



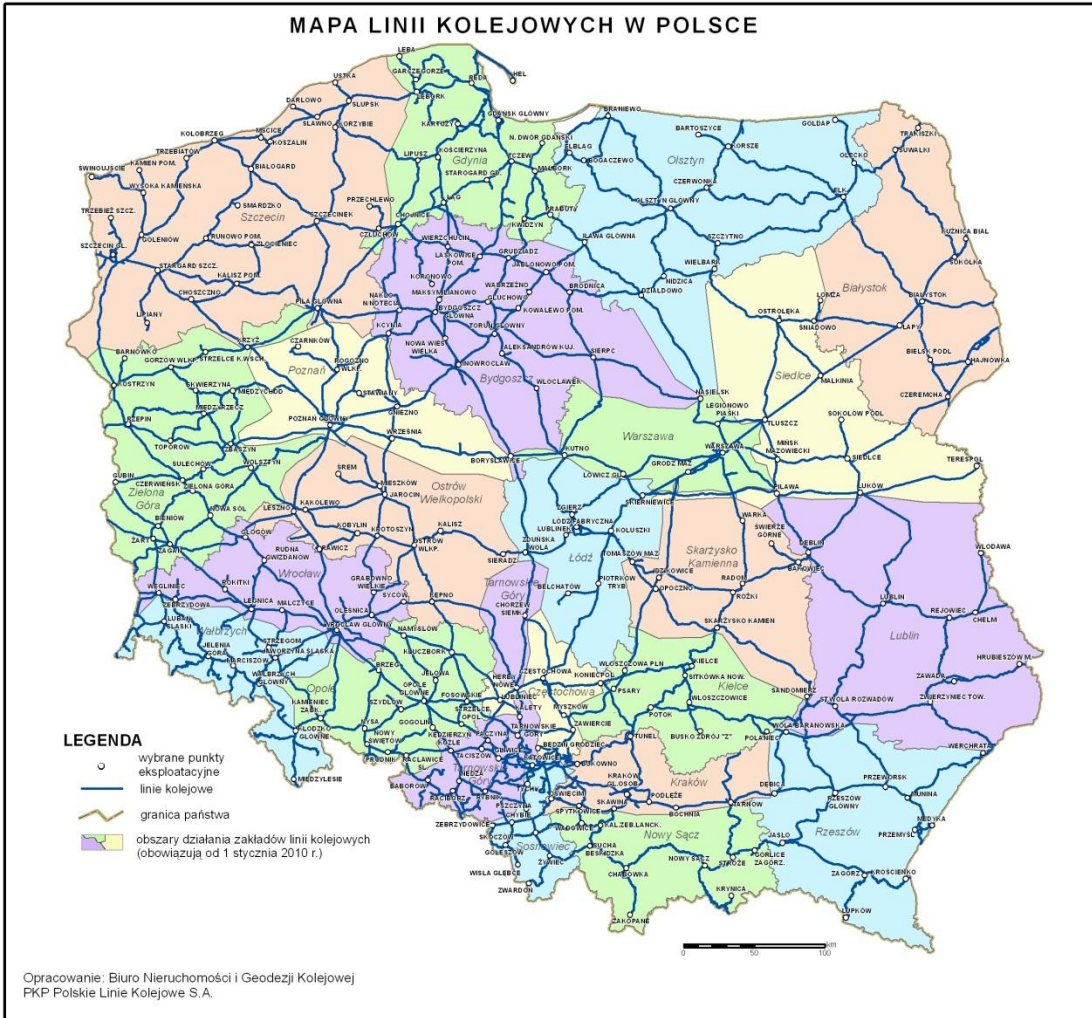
European interoperability certification challenges in railway lines upgrading projects

Предизвикателства в сертифицирането
за съответствие с Европейската оперативна система
на проекти за модернизация на железопътни линии



Burgas, 9 June 2017

IK Poland - 20 000 km of lines
INSTYTUT KOLEJNICTWA



20 000 kms of railway lines
(38 000 kms of railway tracks)

Operational cost per year
2 000 000 000,- euro
(60% by state, 40% by operators)

Investments – upgrading projects (budget perspective 2020 (23))

16 000 000 000,- euro
(80% by EU funds, 20% Poland)

Investment – **new line** (high speed)
6 000 000 000,- euro

‘ interoperability ’ :

the ability of the railway system to allow the safe and uninterrupted movement of trains, which accomplish the required levels of performance for , depending on all the regulatory, technical and operational conditions which must be met in order to

satisfy the essential requirements

- Safety
- Reliability and availability
- Health
- Environmental protection
- Technical compatibility
- Accessibility

‘ new approach ’ :

- Only products satisfying harmonized **essential requirements** can be put on the European Union market;
- Technical Specifications for Interoperability (**TSIs**), European Specifications (**ETCS/GSM-R**) and harmonized standards (**ENs**) for predefined scopes are based on **essential requirements**;
- **Essential requirements** are assumed to be satisfied, when regulatory, technical and operational conditions specified in respective TSIs, European specifications and ENs are fulfilled;
- **Essential requirements** can be satisfied in another way;
- **EC certification** has to be based on allowed conformity modules.

‘ intraoperability ’ :

- Railway systems in different EU Member States are satisfying essential requirements – railway is safe, reliable, health and environment supportive, accessible and technically coherent;
- Railway systems on Member State level are intraoperable;
- Set of MSs intraoperable railway systems, thanks to interoperability has to be replaced by EU interoperable railway system.

**upgrade railway with EU funds
keeping national railway system
technical coherency**

Requirements' conformity
essential requirements:

- safety
- technical compat.
- reliability
- health
- environment
- accessibility

verification by independent bodies

NBs, DBs, ABs

- technical parameters
- operational restrictions
- maintenance recommendations

Rules & procedures

Safety Management SMS

Safety monitoring

Safety supervision

IMs, RUs, NSAs

gained experience

**Dir. 2008/57/WE + TSI
„interoperability”**

**Dir. 2004/49/WE + CSM
„safety”**

2 EU Parliament Directives on interoperability and on safety

8 EU Commission Directives changing annexes to Parliament Directives

17 EU Commission Regulations establishing

- Technical Specifications for Interoperability TSIs
- Common Safety Methods CSMs

European Spec. & Standards (obligatory and harmonized)

- Railway Agency European Specifications (ETCS, GSM-R, TAF, TAP)
- CEN TC 256 Railway standards
- CENELEC TC 9X Railway electric and electronic applications
- ETSI RP Railway communication

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National requirements

- **First key decisions to be made before design phase in railway lines upgrading projects**
 - railway lines categories and railway track parameters
 - railway lines' power supply main parameters
 - railway lines' control command & communication A & B classes
- **Adjusting railway stations for persons with reduced mobility**
- **Renewal of overhead catenary without touching power supply**
- **Infra managers / contracting entities cooperation with assessment bodies (NB, DB, AB)**

Lines are classified based on the type of traffic (traffic code) characterised by following performance parameters: gauge, axle load, line speed, train length usable length of platform.

Performance parameters for passenger traffic

Traffic code	Gauge	Axle load [t]	Line speed [km/h]	Usable length of platform [m]
P1	GC	17 (*)	250-350	400
P2	GB	20 (*)	200-250	200-400
P3	DE3	22,5 (**)	120-200	200-400
Traffic code	Gauge	Axle load [t]	Line speed [km/h]	Usable length of platform [m]
P4	GB	22,5 (**)	120-200	200-400
P5	GA	20 (**)	80-120	50-200
P6	G1	12 (**)	n.a.	n.a.
P1520	S	22,5 (**)	80-160	35-400
P1600	IRL1	22,5 (**)	80-160	75-240

Performance parameters for freight traffic

Traffic code	Gauge	Axle load [t]	Line speed [km/h]	Train length [m]
F1	GC	22,5 (*)	100-120	740-1050
F2	GB	22,5 (*)	100-120	600-1050
F3	GA	20 (*)	60-100	500-1050
F4	G1	18 (*)	n.a.	n.a.
F1520	S	25 (*)	50-120	1050
F1600	IRL1	22,5 (*)	50-100	150-450

- Nominal track gauge
- Cant
- Cant deficiency
- Abrupt change of cant deficiency
- Equivalent conicity
- Railhead profile for plain line
- Rail inclination

Equivalent conicity calculated for amplitude (y) of the wheelset's lateral displacement:

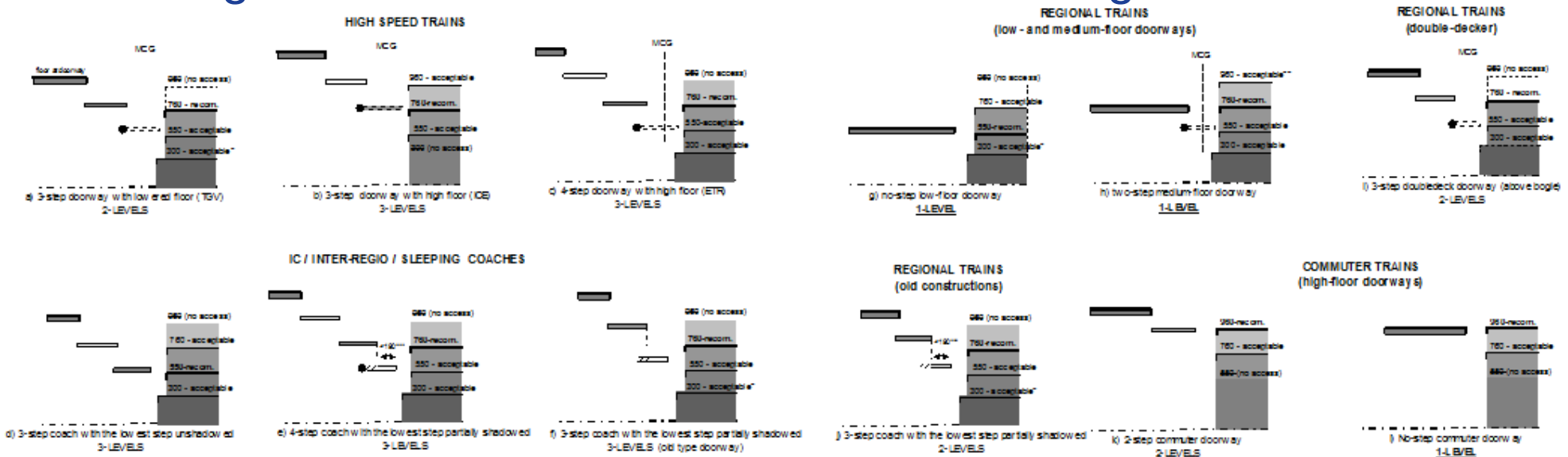
- $y = 3 \text{ mm}$, if $(TG - SR) \geq 7 \text{ mm}$
- $y = \left(\frac{(TG - SR) - 1}{2} \right)$, if $5 \text{ mm} \leq (TG - SR) < 7 \text{ mm}$
- $y = 2 \text{ mm}$, if $(TG - SR) < 5 \text{ mm}$

where TG - track gauge and SR - distance between wheelset flange contact faces.

Equivalent conicity design limit values

$v \leq 60$	Assessment not required
$60 < v \leq 200$	0,25
$200 < v \leq 280$	0,20
$v > 280$	0,10

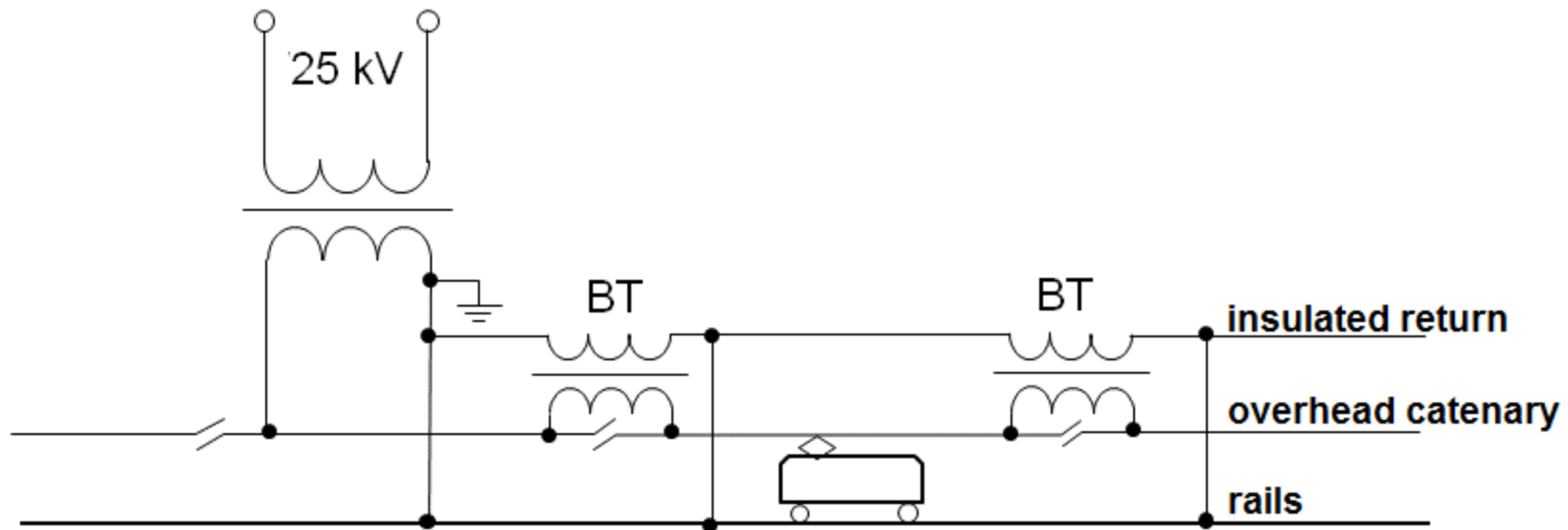
- Parking facilities for persons with disabilities and reduced mobility,
- Obstacle-free routes
- Floor surfaces
- Toilets & nappy change
- Ticketing, info, assistance
- Spoken information
- Boarding aids
- Doors and entrances
- Highlighting of transparent obstacles
- Furniture and free-standing devices
- Lighting
- Visual information,
- Platform width & edges & ends
- Level track crossings



Changing / renewal of the overhead catenary – part of subsystem
no final „subsystem EC verification certificate” can be issued

it is frequently required due to EU financing.

calculations based on timetable & traction vehicles are required



Line with 25 kV supply – EU requirements for track occupation.



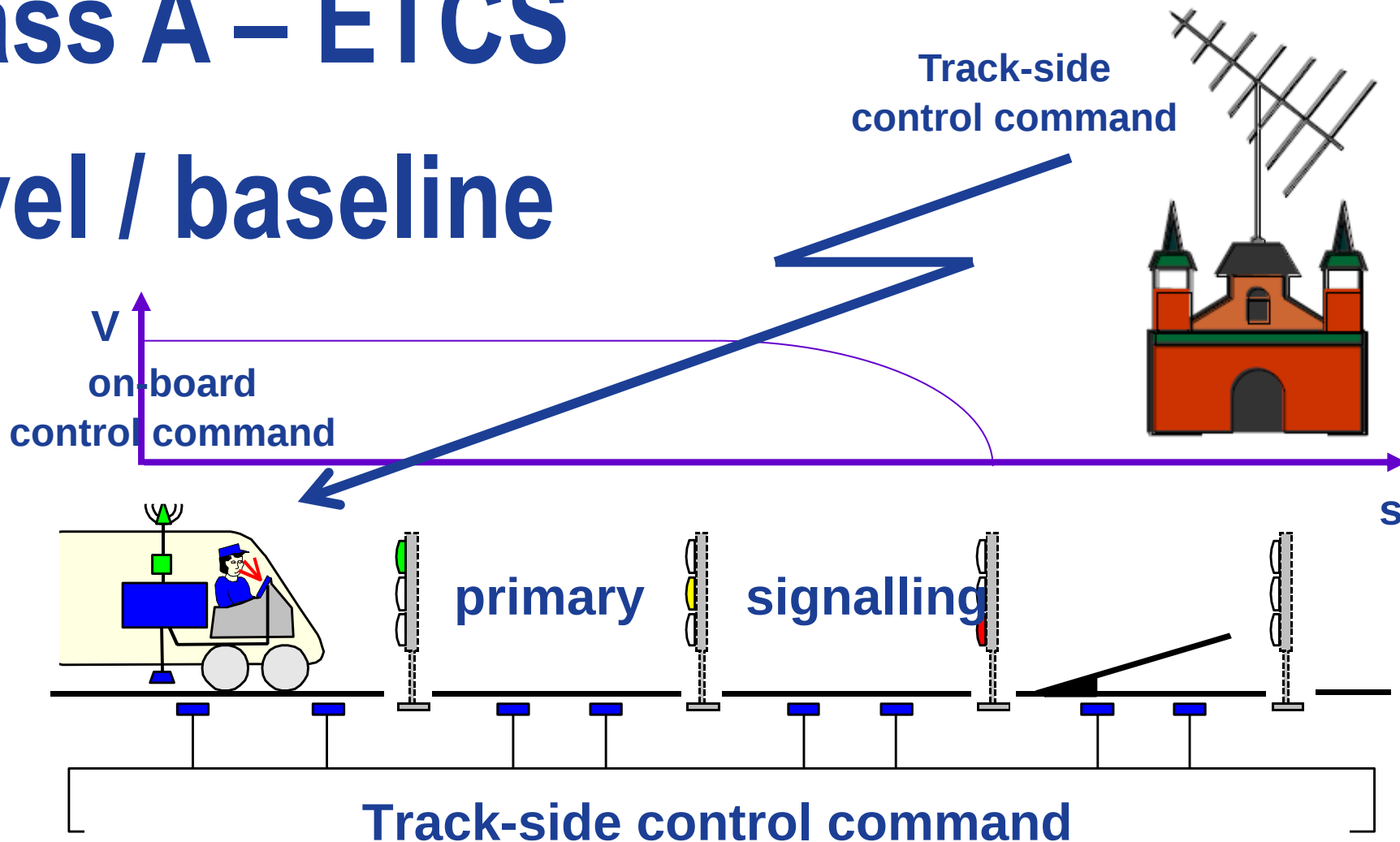
Control Command

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class A and B

class A – ETCS

level / baseline



class A and B

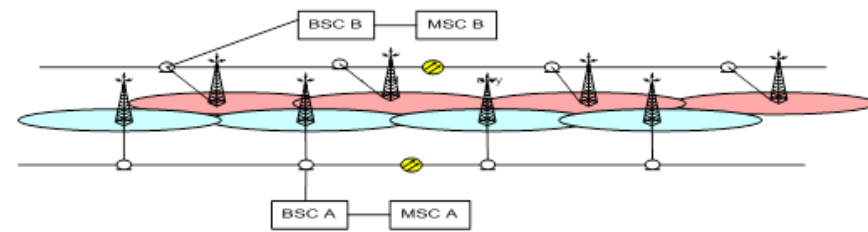
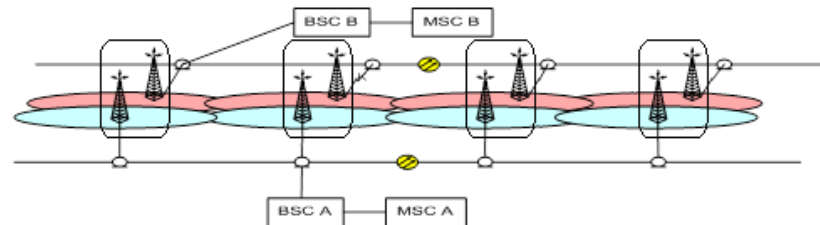
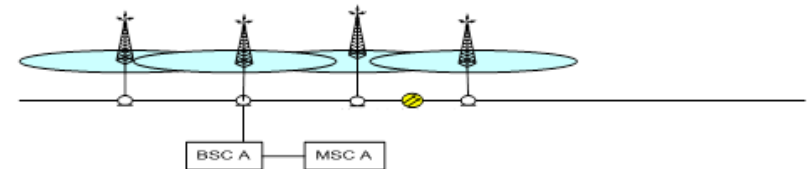
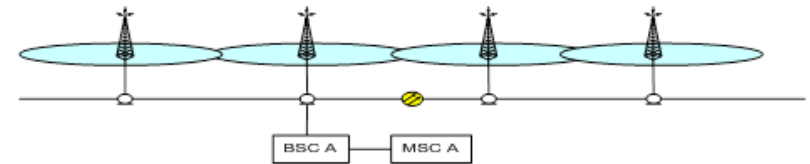
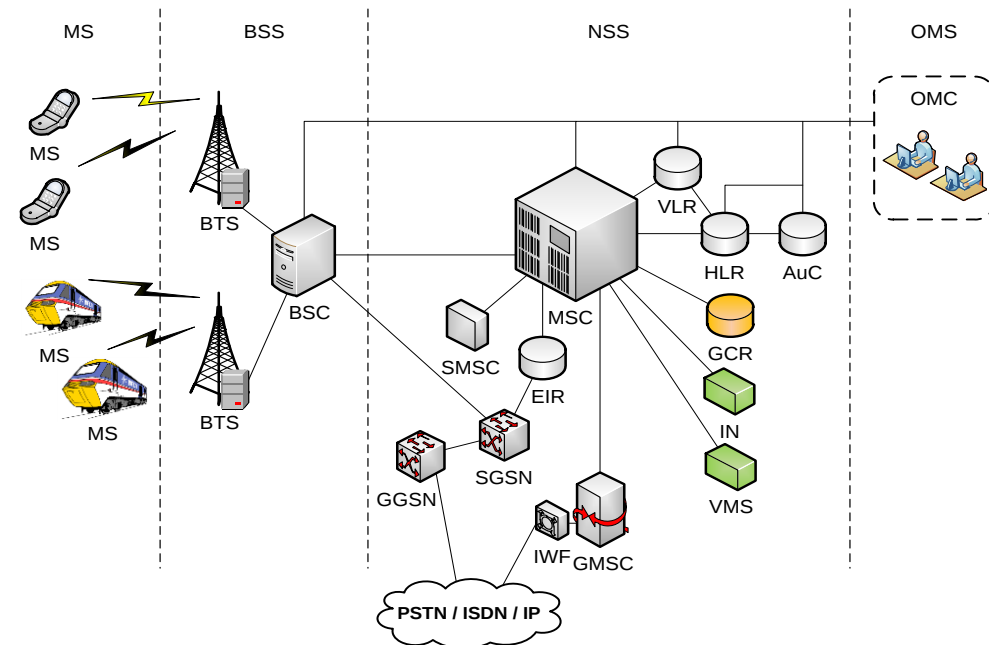
class A – GSM-R – voice / data

MS – mobile stations

BSS – Base Station Sub-system

NSS – Network Switching Sub-system

OMS – Operation & Maintenance Sub-system



- **It is legally required to assess both**
 - products (e.g. slippers for EU market and switches for PL one),
 - subsystems (e.g. infrastructure INF, energy ENE, signalling CCS)

subsystems are not just sets of certified products
- **Subsystems' EC verification certificates are required**

intermediate EC verification certificates are optional

each certificate forms a basis for mandatory EC declaration
- **Cooperation with assessment bodies starts with design phase**
 - Notified Bodies (NB) are verifying fulfilment of EU requirements,
 - Designated Bodies (DB) are verifying fulfilment national ones,
 - Risk Assessment Bodies (AB) are verifying safety (interfaces).



**Thank you
for your kind attantione**



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