



DEVELOPMENT STATUS OF LITHUANIAN NATIONAL GEODETIC CONTROL

National Report

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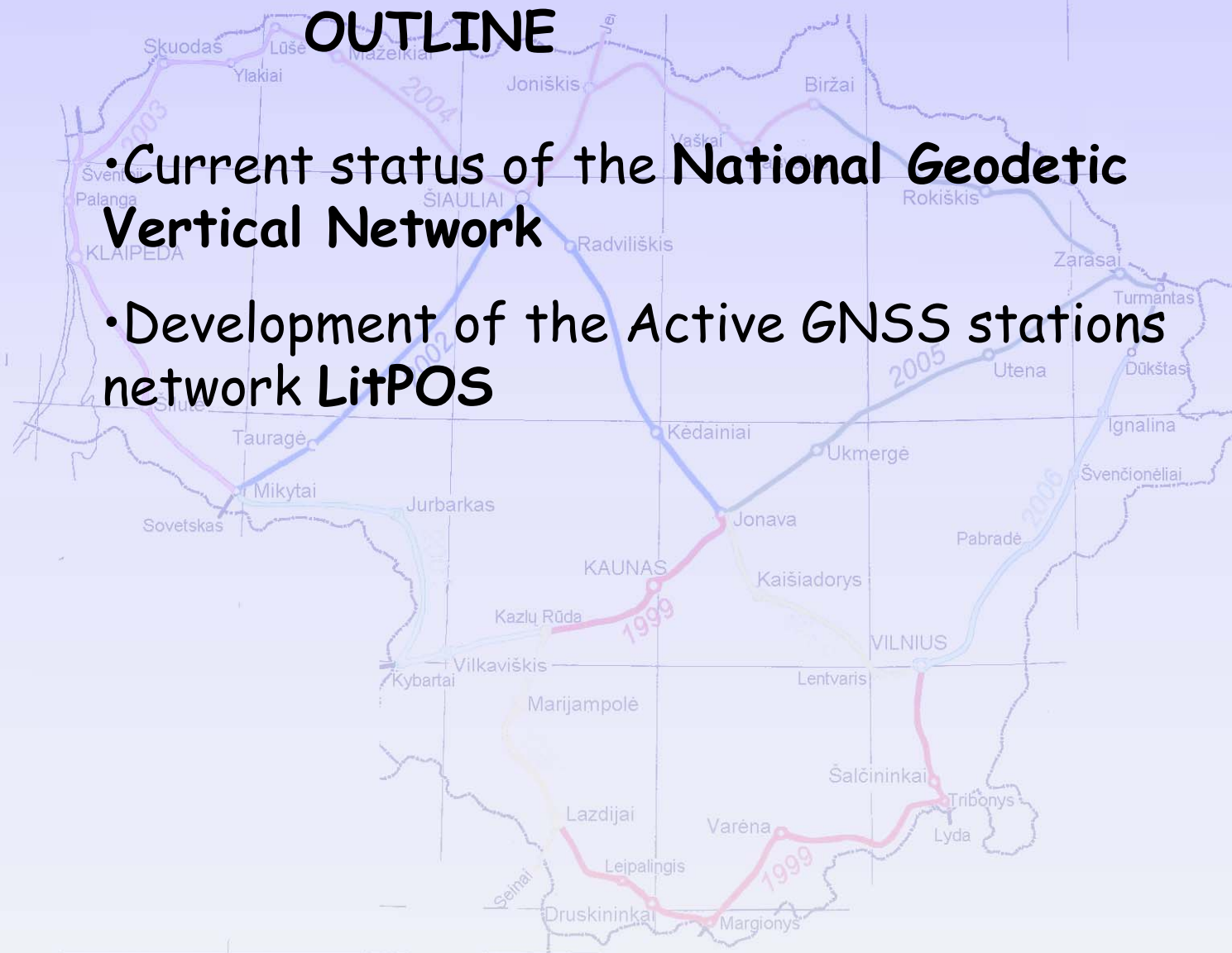
Co-authors: S.Urbanas, E.Sleiteris, P.Petroskevicius



OUTLINE

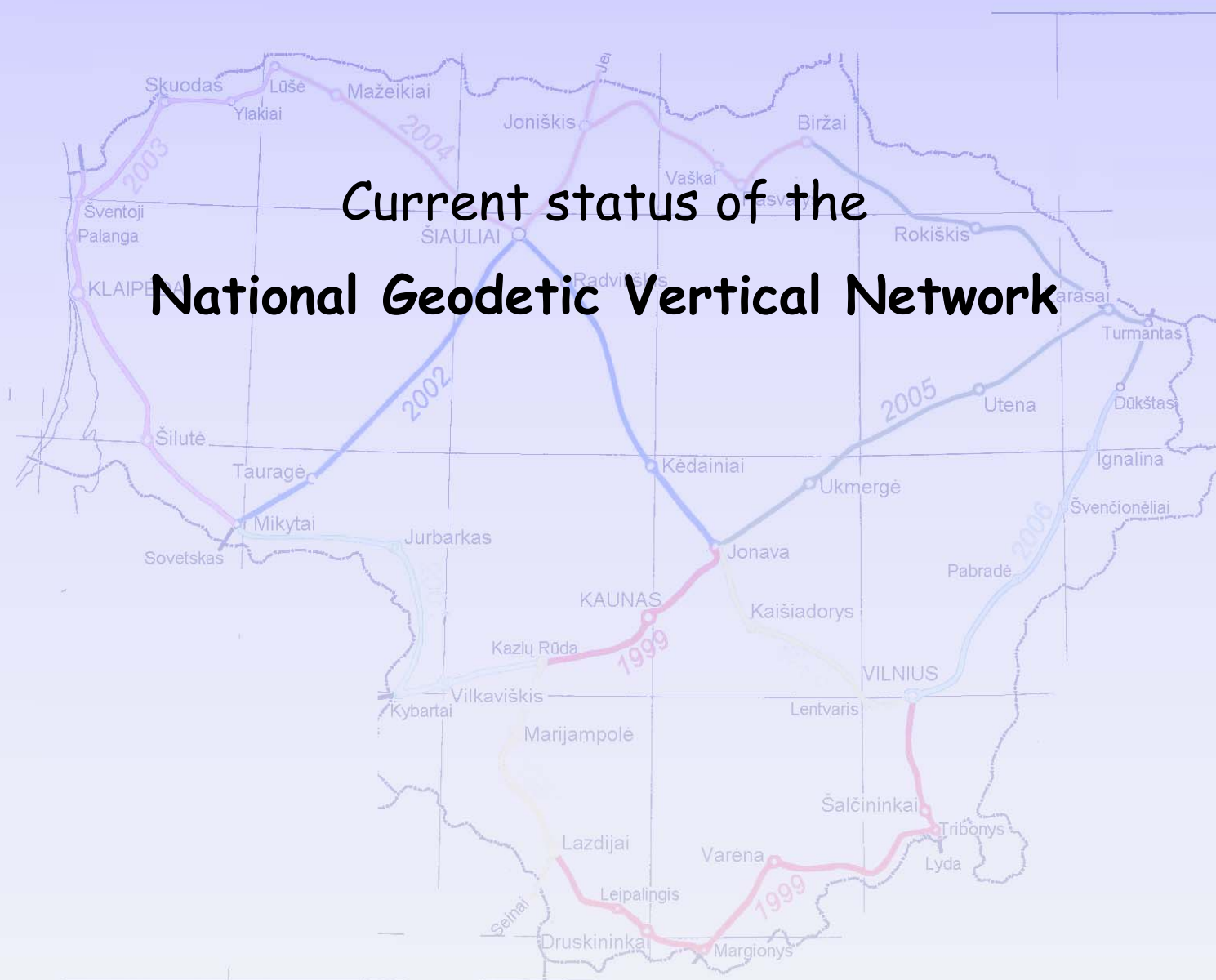
- Current status of the National Geodetic Vertical Network

- Development of the Active GNSS stations network LitPOS



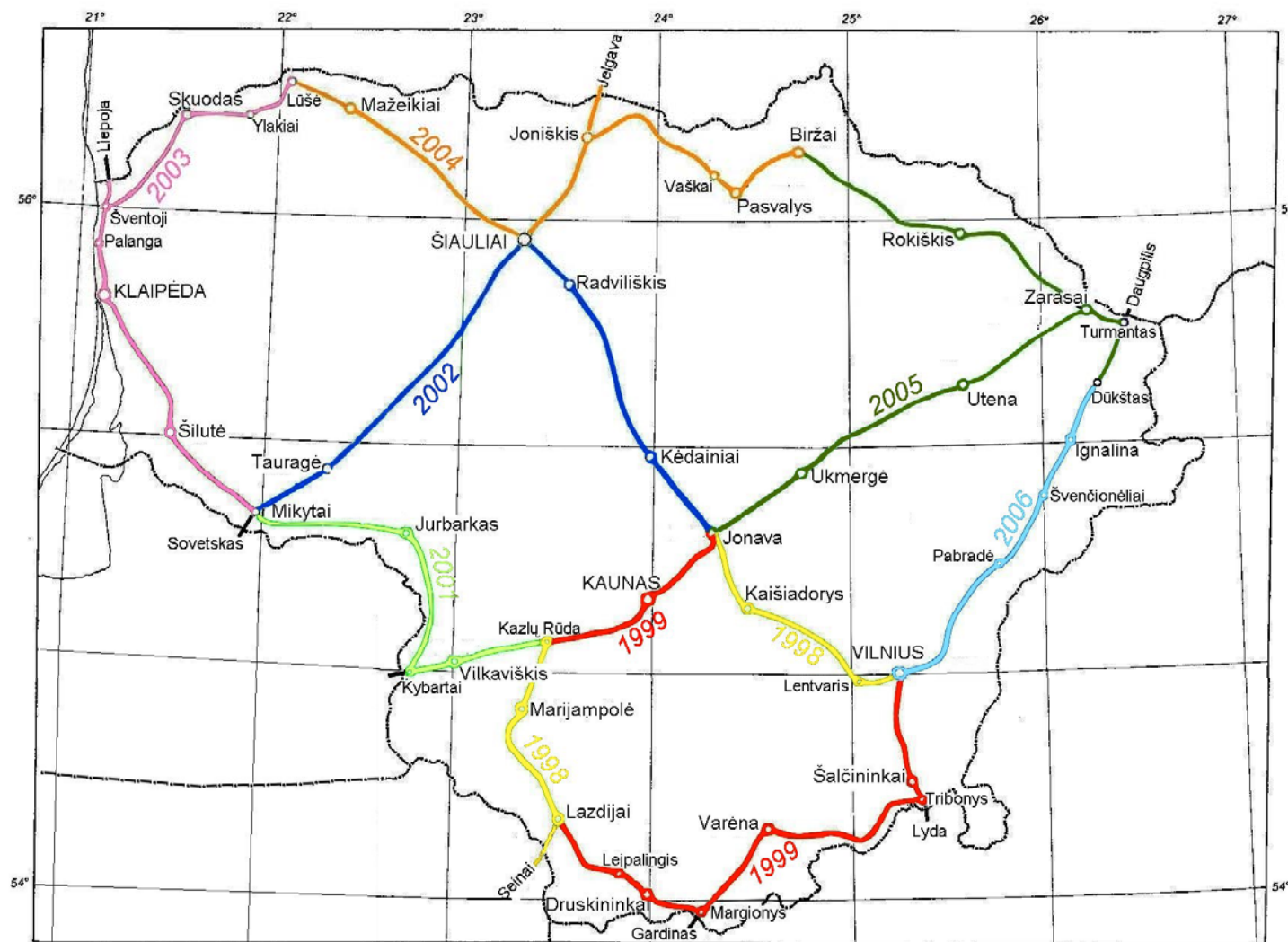


Current status of the National Geodetic Vertical Network





National Geodetic Vertical Network (1)





National Geodetic Vertical Network (2)

Levelling instrumentation

1. *Leica NA3003* No 92426

Wild GPCL3 No 26598, 26599

2. *Leica NA3003* No 92432

Wild GPCL3 No 26600, 26605)

Calibration:

Rods: 1998- 2003 (6 times)

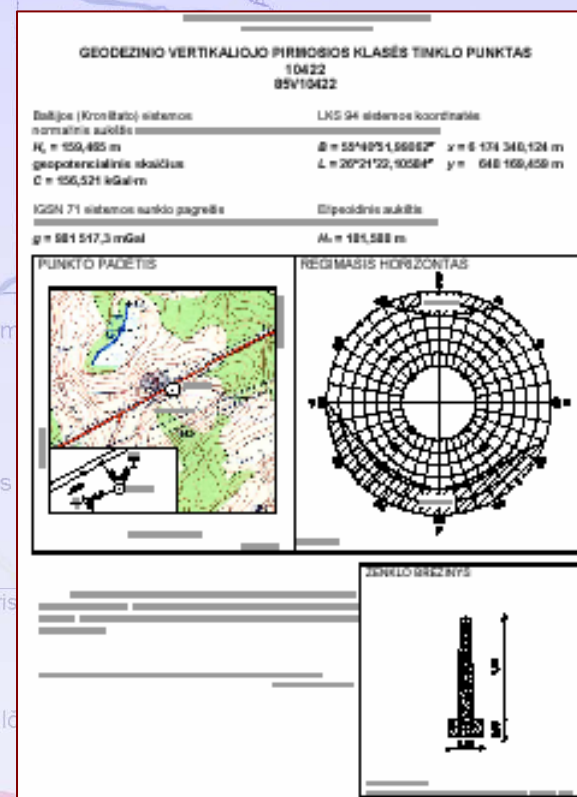
System: 2004-2006 (3 times)

National Geodetic Vertical Network (3)

Data on benchmarks

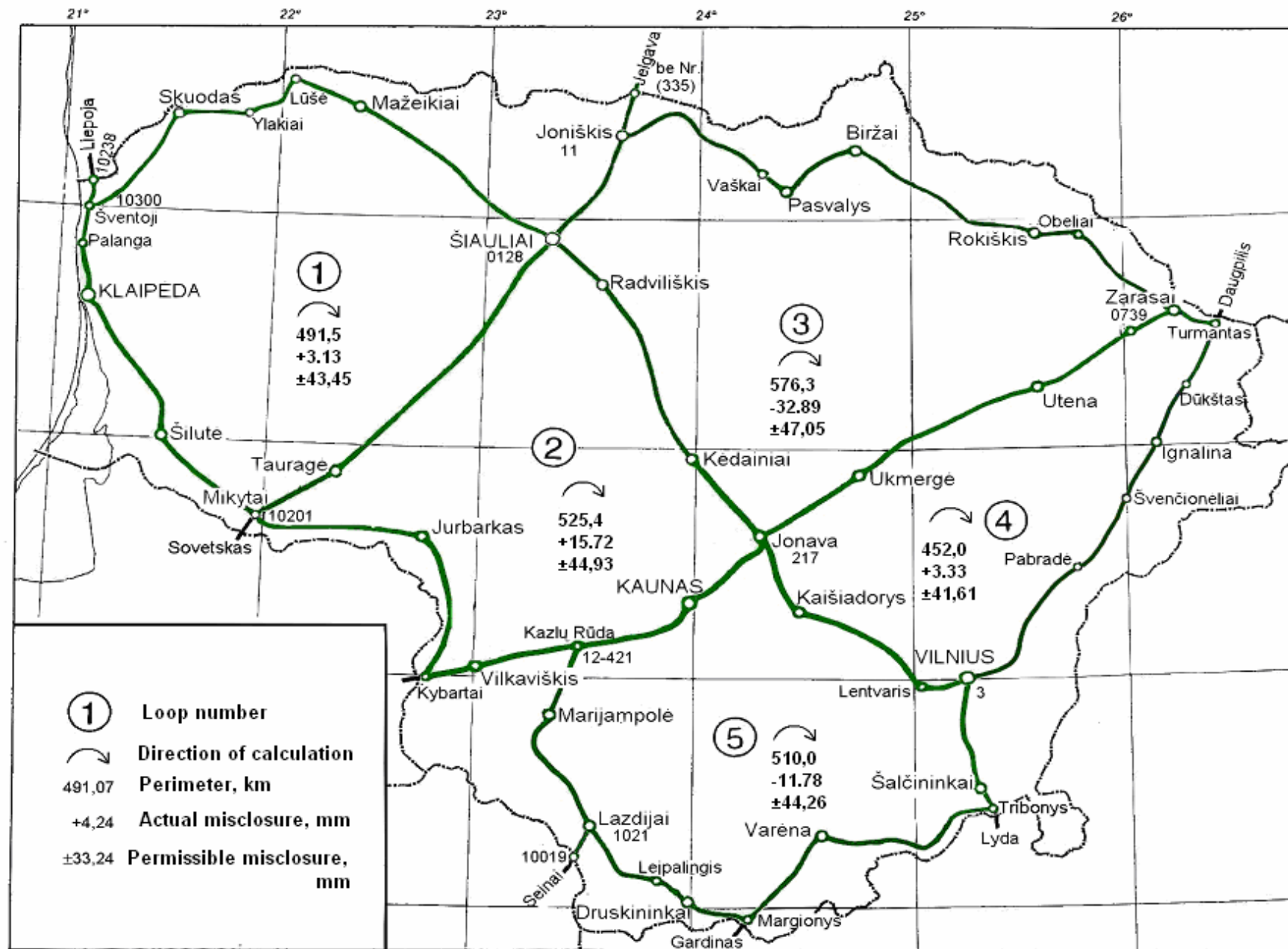
Kroki

Type	New	Old
Fundamental	8	62
Wall	413	285
Ground	441	175
Total	862 (62,3%)	522 (37,7%)
Sum		1384





National Geodetic Vertical Network (4)





National Geodetic Vertical Network (5)

Levelling accuracy characteristics

Year of levelling	m_{km} , mm
1998	0,48
1999	0,42
2001	0,39
2002	0,41
2003	0,43
2004	0,47
2005	0,35
2006	0,44

Misclosures of vertical network polygons

Polygon No	Polygon perimeter km	Actual misclosure mm	Permissible misclosure mm
1	491,5	+3,13	±43,45
2	525,4	+15,72	44,93
3	576,3	-32,89	47,05
4	452,0	+3,33	41,61
5	510,0	-11,78	44,26



National Geodetic Vertical Network (6)

Adjustment statistics

Number of fixed points:

1,

Number of unknowns:

1359,

Number of measurements:

1364,

Minimum length of the loop:

452.0 km

Maximum length of the loop:

576.3 km

Average length of the loops:

511.0 km

Degrees of freedom:

5,

Standard deviation:

0.70 kGal×mm/km

Mean value of the standard deviation of the adjusted geopotential differences:
0.83 kGal×mm,

Mean value of the standard deviation of the adjusted geopotential heights:
7.35 kgal×mm,

Biggest value of the standard deviation of the adjusted geopotential heights:
9.11 kGal×mm,

Average redundancy:

0.016.



National Geodetic Vertical Network - Future plans (1)

Adoption of the Lithuanian Height System 2007 (LHS2007)

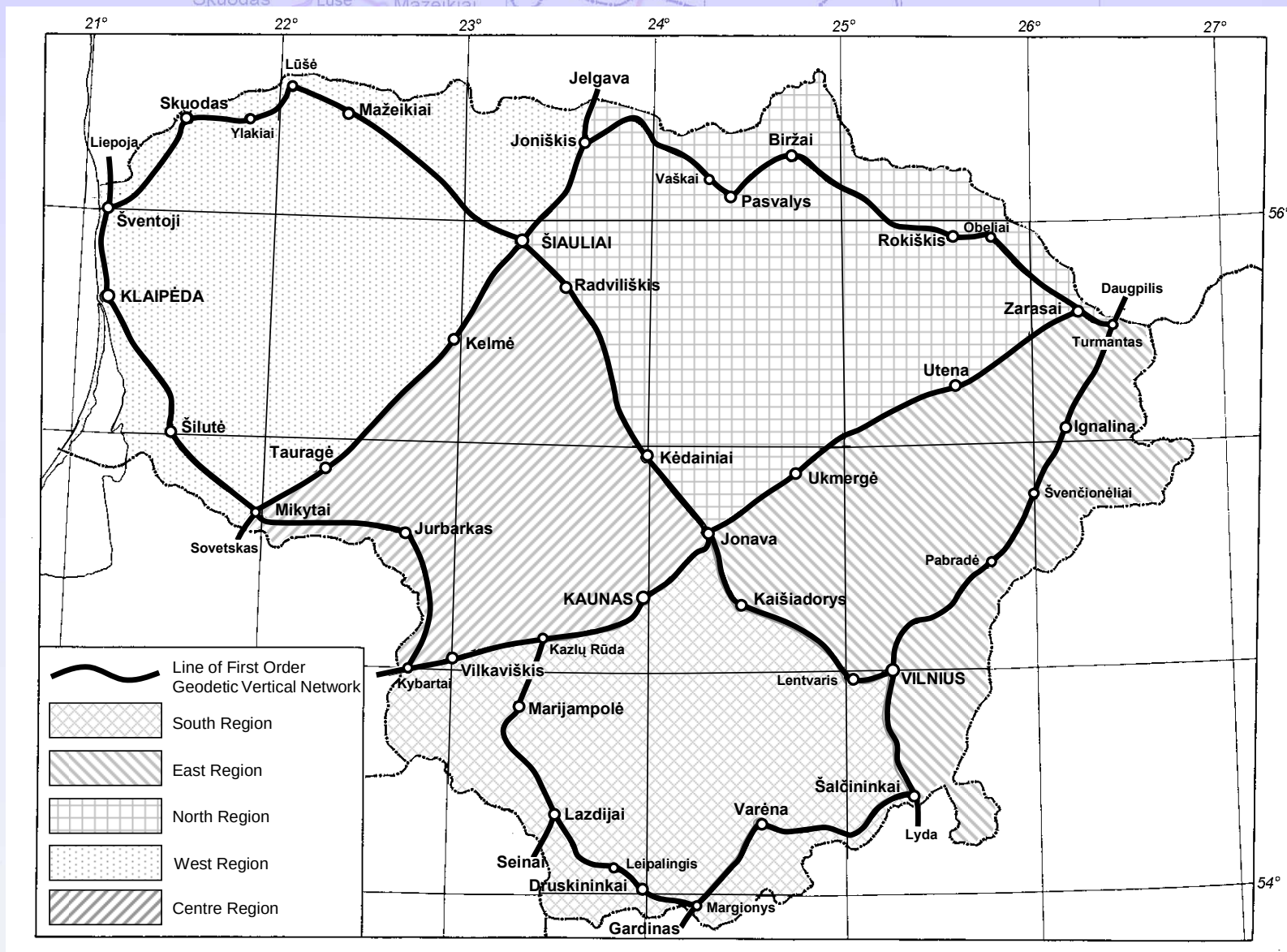
1. It should be realization of European Vertical Reference System based on UELN data.
2. It should utilized normal heights.
3. Apply the zero system for the permanent tide.
4. Apply the land uplift model.
5. Set the reference epoch to 2007.0.
6. Obtain the geopotential number of VILNIUS (UELN ID 12002) benchmark from the UELN (Baltic Levelling Ring) adjustment relative to NAP. Wait till the new Polish data will be introduced into UELN. This is the vertical datum of LHS.
7. Adjust the Lithuanian NGVN in this datum.



National Geodetic Vertical Network - Future plans (2)



National Geodetic Vertical Second Order Network (1)





The map displays the First Order Geodetic Vertical Network of Lithuania, with a projected line for the Second Order network. Key features include:

- Legend:**
 - Line of First Order Geodetic Vertical Network (solid line)
 - Projected line of Second Order (dashed line)
 - GPS Station (circle with a dot)
 - Reference or fundamental benchmark (triangle with a dot)
 - Wall mark (circle with a cross)
 - Wall benchmark (circle with a cross and a dot)
 - Ground benchmark (circle with a cross)
 - Ground benchmark coordinated by GPS (circle with a dot)
- Geographic Labels:** Major cities like Kaunas, Vilnius, Klaipėda, and Šiauliai are marked. Other locations include Jonava, Kėdainiai, Utena, and many smaller towns and villages.
- Benchmarks and GPS Stations:** Numerous points are labeled with numbers and names, indicating specific benchmarks and GPS stations across the country.
- Scale and Coordinates:** A scale bar at the bottom left shows distances up to 30 km. The map includes latitude and longitude coordinates.



National Geodetic Vertical Network - Future plans (4)



National Geodetic Vertical Second Order Network (3)



Characteristics of projected Network

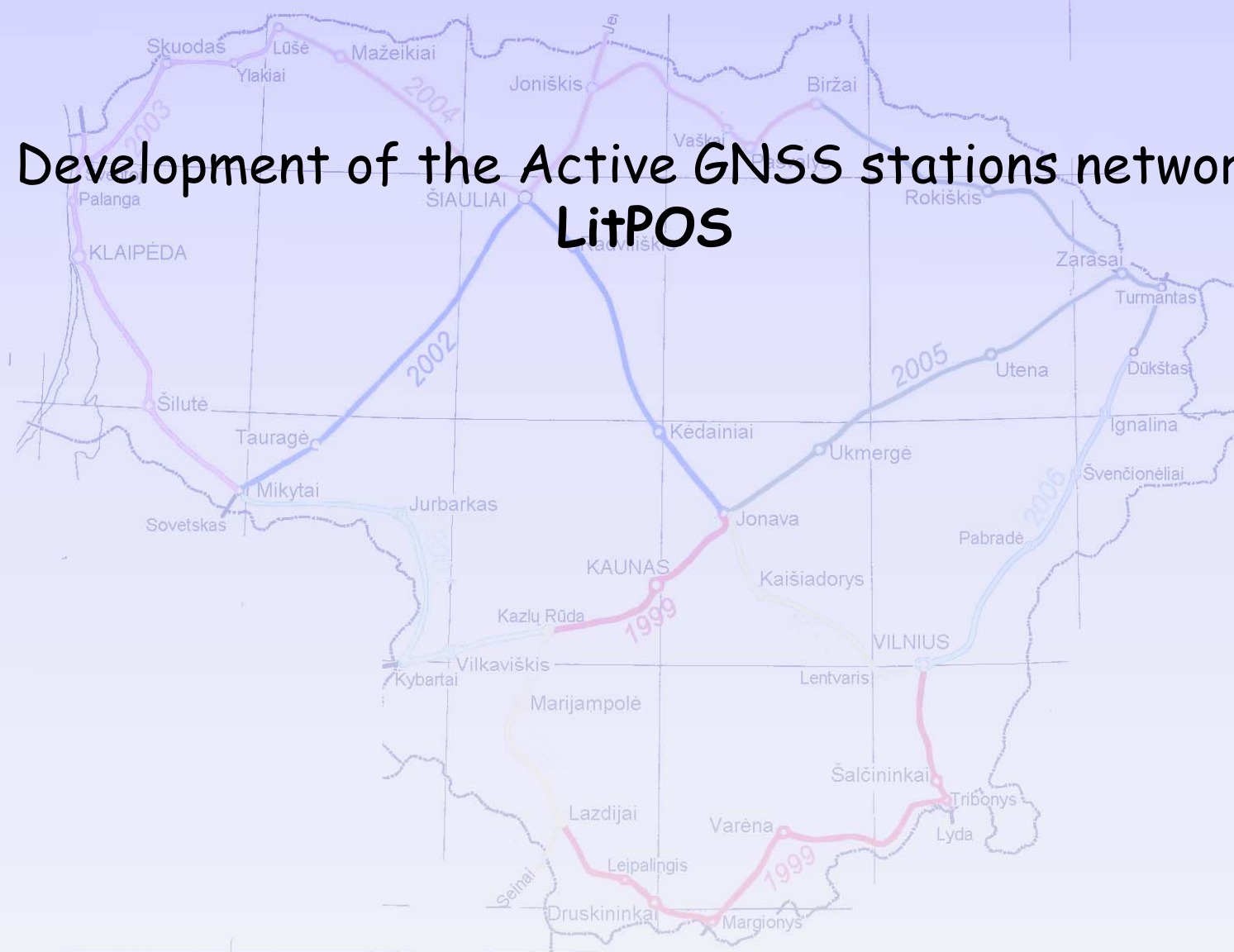
Region	Average length of line, km	Area, thousand km ²	Perimeter of projected network, km	Projected lines			Density of projected network, km/1000 km ²
				Number of lines	Runs which coincide with lines of old levelling, km	New runs, km	
South	27,4	12,6	958	35	692	266	76,0
East	32,8	11,5	854	26	276	578	74,3
North	29,6	15,3	1094	37	635	459	71,5
West	27,5	15,2*	1154	42	812	342	75,9
Centre	31,5	10,2	818	26	708	110	80,2
	29,4	64,8	4878	166	3123	1755	75,3

Total number of points - 3300 (new -2800)



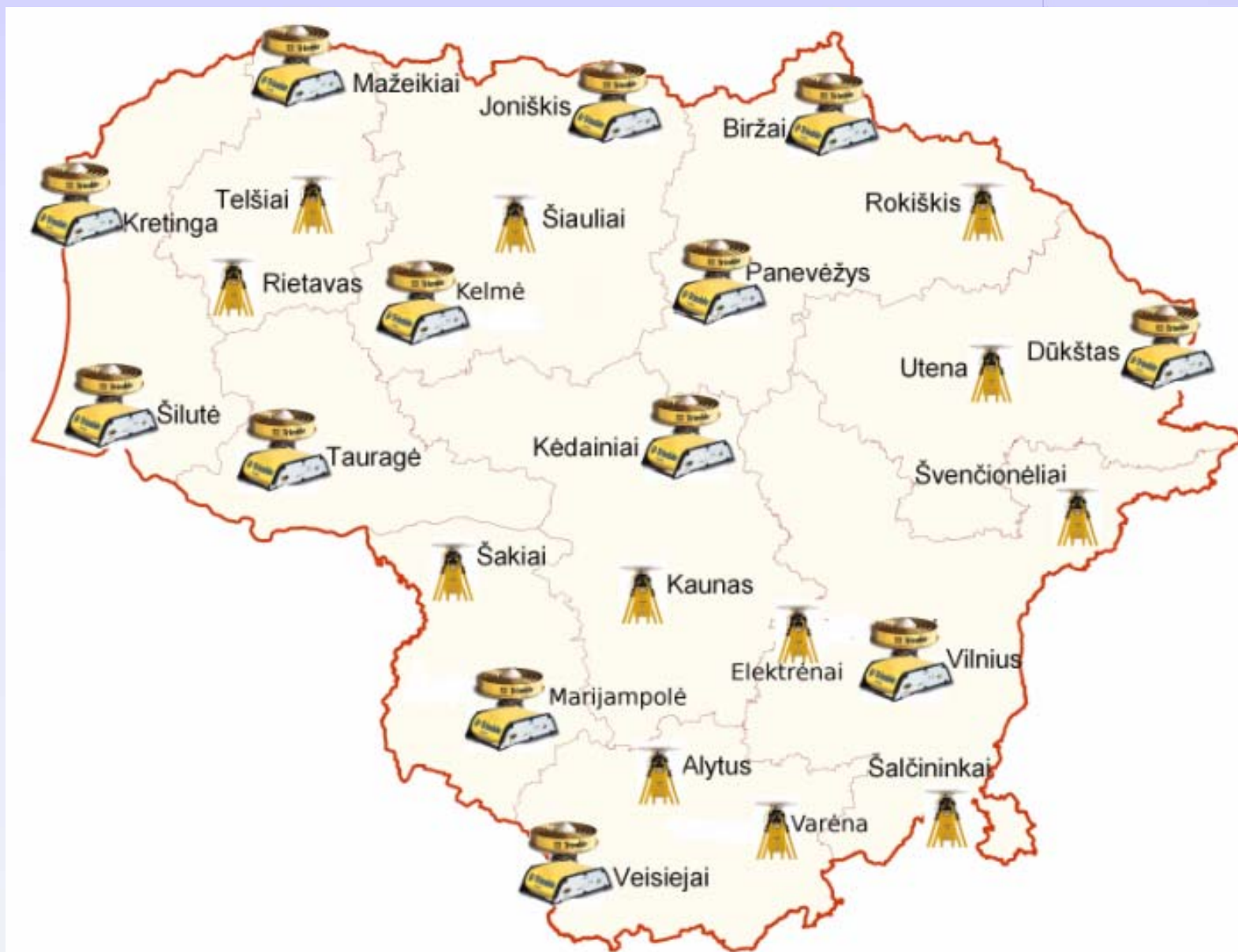


Development of the Active GNSS stations network LitPOS





LitPOS - network scheme





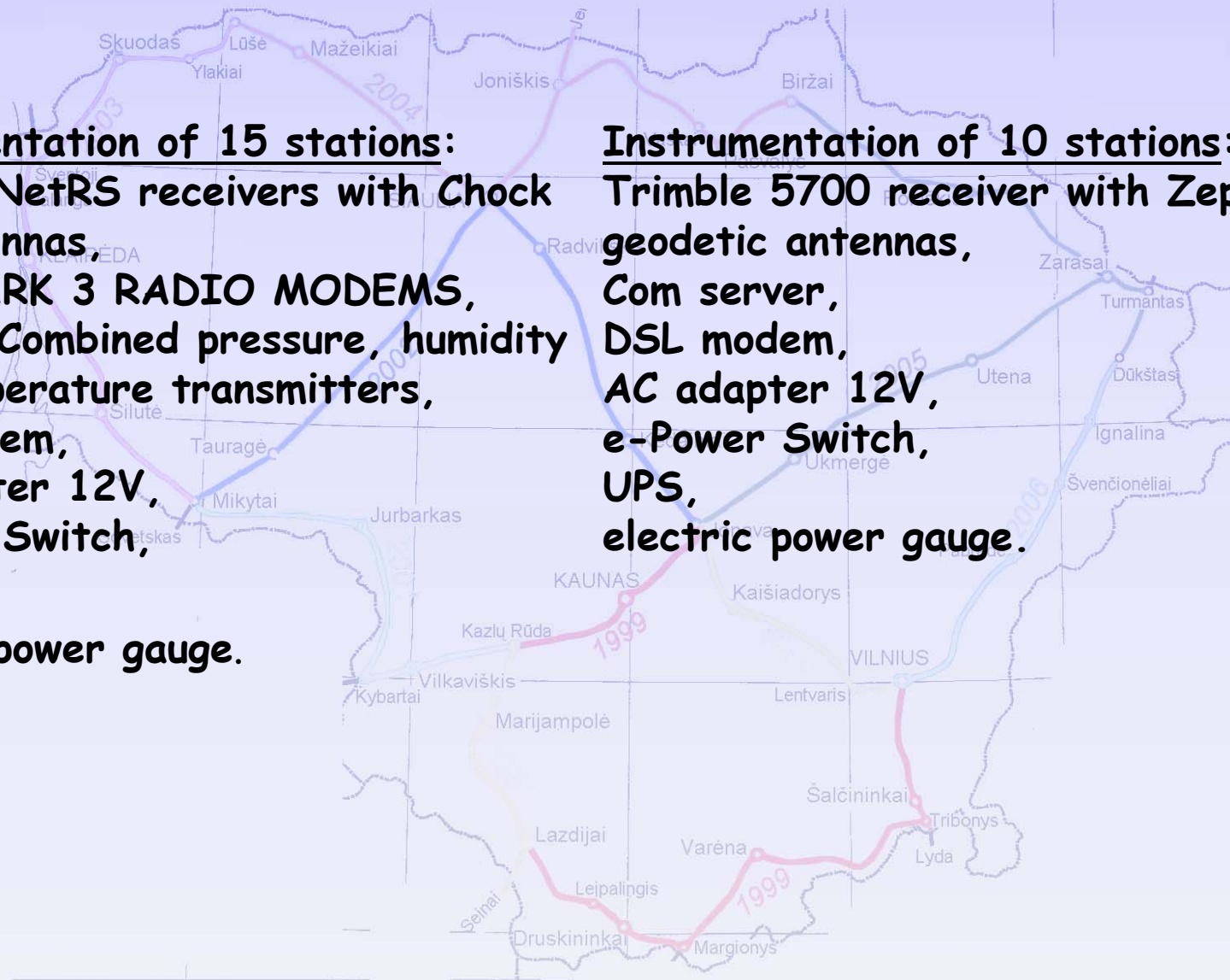
LitPOS - station's instrumentation

Instrumentation of 15 stations:

Trimble NetRS receivers with Chock ring antennas,
TRIMMARK 3 RADIO MODEMS,
PTU200 Combined pressure, humidity and temperature transmitters,
DSL modem,
AC adapter 12V,
e-Power Switch,
UPS,
electric power gauge.

Instrumentation of 10 stations:

Trimble 5700 receiver with Zephyr geodetic antennas,
Com server,
DSL modem,
AC adapter 12V,
e-Power Switch,
UPS,
electric power gauge.





LitPOS - station with NetRS receiver





LitPOS - station with 5700 receiver

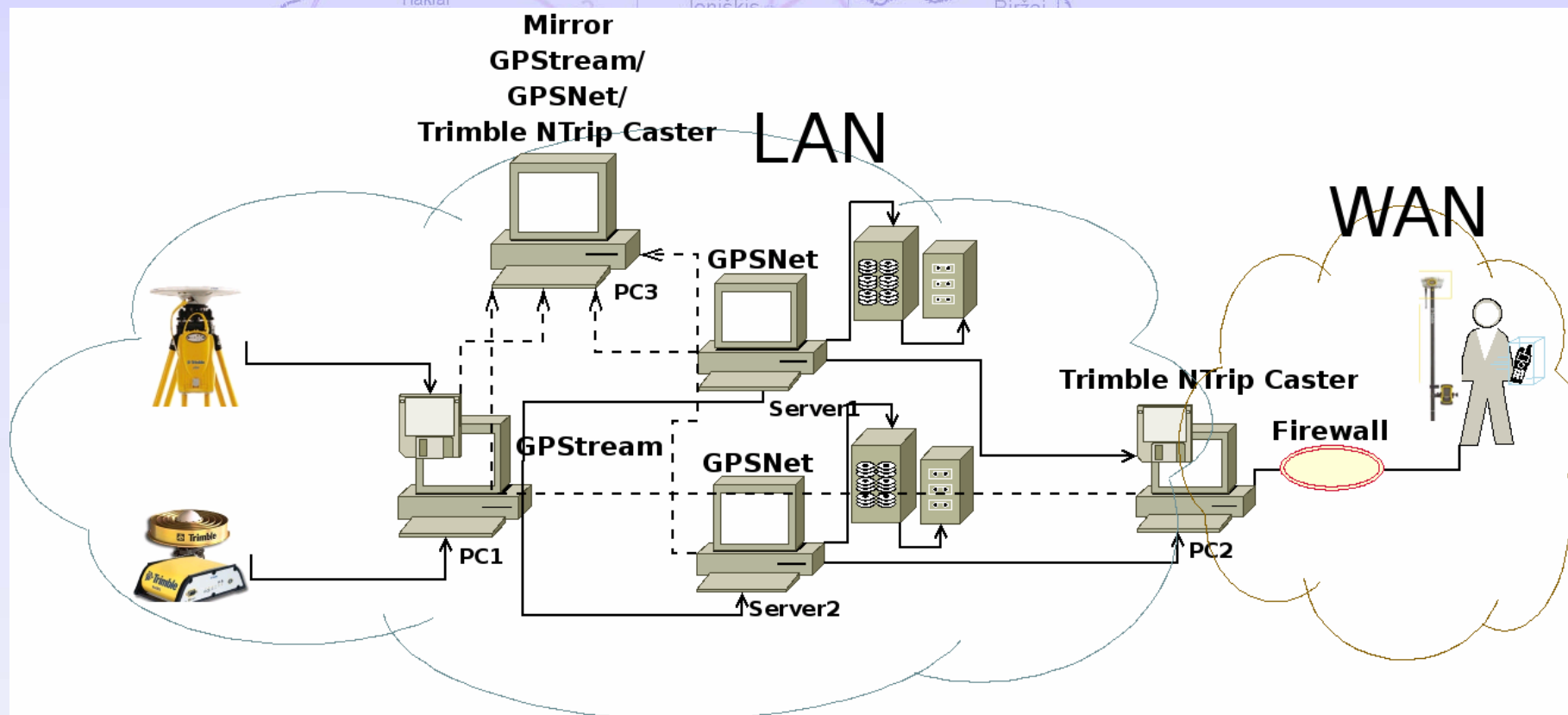




LitPOS - typical GPS antenna view on the tower of the fire station



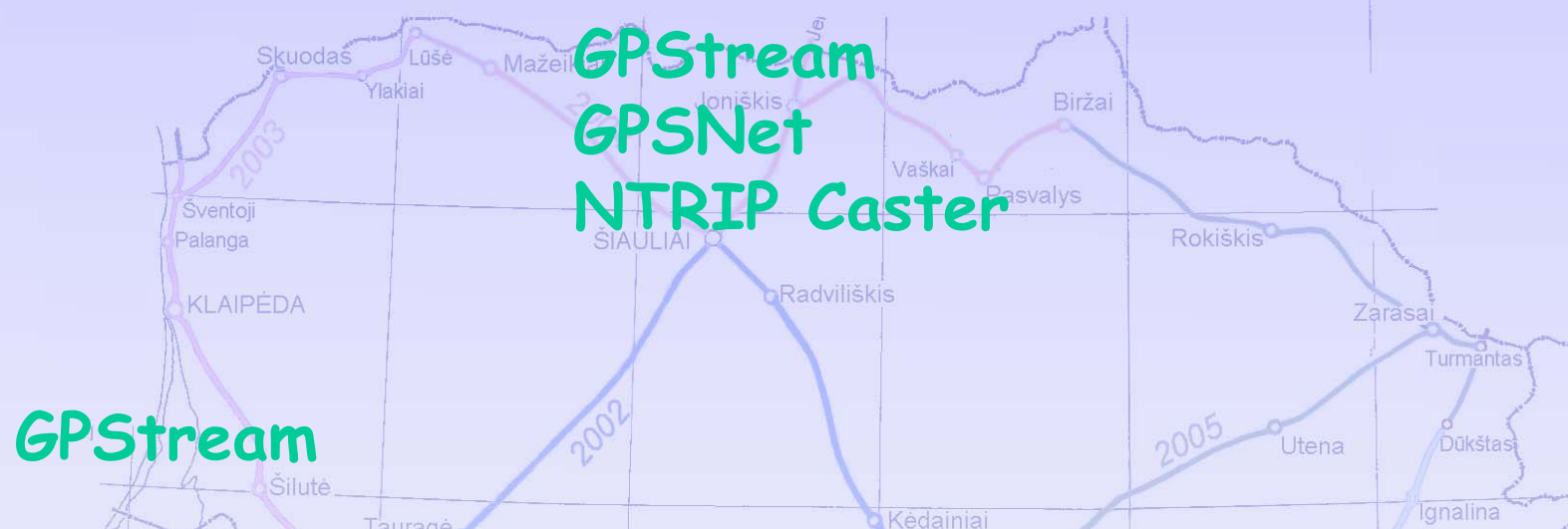
LitPOS - hardware



LitPOS hardware at operating centre consists of 3 PC and 2 servers



LitPOS - software (1)



Connection Router (JNSK_1001_SC - JNSK_1001_SS): Input connection

Driver:	Socket Client
Path:	sockc009.dll
Config:	Socket Client for 10.200.200.2:5018
Type:	Immediate connect
Status:	
Communication:	Active
Bytes In/Out	091 899 479 / 058 851



LitPOS - software (2)



GPSNet



Synchronizer (DGPS): Status

Synchronized output (Time/Stations):

2007.05.24 12:53:25 - 22

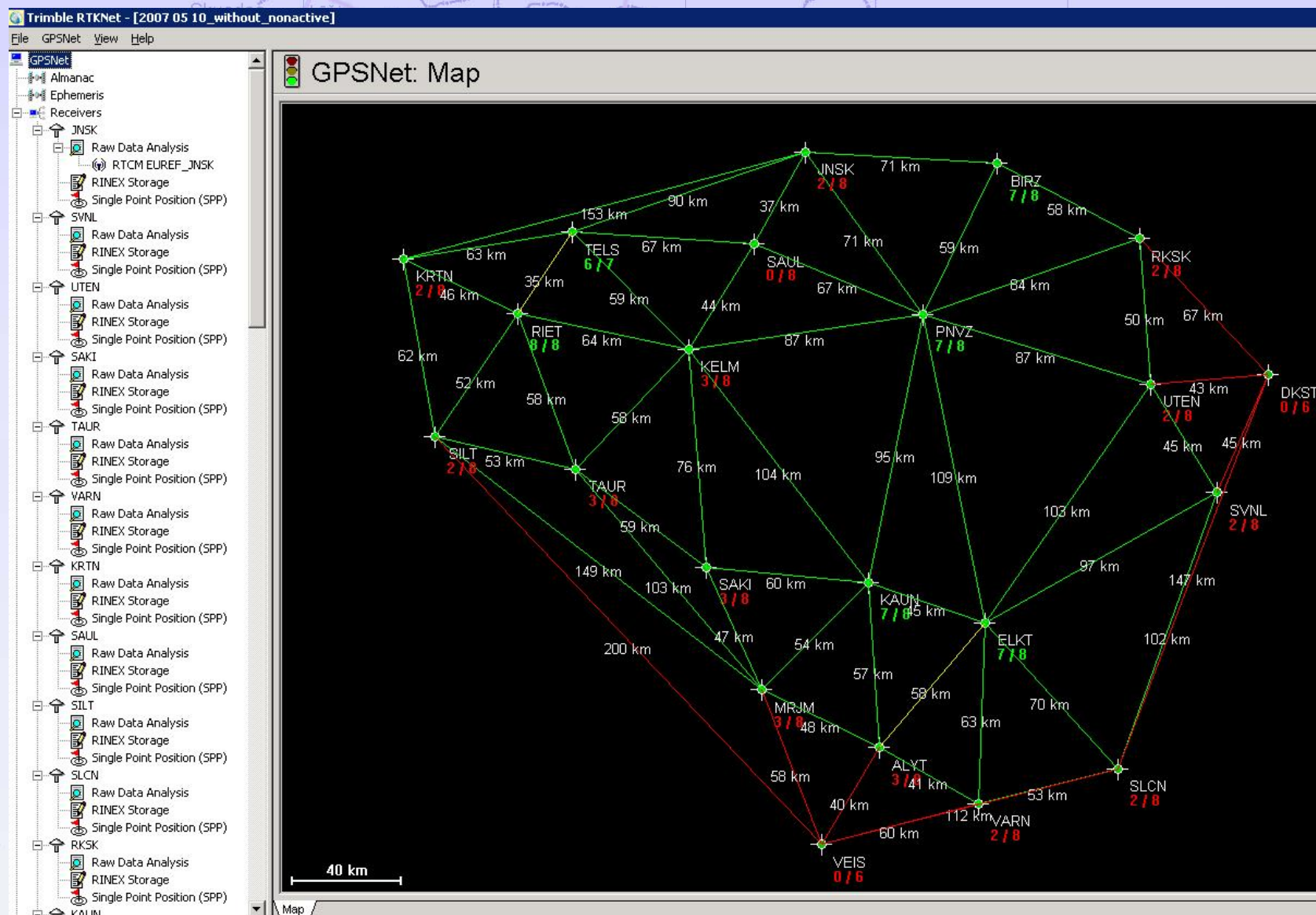
	ID	Station ▲	Received	Delay [s]	Avg. Delay [s] (Epochs)
●	1020	ALYT	2007.05.24 12:53:25	0.110	0.086 (8)
●	1019	BIRZ	2007.05.24 12:53:25	0.422	0.441 (9)
●	1003	DKST	2007.05.24 12:53:25	0.531	0.524 (9)
●	1022	ELKT	2007.05.24 12:53:26	0.000	0.014 (9)
●	1001	JNSK	2007.05.24 12:53:25	0.422	0.448 (9)
●	1016	KAUN	2007.05.24 12:53:26	0.109	0.050 (9)
●	1017	KELM	2007.05.24 12:53:25	0.422	0.464 (9)
●	1010	KRTN	2007.05.24 12:53:25	0.406	0.469 (9)
●	1021	MRJM	2007.05.24 12:53:25	0.438	0.467 (9)
●	1018	PNVZ	2007.05.24 12:53:25	0.328	0.457 (9)
●	1023	RIET	2007.05.24 12:53:26	0.000	0.028 (9)
●	1015	RKSK	2007.05.24 12:53:25	0.422	0.426 (9)
●	1007	SAKI	2007.05.24 12:53:25	0.110	0.074 (8)
●	1011	SAUL	2007.05.24 12:53:25	0.110	0.074 (8)
●	1013	SILT	2007.05.24 12:53:25	0.328	0.389 (9)
●	1014	SLCN	2007.05.24 12:53:25	0.110	0.074 (8)
●	1004	SVNL	2007.05.24 12:53:25	0.110	0.074 (8)
●	1008	TAUR	2007.05.24 12:53:25	0.422	0.439 (9)
●	24	TELS	2007.05.24 12:53:25	0.110	0.070 (8)
●	1006	UTEN	2007.05.24 12:53:25	0.422	0.464 (9)
●	1009	VARN	2007.05.24 12:53:25	0.110	0.074 (8)
●	1012	VEIS	2007.05.24 12:53:25	0.328	0.392 (9)



LitPOS - software (3)



GPSNet





LitPOS - software (4)



NTRIP Caster

Trimble NTRIP Caster [070510]

NtripCaster View Help

Users Mountpoints History

Trimble

Mountpoint	Connection Type	Connections	Connected to Source	Source Host	Source Port
RTCM_23	Point to Point	0	No		
CMR	Point to Point	0	No		
JNSK_RTCM	Broadcast	0	Yes	10.200.16.7	2800
RTCM_30	Point to Point	0	No		
DGPS	Point to Point	0	No		

Active connections: 0 Inbound data rate: 0 Bytes/sec

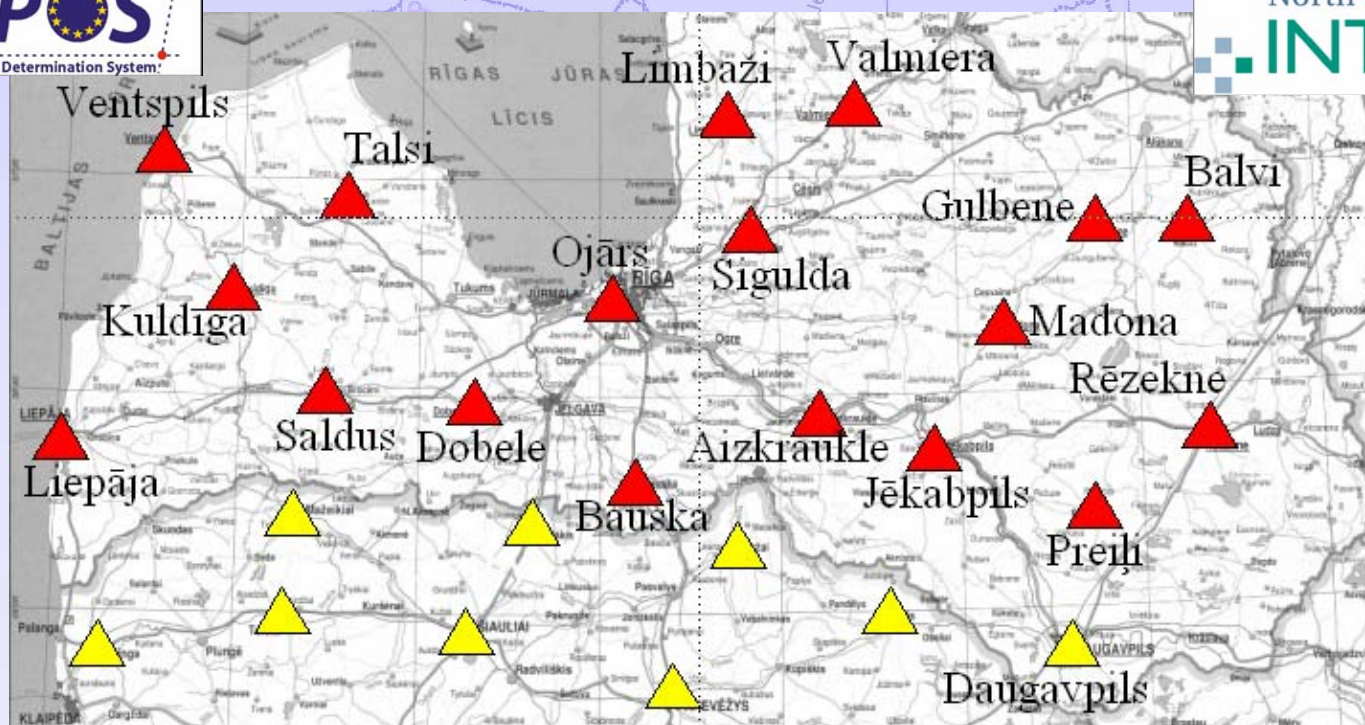
Total connections: 0 Outbound data rate: 0 Bytes/sec

Caster uptime: 1d 02:40:15

Ports: TCP 2101 (193.219.147.191)



LitPOS – a part of *EUPOS*®



Please, read a poster!



