



# NEWS FROM SLOVAKIA 2017

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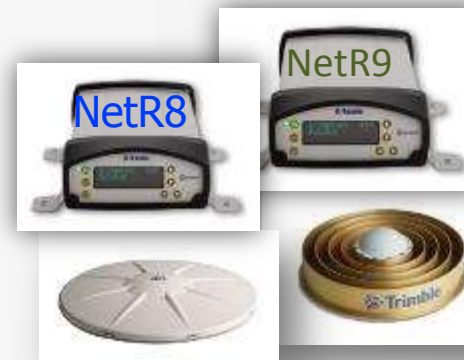
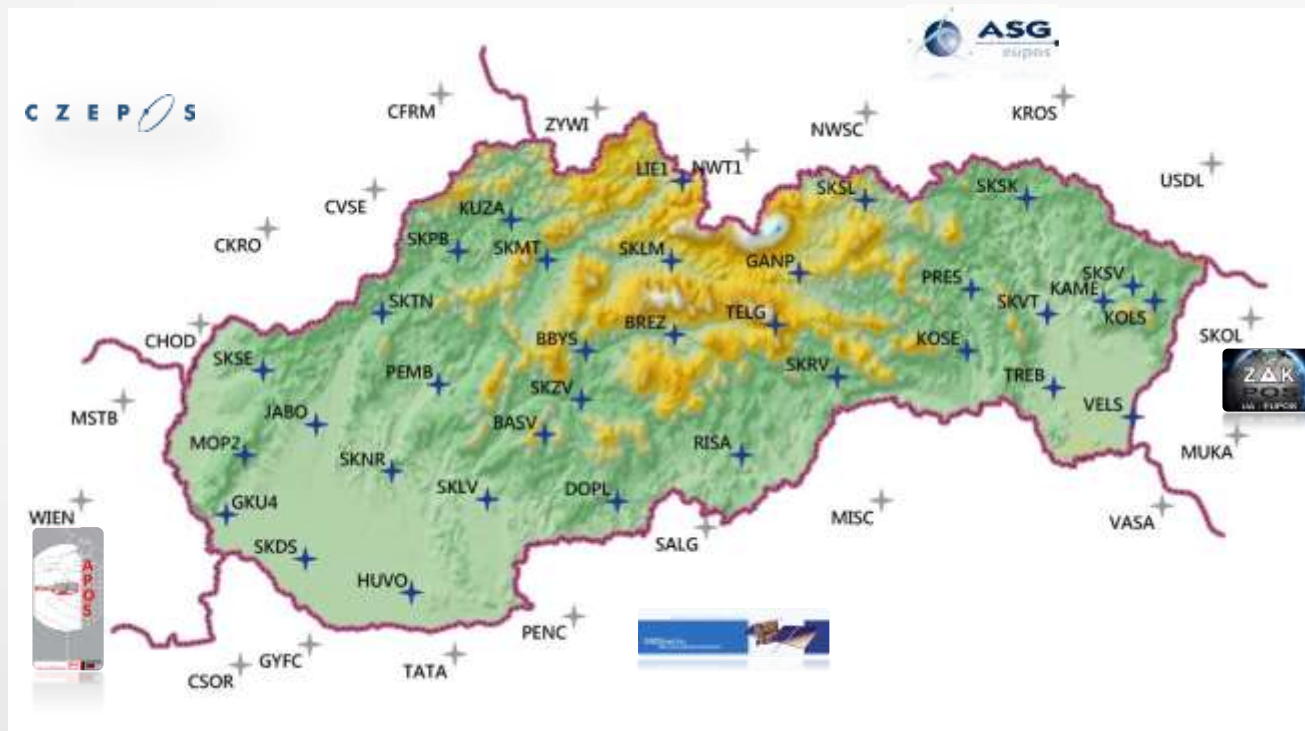


4<sup>th</sup> EUPOS® Council and Technical Meeting  
November 21-22, 2017. Bratislava, Slovakia

# SKPOS stations infrastructure

## Status in November 2017

- **34 Slovakian permanent stations**
  - All stations with TRIMBLE receivers and antennas
  - All stations observe GPS+GLONASS signals
- **20 foreign permanent stations (APOS, gnssnet.hu, CZEPOS, ASG-EUPOS, ZAKPOS)**



# SKPOS station infrastructure

## Relocation of 2 stations in 2017 year

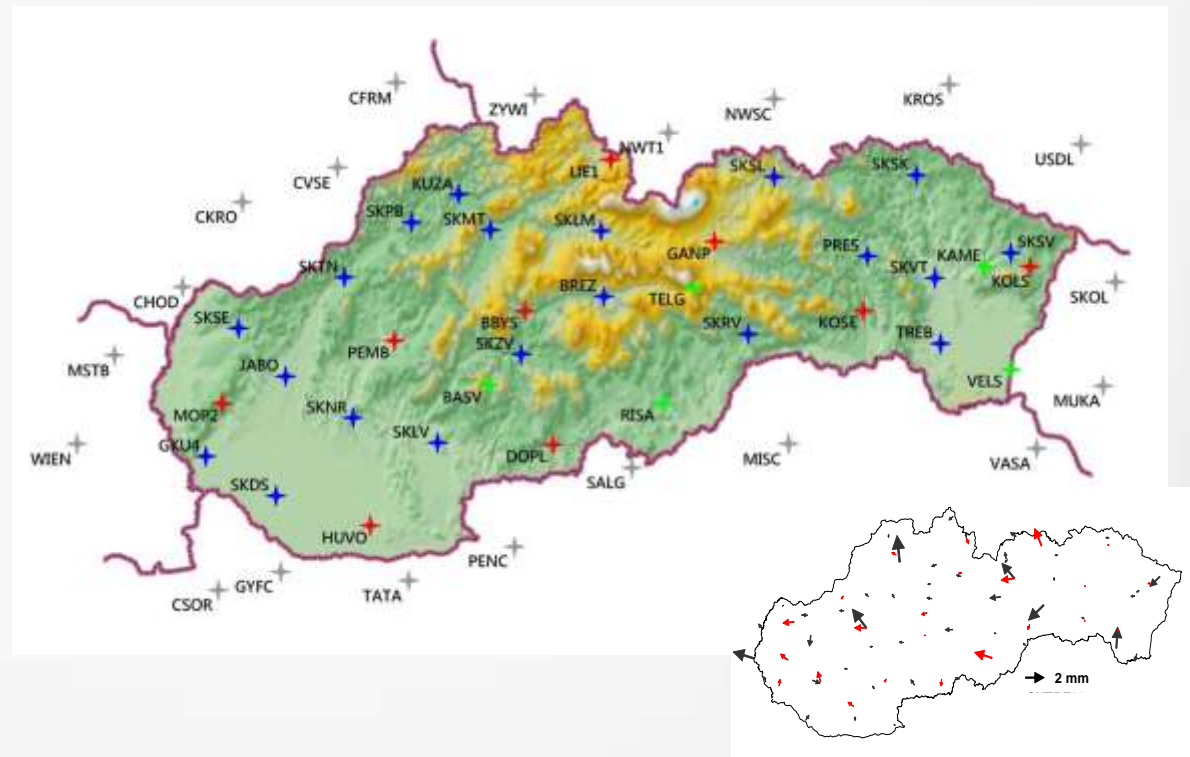
- Reinforced-concrete pillar instead of roof monumentation
- Contribution to geokinematics reseach



# SKPOS stations infrastructure

geodynamics research monumetation

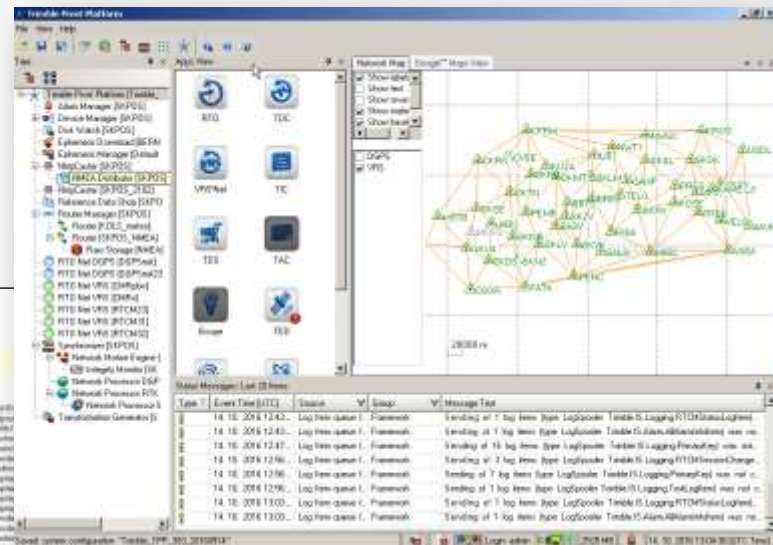
- together 16 of 34 slovakian SKPOS permanent stations have monumentation suitable for geodynamic research purposes



# SKPOS

## control software



- Trimble® Pivot™ Platform GNSS Infrastructure Software
  - Main software: version 3.10.0
  - Back-up software: version 3.8.3



# SKPOS

## services portfolio - data formats - charges

Only network solution (Network RTK in VRS concept) is provided.  
No single RTK!

Package	Content	Duration	Format	Flat rate
SKPOS_mm	RINEX 1000 h	year	RINEX 2.x, 3.x	50 €
SKPOS_cm (year)	RTK unlimited + 50 h RINEX	year	 RTCM 2.3, 3.1, <b>RTCM 3.2 MSM</b> CMRx, CMR+	50 €
SKPOS_cm (month)	RTK unlimited	month	 RTCM 2.3, 3.1 <b>RTCM 3.2 MSM</b> CMRx, CMR+	19 €
SKPOS_dm	DGNSS unlimited	year	RTCM 2.1, 2.3	20 €



# SKPOS

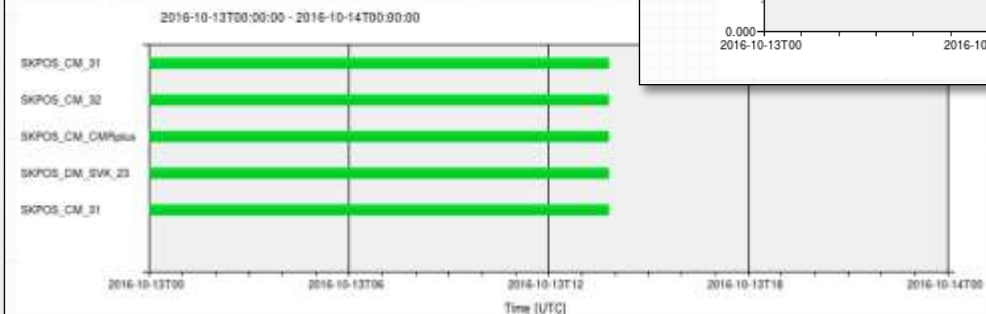
## services availability

- monitored by Alberding-QC software
  - availability in 2017: 99,95%
  - availability 2006-2017: 99,95%

### Statistics

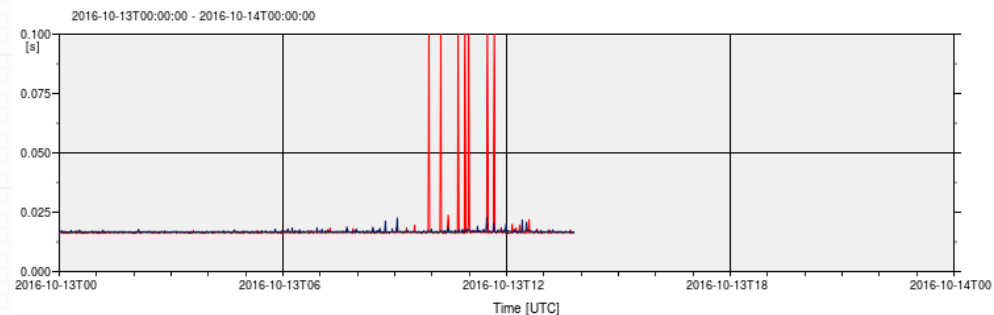
Stream	Caster	Subnet	Activation	Last Accessed	Σ	Connection
						Last Error(24h),(
SKPOS_CM_31 [0]	195.28.70.16.2101	SKPOS	2015-05-27T09:23:20	00:00:09	0	00:00:00 (100.00 %),(
SKPOS_CM_32 [0]	195.28.70.16.2101	SKPOS	2015-05-27T11:04:45	00:00:09	0	00:00:00 (100.00 %),(
SKPOS_CM_CMPlus [0]	195.28.70.16.2101	SKPOS	2015-05-27T09:23:20	00:00:09	0	00:00:00 (100.00 %),(
SKPOS_DM_SVK_23 [0]	195.28.70.16.2101	SKPOS	2015-05-27T11:05:19	00:00:09	0	00:00:00 (100.00 %),(
SKPOS_CM_31 [0]	195.28.70.17.2101	SKPOS	2015-05-27T09:23:20	00:00:09	0	00:00:00 (100.00 %),(

### Availability Plot



Alberding-QC 

### Ping Server



# SKPOS

## services quality monitoring

- monitored by own **SKPOS network solution**  
**quality monitoring application**
- Average deviations in SKPOS:
  - Hz: 1.1 cm
  - V: 2.4 cm

<http://monitoringSKPOS.gku.sk>

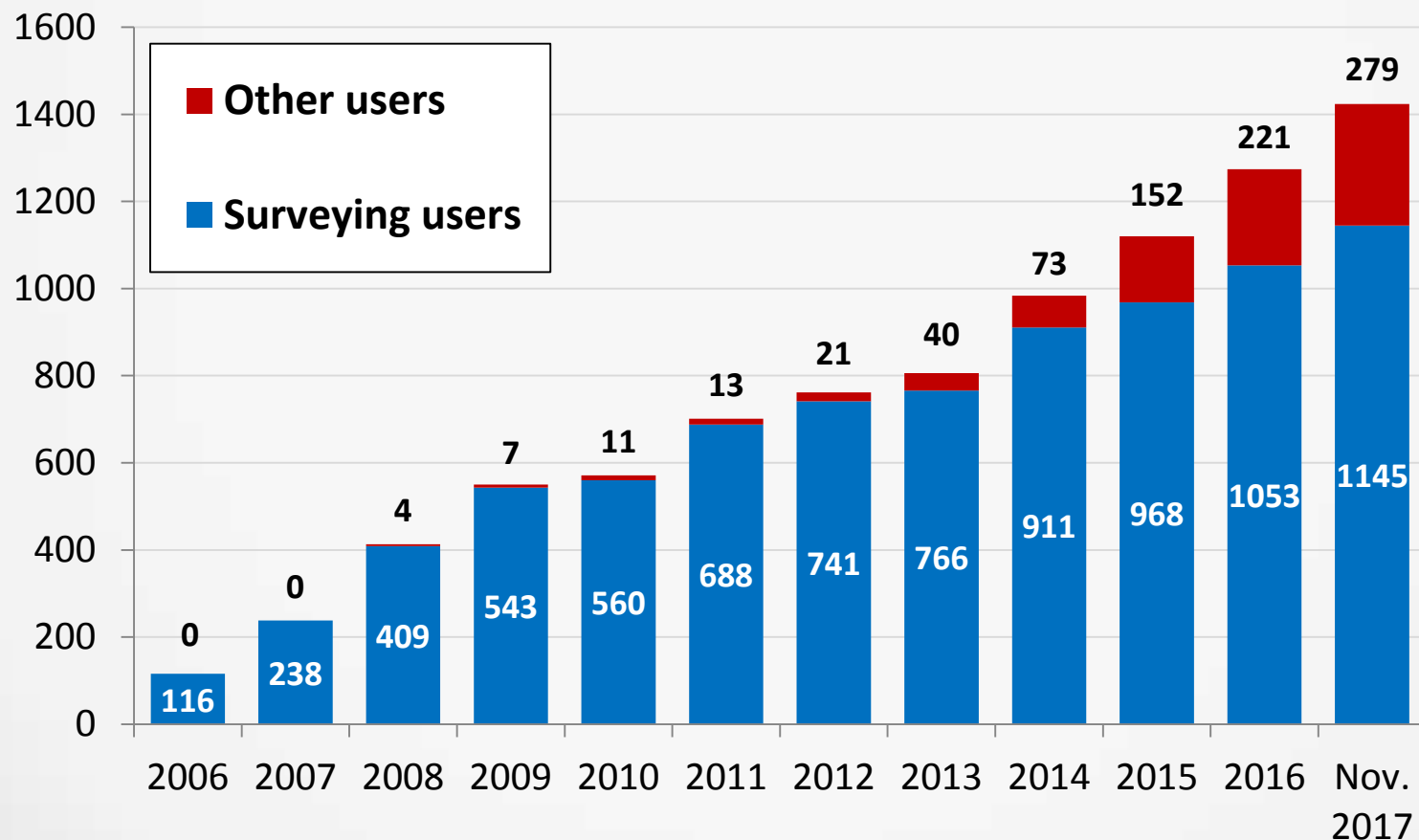




# SKPOS

number of users

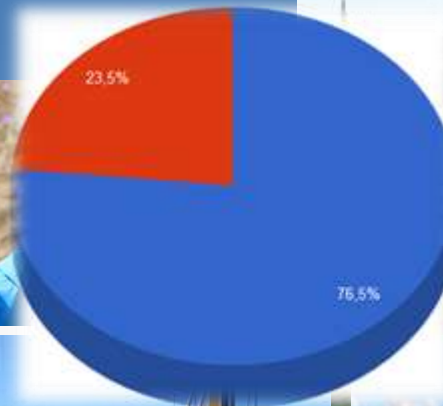
- over 1424 registrations (Nov. 2017)









# SKPOS

## Type of users

- Surveying fields (cadastre, surveying, mapping, GIS) – **76.5 %**
- Other fields (precise agriculture, machine guarding) – **23.5 %**

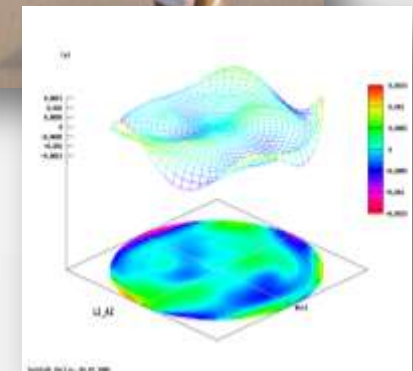
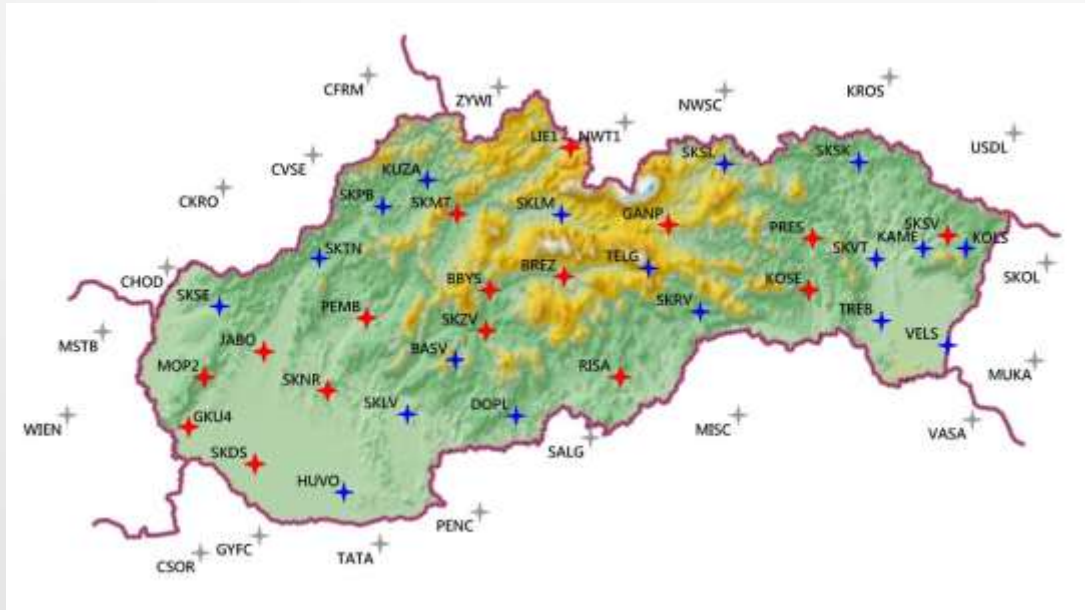


# SKPOS and Galileo

SKPOS	Component	GPS + GLONASS + Galileo + BeiDou
Hardware	Antennas	 34 (34)
	Receivers	 31 (34)
Software Trimble Pivot	RINEX CORS	
	RINEX VRS	 plan for 2018 year
	RTCM 3.2 MSM (GPS+GLONASS)	
	RTCM 3.2 MSM (GPS+GLONASS+GALILEO)	 plan for 2018 year

# SKPOS reference station level

- Number of SKPOS reference stations: 34
- Number of calibrated antennas: 16
- Type of calibration: individual robotic GPS+GLO
- Aim for future: robotic GPS+GLO+GAL for every new antenna



# GNSS metrology in Slovakia

## GNSS rover (users) level

- Legislative:
  - only general act for metrology
  - no calibration order or other official particular legislative document for “GNSS” metrology
- no calibration baseline for GNSS rovers
- If calibration protocol needed
  - dealers of main GNSS manufactures provide “calibration certificate”
  - users go to Czech republic or Hungary where GNSS calibration workplace is
- plans for next few years
  - foundation of GNSS baseline for GNSS rover+antenna calibration (Czech model)
  - maybe purchasing of robot for GNSS antenna calibration



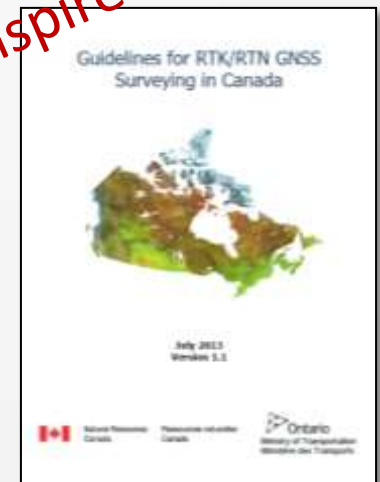


# New guideline for SKPOS users (2016)

- Guideline for usage of Slovak real-time determination system for surveying
- Aim:
  - to define unified procedure of SKPOS usage for surveying in Slovakia
  - to improve the quality and the level of professionalism of surveying using SKPOS
- Content
  - Planning and recommendations for RTK/RTN measurements
  - Planning and recommendations for static and post-processing
  - Conclusions and recommendation for receiver setup



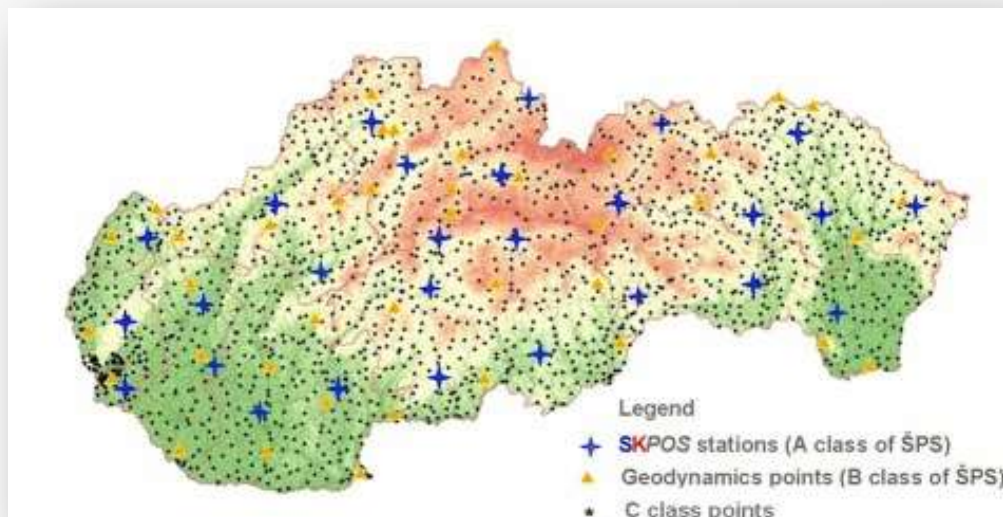
Inspired by





# SKPOS permanent station protection

- SKPOS permanent stations are part of national network
- National spatial network (ŠPS)
  - Class A (SKPOS)
  - Class B (SGRN)
  - Class C
  - Class D



- ŠPS points protected by law (but not sufficient) -> stations are sometimes forced to move
- Plan for future
  - to declare protected 3D zone around all SKPOS stations



# EUPOS Technical standards fulfilment

- SKPOS fulfill EUPOS TS in 99% level
  - we do not have physical monitoring stations only virtual monitoring solution



**Thank you for your attention**

**Miroslav Roháček**

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