



SSC – Automatic Train Protection

What is SSC

SSC is an Automatic Train Protection system designed to run a safe railway operation, making sure that human errors do not turn into fatalities and infrastructure damages.

The SSC system will safely and continuously monitor the driver's activity, quietly comparing the speed and position of the train with a "safety envelope" that ensures that the train is constantly within safety margins. The limits to be observed are typically imposed by the traffic on the line (train separation) but also by the infrastructure (curves, bridges, tunnels, rail adherence) and they all have to be taken into account when determining the safe speed not to be exceeded.

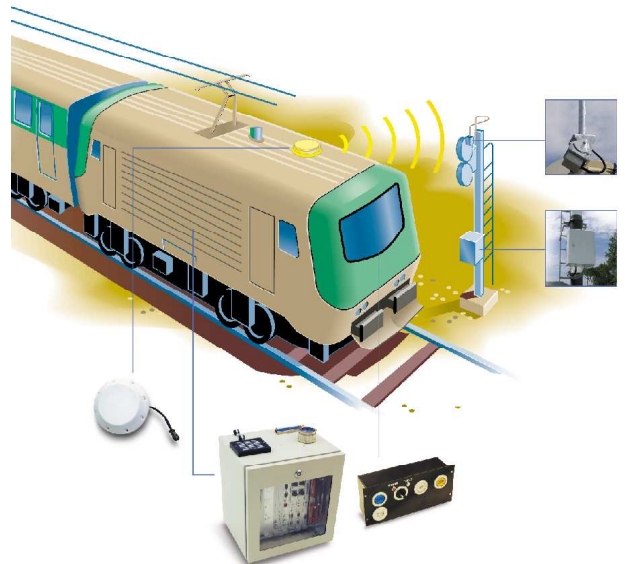
Only when the safe speed is not respected and the situation can lead to a potential danger, the system takes action, cutting traction and applying the brakes to keep the train in a safe situation.

A simple concept

The system is made up of a wayside part and an onboard part.

The wayside part is overlaid on the existing signaling infrastructure, from which it extracts variable information such as signal aspects. The wayside equipment is also programmed to transmit infrastructure information such as gradients and civil speed.

The onboard equipment receives information from the ground and continuously calculates the maximum speed and the driver inputs required by the operating rules. Whenever the rules are not respected, it will cut traction and command the brakes to avoid potential danger.



A safe system

SSC is designed and certified according to CENELEC SIL 4, which is the maximum safety integrity level specified by European standards. Both the onboard and the wayside subsystems are SIL4 and also the overall application attains the same level of safety.

A clever concept

SSC was designed and implemented in 2004-2005 and has taken advantage of technical innovations and past experience that simply were not available when its competitors were conceived. The **dramatic reduction in cabling** along the line (up to 95% less cables!) and the complete **elimination of antennas under the train** are only two of the tremendous advantages of the system, which translate into huge operational savings for our customers.

A system in operation

SSC has been developed and improved with the help of the valuable inputs of RFI, one of the safest railway operators in the world. SSC is currently in operation in Italy on more than 5000 Km of lines and by the end of 2008 more than 1200 trains will be fitted with the onboard equipment.

Although originally conceived for the railway environment, SSC can be easily applied to commuter lines: Ferrovie Nord Milano, one of the main commuter network in Italy with 320 Km of lines and 120 stations moving more than 52 million passenger a year in and out of Milan, has recently chosen SSC to ensure the safety of their operations.



SSC – System features

Transmitted data

Track-to-train transmission involves:

- Signal aspects
- Gradient changes
- Maximum line speed according to infrastructure characteristics (civil speed)
- Distance and ID to the next Information Point
- Target distance
- Target speed
- Temporary speed reductions (if any)

Additional spare fields are available for customer specific needs.

Automatic wheel diameter recalibration with GPS

SSC uses GPS at departure to verify the information coming from wheel sensors and calibrate wheel diameter accordingly. This results in high odometric accuracy without the need for manual diameter input.

GSM communication with central location

The integrated GSM modem and antenna allows the system to transmit event-based real-time information to a centralized and/or distributed system. The information transmitted can be customized and can include:

- Insertion / exclusion of the system
- Real-time diagnostic information (wayside fault, onboard fault) including position data (thanks to the GPS embedded device).
- System intervention on brakes, indicating violation of operating rules
- Initiation of Red Signal Overcome procedure

Integrated diagnostic capabilities

Both wayside equipment and onboard equipment include embedded real-time diagnostics that store diagnostic data in a non-volatile memory that can be downloaded on the maintenance PC by the maintenance team.

Complete suite of tools

- Telegram configuration tools
- In-field maintenance tool to re-install telegrams
- Temporary Speed Restriction tool, to set and reset TSRs
- System simulator

The **system simulator** is a very important complement to the system itself, helping system deployment and operation in many possible ways.

The simulator can simulate a real line with real telegrams before the telegrams are actually installed in field (application validation).

The simulator can help verify the behavior of the system in presence of wayside faults (missing IPs, wrongly configured IPs).

The simulator can take diagnostic data coming from the onboard system and re-run a real mission to verify the behavior of the system and of the driver.

The simulator can also be effectively used for driver training.

