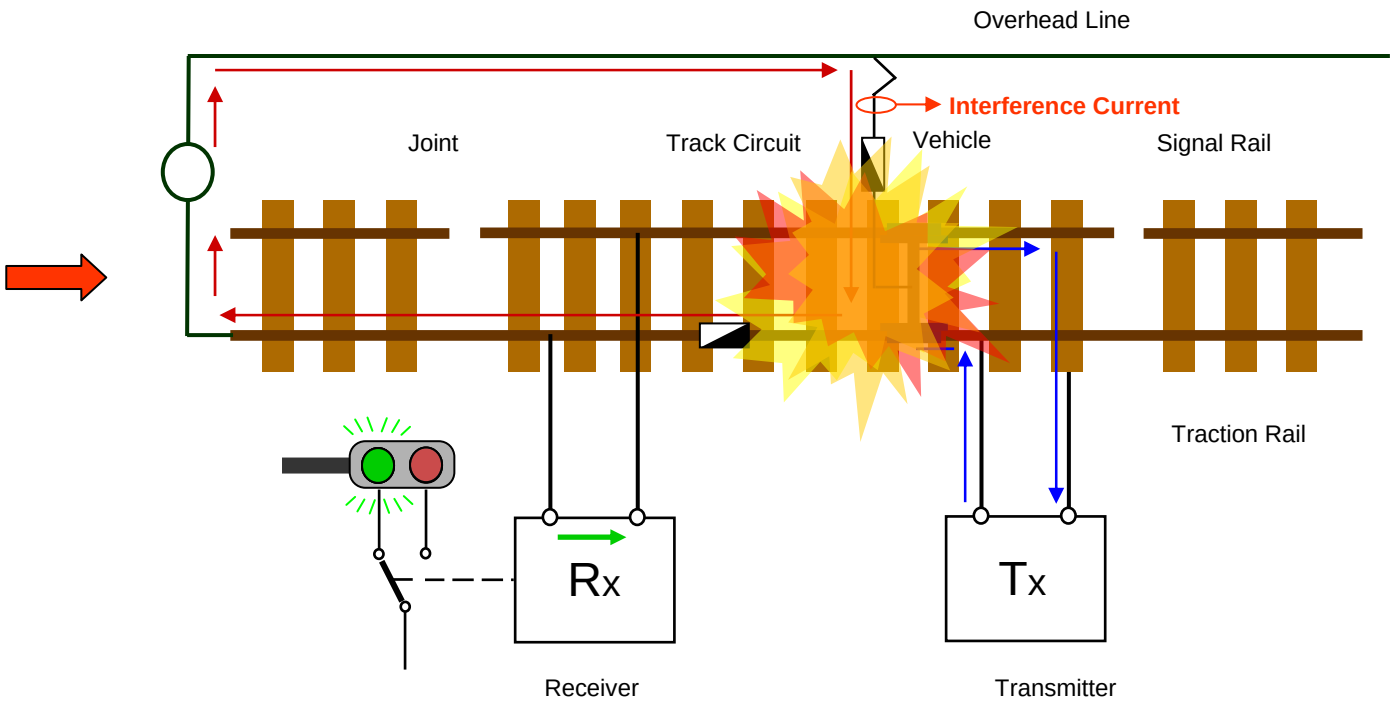

Simplified Interference Scenario of Track Circuits

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- **Work package 3: Compatibility of railway communication systems**
  - Selection of relevant communication systems
  - Identification of potential victims and interference sources
  - Characterisation of the railway electromagnetic environment, from the communications and power viewpoint.
  - Evaluation of the margins between the operating conditions of the railway system and the electromagnetic emission.
  - Input to CENELEC standards

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Swedish Automatic Train Protection (ATP)

ANTENNA

BALISE

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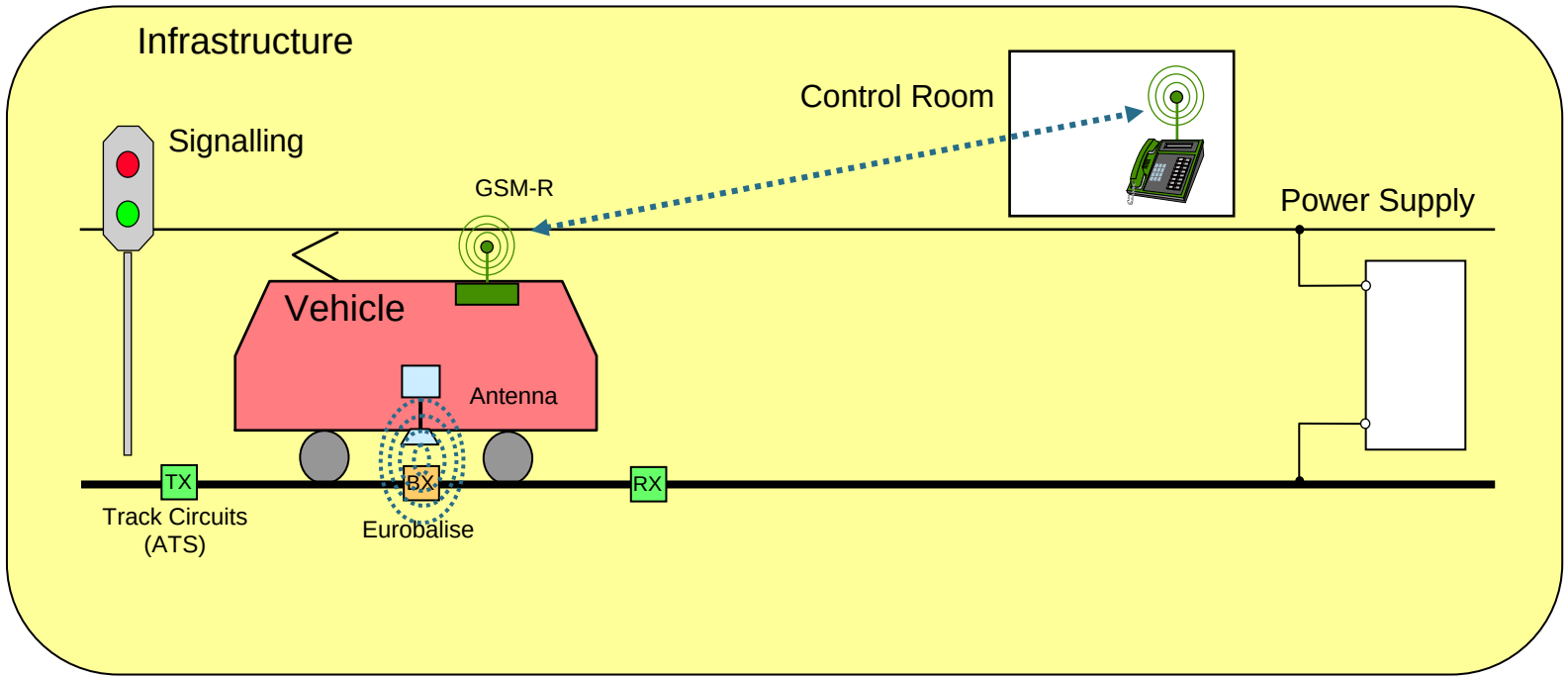
ERTMS Level 3



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- **Communication systems selected for investigation**
  - ERTMS
    - GSM-R
    - Eurobalise-antenna link
  - WLAN, Wi-Fi, IEEE 802.11x
  - GSM, GPRS, EDGE, TETRA
  - GPS satellite links (*if project time and resources permit*)

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- **Work package 4: Modelling support to WP2 and WP3**
  - The main purpose of this WP is basically to support the harmonisation and standardisation procedures of WP 2 and WP 3 from the theoretical point of view. Models will be classified, ranked/evaluated and harmonised with respect to the target applications.
  - Recommendations for set of harmonised modelling techniques, procedures and methods as well as for their software implementation are to be given after evaluated using the full scale test results.

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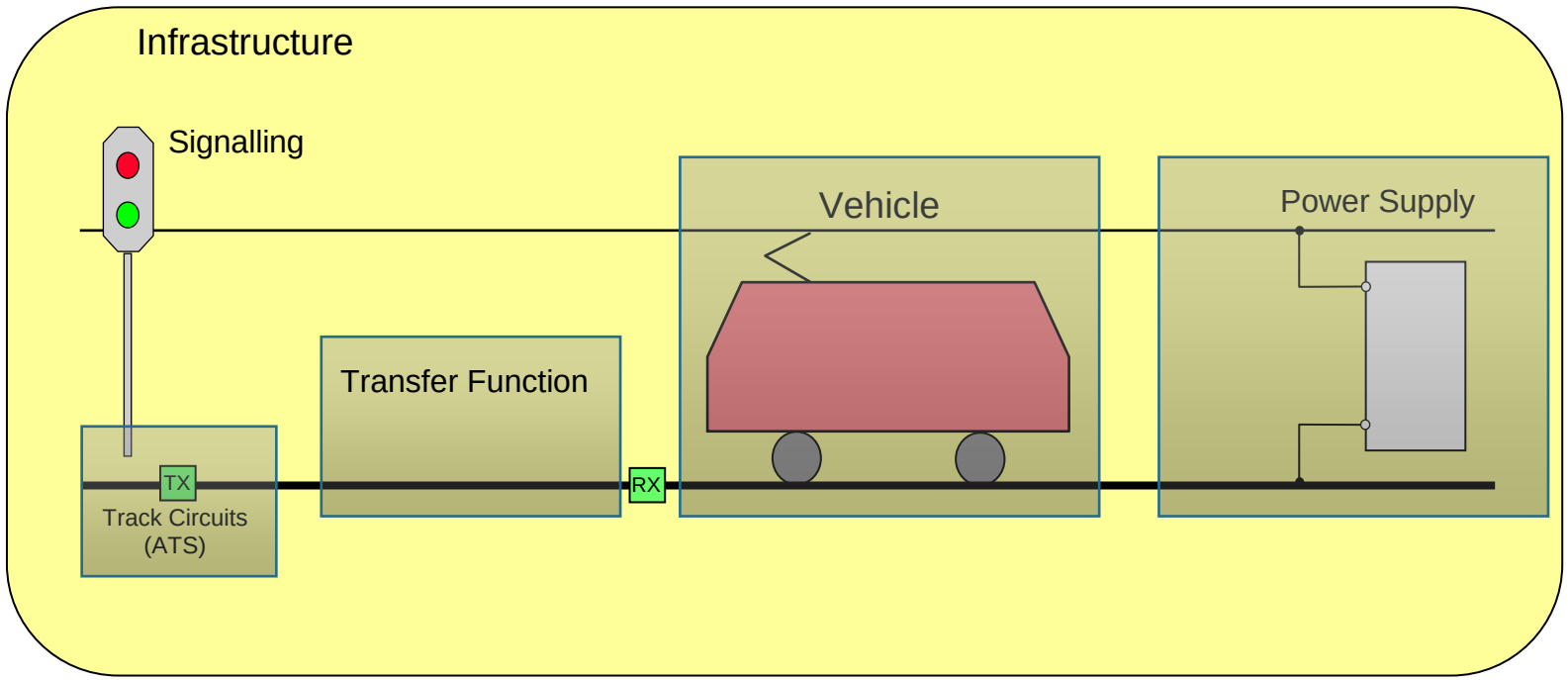

Typical Model Elements for WP3

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- **Status**
  - WP2
    - Limit tests and methods to preferred track circuit types for Trans-European Networks
    - Ongoing discussion between Railcom and CENELEC, WGA4-2 regarding the selection of preferred track circuits.
  - WP3
    - Selection of systems for investigation
    - Development of a matrix of victim and aggressors from which a selection will be made of the more likely disruptive electromagnetic sources for each communication link.
  - WP4
    - Collection of existing models from previous European projects
    - To be examined in both time and frequency domain
    - Measurement on Dutch Betuweroute for line impedance, interference current and transformer characteristics

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- **Thank-you for your attention**
- **Any questions / Frågor ?**