



AŽD Praha s.r.o.

# ATO over ETCS (GoA2)

Vladimír KAMPÍK, MIRSE

European Affairs Director

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# ERTMS Game changers

- **Identified 2014, standardisation since 2016, first demonstrators 2020, commercial NOW**
- **ETCS L3** - Potential increase of capacity and/or reduction of trackside life cycle costs due to less train detection systems to be installed;
- **ATO** - Potential reduction in energy consumption costs and/or increase in capacity due to optimal train speed setting and/or more robustness in operation (better respect of timeplan);
- **Braking curves model** - Increase of capacity due to further optimisation/balancing the safety and capacity requirements in different operational scenarios;
- **Next Generation Communication System(s) – FRMCS** - Obsolescence management and potential reduction in costs due to non dedicated railway radio communication technology/network model and/or potential use of capacity increase due to increased spectrum efficiency;
- **Satellite positioning** - Potential reduction in deployment and maintenance of balises and improved performance due to more accurate odometry

# ATO is the way to Autonomous train

Target solution for **today** in Automation:

**“SMART, **AUTOMATED** TRAIN @ SMART and **AUTOMATED** INFRASTRUCTURE  
of Single European Railway Area as backbone  
of sustainable mobility”**

# ATO is the way to Autonomous train

Target solution for **tomorrow** in Automation:

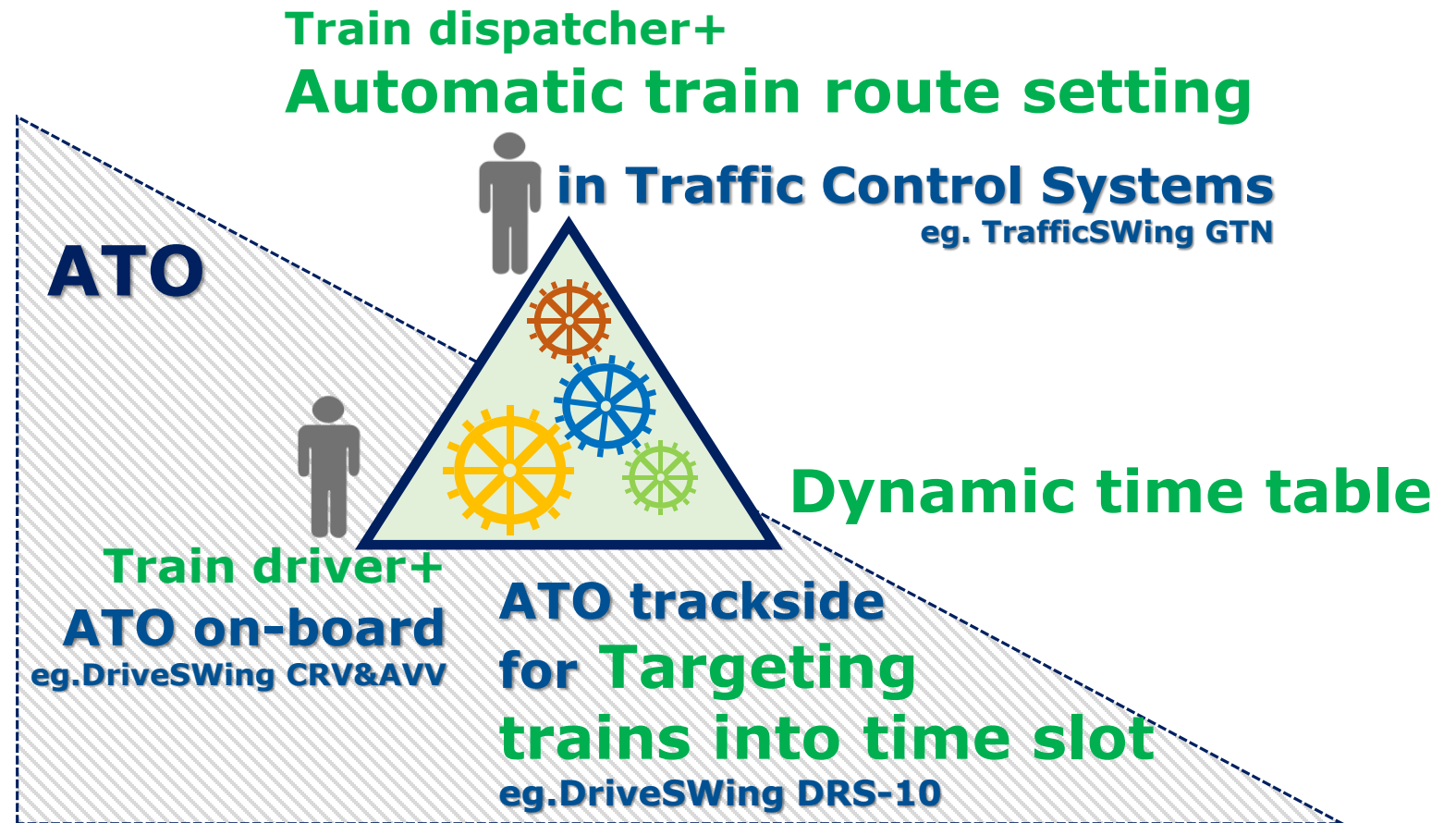
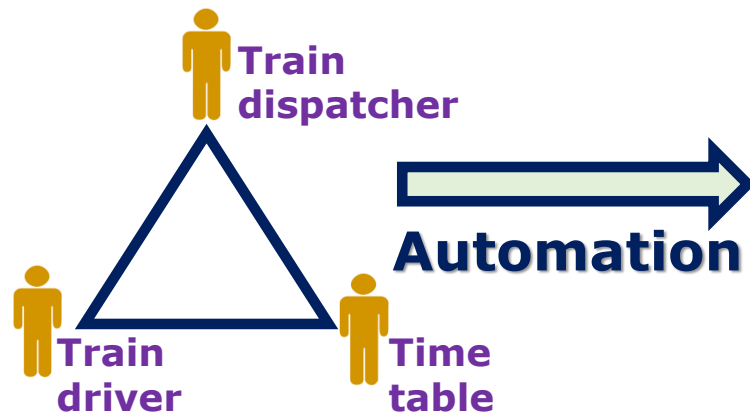
**“SMART, AUTONOMOUS TRAIN @ SMART and AUTONOMOUS RAILWAY”** as integral part of Single European Railway Area as backbone of sustainable mobility”

# 3 pillars of rail traffic operation



- TARGET: Increase capacity and effectiveness with ensuring same or increasing level of safety
- TARGET: Elimination of routine operations and computerized support for decision making process

# 3 pillars of rail traffic automated operation



# ATO history in Czech Republic

1960's

On Czechoslovak State Railways (now Czech Railways), train driving automation started in 1960's in our R&D organisation CD VUZ → AŽD Praha (90'). Main interest:

- saving of energy for traction
- better utilization of track and rolling stock parameters
- decreasing of driver's workload

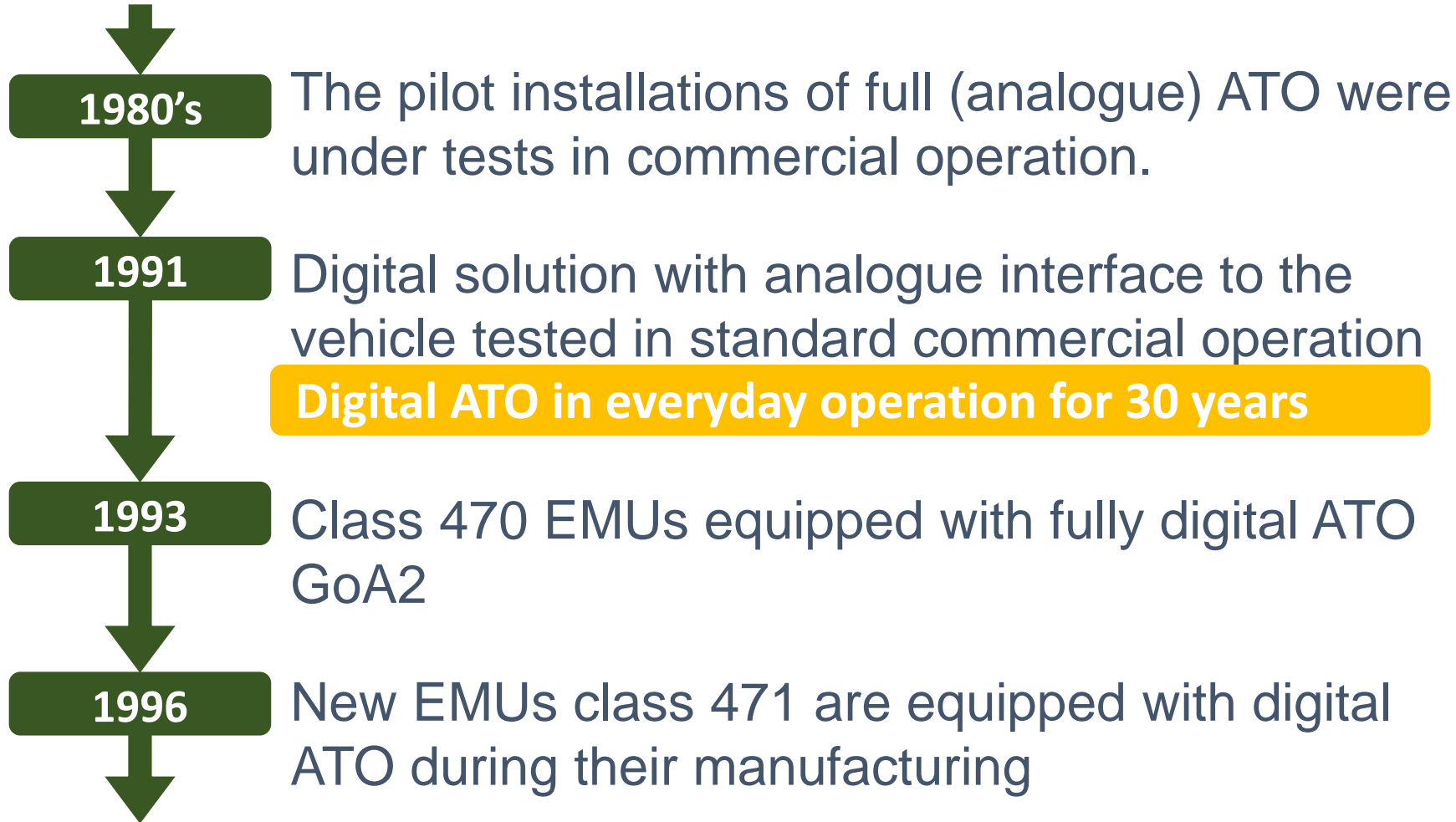
1966

In half of 60's - first tests with Automatic Train Operation systems (consisting of Speed Regulator, Automatic Target Braking System and Energy Saving System)



ATO testing DMU  
class M 286.1

# ATO history in Czech Republic



ATO test loco 242.256 (1985)



EMU 470.001-002 with commercial ATO (1996)



# ATO history in Czech Republic

2008

Unit 471.042 was equipped with ATO over ETCS (AoE) in 2008 as one of the **first in the world**.

2010

ATO at 30% of CZ railway network,  
≈ 90% of total transport performance

2020

Oct 19. **Worldwide premiere of AoE for freight train**, Switzerland. Shift2Rail demonstrator.

2021

AŽD: Plum Railway/Švestková dráha AoE equipped

2022

ATO lines 3500 km (of 9500km),  
ATO trains – 285 (of 2400)

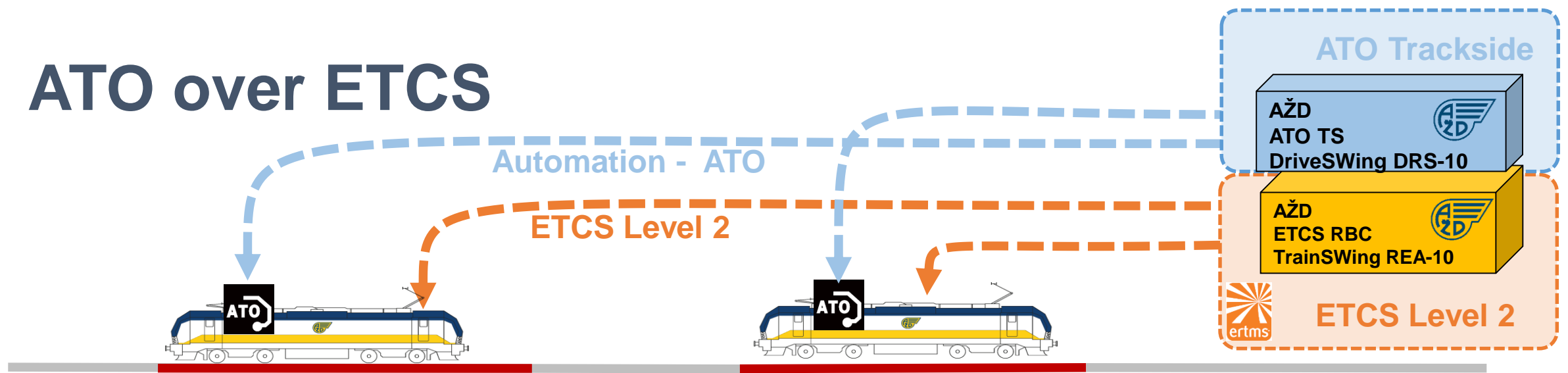


(2008) Unit 471.042 with  
ATO over ETCS



19.10.2020 Sierre – Sion, CH  
185 141-9 DB Cargo

# ATO over ETCS

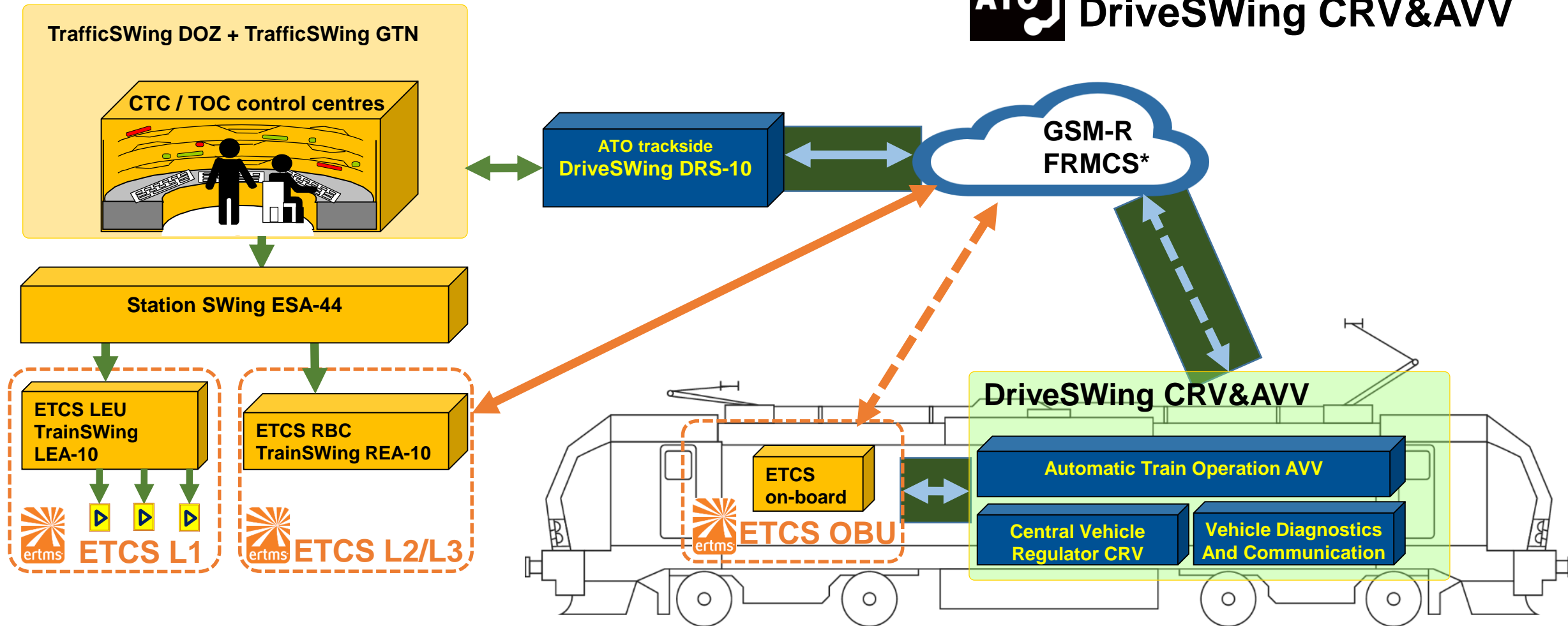


- ETCS = SAFETY, ATO = EFFICIENCY AND ENERGY SAVINGS
- On-line interconnection of traffic and train control system
- Interoperable solution according to TSI,
- **Reduction of energy consumption by 10-30%,**
- Timetable keeping  $\pm 5$  sec – **up to 20% increase of line capacity**
- Possibility to switch to fully autonomous operation (ATO GoA4)
- ETCS Level 3 ready (including virtually coupled trains)

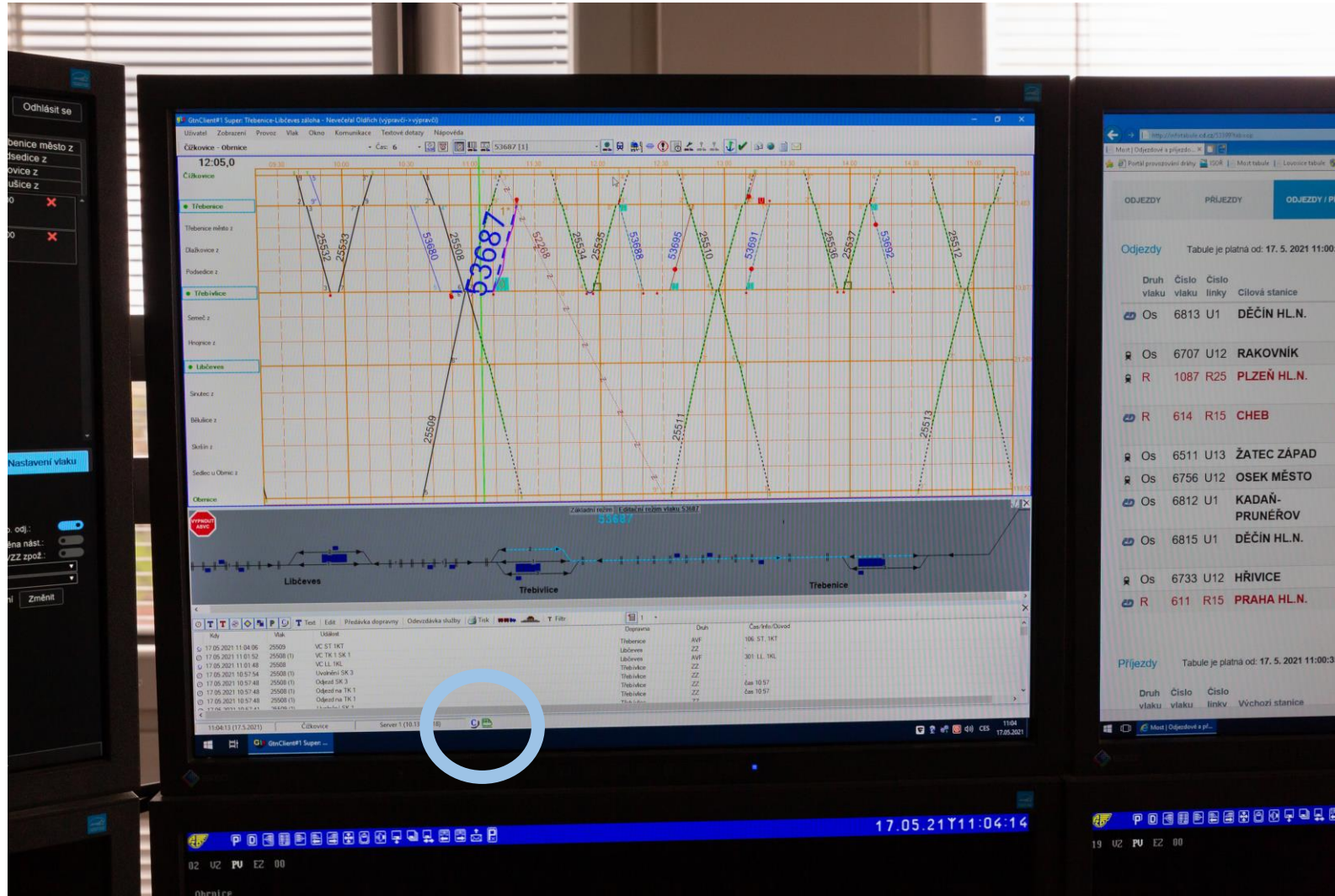
# Interoperable solution for ATO over ETCS



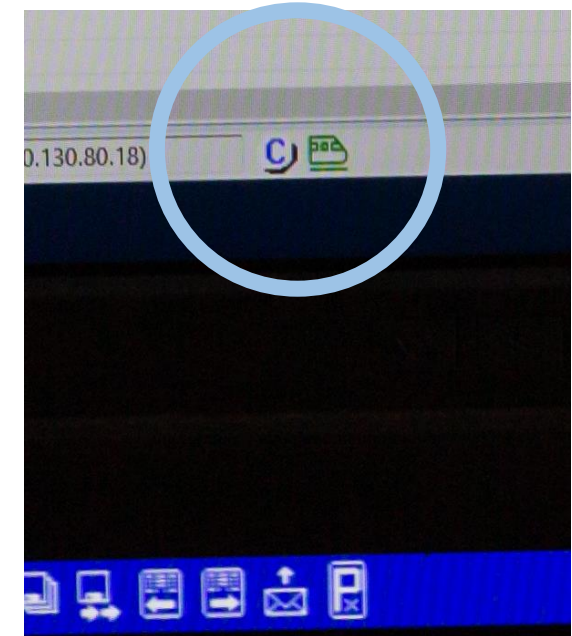
DriveSWing DRS-10 +  
DriveSWing CRV&AVV



# ATO over ETCS Trackside infrastructure



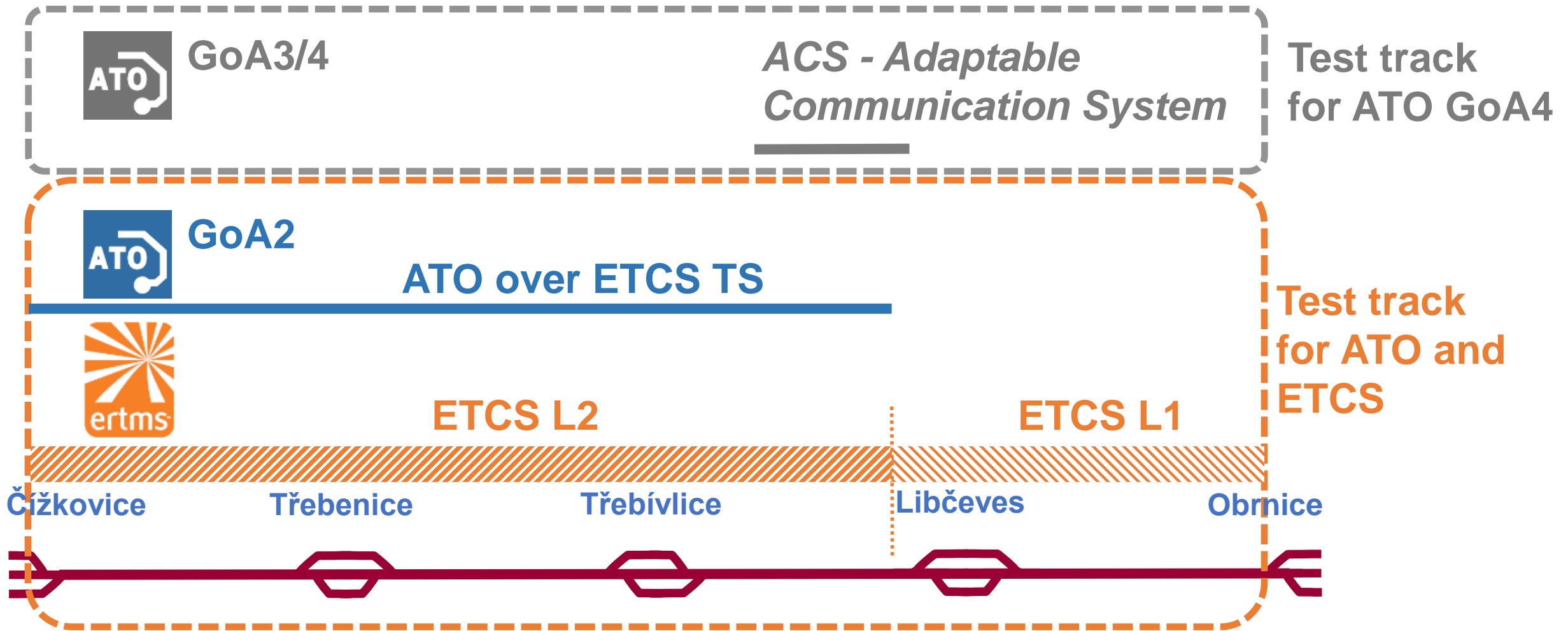
ATO trackside  
DriveSWing DRS-10



ATO over ETCS (GoA2)



# Test Polygon for Rolling Stock Applications



# The world premiere of automatically operated freight train ride under control of an ATO over ETCS system

- Demonstrating of interoperability as Shift2Rail project - X2Rail-3
- Swiss SBB Sierre-Sion line ETCS level L2 with ATO trackside part
- DB Cargo loco+14 freight wagons run under the control of the ATO system (AŽD DriveSWing CRV&AVV), fully supervised by ETCS.
- The system runs in GoA 2
- The demonstration and testing campaign in Switzerland was led by a DB Cargo embracing participants from the whole Europe, namely AŽD, Alstom, Hitachi, Siemens, Thales



# What about ATO and freight trains?

## Freight train specific requirements

## Available solution

No regular time table

ATO trackside eg. AŽD DriveSWing DRS-10

Need for Energy optimization

ATO on-board eg. AŽD DriveSWing CRV&AVV

Regulation at low speed  
(i.e. 5km/h when loading)

ATO on-board eg. AŽD DriveSWing CRV&AVV

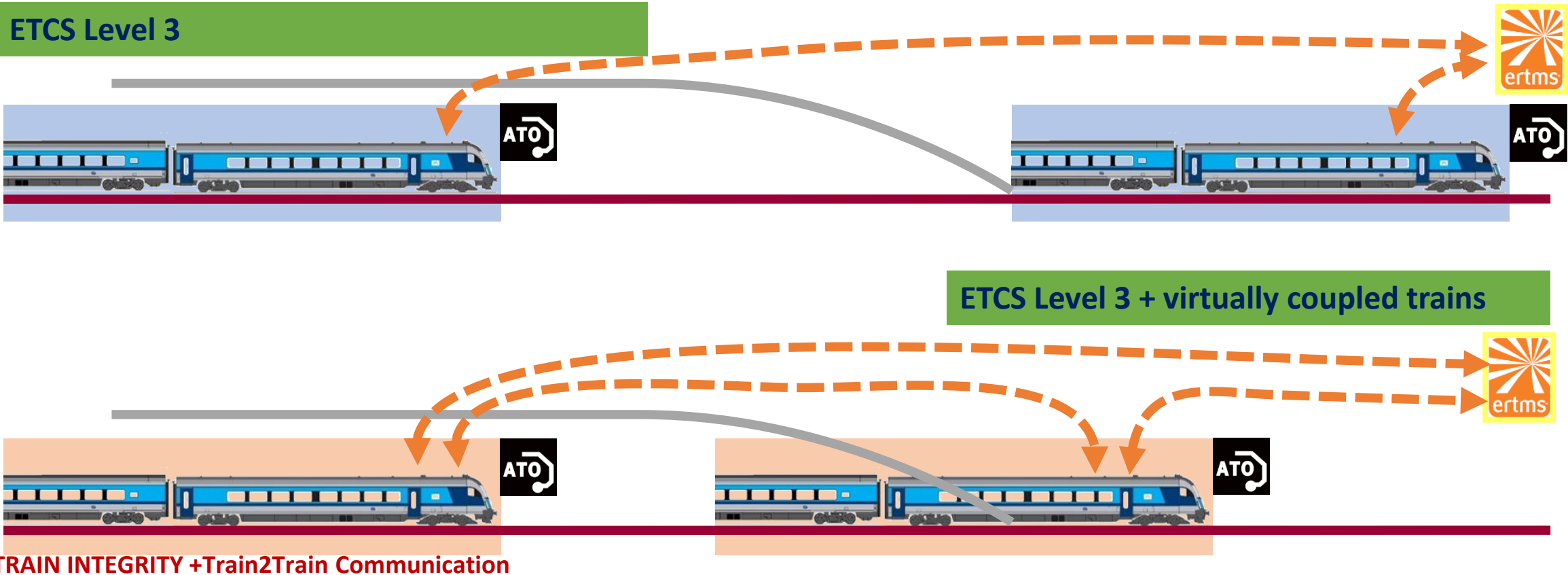
Soft breaks with longer reaction time

ATO on-board eg. AŽD DriveSWing CRV&AVV

Interoperable solution, standardized interfaces, COTS solution -  
**fully ready for Freight trains**

# ATO over ETCS is the Key for future

- ATO over ETCS is enabler and accelerator for further application of new technologies





# ATO over ETCS

- ATO is matured technology already proved and in everyday operation at CZ Railway network for more than 30 years
- ATO over ETCS technology is standardized, interoperable and enables wide deployment at European railway network in short future
- ATO over ETCS is key element for increasing traffic density and accelerator for further application of new technologies as fully autonomous train

# Time for your questions

Vladimír KAMPÍK, MBA, MIRSE



Žirovnická 3145/2, Záběhlice, 106 00 Praha 10

[www.azd.cz](http://www.azd.cz)