



NLS
NATIONAL
LAND SURVEY
OF FINLAND

CORS data flow in NKG

NKG Science week Iceland 2024

WG GNSS Positioning

Topi Rikkinen

National Land Survey of Finland

Background

WG meeting April 2023 in Copenhagen
 → Summary table of services



	stations			communication	private owned	metadata	software		RINEX	RTCM streams	NRTK service	
	IGS	EPN	new stations			metadata	NRTK/streaming	other (QC, handling...)	generation method(s)	availability	pricing	pricing/info
Finland	2	20	2023 5-8 new stations	used on 8 stations (IGS) and on rest. Table Cigante monitors these	200 (Trends and Loran coast, rest other 5-8 stations owned)	IGS for Finnish stations A, B and C (change for F2000 stations B)	IGS for Finnish stations A, B and C (change for F2000 stations B)	IGS for Finnish stations A, B and C (change for F2000 stations B)	IGS for Finnish stations A, B and C (change for F2000 stations B)	IGS for Finnish stations A, B and C (change for F2000 stations B)	IGS for Finnish stations A, B and C (change for F2000 stations B)	IGS for Finnish stations A, B and C (change for F2000 stations B)
Iceland	2	2		Table Cigante monitors these		IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations
Latvia	2	2	Publication of 2-4 hours stations is planned in 2023	Cable connection for all from stations	None	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations
Lithuania	-	2		for all from stations	IG	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations
Norway	2	4	Last 3 years 10 new stations for the Post Administration, also support stations, some others	IG on practically all stations, some connections via fiber and cables (cable stands)	IG on practically all stations, some connections via fiber and cables (cable stands)	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations	IGS for all stations

Thank you for filling!

(If you don't have the link, send a message topi.rikkinen@nls.fi)

Stations

	Denmark	Estonia	Finland	Iceland	Latvia	Lithuania	Norway	Sweden	Greenland
NMA owned	27	29	112	32	30	35	283	481	67
Private owned	>150	~110	~250	(several stations for plate monitoring exists)	none	<20	<50	29	?

- Class A + B
- More private owned most likely exists

NRTK service & RTCM streams

	Denmark	Estonia	Finland	Iceland	Latvia	Lithuania	Norway	Sweden	Greenland
price	free (NRTK only from TAPAS)	free (only for government)	free (only for NLS, and R&D)	free	free	free	800-1200 €	~1050 €	free (no NRTK)
users		~200 (only for government)	~500 NLS <500 short-term external RTK	~350 registered	~2800	~2200	~4500 (Kartverket only)	~10 500 (SWEPOS only)	
RTCM streams	free for all	not sold	100 € / station / month	free	not sold	free for all	~200 € / station / month	~140 € / station/month	free

Latvia 0,15 % of population!!!
 Lithuania, Iceland, Sweden ~0,1 %

RINEX – end user perspective

	Denmark	Estonia	Finland	Iceland	Latvia	Lithuania	Norway	Sweden	Greenland
generation	FTP (1s)	FTP, (0.5s, 30s)	RT stream, FTP (1s, 30s)	RT stream	RT stream	RT stream	RT stream	FTP (1s ,15s) RT stream	FTP (1s)
interface	SFTP (1s, 30s)	www	www	www	FTP, www	www, FTPS	FTP/SFTP, www (1s, 30s)	FTP/SFTP (1s, 30s)**	SFTP (1s, 30s)
availability	1 s = ∞ 30 s = ∞	1 s = 3 mos	1 s = 8 mos		1 s = 2 mos 30 s = ∞	1s,30s = 2 years	1s,30s = 3 mos	1 s = few mos * 30 s = ∞	
price	free	free	free	free	free	free	~700 €/year	1 s = 90 €/year	

Registration is needed for all!

- EPN stations' data available via EPN data centres FTP/HTTP!
- Non-public FTP etc. might exist!
- *plans to increase availability to full data length
- **HTTPS server coming soon

EU open data directive

DIRECTIVE (EU) 2019/1024 OF THE
EUROPEAN PARLIAMENT

on open data and the re-use of **public** sector
information

1

“Dynamic data must be made available for reuse immediately on collection via an application programming interface and, where relevant, as a bulk download”

2

“list of high-value datasets which should be made available free of charge”

→ *geospatial and earth observation and environment* included. But GNSS data not specified directly

3

“The reuse of documents should be free of charge. However, marginal costs incurred to reproduce and disseminate documents, anonymise personal data and protect commercially confidential information may be recovered.”

4



RINEX in other EU countries

	Netherlands	Belgium	France	Spain	Portugal	Austria
institution	Kadaster	ROB	Institut national de l'information géographique et forestière	Instituto Geográfico Nacional	Direção-Geral do Território	BEV (Bundesamt für Eich- und Vermessungswesen)
interface	HTTPS, FTP (1s, 30s)	HTTPS, FTP (30s)	FTP, www	HTTPS, www (30s)	FTP	HTTPS API (STAC), www
availability	1 s = ∞		1 s = ∞	1 s = few mos	5 s = ∞	1 s = 2 mos
	30 s = ∞	30 s = ∞	30 s = ∞	30 s = ∞		30 s = 2 years
price	free	free	free	free	free	free

No registration needed for almost all!

Thoughts

- 1 www interface for RINEX does not fulfil the EU open data directive? It is not an API!
- 2 RTCM streams should be provided to anyone? Free or with a cost
- 3 Do users want tailored RINEX file? Or only 1s/1h FTP/HTTP?
- 4 Comments?

Thank you

