WG 37 – EN 50463 Energy Measurement

19th November 2025

Eress Webinar

Bart Van der Spiegel - bart.vanderspiegel@infrabel.be

Agenda

- Framework
- Members and organisation
- Timing
- prEN 50463 enquiry
- prEN 50463-1
- prEN 50463-2
- prEN 50463-3
- prEN 50463-4
- prEN 50463-5
- Dissemination

At end of presentation, we have 20 minutes for Q&A.

Railway Undertaking

commodity (€)

Energy market

grid fee (€)

operates trains

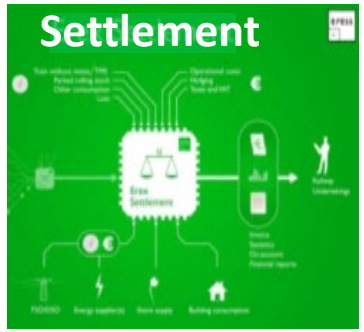
requests train-runs

Infrastructure Manager

kWh

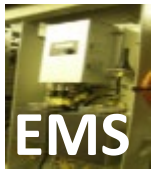
kWh

data for validation, estimation and allocation



Allocate:

- allocate consumptions to the correct end user
- distribute to correct actors in energy market



On-board Energy Measurement System

LOC&PAS TSI:2018
Support retrofit in 2023
EN 50463:2017

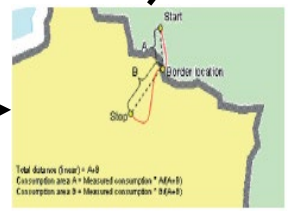
ENE TSI:2018
EN 50463:2017
IRS 90930:2020

CIR EU/2018/868
IRS 90930:2020

Validate/estimate:

- validate data coming from EMS
- estimate missing data

Data Collecting System on ground



CIR EU/2018/868
IRS 90930:2020

Exchange:

- allocate consumption to country where consumption took place
- distribute to correct settlement system

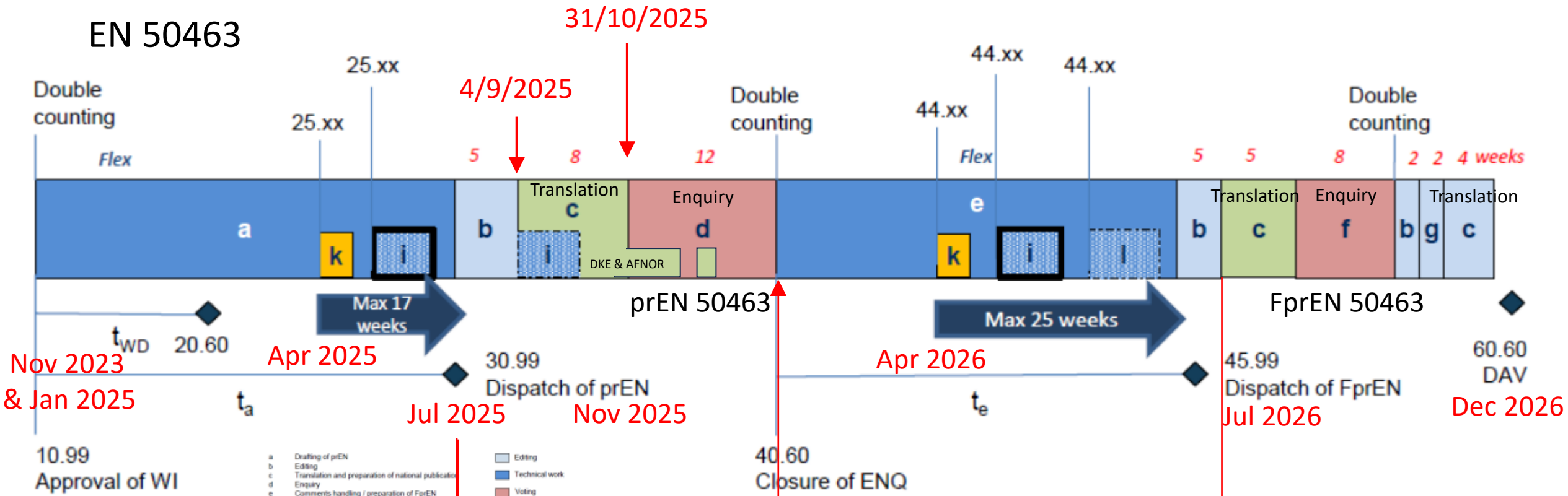
CENELEC

Members and organisation

- 42 members from 12 NCs
- 2 observer from ERA
- Wide range of expertise with experts from meter manufacturer, train builder, infrastructure manager, railway undertaking, notified body, metrological institute, consultancy and university
- Task leaders for the 5 parts:
  - EN 50463-1: Etienne Sourdille and Hamou Benhabib
  - EN 50463-2: Björn Ållebrand
  - EN 50463-3: Gunn-Helene Krogstad
  - EN 50463-4: Francesco Sperotto
  - EN 50463-5: Andrea Gatti

Last Name	First Name	NC
ABOUDRAR	Saïd	FR
Ållebrand	Björn	SE
Arranz Abascal	Guillermo	ES
Benciolini	Luigi	IT
BENHABIB	Hamou	FR
Biela	Alexander	AT
Bohlscheid	Bernd	DE
Borselli	Alessandro	IT
Bosnyak	Laszlo	AT
CISSE	Olivier	FR
Coito González	Esteban	ERA
DERRIEN	Guillaume	FR
DOUCET	Adeline	FR
Fadin	Gianosvaldo	IT
Fasoli	Carlo	IT
Frenzke	Thorsten	DE
Gatti	Andrea	IT
Genovese	Dario	IT
Giordano	Domenico	IT
Girardi	Alessandro	IT
Harms	Christian	DE
Hilgers	Carsten	LU
Hribar	Gregor	NL
Iraola Goiburu	Inigo	ERA
Jirout	Stepan	CZ
Krogstad	Gunn-Helene	NO
Langenberg	J.M.	NL
LECROART	Eric	FR
Lémont	Mathieu	CH
Maracich	Gabriele	IT
RAOUL	Isabelle	FR
Rodríguez Mondéjar	José Antonio	ES
Schaerrer	Marc	CH
Schwabl	Manuel	AT
SOURDILLE	Etienne	FR
Sperotto	Francesco	IT
Svoboda	Daniel	CZ
Van der Spiegel	Bart	BE
Werf, van der	J.	NL
Widmer	Daniel	CH
Zwetkow	Marin	AT

EN 50463



Input on how EN should be adjusted to fit new clauses of TSI

FprEN 50463 Correct referencing possible

22/9/2025 > …

Dec 2026

TSI LOC&PAS

TSI ENE

Draft for prEN 50463

Ad-hoc group revision EMS clauses in TSI

Revision TSIs

Cyber-security

16/9/2025 & 20/10/2025

With experts of EN 50463, ERA and ERJU

prEN 50463 enquiry

- prEN 50463 enquiry started on 31/10/2025 and will end on 23/01/26.
- Only experts registered at a National Committee can give comments. It might be you have to contact a colleague.
- National Committees will have an internal deadline some weeks before the official end of enquiry.
- We are having meetings in parallel of the enquiry with Europe's Rail, ERA and EC. As a result of these meetings, comments will also be introduced.
- After the prEN enquiry the WG 37 will process all comments. Comments can get rejected, but then we shall write a justification.
- This is the last enquiry permitting to give Technical or General comments.
- In August or September 2026 an FprEN enquiry will take place. Only editorial comments are allowed during that enquiry.

EN 50463-1
General

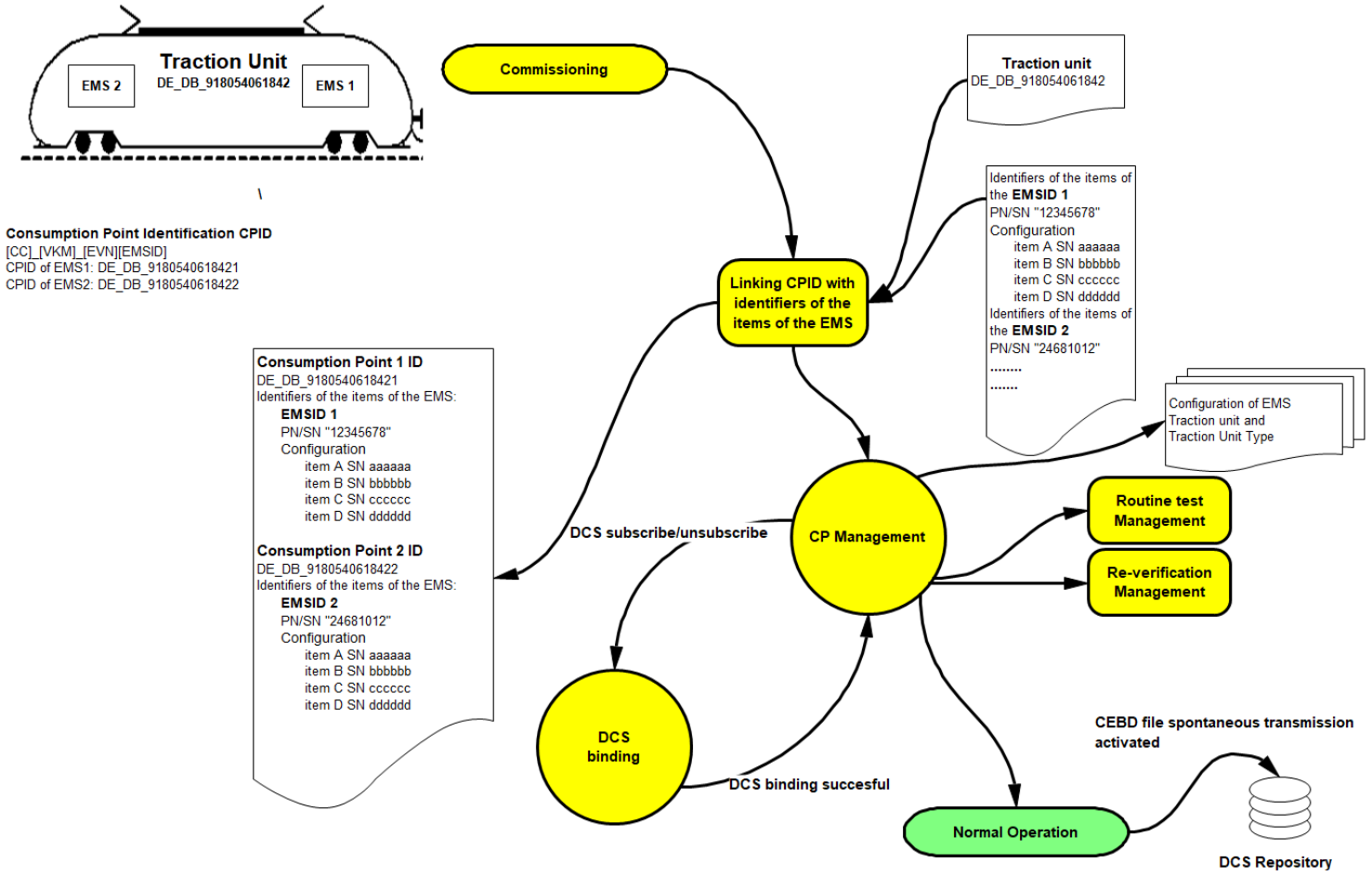
Main changes from 2017 version

- *Significant technical changes :*
  - *introduction of hybrid trains;*
  - *added Figures on commissioning and maintenance.*

- *Revisions*
  - §3 : creation of Consumption Point (i.e. EMS installed on-board)
  - Introduction of the hybrid train definition taking into account the TS50729, EN62864, current IEC62888 discussions and members input
  - The hybrid train definition and description in §3.1.24 and §4.26 also include a general position for energy data and energy billing
  - In §4.2.5.2 (related to CPID), figures 3 and 4 have for handling of CPID during commissioning and maintenance
  - A §5 Test has been added to better reference the required test in the other parts
  - Annex ZZ has been modified to take into account the modifications in the document and in the regulations

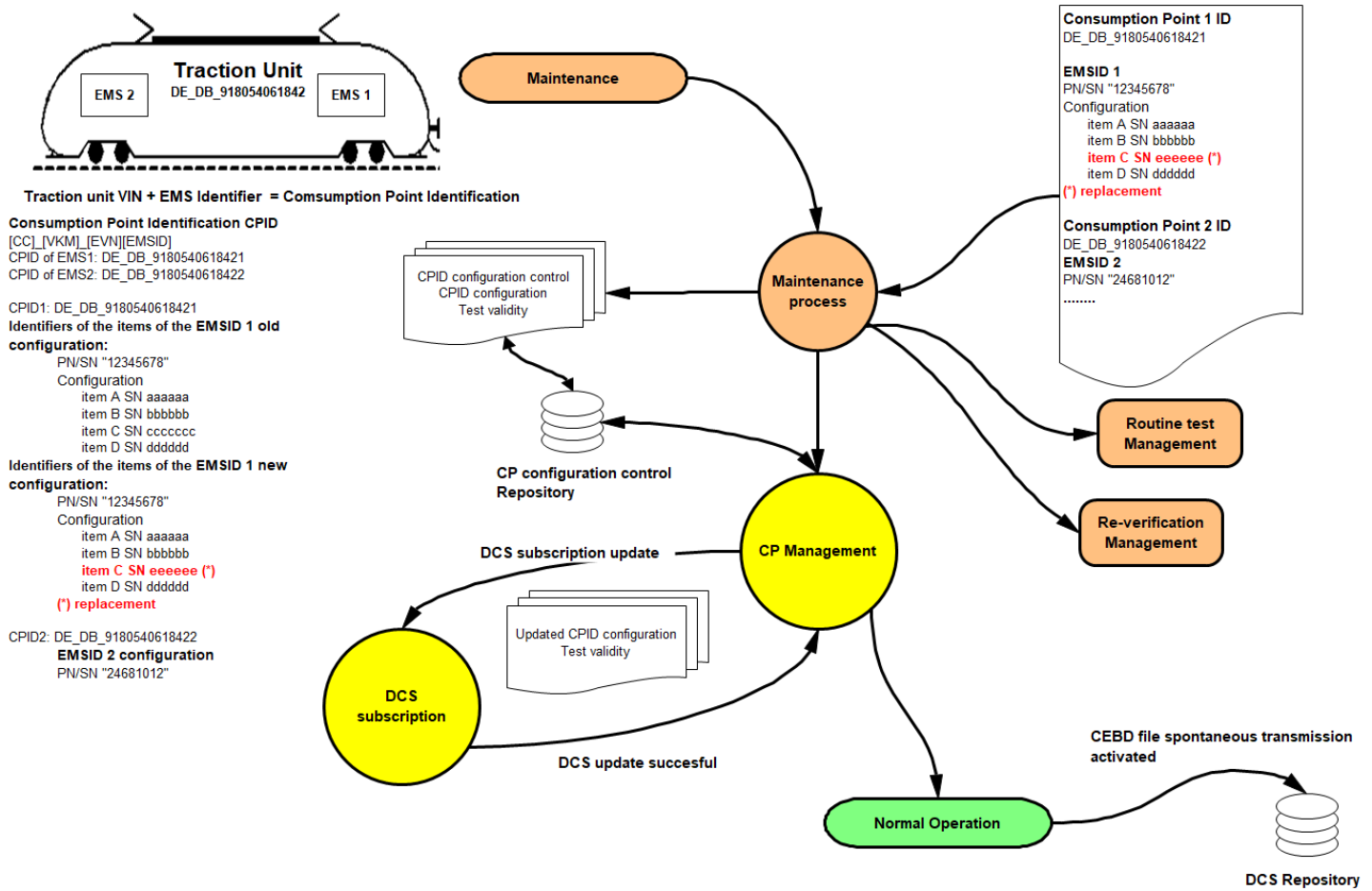
Commissioning

- Example with two EMS on one traction unit



Maintenance

- Example with two EMS on one traction unit



Cybersecurity

- Requirements on high level grouped in one clauses.
- Informative Annex A provides extra guidance.

4.2.8 Cybersecurity

Cybersecurity provides protection against unauthorised disclosure, transfer, modification, or destruction of information or information systems, whether accidental or intentional. To achieve this, there are several security standards which apply to the railway environment, for example, CLC/TS 50701, prEN IEC 63452 or EN IEC 62443 series.

Due to the ever-evolving communication technology (e.g. communication architecture between EMS and DCS) and new threats to security, this requirement is not static. Hardware and software security measures are continuously being developed and implemented to mitigate the associated threats and risks. The manufacturer shall declare (in the technical data) the cybersecurity measures followed to ensure a secure product.

During the EMS integration, installation, operation, and maintenance stages, cybersecurity measures shall be applied and documented.

Annex A provides a way of fulfilling these requirements.

NOTE National or regional regulations can require specific cybersecurity measures.

EN 50463-2
Energy measuring

19th November 2025

Eress Webinar

Björn Ållebrand

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Main changes from 2017 version

- Improved burden requirements.
- Addition of Integrated EMF. An EMF system with integrated VMF, CMF and ECF.
- When the equipment type doesn’t consist in the whole EMF, the relevant requirements shall be fulfilled at system integration and installation level.
- Completely rewritten annex C on EMF accuracy and measurement uncertainty by Italian NC.
- How reactive energy is calculated shall be documented by manufacturer.
- Test procedures have been updated due to user experience
- Accuracy requirements has been added

Main changes from 2017 version, simpler cases

- Completely rewritten annex C on EMF accuracy and measurement uncertainty by Italian NC.
- How reactive energy is calculated shall be documented by manufacturer.
- Test procedures have been updated due to user experience.

Accuracy requirements section has been added

- When all devices implementing the EMF functions or the device implementing the IEMF, pass the accuracy tests as detailed in Clause 5, the percentage error calculated in accordance with Formula (1) or measured in accordance to 4.5 shall not exceed the limits of Table 2 indicated in Area 1 as defined in Figure 3.

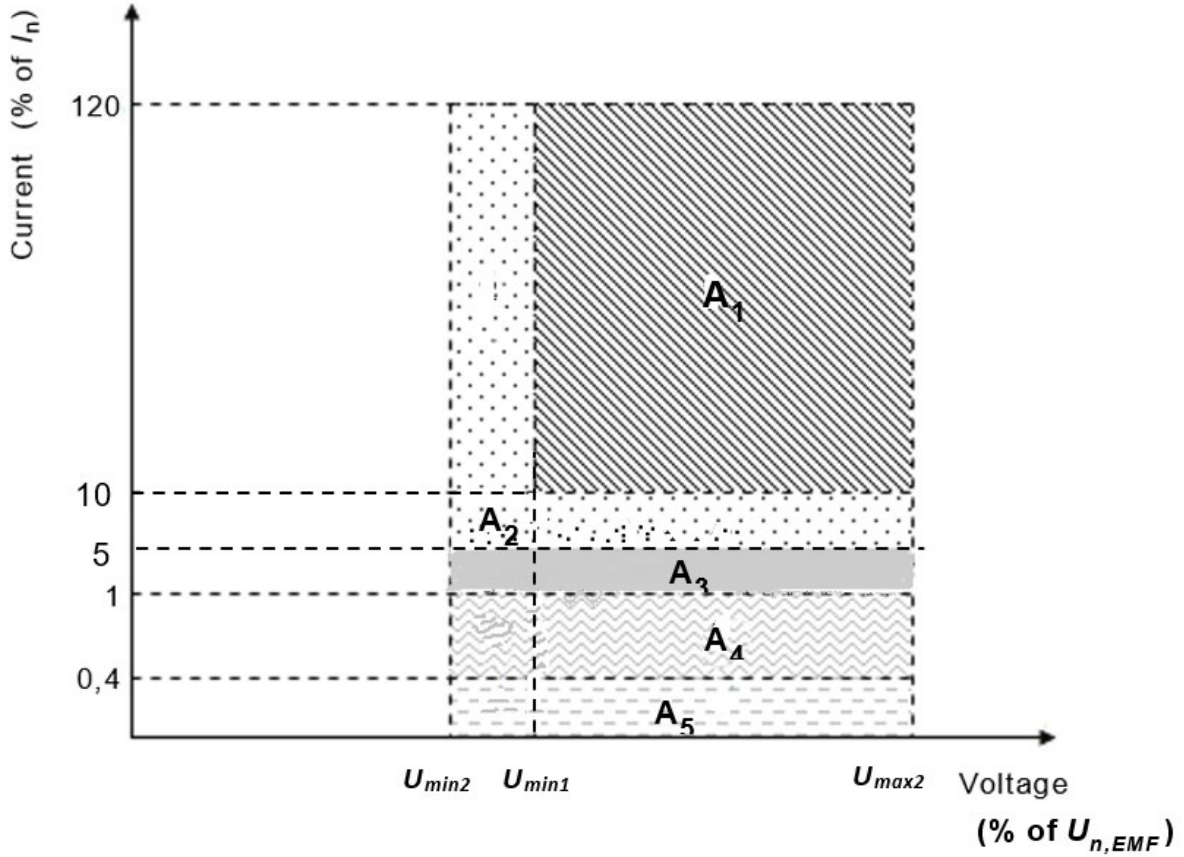


Figure 3

Accuracy requirements

AC or DC	EMF Accuracy class	± Maximum percentage energy (ratio) error (ε_{EMF}) at percentage of rated currer defined in rated voltage defined in EN 50163:2004			
		Area 1 10 % $I_n \leq I \leq$ 120 % I_n and $u_{min1} \leq u \leq u_{max2}$	Area 2 (5 % $I_n \leq I \leq$ 120 % I_n and $u_{min2} \leq u < u_{min1}$) and (5 % $I_n \leq I \leq$ 10 % I_n and $u_{min1} \leq u < u_{max2}$)	Area 3 1 % $I_n \leq I <$ 5 % I_n and $u_{min2} \leq u \leq u_{max2}$	Area 4 0,4 % $I_n \leq I <$ 1 % I_n and $u_{min2} \leq u \leq u_{max2}$
AC	DPF ≥ 0,85				
	0,4 R	0,4	0,8	1,5	Energy measurement required; no accuracy requirements
	0,75 R	0,75	1,5	3	
	1 R	1	2	4	
	1,5 R	1,5	3	5,5	

Table 2

What is Burden + Improved burden requirements

- The Burden of a measurement transducer is the rated Volt-Ampere loading which is permissible without errors exceeding the limits for a particular class of Instrument Transformer.
- When the burden is exceeded, the measurement transducer will end up delivering a value lower than the actual value.

- Examples from 50463-2:
- The rated burden shall be defined to be matched with the input circuit of ECF.
- Accuracy requirements for current transformer should be guarantee for burden from 1% to 100%.
- Manufacturer shall provide the burden range under which it guarantees the accuracy requirement.

User case from Sweden regarding burden and system integration and installation level

- *IORE, is a class of 34 electric locomotives used Swedish mining company LKAB.*
- *The locomotives are considered to be one of the most powerful locomotives and haul iron ore freight trains on the Iron Ore Line and Ofoten Line in Sweden and Norway, respectively.*
- The 8,600-tonne (8,500-long-ton; 9,500-short-ton) 68-car trains are hauled by two single-ended Co′Co′ locomotives, each with a power output of 5,400 kW (7,200 hp).
- It was discovered by Bane Nor that the units 127-134 had 5-10% lower energy consumption than the previous trains (101-126).
- The explanation from LKAB was that cable from the CMF to the ECF on 127-134 had a cable area of 0,2 mm2. On the other trains it was 2,5mm2.
- For 127-134 it meant at high currents the burden of the CMF was exceeded leading to inaccurate results. If all trains had been delivered with wrong cabling no one would have noticed this fault.

Build date *101+102*: 2000
103–118: 2002–2005
119–126: 2010–2011
127–134: 2013–2014

User case from Sweden regarding burden and system integration and installation level

- *This user case shows the importance of Burden.*
- *Shows that a train can have a certified CMF, VMF and ECF and still get the wrong measurements although the requirements set out in TSI § 4.2.8.2.8.2 (3) is assessed and found compliant .*

5.1.3.2 Device design review

Assessment of the adequacy of the technical design of the EMF functions shall be undertaken through examination of technical documentation for the device together with any supporting evidence.

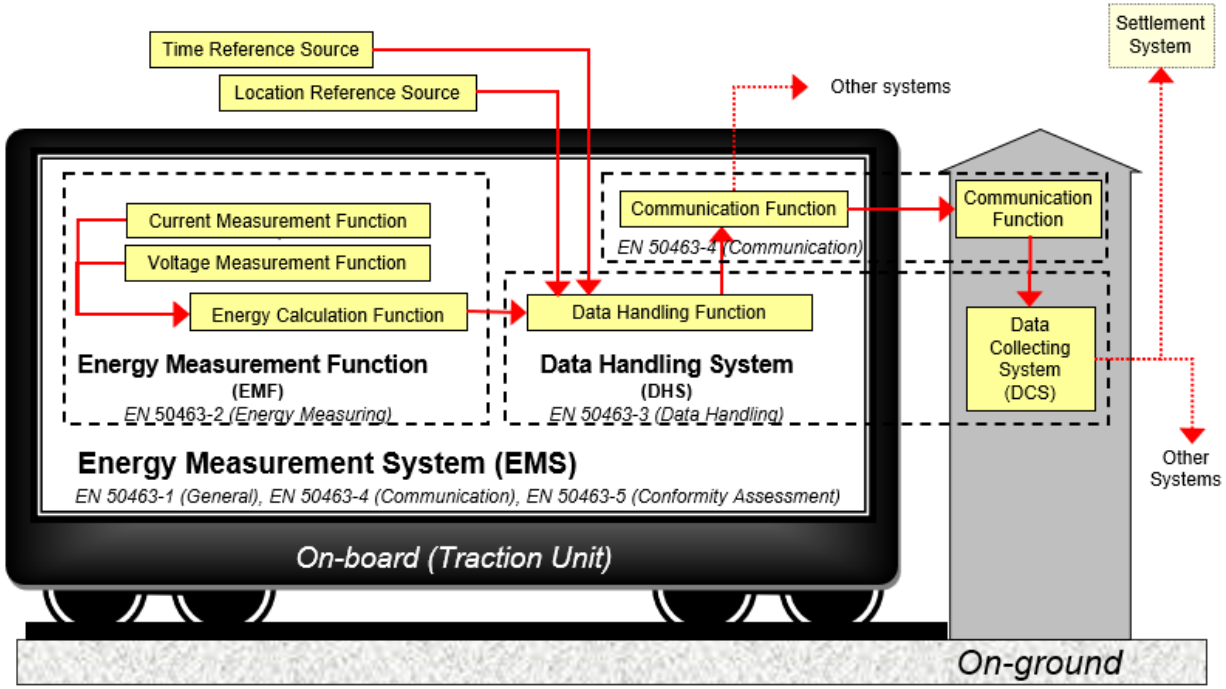
This shall also include examination of documentation detailing integration and installation constraints.

When the equipment type doesn't consist in the whole EMF, the relevant requirements shall be fulfilled at system integration and installation level according to EN 50463-5 clauses 4 and 5.

If there is any change to a device that has been previously assessed, the review shall focus on the change and its impact on other aspects.

Clarifications in the case of an EMF system with integrated VMF, CMF and ECF

- *The EN 50463-2:2017 (and 2012) are written as CMF, VMF and ECF are separate units but there are companies who builds and EMF system with integrated VMF, CMF and ECF. They are not separate. This can be an advantage. No problems like the use case presented before.*



Integrated EMF (IEMF)

4.5 Integrated Energy Measurement Function

- 4.5 Integrated Energy Measurement Function
  - 4.5.1 General
  - 4.5.2 Reference conditions
  - 4.5.3 Accuracy class and percentage error limits
  - 4.5.4 Starting conditions
  - 4.5.5 Electric traction power supply system cha...
  - 4.5.6 Re-verification
  - 4.5.7 Insulation requirements
  - 4.5.8 Influence of input overvoltage
  - 4.5.9 Rated primary current (In,EMF)
  - 4.5.10 Rated continuous thermal current (IEMF,...
  - 4.5.11 Rated short-time thermal current (IEMF,...

Integrated EMF (IEMF): Also leads to other changes.

4.2.3 Accuracy requirements

Instead of using one method of calculating limitys of error

The accuracy of EMF shall be determined by either one of the following methods:

— by verifying the accuracy of EMF according to requirements set out in 4.5.

— by using Formula (1) based on the accuracy of the functions included within the EMF;

$$\varepsilon_{EMF} = \sqrt{\left(\varepsilon_{VMF}\right)^2 + \left(\varepsilon_{CMF}\right)^2 + \left(\varepsilon_{ECF}\right)^2}$$

NOTE 2 It is also permitted for an EMF composed of multiple devices to verify the accuracy based on the requirements and procedure set out in 4.5.

Integrated EMF (IEMF): Also leads to other changes in chapter 5 Conformity assessment

Since now there is an IEMF we need to add a new section in chapter 5.

5.4.5 IEMF Type test

5.4.5.1 General

5.4.5.2 Tests of electrical requirements

5.4.5.3 Accuracy tests

EN 50463-3
Data handling

Main changes from 2017 version

- introduced optional elements regarding hybrid energy and use of different types of energy sources (Clause 4)
- Extended the table of Traction system power supply codes to include all codes referred in ICE 62888

EN 50463-4 Communication

19th November 2025

Eress Webinar

Francesco Sperotto

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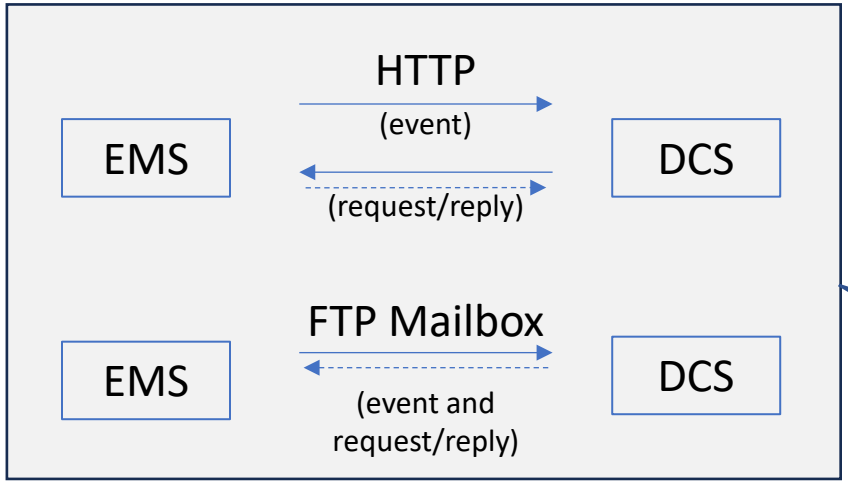
Main changes from 2017 version

- EN 50463 4 includes the following significant technical changes with respect to EN 50463 4:2017:
  - introduction of **secure protocol** HTTPS
  - **removal of insecure protocols** HTTP and FTP with Mailbox, which are no longer permitted
  - introduction of **HTTP periodic polling** as alternative of current direct request
  - introduction of requirements for **downloading energy data** directly from the EMS, **without a GS**
  - introduction of **standardized digital signature** and **uncompressed payloads**
  - introduction of **hybrid train support**
  - introduction of a standard mechanism for collecting measurements with a sampling **frequency higher** than the defined time reference period
  - generation of a new version of **XSD schemas** (**version 2.0**) to support secure protocols, standardized digital signature, uncompressed payloads, hybrid trains and higher rate sampling
- An informative Annex H with example on **schema extension mechanism** has been added
- The **Annex ZZ has been removed** because no more necessary

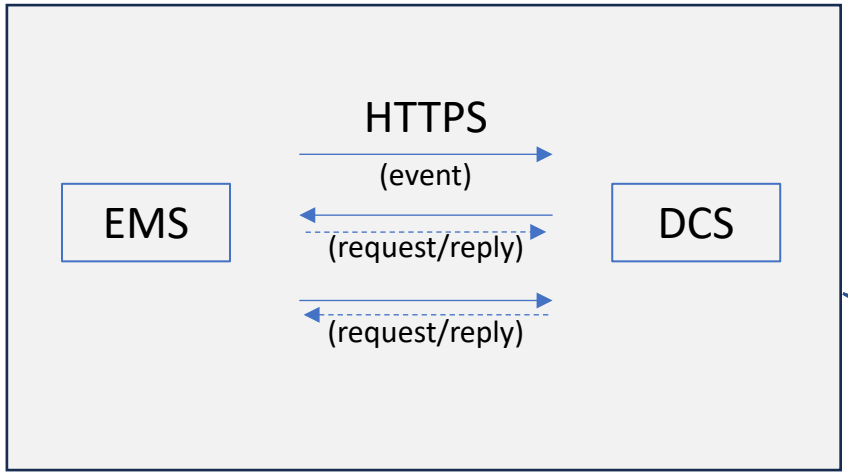
Secure Protocol

- The **demand for secure protocol** has been very strong from all the players.
- Many IM and RU do not even allow an **insecure protocol**.
- The existing **application layer encryption** was good for confidentiality and authentication, but **the access phase of both HTTP and FTP remained in the clear**, exposing the DCS and the EMS (in case of HTTP) to cyber-attacks.
- We responded by **introducing HTTPS** and **removing HTTP and FTP**
- HTTPS is based on **TLS** (Transport Layer Security), which is now in version 1.3, from August 2018
- **TLS**
  - is a **cryptographic protocol** ➔ it provides *confidentiality, integrity and authenticity* to EMS-DCS communications
  - runs at **presentation level** ➔ no need to change existing HTTP protocol
  - is widely accepted (*) ➔ easy to implement
  - use **certificates** to prove the validity of the encryption key



EN 50463
2017

Removed



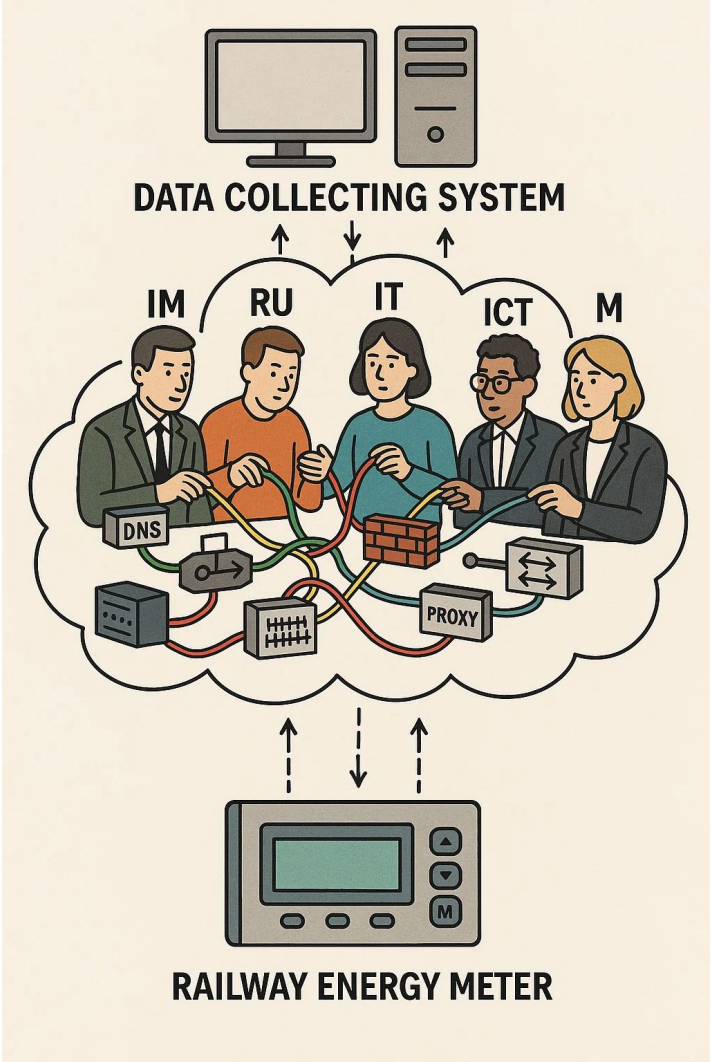
prEN 50463
2025

Added

(*) ~90–95 % (or higher) of web-traffic is TLS-encrypted

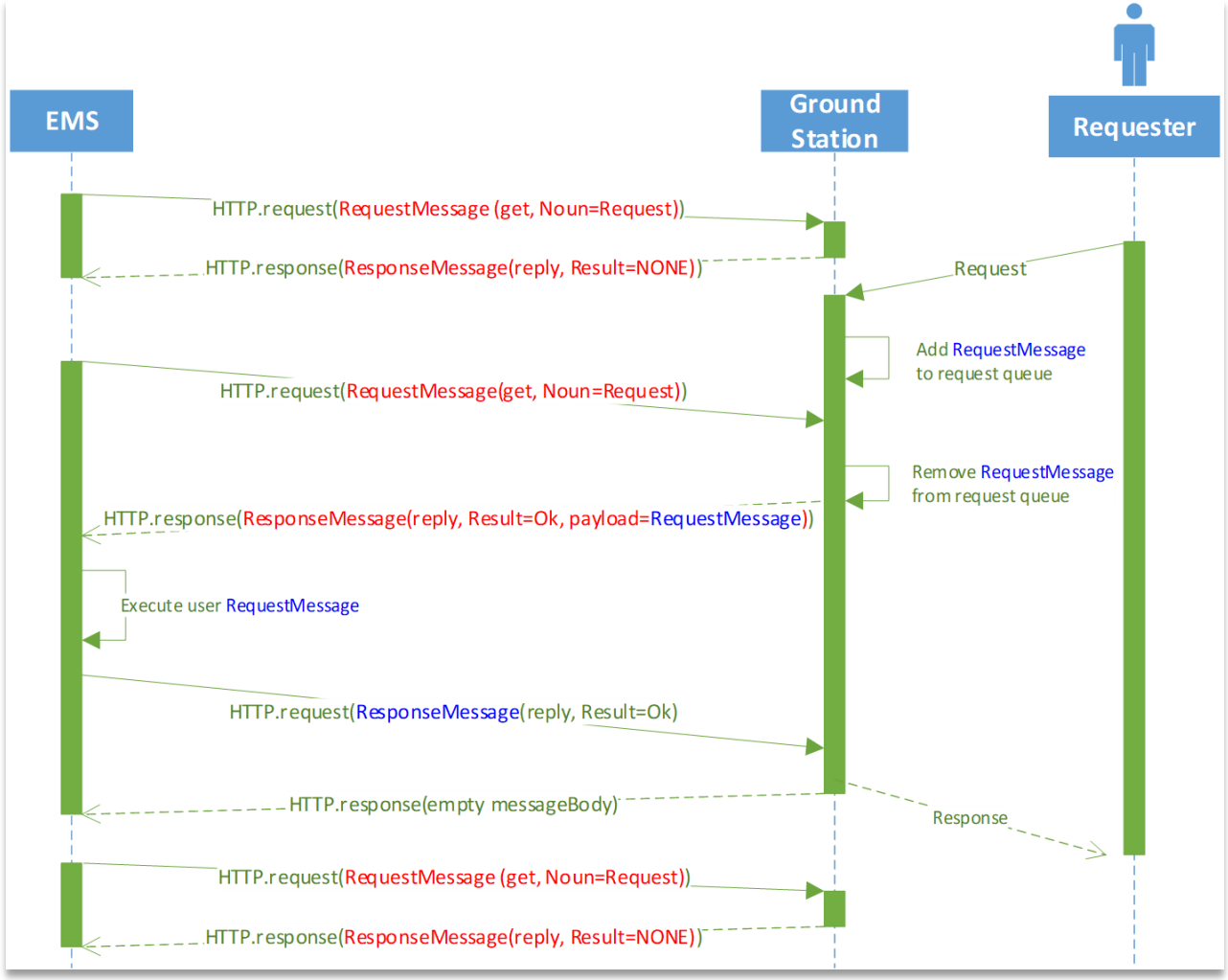
HTTP periodic polling

- **DCS to EMS request implementation problem:**
  - In **EN 50463:2017**, in case of **HTTP**, the implementation of the two **mandatory** the services "**request CEBD blocks**" and "**request EMS events**" was simple at EMS and DCS level, but often quite impossible at communication infrastructure level, mainly for organisational reasons
  - To succeed, an HTTP request from the DCS to the EMS should pass through many different communication devices, often under the **responsibility of different organisations**: DNS, routers, NAT, proxies, firewalls, mobile communication gateways, radio equipment, SIM, etc.
  - **Cybersecurity** requirements at EMS system level could also impose to close all inbound TCP port, making impossible to use the two services
  - FTP Mailbox didn't suffer of this problem, because all communication were from EMS to DCS, but FTP was considered insecure, even with the mitigation of encryption required by the EN
  - We could not replace FTP with **SFTP** because, although widely used, **SFTP is not defined in any official IETF RFC**. This lack of formal standardization may lead to potential interoperability issues.
  - We discarded **FTPS** because it (especially explicit FTPS, RFC 4217) dynamically negotiates data ports. This causes **difficulty through firewalls**, **problems with NAT**. In summary, it is affected by the very same issues we intended to eliminate.



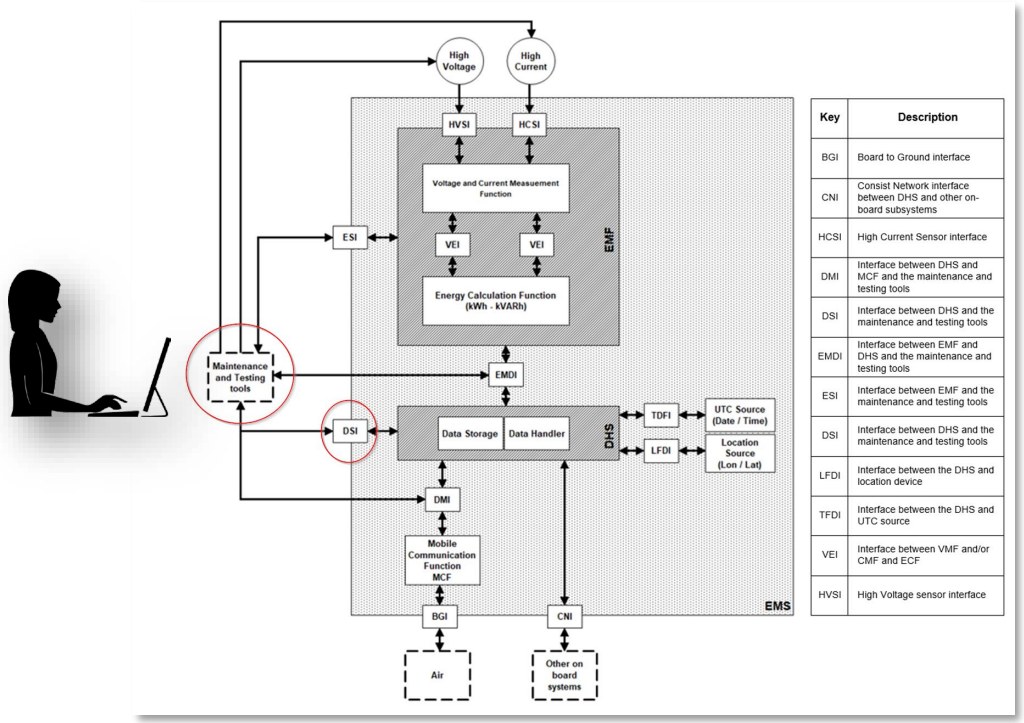
HTTP periodic polling

- **Solution is HTTP periodic polling:**
  - Always initiate the call from the train ➔ the EMS ***periodic poll*** the DCS for requests to execute
  - Re-use existing protocol ➔ periodic poll re-use the **simple/request** mechanism of the EN 50463 protocol
  - Keep it simple ➔ maintain only one, widely used and secure protocol (***HTTPS***)



Downloading energy data from the EMS, without a GS

- The request came from international colleagues of the IEC 62888 maintenance group, but the requirement also appeared in some European tenders and has a practical scope.



- **4.2.6 Maintenance/testing interfaces (DSI and ESI)**
  - […]
  - One of these interfaces shall permit the download of EMS CEBDs and events as files with the structure of CEBDBlock and EventSet defined in 4.3.4
  - If the EMS supports ReadingBlock, CommunicationConfig, AssetData, or State (see 4.3.4), it also shall support their download as files like CEBDs and events. If the EMS supports ChangeCommunicationConfig (see 4.3.4), it shall support the upload of a file with this structure and make the requested changes.
  - The names of the files shall have the following format:

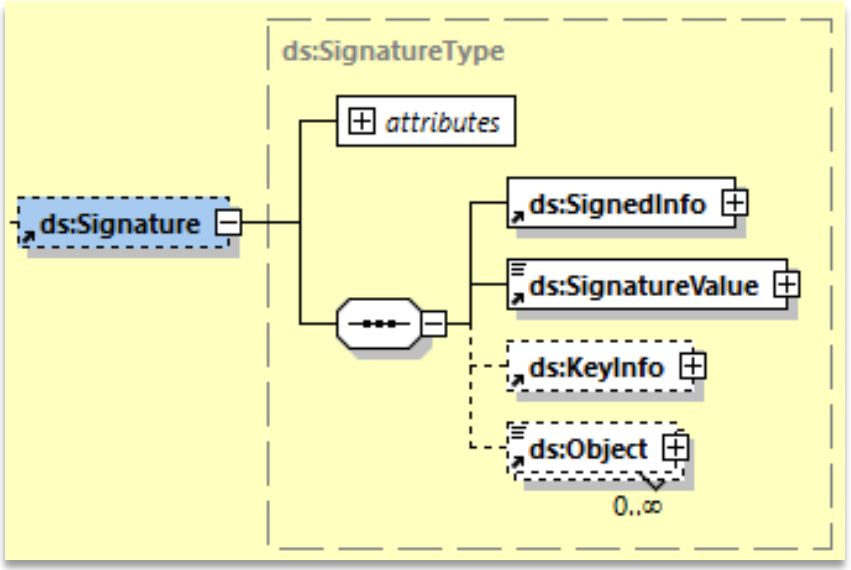
    [CPID]_[Download date]_[Noun][Period].[Extension]

Standardized Digital Signature

- In the 2017 release, verifying the digital signature of a CEBD, ReadingBlock or AssetData document with typical tools requires some manipulation, which can be confusing for implementers and users.
- In the new version, typical tools can be used without extra work

```
<CEBDBlock xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://cencenelec/en50463/CEBDBlock"
 xsi:schemaLocation="http://cencenelec/en50463/CEBDBlock CEBDBlock.xsd">
    <EMS>...</EMS>
    <MeasurementInterval>...</MeasurementInterval>
    <CEBD>...</CEBD>
    <CEBD>...</CEBD>
    <CEBD>...</CEBD>
    <!--More CEBDs-->
    <ds:Signature xmlns:ds="http://www.w3.org/2000/09/xmldsig#">
        <ds:SignedInfo>
            <ds:CanonicalizationMethod Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-20010315"/>
            <ds:SignatureMethod Algorithm="http://www.w3.org/2001/04/xmldsig-more#rsa-sha256"/>
            <ds:Reference URI="">
                <ds:Transforms>
                    <ds:Transform Algorithm="http://www.w3.org/2000/09/xmldsig#enveloped-signature"/>
                </ds:Transforms>
                <ds:DigestMethod Algorithm="http://www.w3.org/2001/04/xmlenc#sha256"/>
                <ds:DigestValue>DIGESTVALUE6qs3sBP4=</ds:DigestValue>
            </ds:Reference>
        </ds:SignedInfo>
        <ds:SignatureValue>SIGNATUREVALUEF1K9A=</ds:SignatureValue>
        <ds:KeyInfo>
            <ds:KeyValue>
                <ds:RSAKeyValue>
                    <ds:Modulus>PUBLICKEYMODULUSUNEjd3hKQak=</ds:Modulus>
                    <ds:Exponent>AQAB</ds:Exponent>
                </ds:RSAKeyValue>
            </ds:KeyValue>
        </ds:KeyInfo>
    </ds:Signature>
</CEBDBlock>
```

Typical tools can be used without extra work



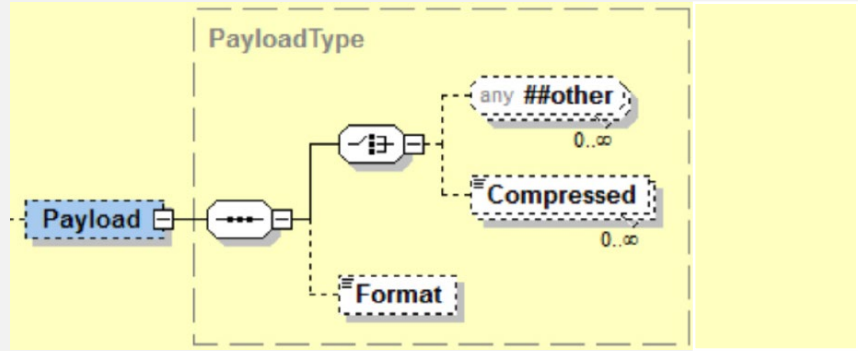
Uncompressed Payloads

- In the 2017 release, using uncompressed payload is possible, but needs adding custom prefixes to the payload content and removing them for the payload validation
- In the new version, the new *Uncompressed* element permits the insertion of an unchanged XML document, simplifying insertion and extraction and improving interoperability

EN 50463 2017

XML needs manipulation (add prefix)

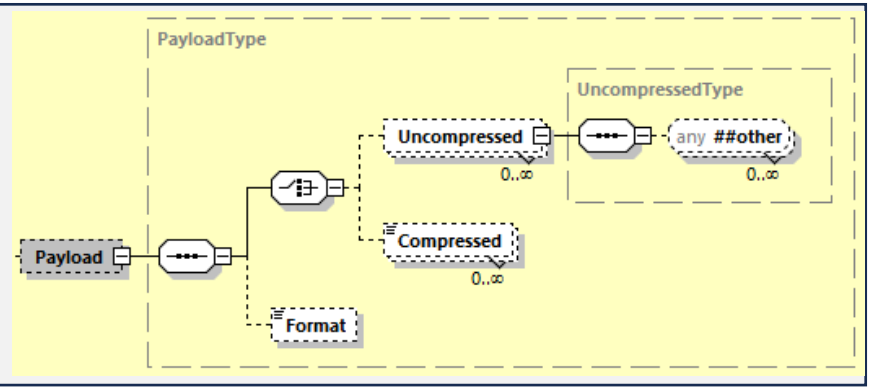
```
<Payload>
    <hb:Heartbeat xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation="Heartbeat.xsd">
        <EMS>
            <CPID>
                <CC>DE</CC>
                <VKM>DB</VKM>
                <VIN>918054061842</VIN>
                <EMSID>1</EMSID>
            </CPID>
            <XMLVersion>1.0</XMLVersion>
        </EMS>
        <TimeStamp>2001-12-17T09:32:47Z</TimeStamp>
        <Location>
            <Latitude>-83.12345</Latitude>
            <Longitude>163.12345</Longitude>
            <Quality>127</Quality>
        </Location>
    </hb:Heartbeat>
```



prEN 50463 2025

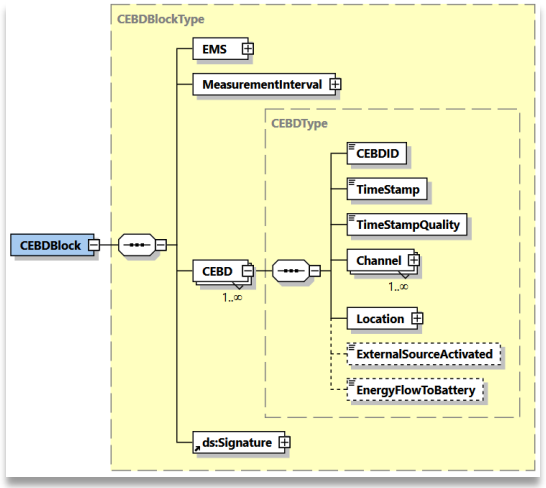
No more need of adding prefixes

```
<Payload>
    <Uncompressed>
        <Heartbeat xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://cencenelec/en50463/Heartbeat"
schemaLocation="http://cencenelec/en50463/Heartbeat Heartbeat.xsd">
            <EMS>
                <CPID>
                <NVR>DE</NVR>
                <VKM>DB</VKM>
                <EVN>918054061842</EVN>
                <EMSID>1</EMSID>
                </CPID>
                <XMLVersion>2.0</XMLVersion>
            </EMS>
            <TimeStamp>2001-12-17T09:32:47Z</TimeStamp>
            <Location>
                <Latitude>-83.12345</Latitude>
                <Longitude>163.12345</Longitude>
                <Quality>127</Quality>
            </Location>
        </Heartbeat>
    </Uncompressed>
</Payload>
```

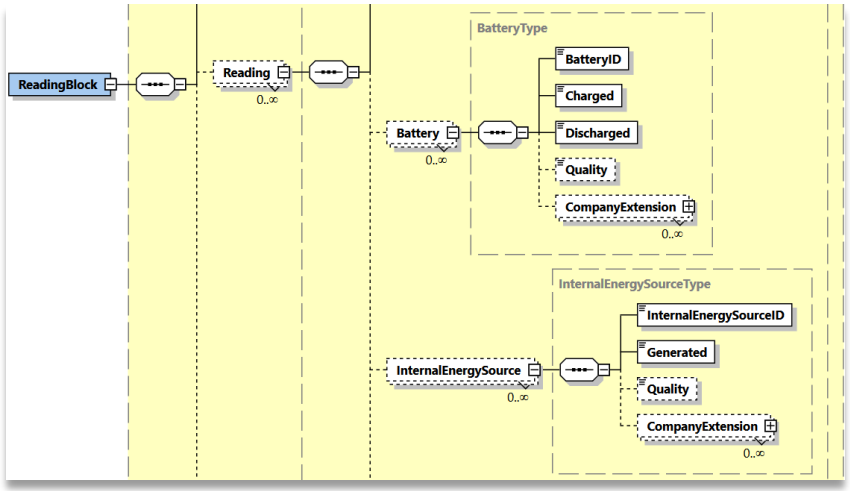


Hybrid Train support

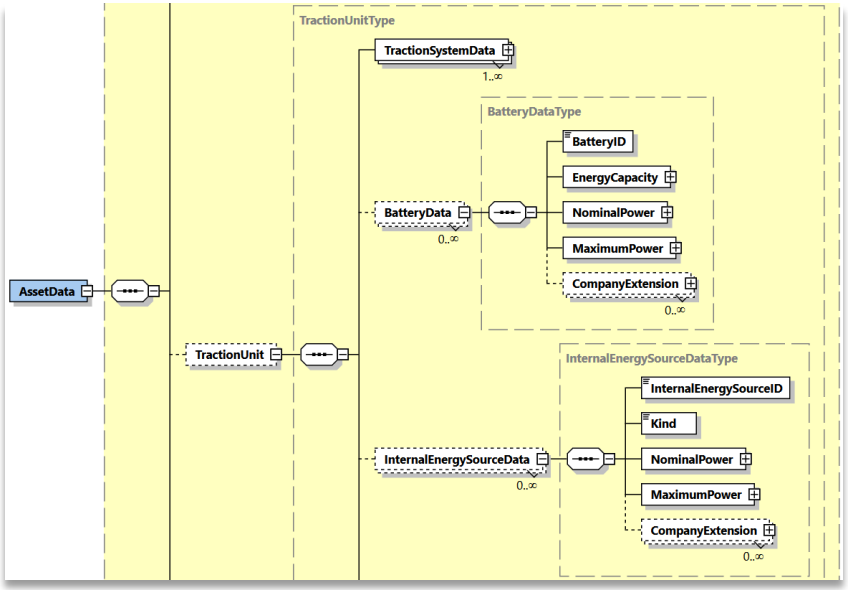
- To correctly validate energy consumption data of hybrid train at settlement level, it is necessary to know if and where external energy source have been activated and if the external energy was used to charge battery:
  - new *CEBDBlock* element ***ExternalSourceActivated***
  - new *CEBDBlock* element ***EnergyFlowToBattery***
- As usual, extra information on hybrid train journeys can be collected through ReadingBlock:
  - new *ReadingBlock* elements ***Battery*** and ***InternalEnergySource***
- Static information on hybrid trains capabilities can be collected through AssetData:
  - new *AssetData* elements ***BatteryData*** and ***InternalEnergySourceData***



Hybrid train support in CEBDBlock



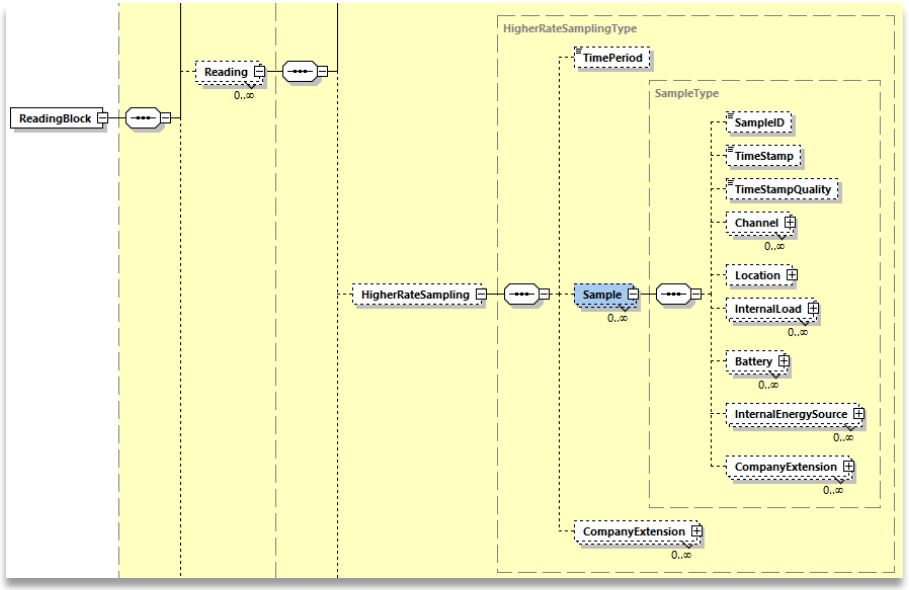
Hybrid train support in ReadingBlock



Hybrid train support in AssetData

High Frequency Sampling

- IMs and RUs need high frequency historical energy data
- An EMS – GS system has the capabilities to collect energy data at a frequency higher than that used for billing (5 minutes)
- The new ***HigherRateSampling*** element of ReadingBlock is designed to carry time series with a shorter time period than ReadingBlock, in a standard, flexible and interoperable format.



High frequency sampling support in ReadingBlock

Normal time period of the Readings

Time period of the high frequency time series embedded in the Reading

```
<ReadingBlock xmlns:xsi="http://www.w3.org/2001/XMLSc
  <EMS>
    <CPID>
      <NVR>DE</NVR>
      <VKM>DB</VKM>
      <EVN>918054061842</EVN>
      <EMSID>1</EMSID>
    </CPID>
    <TimePeriod>PT1M</TimePeriod>
    <XMLVersion>1.0</XMLVersion>
  </EMS>
  <MeasurementInterval>
    <Start>2001-12-17T09:25:00Z</Start>
    <End>2001-12-17T09:40:00Z</End>
  </MeasurementInterval>
  <Reading>
    <ReadingID>4621</ReadingID>
    <TimeStamp>2001-12-17T09:26:00Z</TimeStamp>
    <TimeStampQuality>127</TimeStampQuality>
    <Channel>...</Channel>
    <Location>...</Location>
    <AssociatedCEBD>462</AssociatedCEBD>
    <Speed>...</Speed>
    <HigherRateSampling>
      <TimePeriod>PT1S</TimePeriod>
      <Sample>
        <SampleID>1</SampleID>
        <Channel>
          <ChannelID>1</ChannelID>
          <Voltage>
            <Average>25.3</Average>
          </Voltage>
        </Channel>
      </Sample>
      <Sample>
        <SampleID>2</SampleID>
        <Channel>
          <ChannelID>1</ChannelID>
          <Voltage>
            <Average>25.4</Average>
          </Voltage>
        </Channel>
      </Sample>
    </HigherRateSampling>
  </Reading>
```

XSD version 2.0

- Changes in the protocol were so important to require to increment version counter from 1.0 to 2.0
- Thanks to the protocol version control, a DCS can easily handle messages from both 2017 and new EN

EventMessage 2.0 carrying a Heartbeat 2.0

```
<?xml version="1.0" encoding="UTF-8"?>
<EventMessage xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:hb="http://cencenelec/en50463/Heartbeat
xmlns="http://cencenelec/en50463/Message" xsi:schemaLocation="http://cencenelec/en50463/Message Message.xsd">
        <Header>
                <Verb>created</Verb>
                <Noun>Heartbeat</Noun>
                <Revision>2.0</Revision>
                <Timestamp>2024-12-31T12:00:00Z</Timestamp>
                <Source>EMS_DE_DB_9180540618421.deutschebahn.com</Source>
                <MessageID>8222200</MessageID>
                <Target>dcs.adif.es</Target>
        </Header>
        <Payload>
                <Uncompressed>
                        <Heartbeat xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                                xmlns=http://cencenelec/en50463/Heartbeat
                                xsi:schemaLocation="http://cencenelec/en50463/Heartbeat Heartbeat.xsd">
                                <EMS>
                                        <CPID>
                                                <NVR>DE</NVR>
                                                <VKM>DB</VKM>
                                                <EVN>918054061842</EVN>
                                                <EMSID>1</EMSID>
                                        </CPID>
                                        <XMLVersion>2.0</XMLVersion>
                                </EMS>
                                <TimeStamp>2001-12-17T09:32:47Z</TimeStamp>
                                <Location>
                                        <Latitude>-83.12345</Latitude>
                                        <Longitude>163.12345</Longitude>
                                        <Quality>127</Quality>
                                </Location>
                        </Heartbeat>
                </Uncompressed>
        </Payload>
</EventMessage>
```

This field indicates to the recipient (e.g. the DCS) which version of message.xsd to use to validate the message

Once extracted, this field indicates which version of schema to use for validate the XML document

Message.xsd 2.0

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns="http://cencenelec/en50463/Message"
targetNamespace="http://cencenelec/en50463/Message" elementFormDefault="qualified" attributeFormDefault="unqualified"
version="2.0">
        <xs:include schemaLocation="50463_BaseTypes.xsd"/>
        <xs:annotation>
                <xs:documentation xml:lang="en">

                        Copyright (c) 2024 CENELEC. All rights reserved.
                        Version 2.0 (In development)

                        Changes from version 1.0:

                        2024-09-09: In UserType complexType:
                                - changed UserID type from xs:string to ShortRestrictedStringType
                                - changed Organization type from xs:string to ShortRestrictedStringType
                        2024-10-22: Updated version field from "1.0" to "2.0"
                        2024-10-24: Name space added
                        2024-10-31: Any substituted by Uncompressed
                        2024-10-31: Changed type of XPath to xs:string
                        2024-10-31: Changed Password type from xs:string to PasswordType
                        2024-10-31: Added unknow to VerbType

                </xs:documentation>
        </xs:annotation>
        <xs:element name="RequestMessage" type="RequestMessageType"/>
```

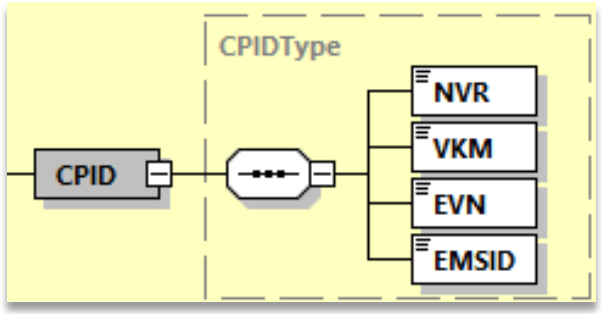
Heartbeat.xsd 2.0

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns="http://cencenelec/en50463/Heartbeat"
targetNamespace="http://cencenelec/en50463/Heartbeat" elementFormDefault="qualified" attributeFormDefault="unqualified"
version="2.0">
        <xs:include schemaLocation="50463_BaseTypes.xsd"/>
        <xs:annotation>
                <xs:documentation xml:lang="en">

                        Copyright (c) 2024 CENELEC. All rights reserved.
                        Version 2.0 (In development)

                        Changes from version 1.0:

                        2024-10-22: Updated version field from "1.0" to "2.0"
                        2024-10-24: Name space added

                </xs:documentation>
        </xs:annotation>
        <xs:element name="Heartbeat" type="HeartbeatType"/>
```

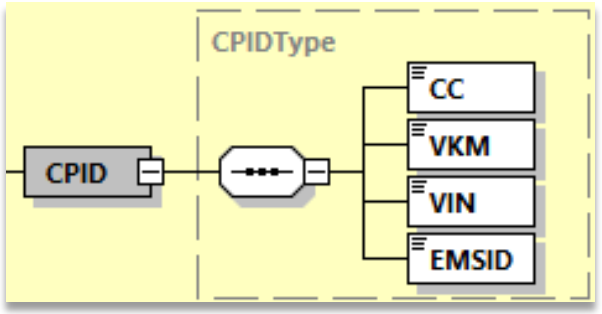
New CPID definition

- The IEC TC9/MT 62888 proposed to adopt a new CPID definition that supports CENELEC, IEC and a country specific requirements (example: tram).

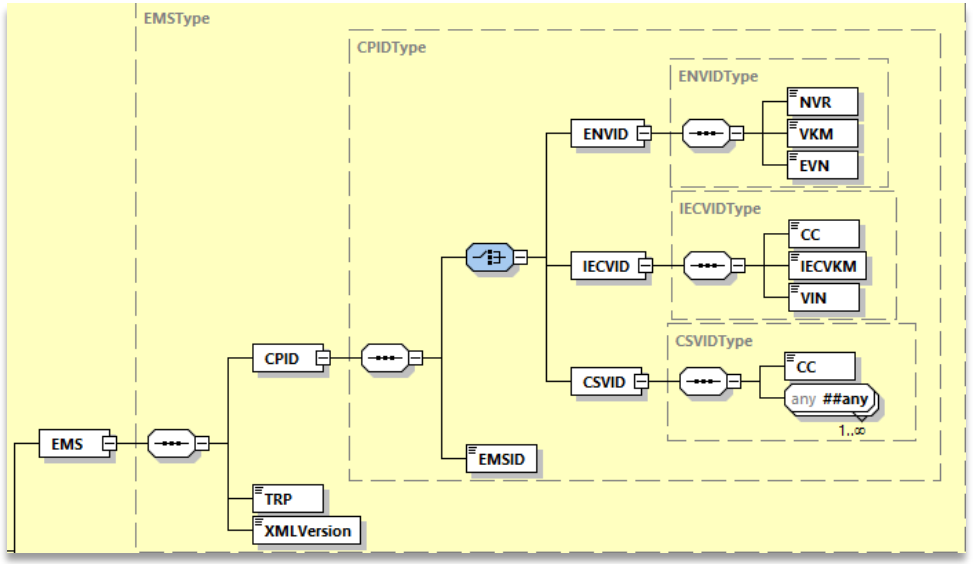
EN 50463:2017



IEC 62888



NEW COMMON CPID DEFINITION



- **Pros**
  - Easier maintenance
  - Wider adoption (non only rolling stocks)
  - In line with the expected convergence of the two standards
- **Cons**
  - Requires a relatively small change in the EMS/DCS software

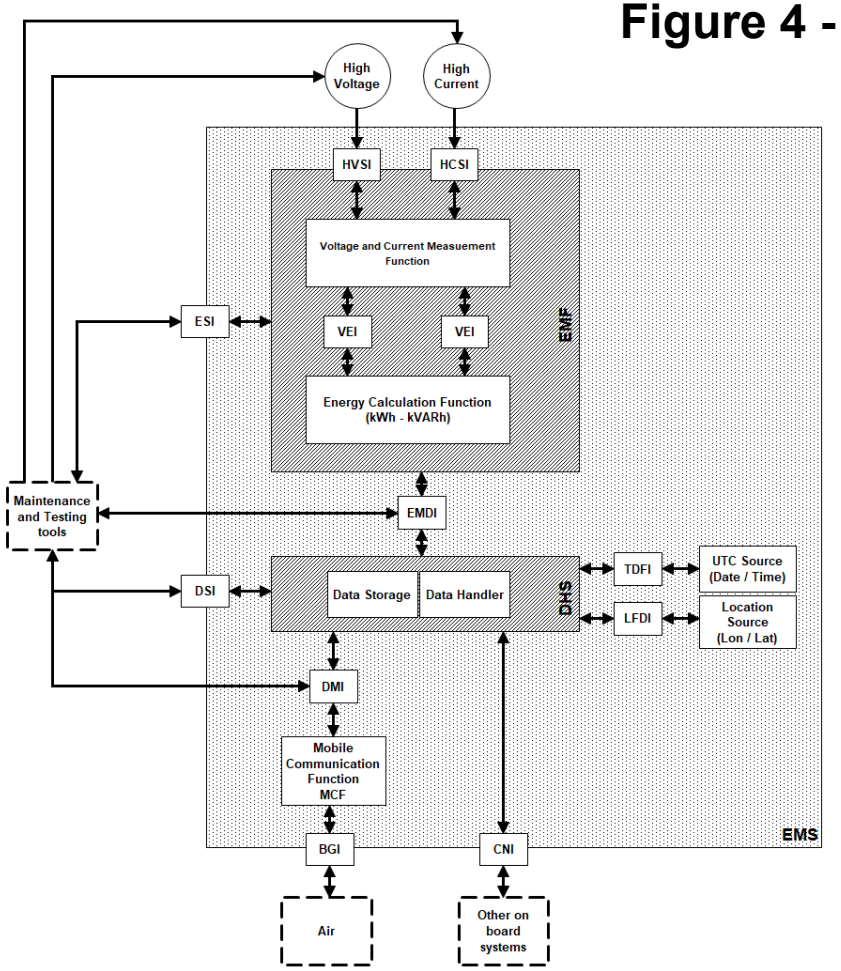
EN 50463-5
Conformity assessment

Main changes from 2017 version

- Improved Conformity assessment procedures
- Considering Integrated Energy Measurement Function also integration and installation
- Interface definition improved
- Introduction of the informative Annex A - Test bench

Main changes from 2017 version

Figure 4 - EMS functions and the related interfaces



Dissemination

- October 2nd- 3rd – ICT for Railways – Madrid and online:
  ICT-for-RAILWAYS | Workshop | 8 th Edition Madrid – Spain 2-3 October 2025
- October 7th – Traction Energy Settlement – Paris and online:
  UIC Traction Energy Settlement workshop Paris 2025 | UIC - International union of railways | Events
- November 5th – Energy and CO2 Data Management – Düsseldorf and online:
  UIC Energy and environmental data management for rail efficiency | UIC - International union of railways | Events
- November 19th – New draft of EN 50463 – Eress webinar:
  Latest Update to the Standardisation for Railway Energy Metering (EN 50463)
- December 10th – ERA workshop on Rail Traction Energy Studies – Brussels and online:
  ERA hybrid workshop on Rail Traction Energy Studies | European Union Agency for Railways

Please read the prEN 50463 and provide feedback.
Thank you for your kind attention.

Do you have any questions?