



Latest technologies in railway signaling and telecommunications for safe railway operations.

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Introduction

- Many railway incidents are associated with poor signalling and ineffective telecommunications equipment.



- The objective of signalling and telecommunication:
 - Ensure safe movement of trains
 - Preventing collisions and derailments
 - Effective and efficient railway operations
 - Reliability
 - Reduce overcrowding
 - Save costs



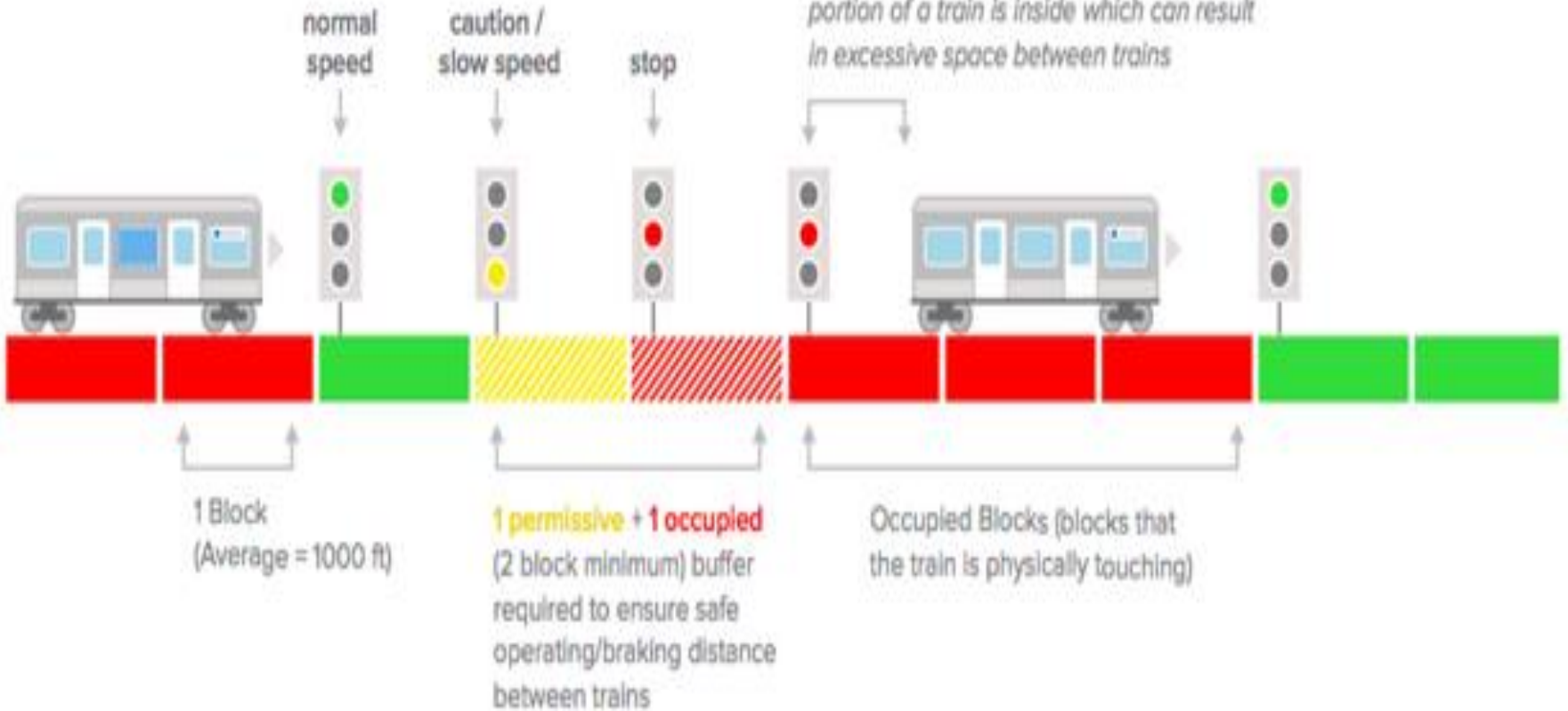
Current technology

Fixed block signal system:

- Divides track into small blocks which determines
 - how far apart trains are (safety)
 - Frequency service at the station (efficiency)
- Only 1 train can occupy a block at a time
(for enough headway)
- If the signal light in front of a train is red – train is not allowed to move to the leading block,
- If the colour of the signal in front of a train is yellow –the train is allowed to move with limited speed (proceed with caution)

Signals lights reflect the status of the block ahead informing drivers how to proceed

A full block is occupied even if only small portion of a train is inside which can result in excessive space between trains

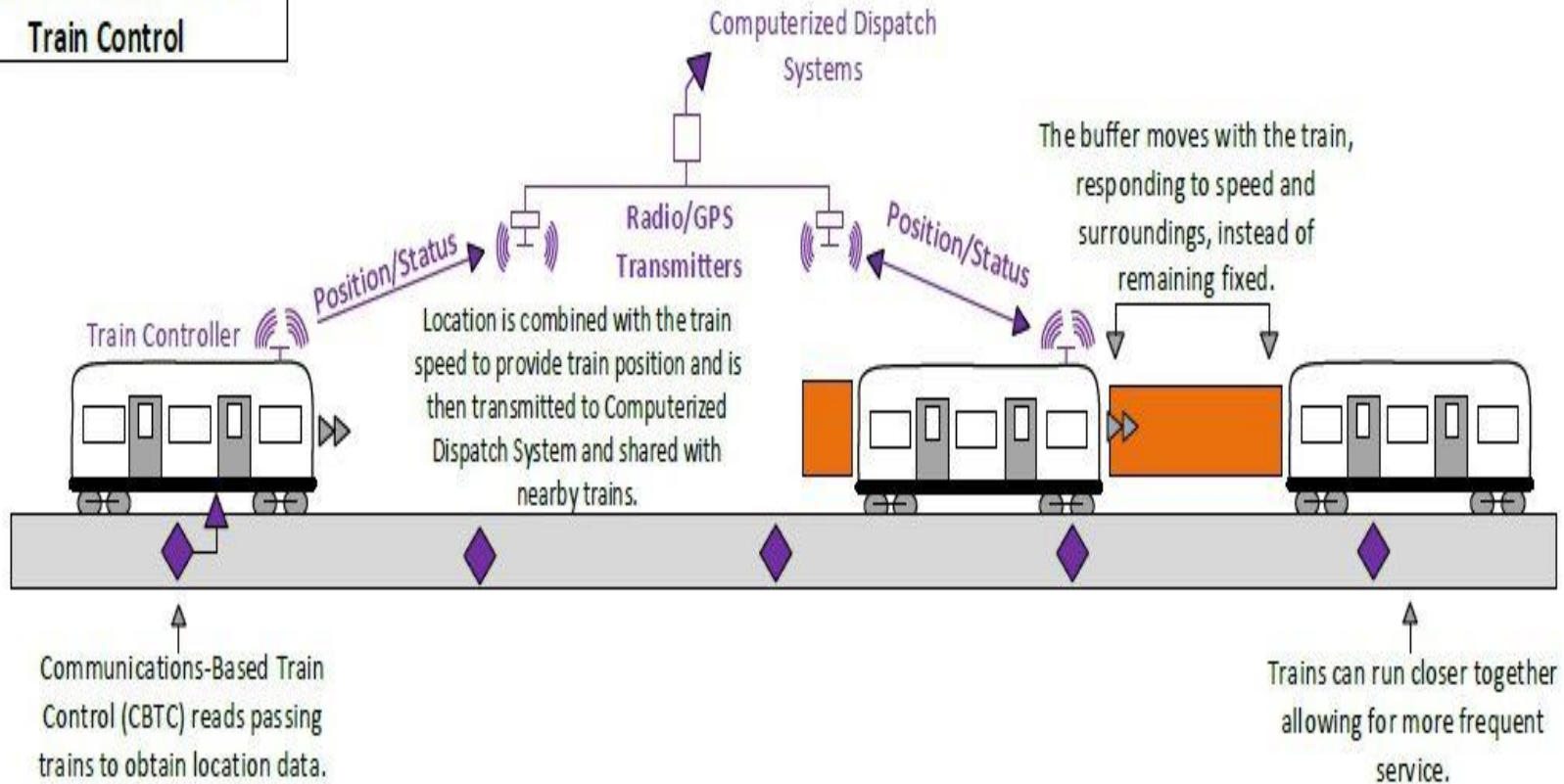


New Technology

Communications-Based Train Control (CBTC) (with moving block capability)

- Uses automatic train protector (ATP) which controls train movement
- The trains continuously calculate and communicate their status via radio or GPS-R;
 - Exacts position, speed, travel direction and braking distance of train
 - Shortens headway while maintaining and improving safety

Communications-Based Train Control



Benefits of CBTC system

- Safe:
 - Automatically brakes trains which exceed maximum allowed speed the system has determined
 - It's fail safe in the event of system malfunction
- Loss of communication between train and signal system over a certain time results in train applying brakes immediately
- All CBTC trackside components are connected using **fibre optic cabling** for communications, (unlike fixed block signal system- copper cabling)
 - Constructed of glass material immune to corrosion



Benefits of CBTC system (cont.)

- Conservation of energy

Sharp acceleration consumes energy, breaking hard increases wear and tear on the equipment

- CBTC minimises use of hard braking, except for emergencies,
- Uses coasting, constant speed adjustments and light braking to maintain separation distances and smooth running.

- CBTC generates operating and maintenance cost saving, no active maintenance which is labour intensive.

Questions??

