SENTINEX – Low Cost Level Crossing warning system

GPS based, economical gate warning system

SENTINEX is a fully integrated state of the art level crossing warning system designed to minimize collisions at manned and unmanned level crossings between train and road vehicles. Being a Non-signaling system, it is not intended to replace any existing equipment and procedures for train operations.

With unmatched flexibility and reliability, SENTINEX provides an additional layer of safety in form of warning devices to enhance safety and prevent collisions caused due to human errors and equipment failures

SENTINEX is a network of electronic collision prevention devices (CPDs) comprising on On-board devices called Loco CPD for locomotives and Gate CPD installed at Manned and unmanned level crossings. The Loco and Gate CPDs use radio communication for passing the command messages when they are within a radial range of 2.

Loco CPD uses inputs from Global positioning system for determination of train location, speed, direction of travel, and time. SENTINEX provides a "Train approach" a train approach warning to road users at level crossings. At Manned LC gates, the approaching Loco CPD can also detect the gate open condition and warn the driver to reduce the speed.

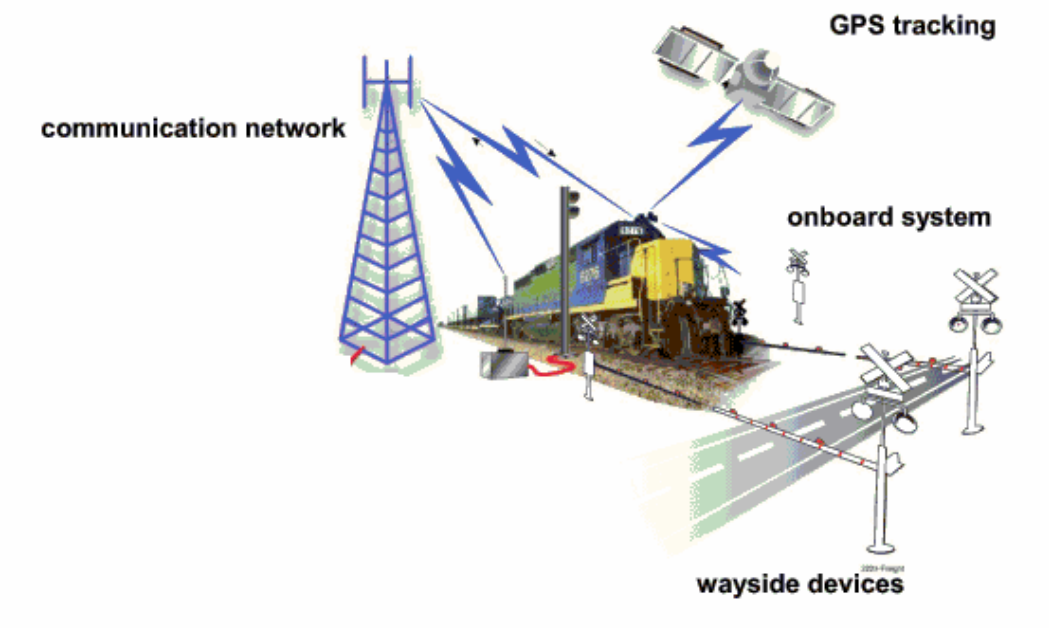
LOCO CPDs

The Loco CPD is the main module of the SENTINEX system. It is equipped with GPS and a wireless unit. Each Loco CPDs is also provided with a Loco Pilot Audio-visual console placed strategically for easy access and visibility to display text messages and audio warnings. Loco CPD can also gather the health status of all Gate CPDs along its route and store the information for maintenance purposes. The power for the Loco CPD is taken from the locomotive itself.

GATE CPDs / SENSOR BASED CPDs

The Gate CPDs are stationary CPDs which are installed at Manned and unmanned level crossings as the need may be. Each Gate CPD is provided with a wireless device to communicate its status with the approaching locomotive. It is provided with a set a hooter/bells and flashers to warn he road users. It can also be integrated with a gate sensing switch to detect the status of the gate (open/close) to inform the approaching train. In case of dark territory, solar panels can be used to power the gate devices

In general, Input from sensors used to detect Landslides, mud slides, avalanches, track inundation, and high winds can be integrated with the field CPDs to generate an emergency condition and broadcast the same to all Loco CPDs within a prescribed radial range to avoid and prevent major accidents due to natural calamities.



Technical Specifications

- Intel Processor, 16 MB RAM with 32 MB Flash Disc Memory and RTC.
- 2 watch dog timers to monitor the health of CPU and system
- Flasher and siren will be switched on when train is approaching and within 2 k.m. from Manned / Unmanned Level Crossing Gates.
- Repeaters are used to improve the communication range in hilly and urban terrain.
- Operating frequency UHF Band
- TX Power 2 W to 5 Watts, programmable
- Communication Range 3 to 5 km., line of sight
- Vibration:4 – 10 Hz : 7.6 mm 10 – 50 Hz : 1.5 mm
- Comply with General Standards IEC 571, IEC 1000 – 4-4 and IS 9000
- Digital Inputs 24, Optically isolated
- Digital Outputs 24, Relay contacts
- Loco Pilot / Gateman's Console with text display and buzzer
- LCD Display: 4 line x 20 characters, backlit
- Operating Voltage: 110v or 72vDC / 16vDC / 12VDC
- Power Consumption: 25W of Loco CPDs, 10W for other CPDs
- Ingress Protection Class IP54
- Operating Temperature Range – 10 to 70°C
- Relative Humidity 95% @ 40°C (w/o Condensation)
- Mechanical Shock 40G in packed conditions and 10G in operating condition
- Optional Solar Power for operation of System

SENTINEX Implementation Plan

- Technical Feasibility study
- Time and cost estimate
- Positional GPS survey
- Inter CPD radio communication survey
- Wayside points survey
- Route design and Assessment of CPDs
- Manufacturing and installation of CPDs
- Customization and commissioning fo the SENTINEX network
- Training of personnel
- Warranty Maintenance
- Post warranty Maintenance (if required)

KERNEX
Delivering Railway Safety

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