EVOLUTION OF AUTOMATIC PROTECTION SYSTEMS IN RAILWAY LEVEL CROSSINGS

SUMMARY

- CURRENT SITUATION.
- ADIF AUTOMATIC PROTECTION SYSTEM.
- ADIF DATA RECORDER SYSTEM.
- R + D → ADIF OBSTACLE DETECTION SYSTEM.

CURRENT SITUATION

CURRENT SITUATION OF RAILWAY LEVEL CROSSINGS IN SPAIN

- 3,031 LEVEL CROSSINGS.
- 1,211 LEVEL CROSSINGS WITH AUTOMATIC PROTECTION.
- 152 NEW LEVEL CROSSINGS WITH AUTOMATIC PROTECTION BY 2024.

TECHNOLOGIES

TECHNOLOGIES USED FOR AUTOMATIC PROTECTIONS SYSTEMS

RELAYS AND FREELY CONFIGURABLE WIRING TECHNOLOGY.

IMPLEMENTATION: 1974

Located in areas near train stations.

PROTECTION: CLASS “C” Interlocked Semi-barriers (S.B.E.)

IN SERVICE: 25% of Current Automatic Protections.

TECHNOLOGIES USED FOR THE AUTOMATIC PROTECTION SYSTEMS

RELAYS AND UNIFIED MODULAR WIRING TECHNOLOGY.

IMPLEMENTATION: 1988

Located in areas near train stations and on the tracks.

PROTECTION: CLASS "C" Automatic and Interlocked Semi-barriers (S.B.A. / S.B.E.)

IN SERVICE: 30% of Current Automatic Protections.

TECHNOLOGIES USED FOR THE AUTOMATIC PROTECTION SYSTEMS

ELECTRICAL CONTROL AND UNIFIED MODULAR WIRING TECHNOLOGY.

IMPLEMENTATION: 1998

Located on the tracks.

PROTECTION: CLASS “B” Acoustic and light signals (S.L.A.) & CLASS “F” Pedestrian light signals (S.L.P.).

IN SERVICE: 42 % of Current Automatic Protections.

ADIF TYPE AUTOMATIC PROTECTION SYSTEM

ADIF TYPE PROTECTION SYSTEM OBJECTIVES

- REDUCTION OF ENERGY CONSUMPTION (75%), ALLOWING THE USE OF RENEWABLE ENERGY (SOLAR ENERGY) → SUSTENAIBLE DEVELOPMENT.

- AVOID SPECIFIC WIRING NETWORKS AND ITS CIVIL WORKS, REPLACED BY RADIO LINK TO AVOID ENVIRONMENTAL IMPACT.

- MODULAR TECHNOLOGY → MODULES

ADIF TYPE PROTECTION SYSTEM OBJECTIVES

- PROGRAMMABLE ELECTRONIC TECHNOLOGY THAT IS COMPATIBLE WITH ALL CURRENT SYSTEMS.
- INTEGRATION WITH THE EUROPEAN SIGNALLING SYSTEM (ERTMS-ETCS).
- AVAILABILITY OF A CENTRALISED CONTROL THAT IS EXTENDIBLE AND CONFIGURABLE.

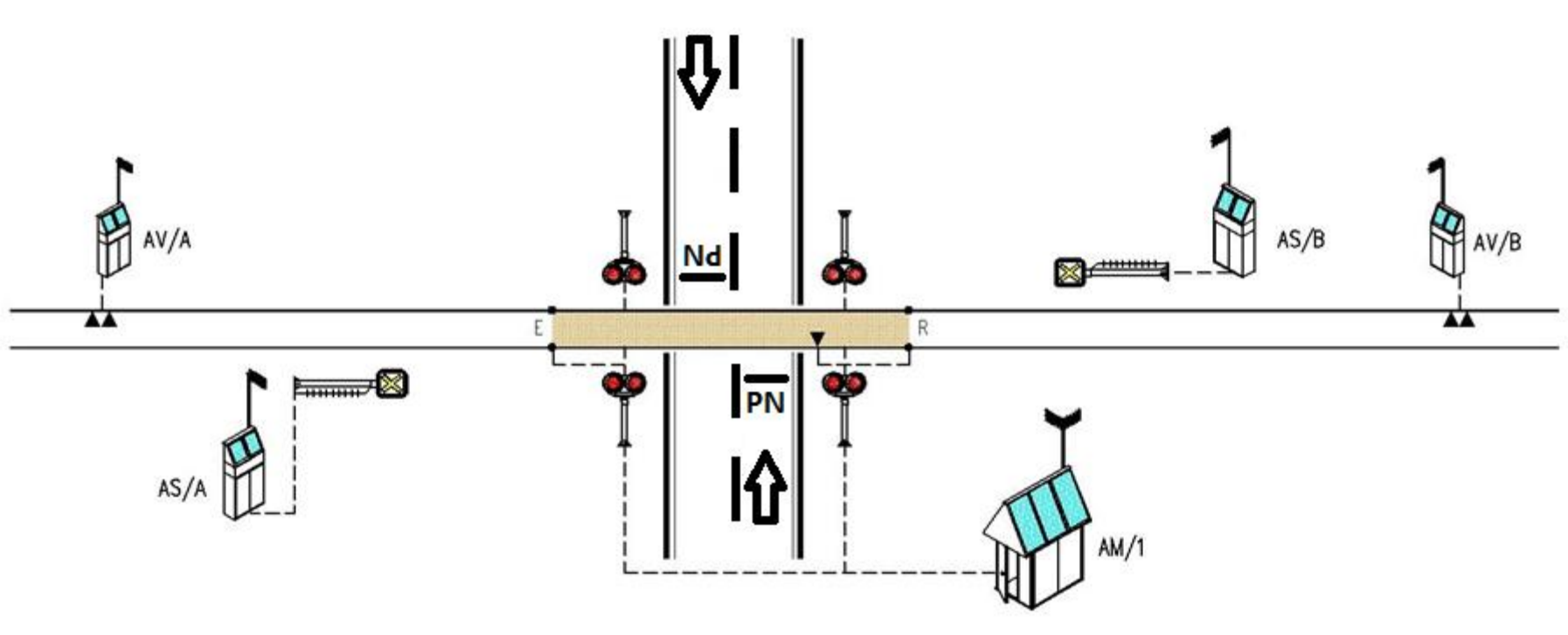
ADIF TYPE PROTECTION SYSTEM OBJECTIVES

- TO OPTIMISE MAINTENANCE OF THE INSTALLATIONS.
- OPTIMISATION OF INSTALLATION ASSEMBLY TIME.
- DELIVER SAFETY INTEGRITY LEVEL SIL-4.
- COST REDUCTION AND 100% RETURN ON INVESTMENT IN NEW OR EXISTING INSTALLATIONS.

ADIF TYPE
PROTECTION SYSTEM
BASIC DESCRIPTION

ADIF TYPE CLASS B PROTECTION SYSTEM ON THE TRACK

- ADIF SYSTEM ELEMENTS CONNECTED BY RADIO-LINK AND SOLAR ENERGY SUPPLY INSTALLED INSIDE THE BOX (AV/AS).



- PEDALS FOR TRAIN DETECTION / RESET PEDAL. ▲▲/▼

- TRACK CIRCUIT CONNECTED BY WIRING WITH THE ELECTRIC CONTROL. E R

- WIRING ONLY TO CONNECT PROTECTION ELEMENTS INSTALLED ON THE RAILWAY LEVEL CROSSING. — — —

ADIF TYPE PROTECTION SYSTEM
BASIC DESCRIPTION

ELECTRONIC CONTROL OF LEVEL CROSSING PROTECTION → CABIN

ADIF TYPE PROTECTION SYSTEM
BASIC DESCRIPTION

- ELECTRONIC CONTROL
- RADIO LINK
- PHOTOVOLTAIC PANELS

AUTONOMOUS BOXES

ADIF TYPE LIGHT SIGNAL

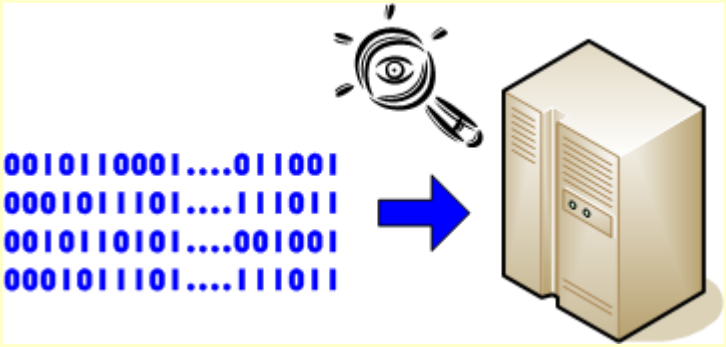
ADIF TYPE RAILWAY SIGNAL

ADIF TYPE PEDAL
FOR TRAIN DETECTION

INFORMATION CONCENTRATION SYSTEM USING DATA RECORDERS AT LEVEL CROSSINGS

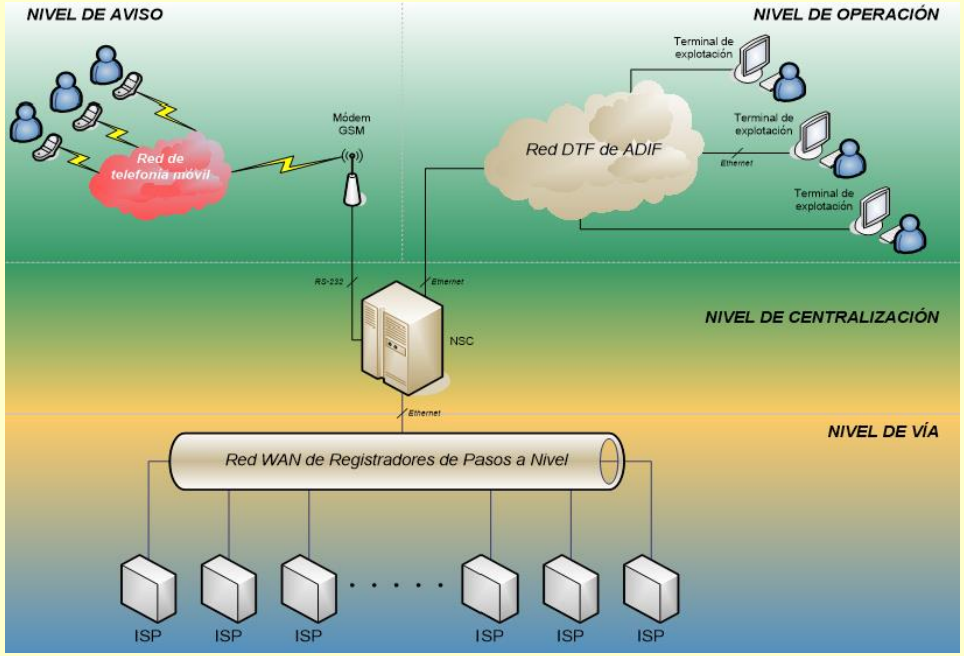
AIMS

- IMPROVE MAINTENANCE.
- SYSTEM COMPATIBLE WITH DIFFERENT TECHNOLOGIES.
- UNIFY INFORMATION.
- REDUCE INTERVENTION TIME.



GENERAL DESCRIPTION
SYSTEM ARCHITECTURE

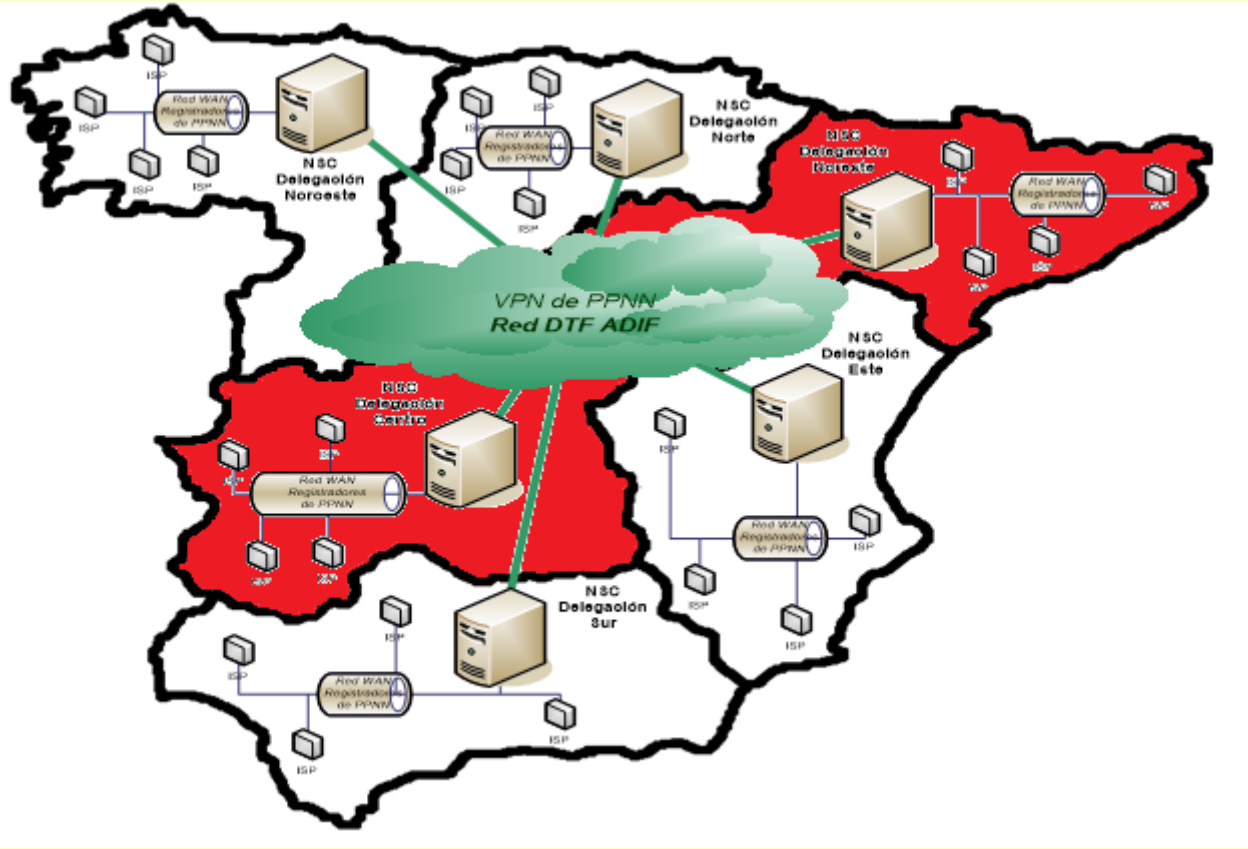
- TRACK LEVEL (INCIDENTS IN THE FIELD).
- CENTRALISATION LEVEL.
- OPERATION LEVEL.
- WARNING LEVEL.



ADVANTAGES OF DATA RECORDERS

- REAL TIME INFORMATION ON THE CONDITION OF INSTALLATIONS.
- EASE TO ANALYSE RECORDS REMOTELY.
- REDUCED TIME IMPACTS ON USERS DUE TO INCIDENTS.
- IMPROVED MANAGEMENT OF FAILURES/INCIDENTS
- HIGH RELIABILITY.
- RESTRICTED INFORMATION.

ADIF TYPE DATA RECORDERS SYSTEM



NEW TECHNOLOGIES R+D

OBSTACLE DETECTION SYSTEM BASED ON ARTIFICIAL VISION

OBSTACLE DETECTION SYSTEM BASED ON MAGNETIC INDUCTION LOOPS

- DETECT THE PRESENCE OF VEHICLES IN THE LEVEL CROSSING AREA THROUGH MAGNETIC FIELDS, TO INFORM THE TRAIN OF THE UNPROTECTED LEVEL CROSSING SITUATION, THROUGH RAILWAY SIGNALS UNTIL THE OBSTACLE LEAVE IT.

- ONLY DETECTS THE PRESENCE OF SEVERAL TYPES OF VEHICLES ACCORDING FUNCTIONAL REQUIRMENTS.

OBSTACLE DETECTION SYSTEM BASED ON ARTIFICIAL VISION

- STANDARD EQUIPMENT.
- COMPATIBLE FOR INSTALLATIONS WITH CAMERAS.
- CONFIGURABLE SYSTEM FOR ALL THE TECHNOLOGIES AUTHORISED BY LEVEL CROSSINGS PROTECTION AREA.

OBSTACLE DETECTION SYSTEM BASED ON ARTIFICIAL VISION

- BASED ON ARTIFICIAL VISION.
- INDEPEDENT COVERAGE AREA (Nº OF TRACKS, LEVEL CROSSING AREA, ETC…).
- DETECT PEDESTRIANS, ANIMALS AND ALL TYPE OF VEHICLES

PROTOTYPE ON TESTS INSTALLED BY ADIF ON LEVEL CROSSINGS (CLASS C)

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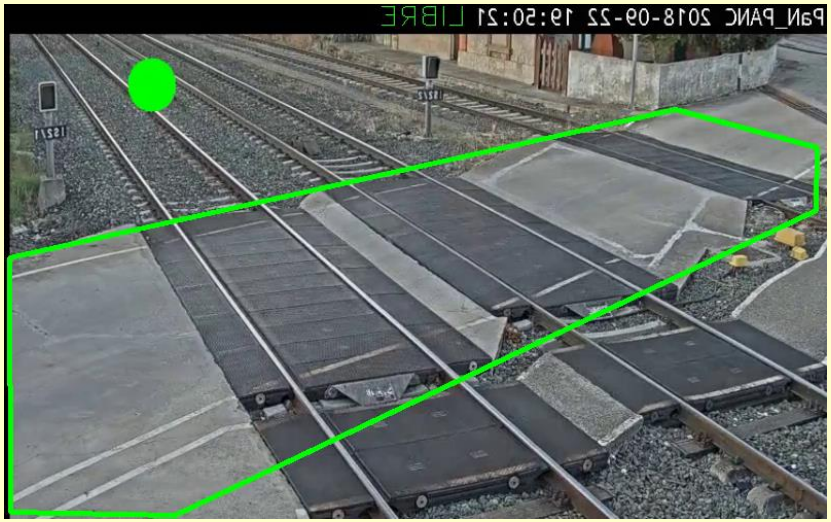
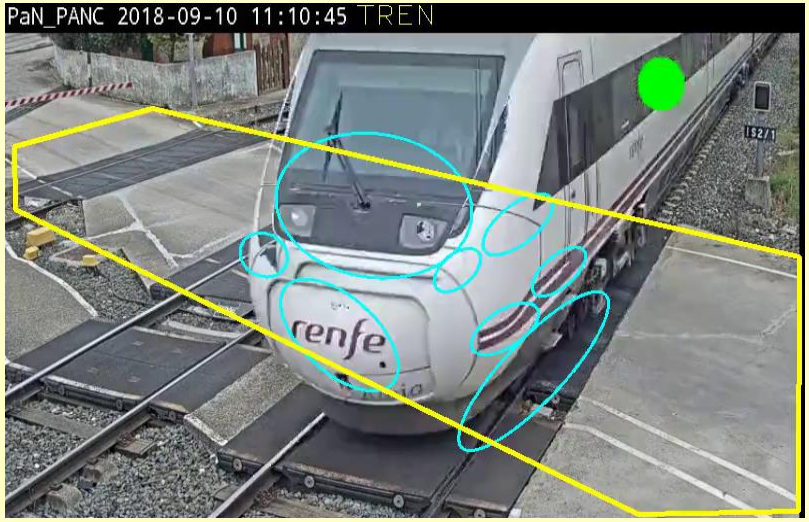


PROTOTYPE ON TESTS INSTALLED BY ADIF ON LEVEL CROSSINGS (CLASS C)



THANK YOU FOR YOUR ATTENTION

MUCHAS GRACIAS POR SU ATENCIÓN

- AREA OF LEVEL CROSSINGS PROTECTION.