# COMMUNICATION

## WHY ?

- Secure reliable and interoperable bidirectional communication.
- Compatible with DAS and ATO.

## WHAT ?

- Data layer independent of content.
- Three different supported communication architectures.
- Two architectures  well defined, one under construction.

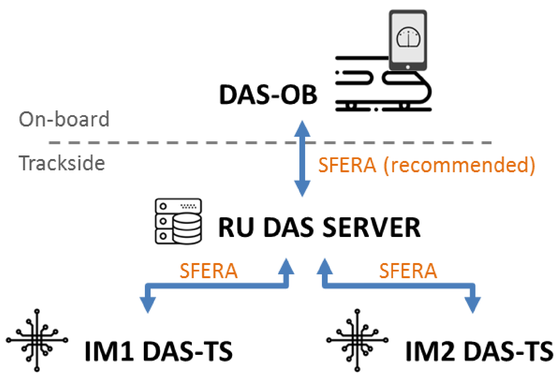
## BENEFITS

- SFERA extends ATO over ETCS beyond Baseline 3+ Full Supervision and remains compatible.
- Same IM server can be used for the three architectures.
- Architecture can be chosen based on preference of RU.

## REMARKS

- All three communications can be used for DAS and ATO.

## BACK OFFICE TO BACK OFFICE




### WHAT ?

- Back office communication between IM and RU.
- Communication with device on train guaranteed by RU.

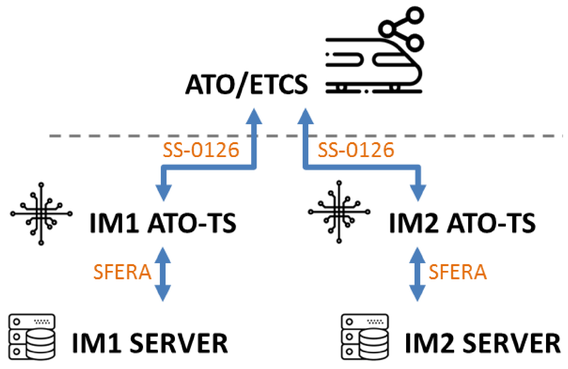
### BENEFITS ?

- Integrates with existing devices and data feeds of RU.
- On ground IM-RU link (with high reliability).
- Easy to reach good performance.
- Applicable to class B trains and lines.

### REMARKS

- RU Server may be offered as a service by third party.

## USING ATO OVER ETCS




### WHAT ?

- Communication via ATO-TS (according to ATO over ETCS standards).
- With trains and lines equipped with ETCS Baseline 3+ Full Supervision.

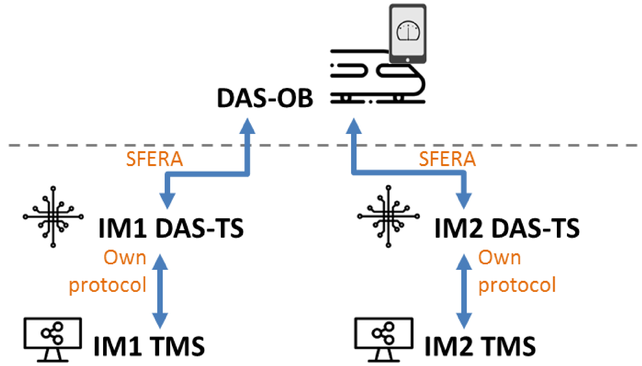
### BENEFITS ?

- Performance guaranteed by ETCS.
- Same SFERA dataset usable for trackside data preparation.

### REMARKS

- SFERA can be translated to the binary Subset 126.

## DIRECT COMMUNICATION




### WHAT ?

- Device on train communicates with IM responsible for area where train is running.

### BENEFITS ?

- No ground RU-servers needed.
- Public communication infrastructure may be used.
- Applicable to class B trains and lines.

### REMARKS

- Not identified yet.
- Challenging in keeping interoperability.
- Implementation can be different for handheld and built-in device.