Welcome

• We will use an interactive polling tool called *Menti* within the session
  • We recommend to use a second screen or device for the polling
  • All results will be made available for future reference
• Please place questions into the chat as we go or raise your hand
• Participants are expected to abide the “IGS Code of Conduct”
IGS Workshop Agenda

1. IGS Network [40 minutes]
2. IGS IT Infrastructure [40 minutes]
3. RINEX 4.00 [10 minutes]
IGS Workshop Goals

• Developing a vision and strategy to sustain and evolve the IGS tracking network and general IT infrastructure
• Include and receive feedback from the community
• Create decision-making references for the future of the IGS within the next 6 months
• Create and update central documents
• Set up a roadmap for the Infrastructure Committee for the next years
IGS Workshop Icebreaker

Visit https://www.menti.com
and type in the following code: 9888 4707

OR

scan the QR code on your mobile device
01

IGS Network

Current Status, Participation and Roadmap
IGS Network

512 STATIONS*
309 MULTI-GNSS**
301 REAL-TIME

* Last updated 2 June 2022
** GPS+GLO+GAL+BDS (in blue)
IGS Organisations

- Contributions from 120 organisations
- Operated and supported by public funded organisations
- 20 organisations cover 70% of the entire network
- 65 organisations with just 1 station
IGS Regions

- Stations located in 116 countries/regions
- 13 countries provide 10+ stations → 50% of the network
- 82 countries with less than 4 stations
Feedback and Participation

General question: Is the current IGS network fit for purpose?
IGS Network Feedback (1/3)

Network Coverage:

- Closing network gaps (Russia, China, Arabian Peninsula) and optimisation of geographic distribution of stations
- Poor Multi-GNSS coverage in selected areas (e.g., Northern Canada)
- No proper support of NavIC/IRNSS due to lack of S-band capable stations
- More real-time stations and harmonisation of their classification
- Include more BIPM CCTF stations for timing services and time scale generation
IGS Network Feedback (2/3)

Station Quality:

• Study error sources for IGS stations, attenuate them and build/accept stations with high quality standards

• Establish clear methods and guidelines on how to measure position offsets (discontinuities) due to hardware changes

• Incorporate GNSS-provider stations or implement collocated IGS stations with surveyed local ties

• Revive operation of multi-receiver testbeds to understand receiver characteristics (generation of code and fractional phase biases, PPP)
IGS Network Feedback (3/3)

Metadata:

• Provide station pictures for **all** IGS stations

• Accurately provide alignment from True North in the metadata
02

IGS IT Infrastructure

Security, Quality Control, Feedback and Participation
When talking IT in the IGS everyone thinks this!
IGS Network

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301 REAL-TIME

* Last updated 2 June 2022
** GPS+GLO+GAL+BDS (in blue)
IT security is not something; it is everything

- It is everything!
  - Receiver infrastructure
  - Data centers
  - Analysis centers
- Security is not taken seriously until you feel the “PAIN”
- Current state within IGS infrastructure
- Three tenants of Information Security
  - Confidentiality
  - Integrity
  - Availability
Data Centers Current Status

- Data center, repositories and archives: what’s the difference?
- CDDIS larger than all the GDC and RDC combined!
- Data synchronization between the GDCs has never been a requirement nor is it currently feasible
- Each center is essentially independent in how it handles IT security, QC, protocols to use, etc.
- GDC’s that can’t accept data input
- QC standards from high to non-existent
- **NO** data provenance
Quality Control Items for Archive Centers

5 main categories of checks

1: Basic file checks
   • Antivirus
   • Empty file
   • Unknown file name
   • File size

2: File name checks
   • Marker name matches filename
   • RINEX naming scheme
   • Minute check (high-rate only)
   • Correct case for RINEX type

3: Date/time checks
   • Future dates
   • Older than 2 years
   • Date matches filename
   • Invalid day of year
   • Unaccepted data interval

4: Compression issues
   • Unexpected end of file errors
   • Corrupt input errors
   • Unknown or unexpected compression type

5: Header content checks
   • RINEX version check
Path Forward

Information Security

• Data provider agreements with IT security requirements
• Cryptographic checksums originating from the receivers
• Requirement to use encryption protocols ONLY
• Data archive centers must undergo independent IT security audits yearly

Data Archive Centers

• 2-3 Global Data Archive Centers
• Data archive QC standards as published by the IGS
• Service Level Agreement (SLA)
• Metadata collection
• Synchronization method between the global data archive centers
• 30 second availability time
Feedback and Participation

Comments, questions on the presentation

General questions:

1. How does your organization treat information security?
2. Would there be interest if advanced programing interfaces (API) were available at the archive centers?
RINEX 4.00

Timeline and Status
Timeline

- December 2021
  - Accepted by IGS GB

- January 2022
  - Development Transition Plan
  - Data Center Implementation(s)*

- May 2022
  - Start trial period with parallel uploads
  - Receive feedback

- November 2022
  - Merge RINEX 4.00 into operational archive

* CDDIS and BKG accept files
**Status**

- DLR provides summary broadcast navigation file in RINEX 4.00 (BRD400DLR)
- GFZ provides RINEX 4.00 station-wise observation, navigation and meteorological files (upgraded using gfzrnx from RINEX 3.0x) since DOY 2022/142
- DLR provides first native RINEX 4.00 observation files for its Septentrio POLARX5 (FW 5.5.0b) receivers since DOY 2022/158
- Other GNSS vendors anticipate to implement native RINEX 4.00 in Q4/2022
- Please **test** RINEX 4.00 files **and report problems** back to the IC and RINEX WG
More Information


https://youtu.be/w_85yP9E30w
04

GNSS Metadata

Update on GeodesyML and SLM 2.0
Session on June 29 @ 21:00 UTC
Wrap-Up

Take-away and Workshop Recommendations
Wrap-Up

- Define workshop recommendations in the upcoming days
- Prioritise 1 or 2 key points per block (network, IT) and year
- Presented at the outbrief session on July 1, 13:00 UTC