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 operators are continuously improving safety by implementing automatic barrier systems or removing level crossings altogether on high-speed, busy sections of line. Though costly, the benefits of making these improvements are clear. More challenging is 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.

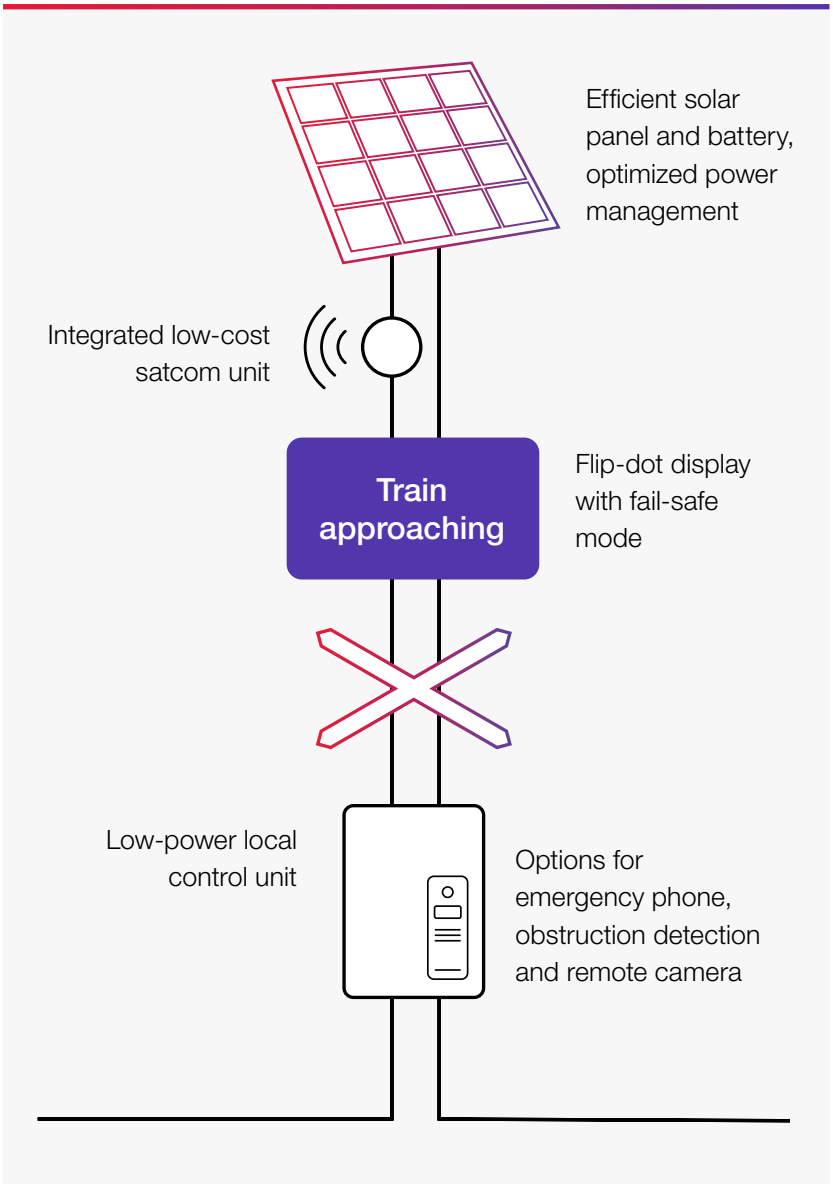
Solution overview

The SAT-LX solution is a low-cost advisory warning system that can be easily deployed to remote level crossing sites to provide motorists 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, centralized 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 level crossings. Calculations are based on position and line speed (plus, where available, actual speed) of trains from either:

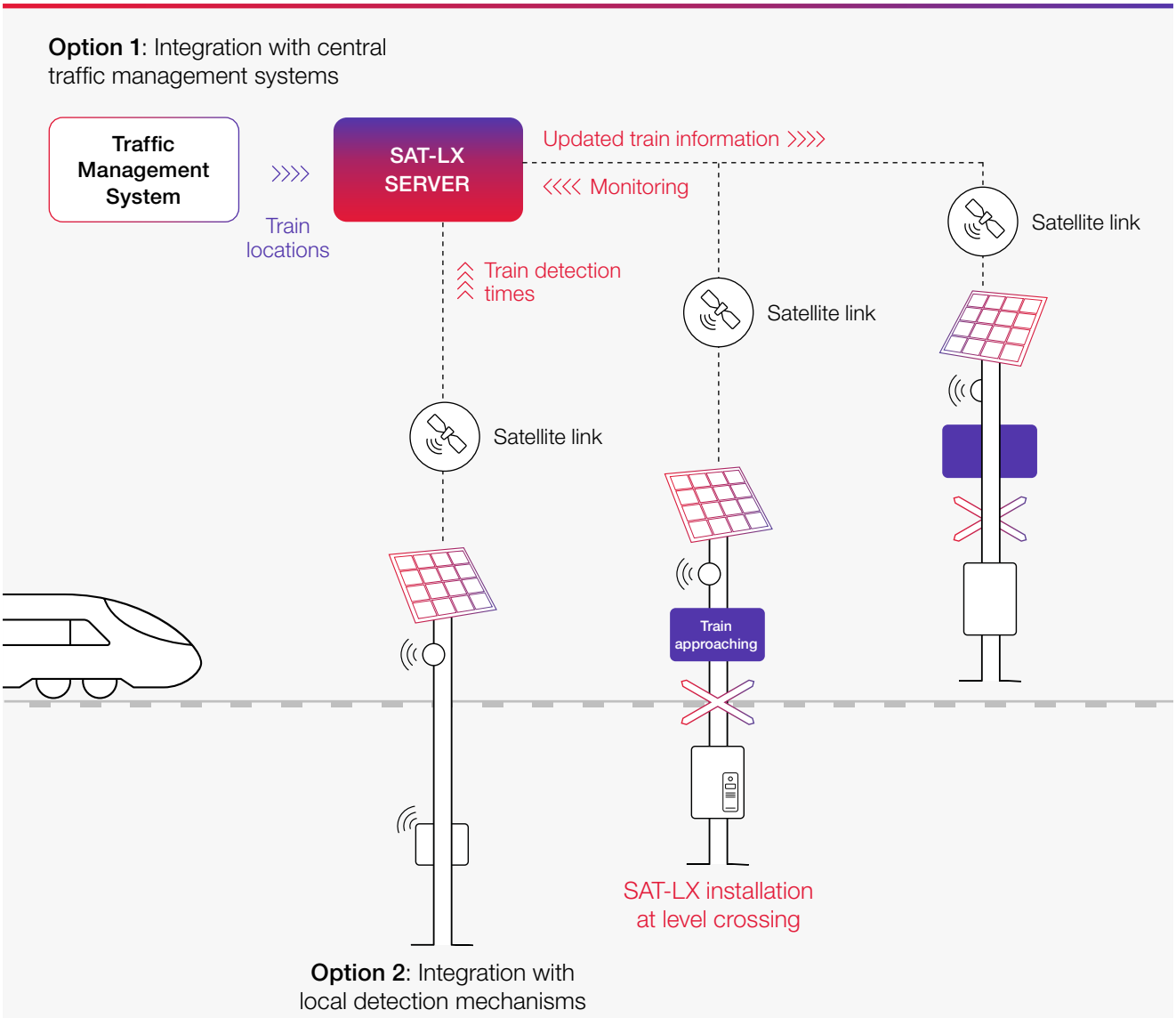
- Information maintained in rail traffic management systems and real-time updates on train movements; or
- Information collected via the satellite link from dedicated train detection systems up and down line of the level crossing. These could be traditional track-based systems (track circuits, axle counters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



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
- Fail-safe mode in event of power or equipment failure
- Options to support emergency telephone and object detection



Trackside equipment

The solution takes advantage of 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.

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 center
- Flip-dot display providing up-to-date information to road users, with safe mode in the event of system or power failure
- Autonomous power supply provided by solar panel and battery (or 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

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

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

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