



AŽD Praha s.r.o.

# OBU ETCS Installation – Retrofit

Design – Realization - Homologation

Praha, 5.9.2022

# Retrofit

- All activities necessary for installation to already operated vehicles
- Installation means:
  - Mechanical modification of vehicle to be ready for installation of ETCS components
  - Electrical design to connect ETCS and related components with vehicle
  - Engineering related to integration of new components with vehicle
  - Modification of already installed system and TCMS
- Homologation
  - All activities related to national approval of modified vehicle
  - All activities related to Type approval through OneStopShop ERA



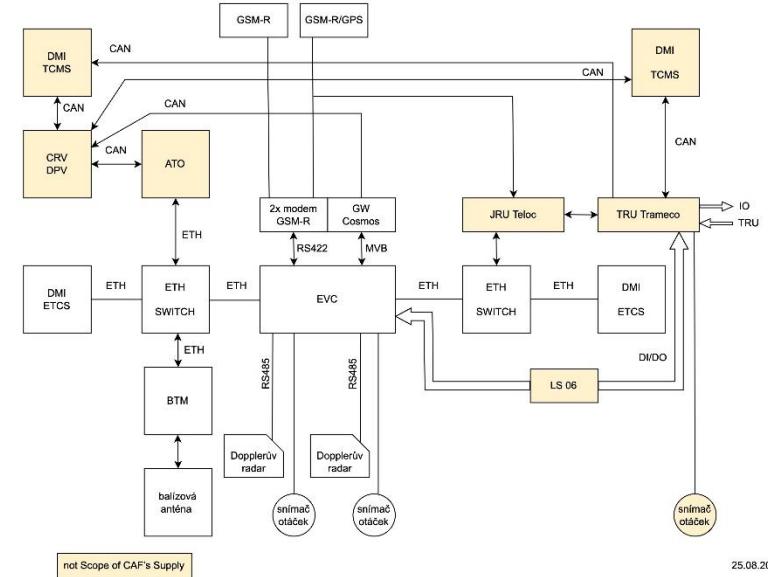
# Retrofit from AŽD and partner

- Conception of OBU ETCS installation, integration with TCMS and national STM (pure or virtual STM)
- Production of national ATP (own or with partner from respective country)
- Mechanical design
- Electrical design
- Technical specification and integration responsibility
- Management of production, engineering in close cooperation with partner in respective country with his responsibility for production and installation
- Close cooperation with national body responsible for approval
- Responsibility for Type approval



# Installed system

- OBU ETCS system
- BL3R2 specification fulfilled (3.6.0 version)
- TSI CCS 919/2016
- Implemented modes LNTC, L0, L1, L2
- Interface to ATO
- National ATP LS06, LS07 (HU), integration SHP
- Ready to integrate other national ATP (direct wired connection)

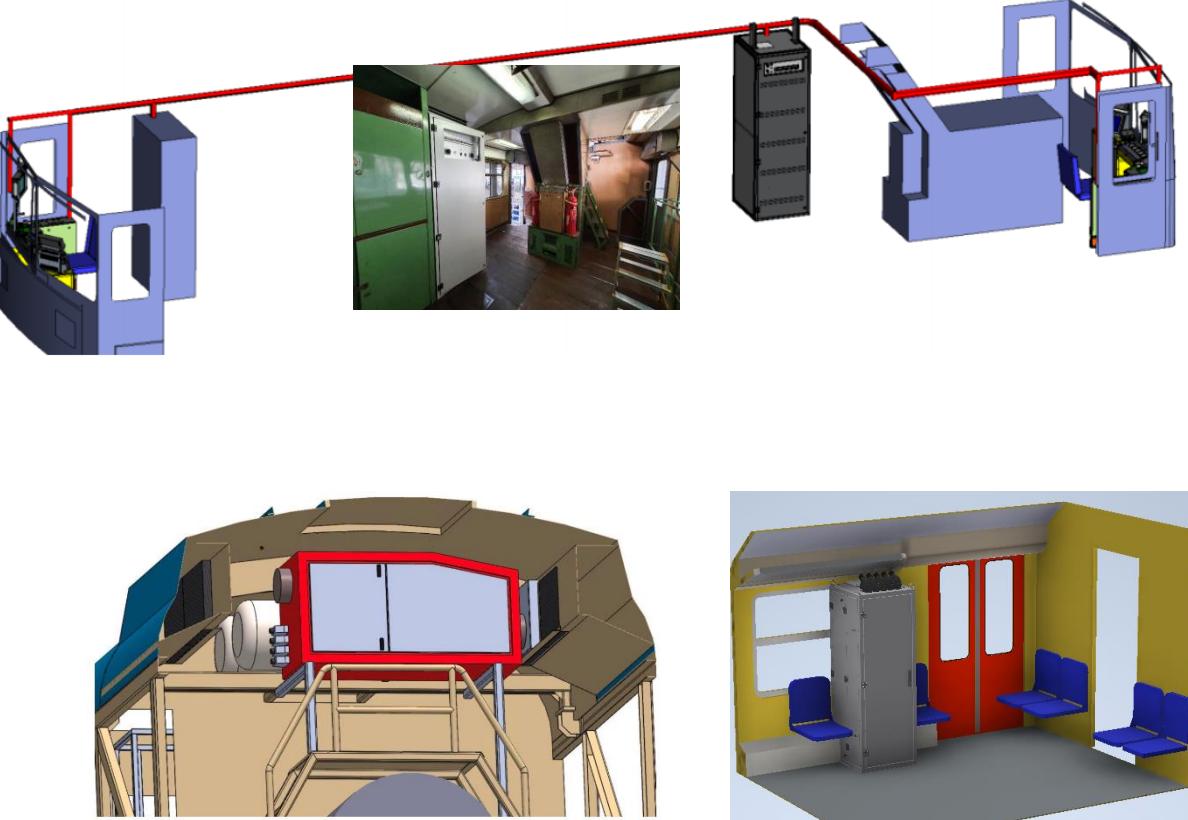
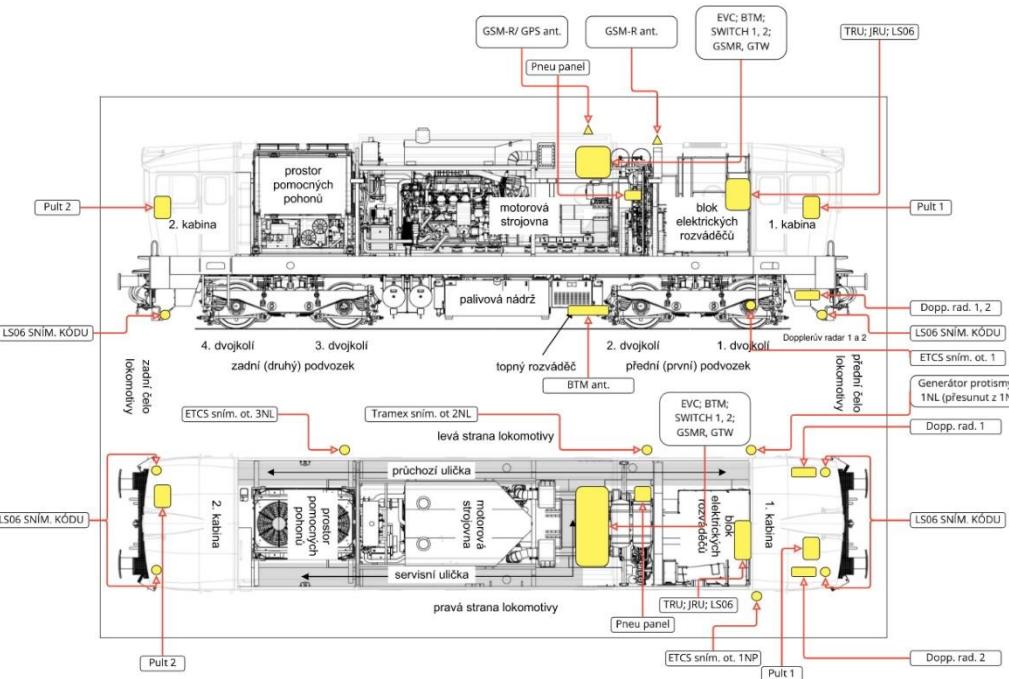


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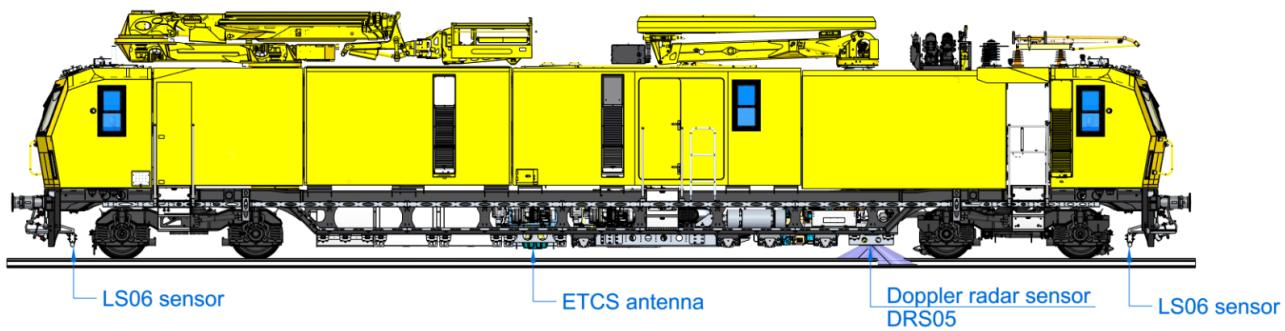
# Experiences

- Experiences with different type of installation
    - New ETCS mounting racks
    - Distributed installation



# References

- Special vehicles for infrastructure managers
  - EM100 (1 pcs)
  - MVTV 2x (51 pcs)
  - MTW 100.013 (3 pcs)
  - MTW 100.506 (6 pcs)
  - OCPD001 (4 pcs)



# Czech Railways reference

- 844 (31 pcs)
- 750.7 (19 pcs)
- 842/954 (37 + 34 pcs)
- 841
- 841.RS1 (39 pcs)



# Other projects – subdelivery (ATO + national ATP)

- Typically delivery of components (GSM-R voice radio, NTP, ATO, JRU ...)
- Part of delivery engineering and design support + integration support
- Projects of vehicle:
  - 162/362 ČD, 163/363 ČD Cargo
  - 471/971 ČD
  - 961 ČD
  - 680 ČD
  - 847



# 842 ČD



Dosazení ETCS na vozidla ČD řady 842

# Popis dodávky

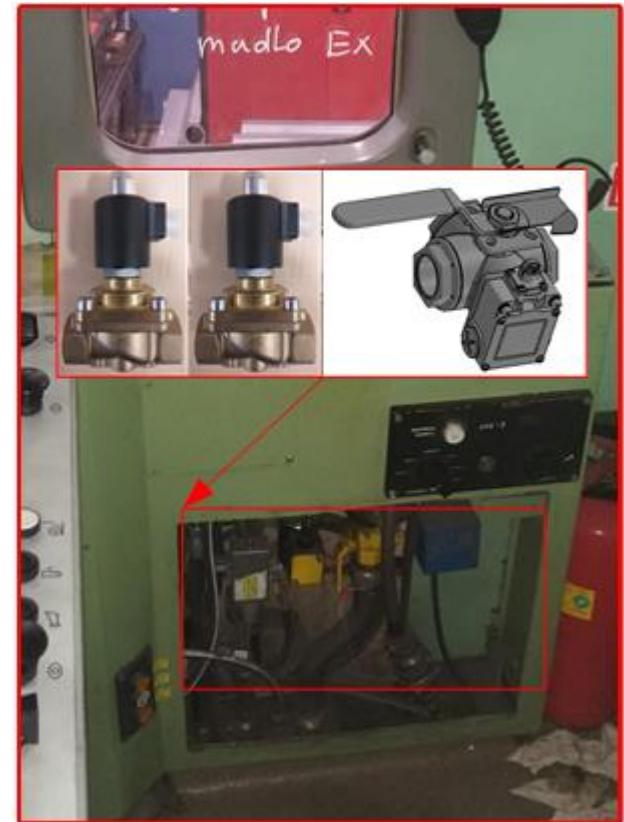
OBU ETCS, fulfilling specification:

- **2016/919 (TSI CCS)**
- **set of specification No. 3 (BL3R2, version 3.6.0),**
- **Requirements of regulation SŽDC Z8 part IV (for CZ)**
- **Application of levels NTC, 0, 1 a 2 including dynamic**
- **SL, NL, PS ... following customer requirements**  
(operation modes of vehicles)
- **PS mode – specific usage for driver movement between cabs**



# Description of installation

- Braking system
- EMV valves
- Integration of NTP LS06, voice radio and ETCS



# Implementing description

- Integration of ETCS control components to driver desk
- Integration of diagnostics of new components to diagnostic display
- Availability to display speed in case of ETCS OBU isolation, independent speedometer
- Communication integration, GPS precise time distribution
- Common log

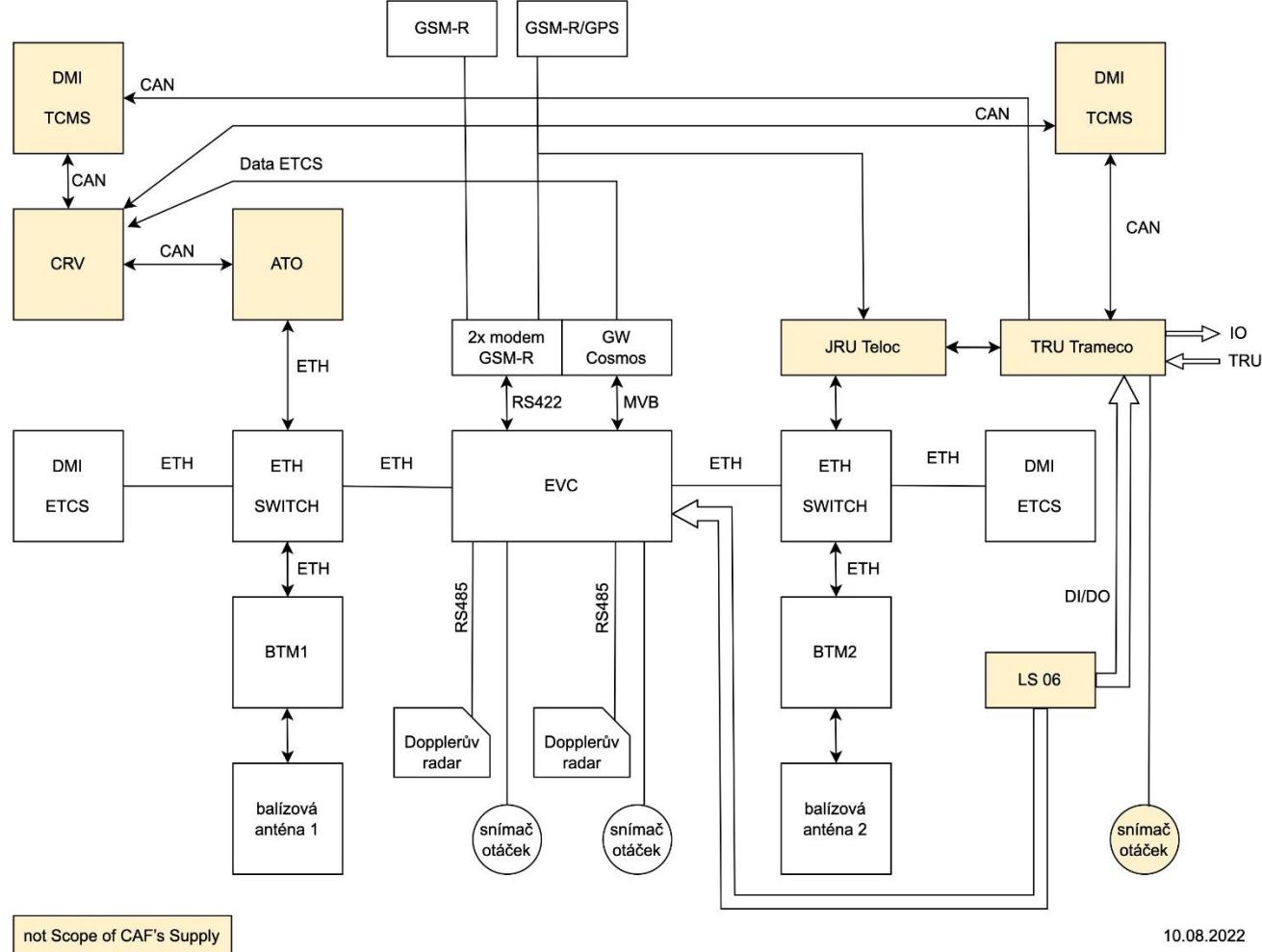


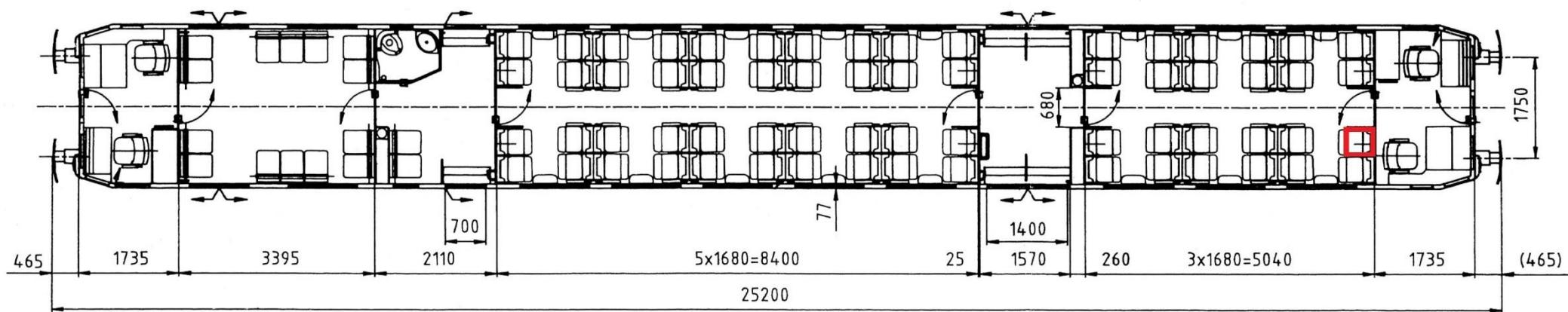
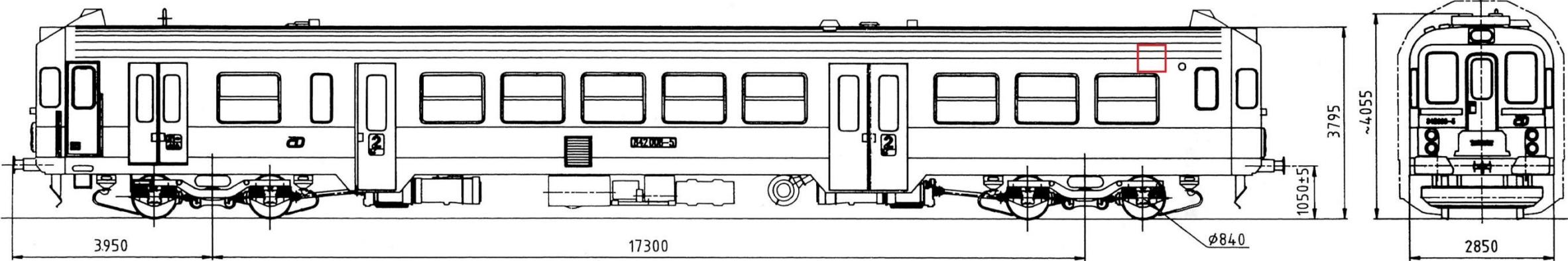
# Main components

- EVC
- BTM
- DMI
- GSM-R modems
- MOXA Switches
- MVB/CAN gateway
- TELOC3000
- LS06
- Speedometer
- Balise antanas
- GSM-R antenas
- GSM-R/GPS antenas
- Speed senzors
- Doppler radars
- EMV valves
- ATO / AVV



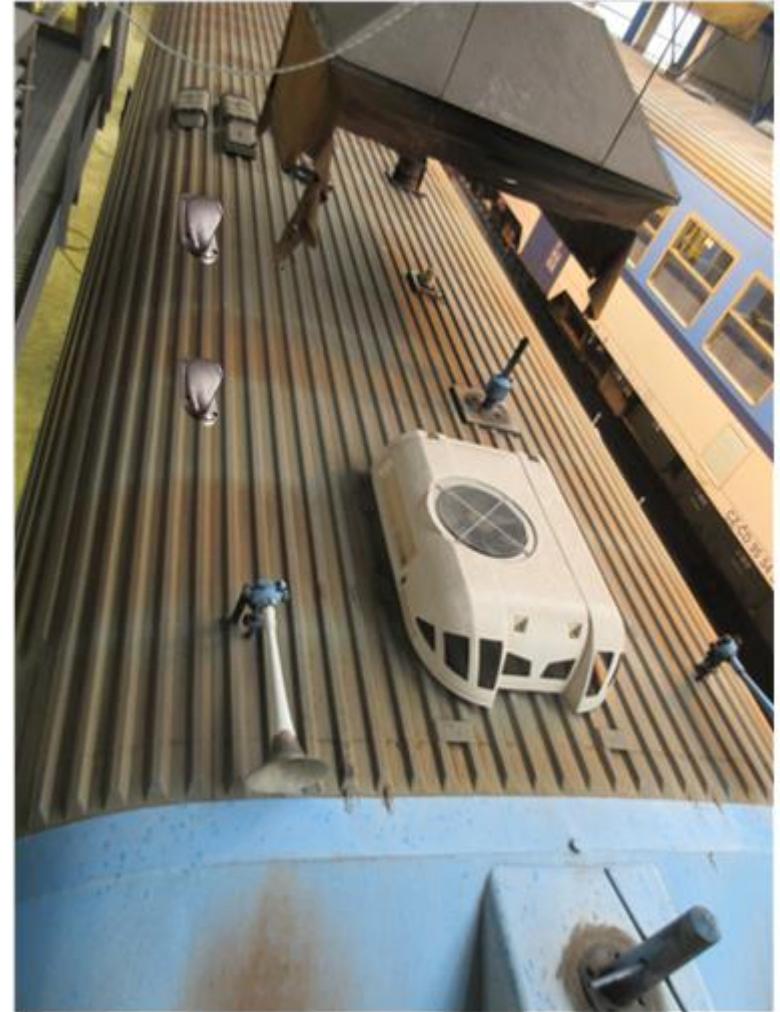
# Block Diagram



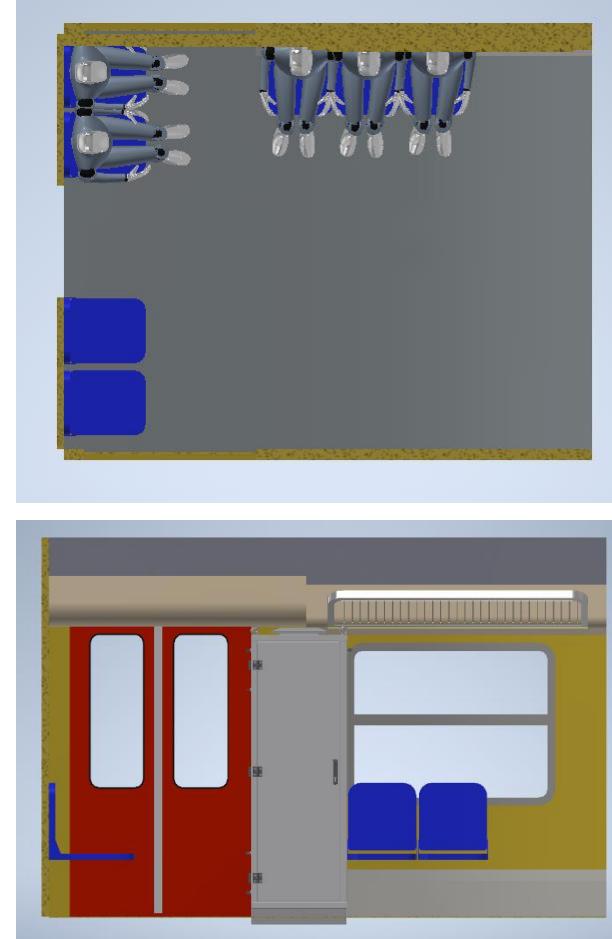
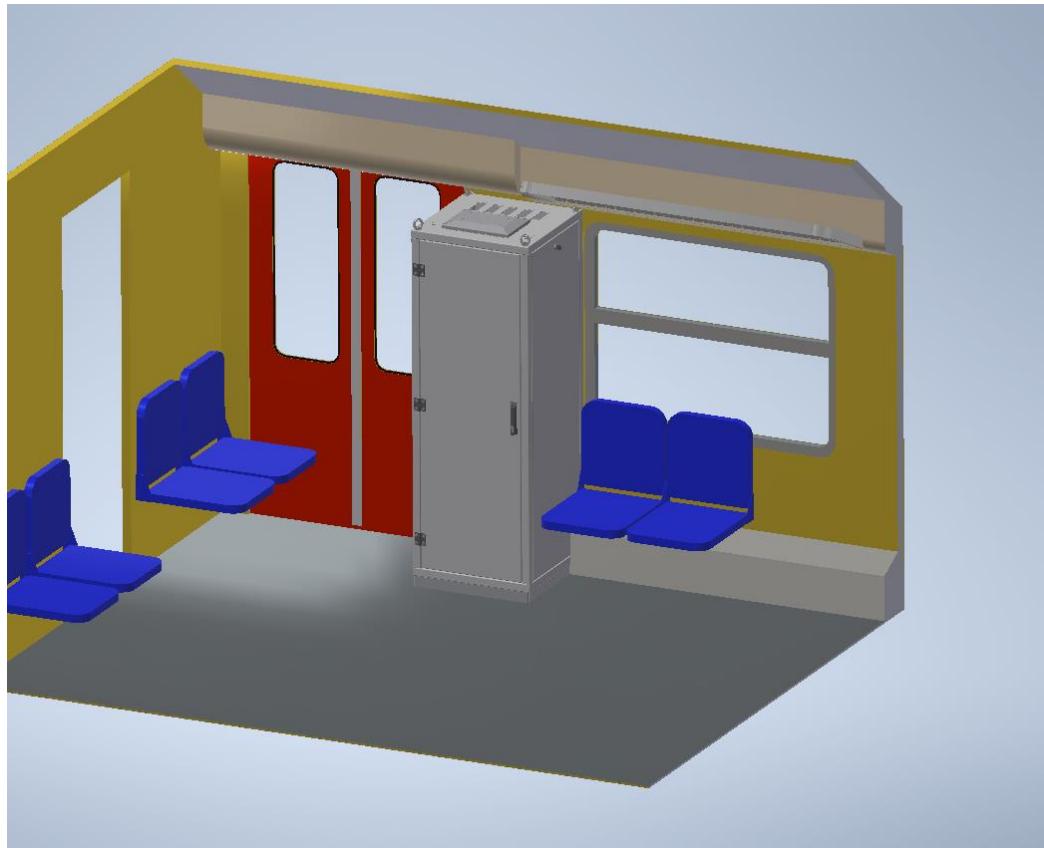


# Mechanical installation

- roof
  - Antennas GSM-R (for ETCS)
  - Antennas GSM-R/GPS  
(precise time ...)
- Where ... distances requirements



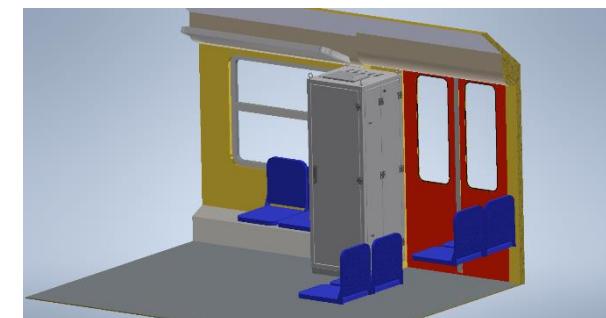
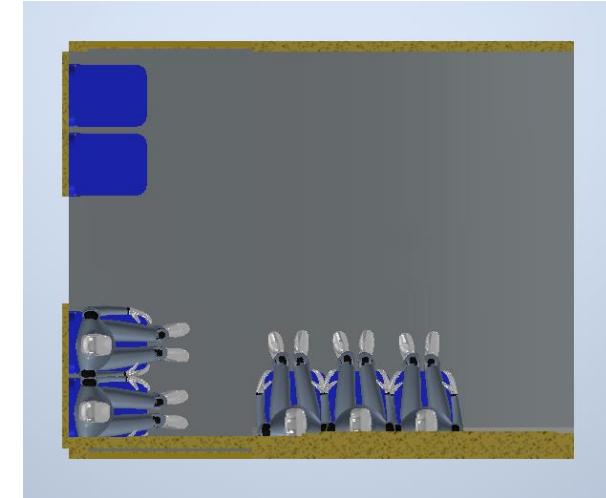
# ETCS rack - seat removal



Dosazení ETCS na vozidla ČD řady 842

# ETCS rack

- Variant 1a



# ETCS rack

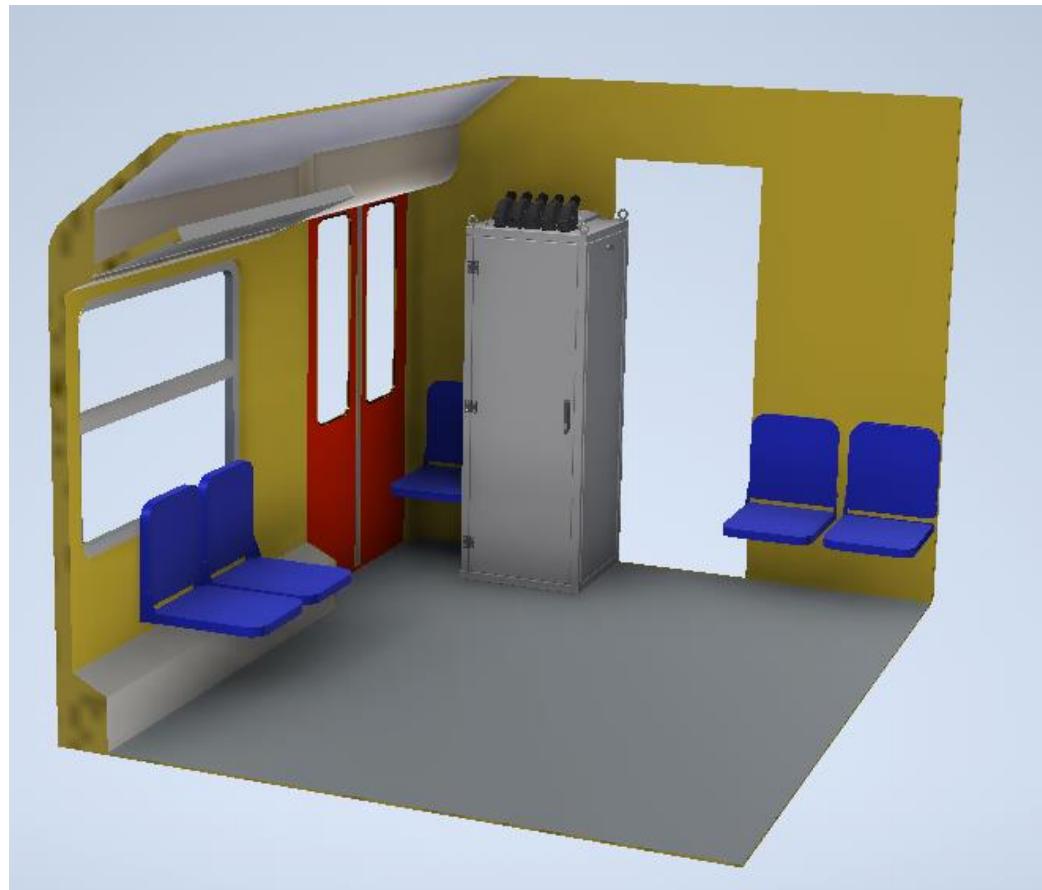
- Variant 2



Problém přístupu k informačnímu systému umístěným v prostoru okna.

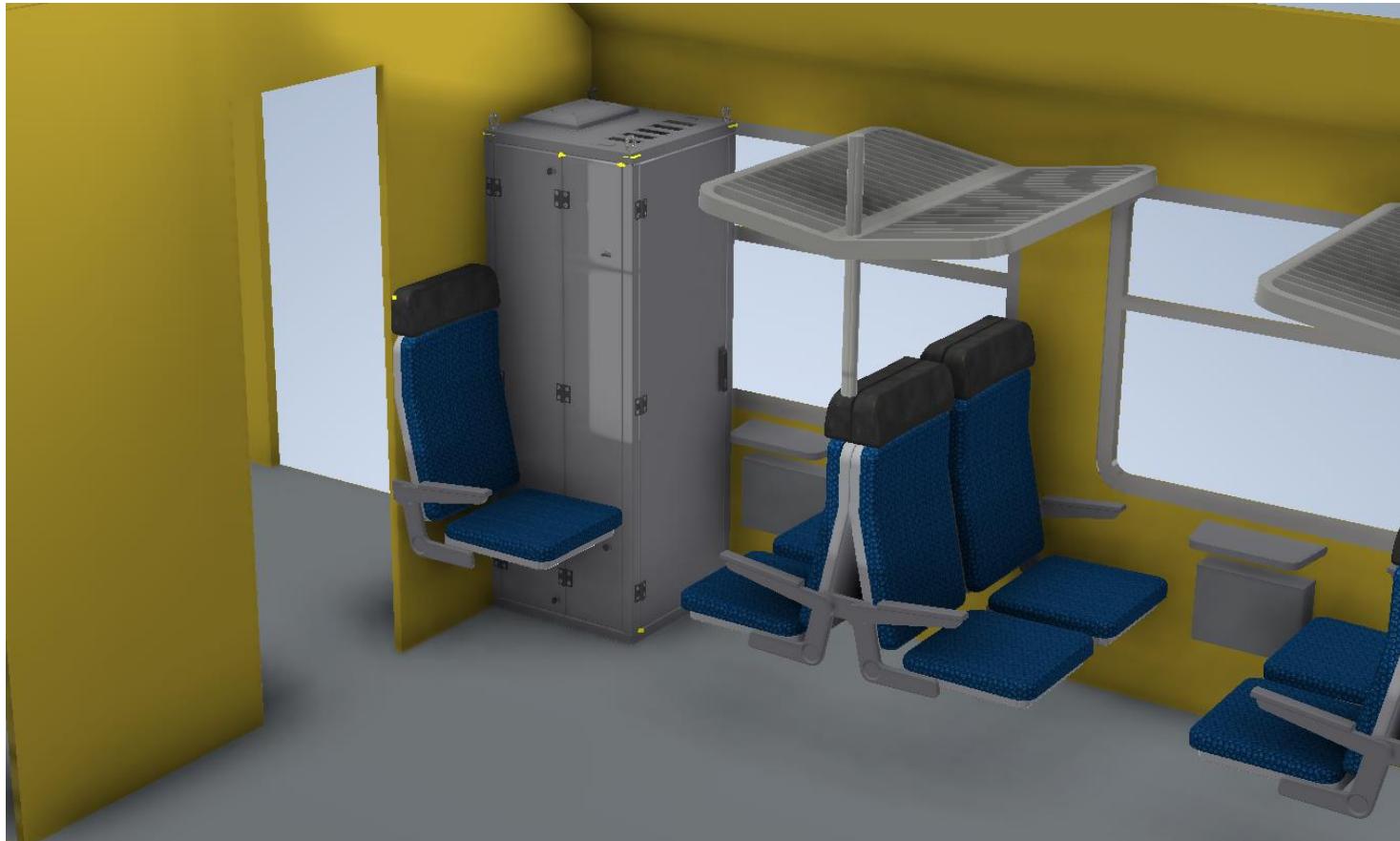
# ETCS rack

- Varianta 3



# ETCS rack

- Varianta 4



Instalace na úkor běžného místa pro cestující.

# BTM II – position



Z hlediska instalace ideální řešení, minimální dopad na kapacitu vozidla (na úkor jednoho odkládacího prostoru pro zavazadla). Technicky vytvoří potřebné podmínky pro činnost subsystému.



Variantní umístění v prostoru nad strojevodoucí. Problém prostoru, prostředí, odvětrání ohřátého vzduchu, přístupu pro údržbu.

# Driver cab



Zachování stávajících displejů.

Integrace zobrazení rychlosti pro provoz s ETCS v izolaci.

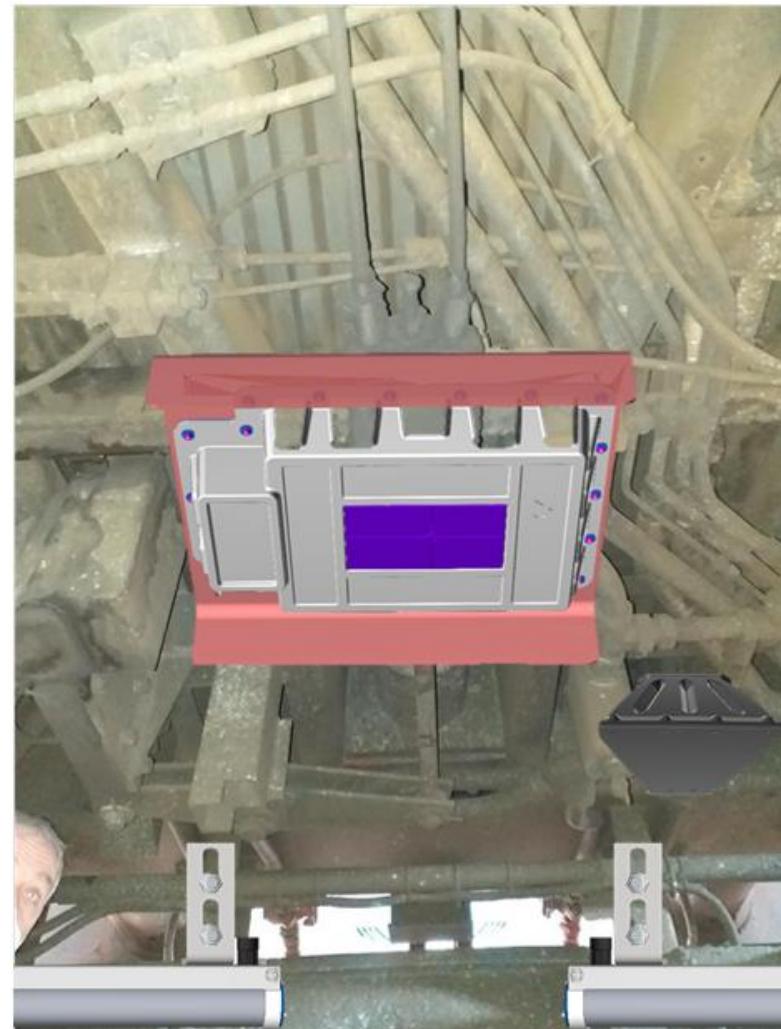
Integrace zobrazení diagnostiky ETCS.

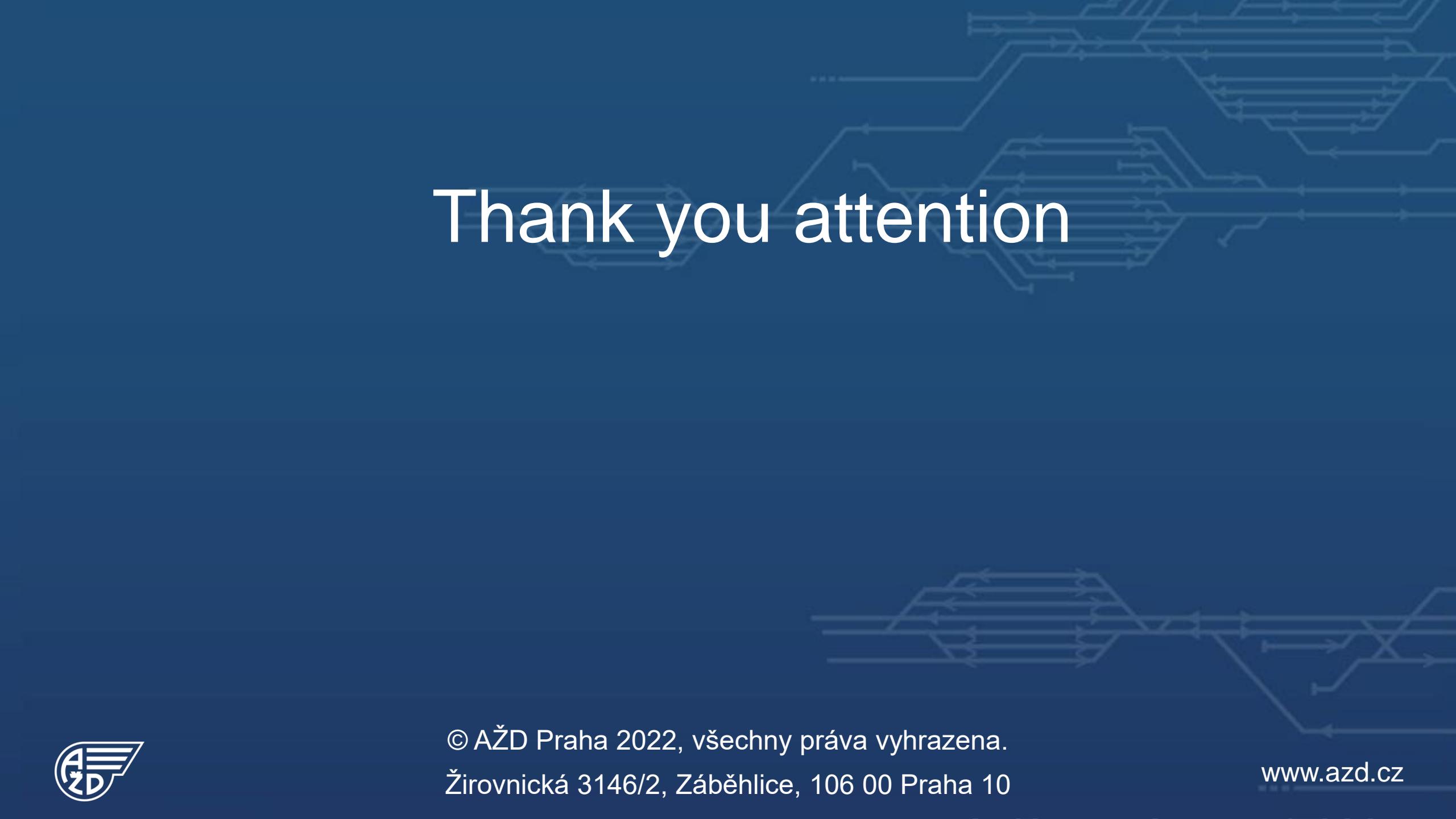
Integrace manometrů do pultu.

Zakomponování displeje ETCS.

# Frame of vehicle

- BTM antennas on the frame
- New sensors for ATP LS06
- Two Dopplers radars
- Axle ends:
  - Antislip + TCMS
  - 1L, 2L ... Speed sensors for ETCS
  - 4L ... Speedometer TRAMEX





# Thank you attention



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