

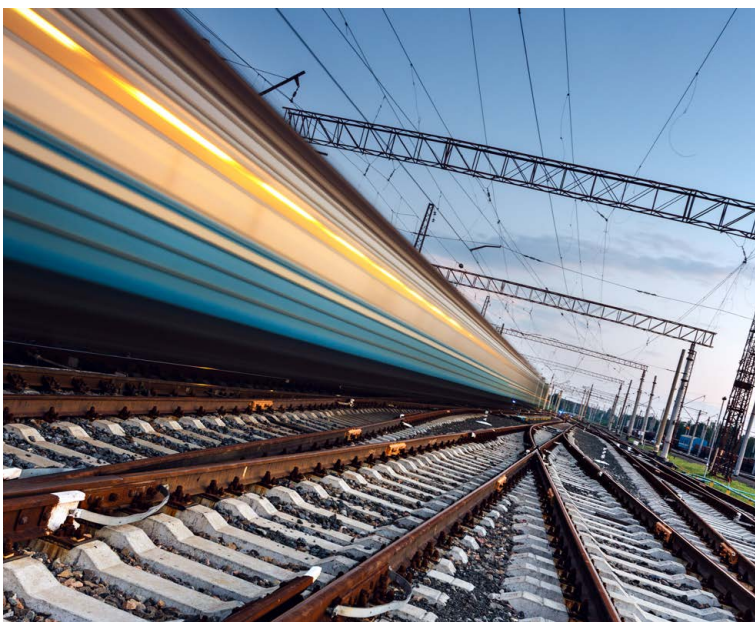


# SAT-LX

## Improving Safety at Level Crossings

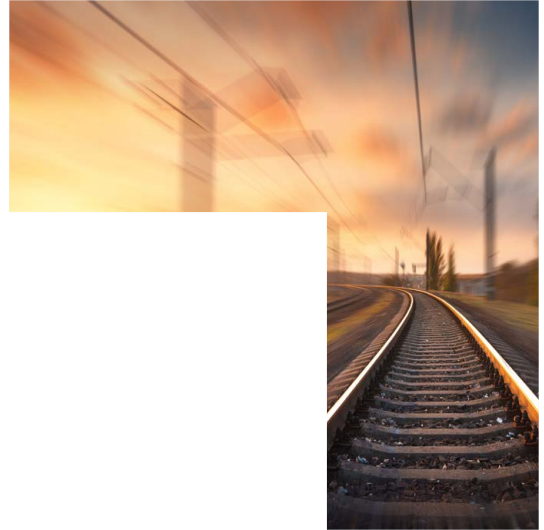
**Level crossing safety remains one of the highest priority areas of improvement targeted by railway infrastructure operators. A particular challenge lies in providing cost-effective solutions in remote, low density traffic sections of the network. SAT-LX is a satellite-based advisory warning system to improve safety in these areas.**

Rail safety is being continuously improved by implementing automatic barrier systems or removing level crossings altogether on high-speed busy sections of line. Though costly, the benefits from making these improvements are clear. More challenging is the improving safety on remote sections of line that do not have sufficient rail traffic to justify expenditure on existing solutions, even though up to 80% of level crossing accidents occur at these locations in some countries. Deployment of safety measures is often hampered by lack of communications and power supply, further increasing the level of investment needed.



## Solution benefits

- Designed to improve safety at remote or rural level crossings with no active protection
- Up-to-date, reliable information to level crossing users
- No reliance on trackside power or communications supply
- Easily installable and maintainable
- Remote equipment health-checks reduce need for scheduled inspection or servicing
- Built on proven technology
- Failsafe mode in event of power or equipment failure
- Options to support emergency telephone and object detection



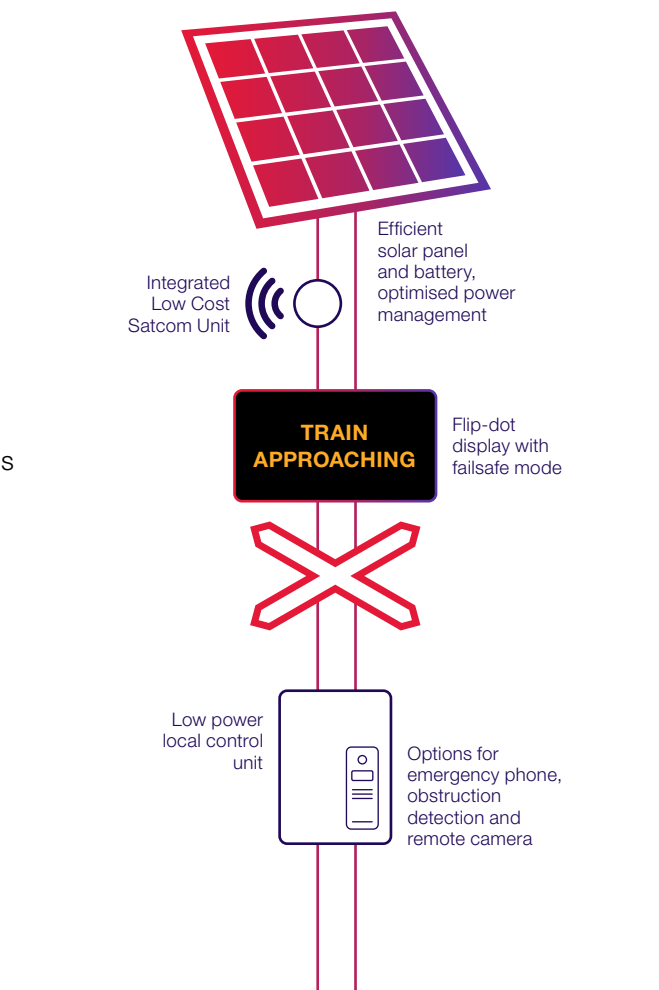
## Solution overview

The SAT-LX solution is a low-cost advisory warning system that can be easily deployed to remote level crossing sites to provide road users timely information about approaching trains. It can be combined with existing level crossing solutions or take advantage of technological advances being made on the network (for example centralised train management systems) to provide a complete solution for improving safety in rural locations.

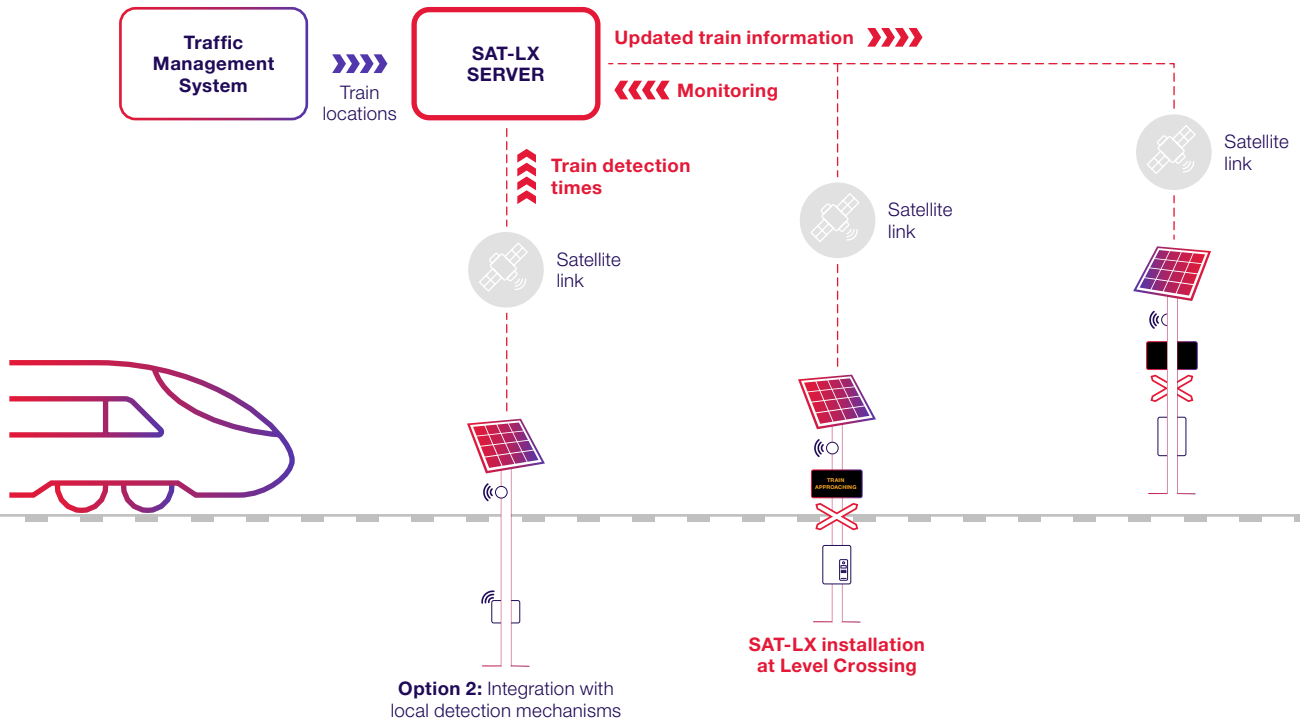
The system maintains an up-to-date database of train position and calculates the time of arrival of the trains at the level crossings supported on the system. Calculations are based on position and line speed (plus, where available, actual speed) of trains from either:

- Information maintained in rail traffic management systems and real-time updates on train movements; or
- Information collected via the satellite link from dedicated train detection systems up and down line of the level crossing. These could be traditional track-based systems (track circuits, axle counters etc) or other systems mounted away from the track (eg radar or RFID)

Warnings are relayed via satellite to the level crossing site whenever a train is within a specified distance of the crossing. This is intended as advisory only: the default mode is always to instruct road users to stop, look and listen. Depending on the accuracy and reliability of available information the expected arrival time of the train could also be displayed.



**Option 1:** Integration with central traffic management systems



## Trackside equipment

The solution takes advantage of the communications coverage via satellite already available at these locations coupled with built-in power supply to remove the need for any existing infrastructure at the site.

Satellite communications offer connectivity independent of terrestrial infrastructure to improve coverage, reliability and capacity.

### The following components are deployed at the site:

- Small, low-power satellite terminal unit providing two-way connectivity to the central SAT-LX server within the operations centre
- Flip-dot display providing up-to-date information to road users, with safe mode in event of system or power failure
- Autonomous power supply provided by solar panel and battery (or optionally fuel cell in areas with significantly restricted daylight)
- Low-power control unit, managing the power supply, flip dot display and message exchanges over the satellite link

Additional features can be integrated with the onsite equipment to take further advantage of the remote connectivity. These include emergency telephone facilities, sensor systems to automatically detect and report any obstructions on the line, and webcams to provide still images of the site to support more detailed assessment of the situation. The Sat-LX satellite connectivity can be also deployed more widely to support condition-based monitoring of other trackside equipment in remote areas.



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