



Insights into the implementation of ATO on Thameslink

Moritz Dorka & David Thomas
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THAMESLINK
PROGRAMME

SIEMENS



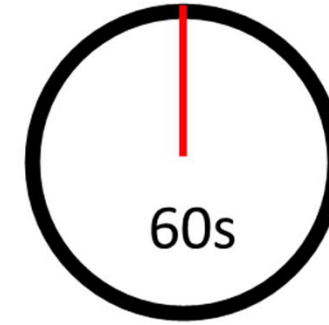
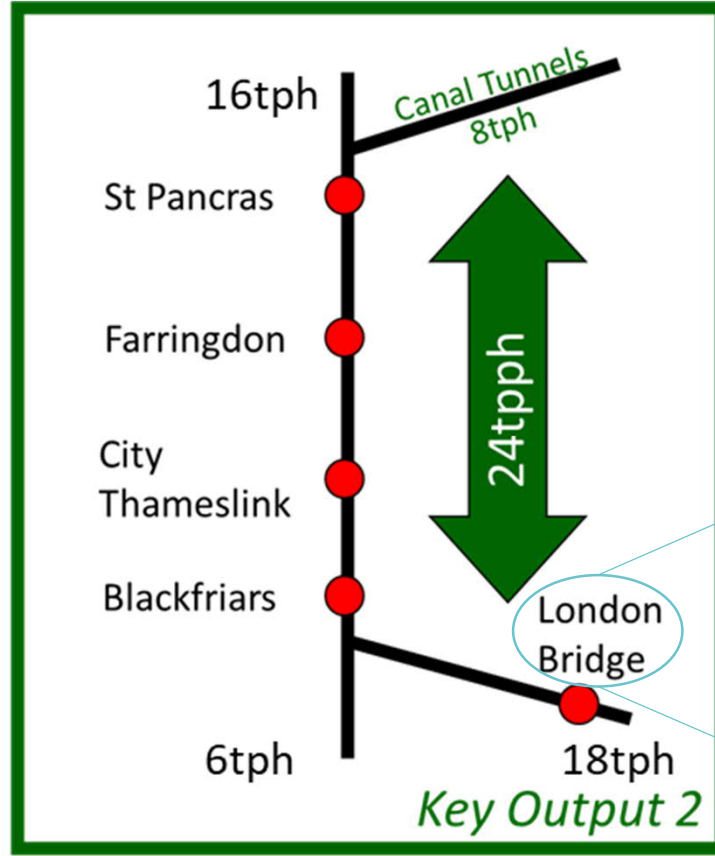
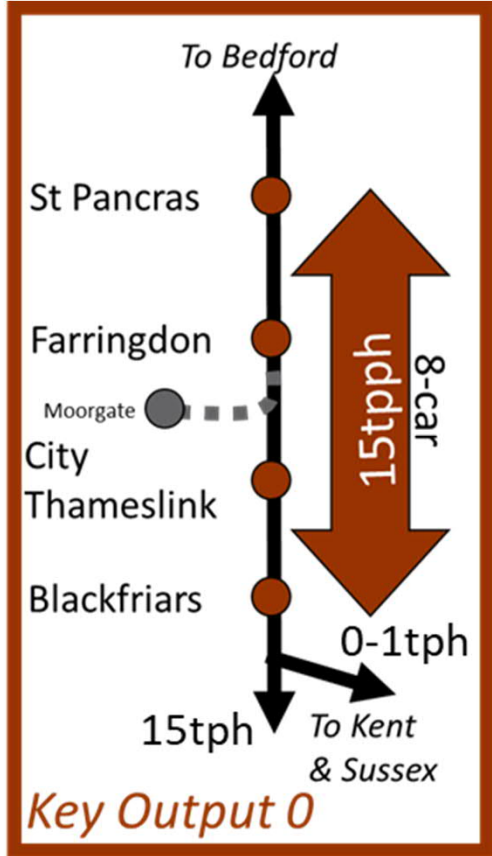
Thameslink Network



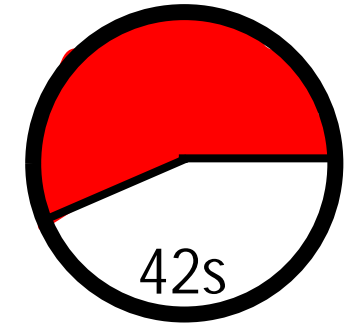
(Illustrative key routes only)

- Main line railway crossing north-south through London
- Services run to/from a number of the UK's main lines
- All trains use a 5km two-track central section known as "The Core"
- Single operator/ rolling stock through central section

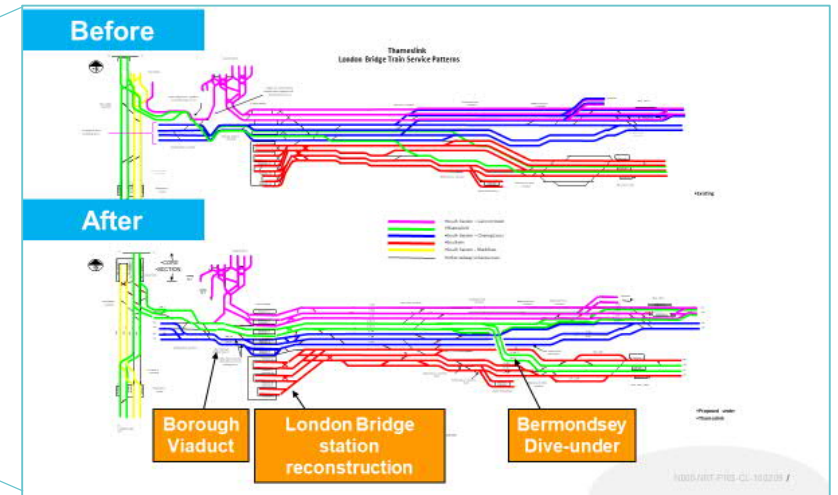
The Core – the capacity challenge...



timetabled dwell time

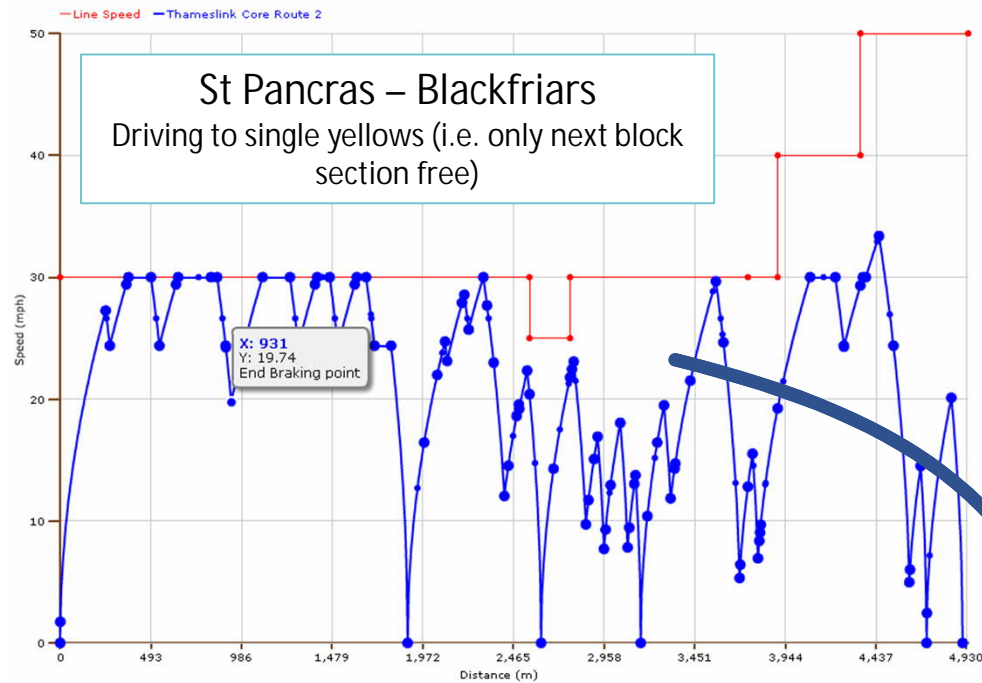


min. boarding and alighting time



£2.4bn KO2 infrastructure programme; new track, signalling, power upgrades across the whole network

The case for ATO

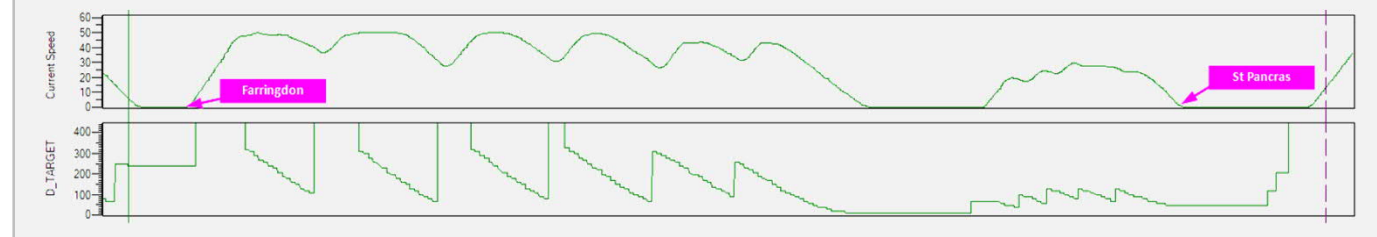


DRIVING PROFILE	northbound	southbound
Very Cautious	21.8 tph	
Professional Driving	23.4 tph	
Modified Professional Driving	24 tph	
ATO	28.4 tph	29.7 tph

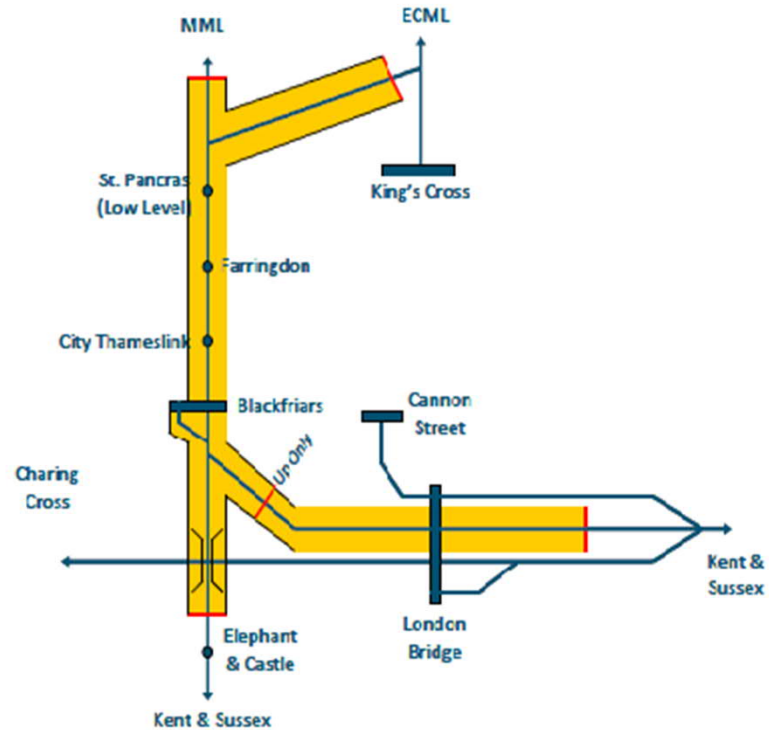
- Modelling (2008) indicated manual driving could not consistently deliver 24 tph
- Aspiration for up to 30 tph to assist with recovery from disruption

Automation required

Now try this in a mixed environment with ATO and manual trains:



Enabling ATO



ETCS area

| transition border

Core Area & London Bridge (only) re-signalled with ETCS L2 overlay

- ETCS Level 2 as a safe braking platform for ATO
Network Rail's signalling technology of choice for future
- Extensive GSM-R upgrades
- Relock & recontrol
- Trackside / On-board contracts split at the 'air-gap'
ATO specified as an on-board feature in the train contract
- Different baselines due to contract dates:
Trackside: 2.3.0d / On-board: 3.3.0

Progressive integration



Dec '13 – Start of testing in integration lab



Jan '15 – Track Testing at ENIF



March '15 – Infrastructure installed to support testing in Central London



April - Nov '15 – ETCS Level 2 testing in Central London with Class 313 test train



August '16 – Start of ETCS testing in Central London with new Class 700 train

Additional infrastructure for ATO:

1. Accurate stopping balises in platforms
2. Infrastructure track database (& testing)

Authorised by ORR for entry into service in December 2017 and May 2019

Class 700 – delivery and (further) testing



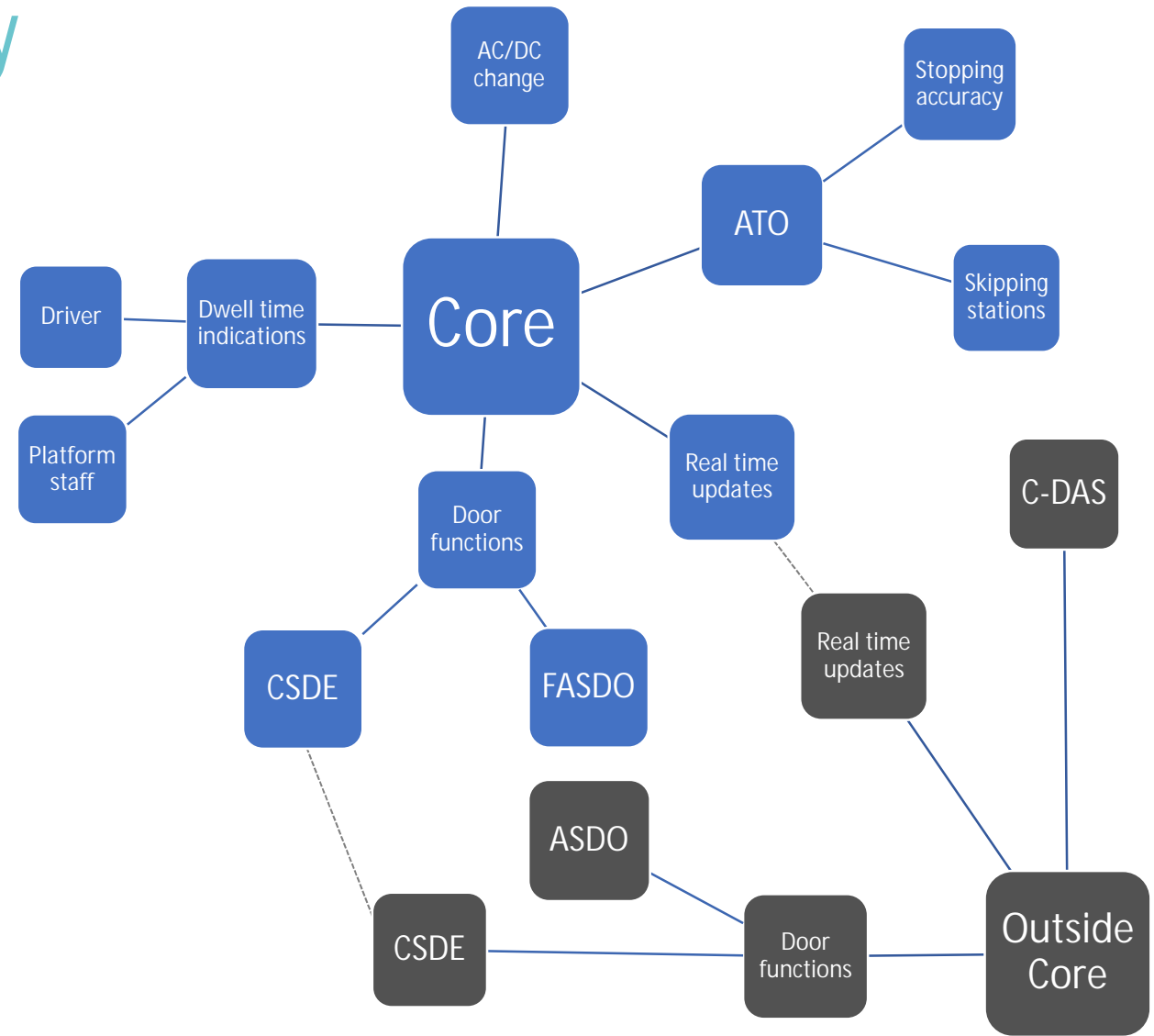
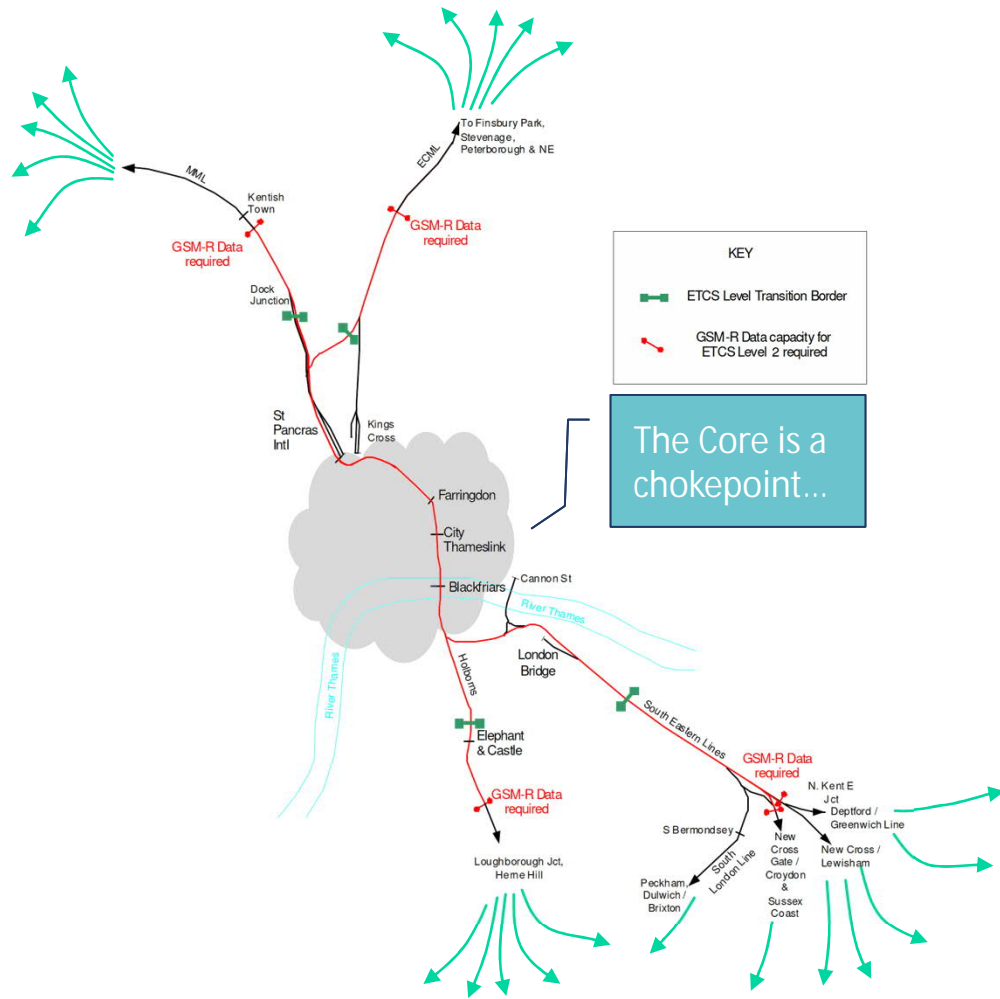
- Fleet of 115 trains, mix of 8- and 12-car fixed formation units (109 required for daily service)
- Passenger service started in June 2016
- Whole fleet in service since June 2018

- ETCS & ATO testing 2016 – 2020 (PCW in Germany, ENIF, Thameslink Core)
- ETCS & ATO soft launch phase in passenger service: Dec 2019 – April 2021
- Driver training since May 2021



World's first high-capacity ATO over ETCS solution for the mainline railway (predating Subset-125 AoE)

Features to maximize capacity



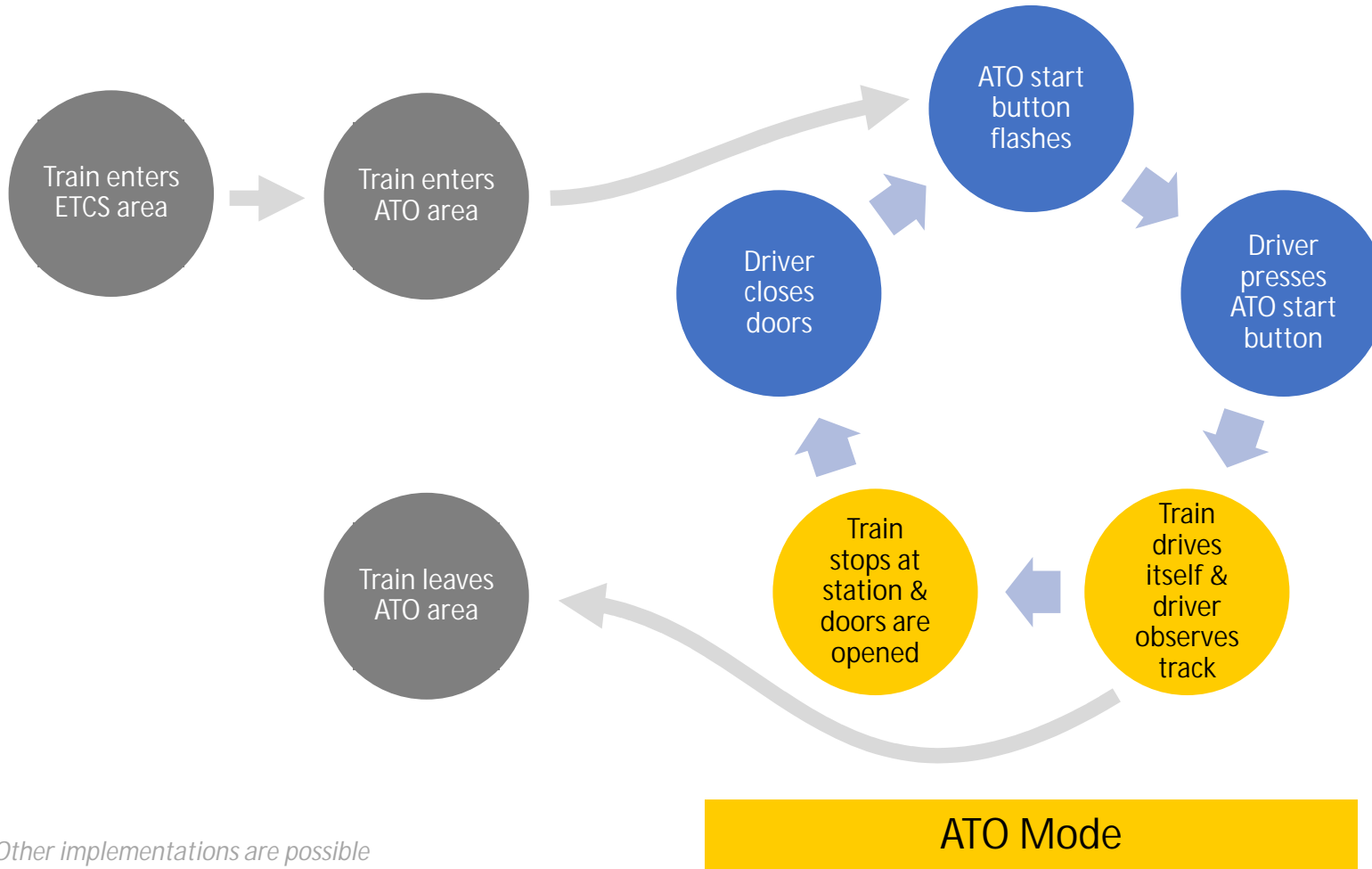
Class 700 – The cab



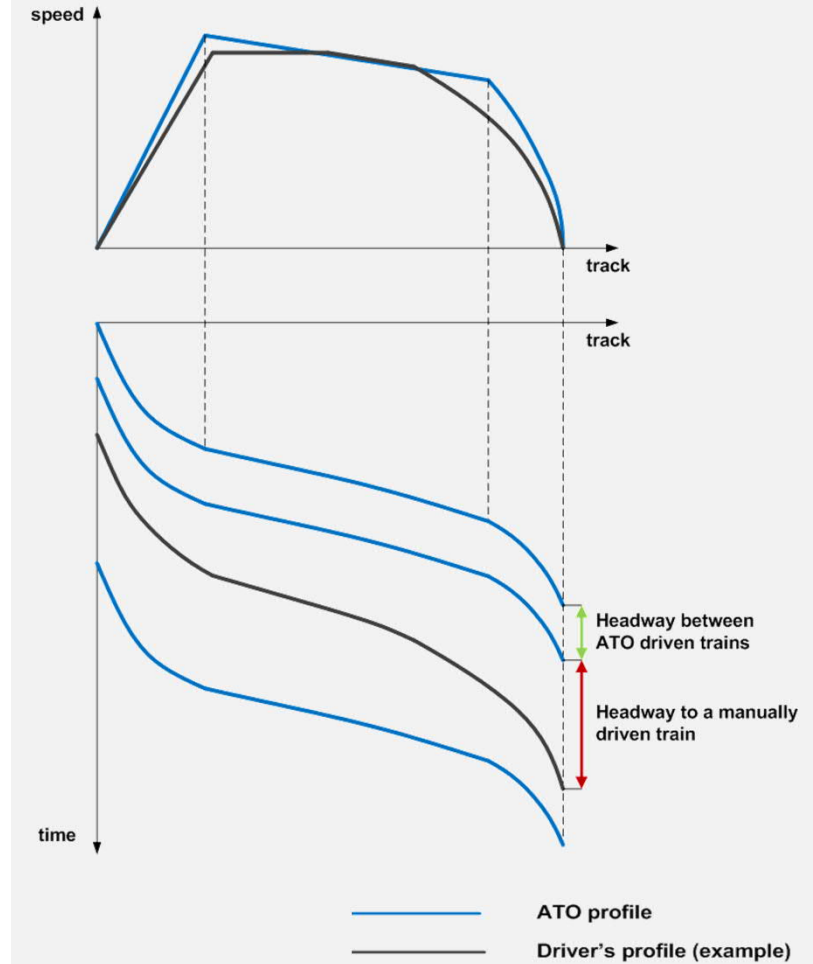
Power / Brake Controller

ETCS Ack
ATO Start
ATO Stop

ATO working principle

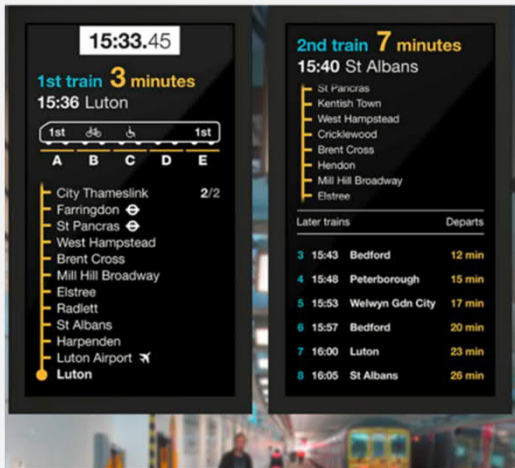


Time optimized train run using ATO



ATO delivers the headway...

...but metro behaviours needed to achieve dwell times



Level access, new platform customer information & new zoning signage



On-board Passenger Information System with shore-side link

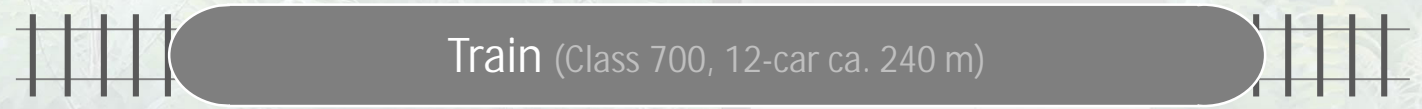


The tale of too short platforms

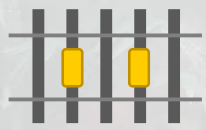
First Class

 Problem

Station platform



Solutions:



(1) Use ETCS Balises



(2) Use GPS data



(3) Let the driver deal with it

All three solutions are employed on Thameslink

Hierarchy

The tale of too short platforms

First Class

 Problem

Station platform



Train (Class 700, 12-car ca. 240 m)



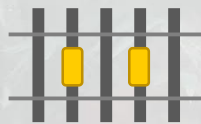
First Class

Provides cost savings for rural stations

ATO area:

1. No short platforms
2. automatic door opening via Balises

Solutions:



(1) Use ETCS Balises

- No on-board database. All information stored in balises. Packet 44 not Packet 69. Reason: use also in Level NTC
- Platform distance & length – Automatic Selective Door Operation
- Platform side – Correct Side Door Enabling
- No platform height / retractable door gap bridging on Thameslink
- Auxiliary information possible (name of station, identity of line, ...)



Stopping location & door release



Information via voice & screens

And now...?

ETCS/ATO in service, but 24tph still to come

Adjacent areas starting to be upgraded to ETCS L2

Start of a journey for GB