Infrastructure, Data Centers, Formats and Network: Status and Progress

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infrastructure |ˈinfrəˌstrək(t)SHər|

noun
  the basic physical and organizational structures and facilities
  (e.g., buildings, roads, power supplies, etc.) needed for the operation
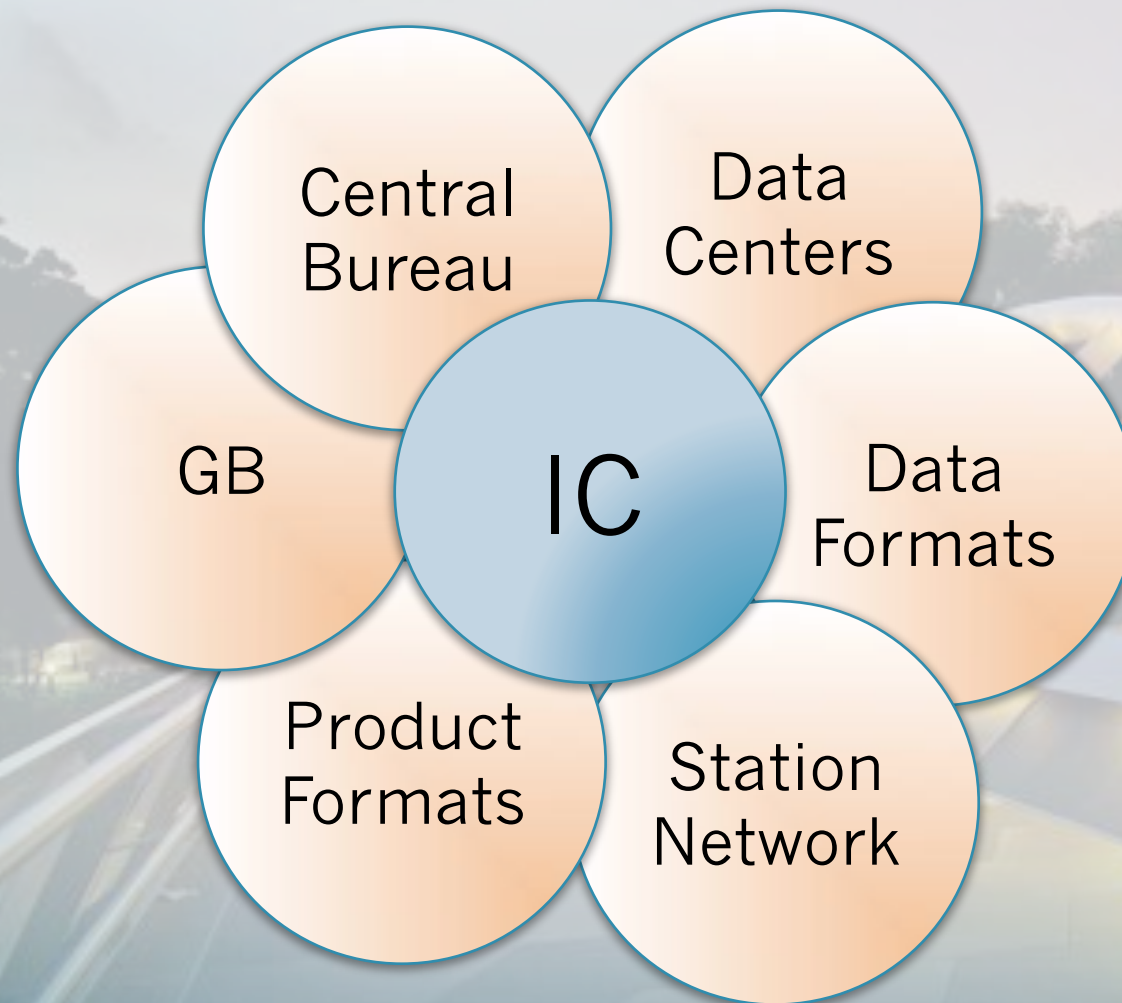 of a society or enterprise.

Outline

- Infrastructure status ...

- Station Network status ...

- Data Centers status ...

- Data Formats status ...

- RT Infrastructure status ...

- Infra/DC/RINEX Splinter Meeting – Wednesday 15:00-16:30 (SM04)

IGS Infrastructure

Central Bureau

Data Centers

GB

IC

Data Formats

Product Formats

Station Network

Infrastructure Committee:
    "To ensure the IGS infrastructure continues to meet the needs of ACs, ACCs, Pilot Projects and WG"

Infrastructure Status

- *1. To implement a **Station product participation table** for the IGS station webpage to show each station inclusion in the different IGS products - ONGOING*

- *2. To create a way forward to provide at least weekly **positions for ALL IGS network station** – progress with RF WG/TIGA*

- *3. To investigate and create a plan of what to do with **parallel station installation data** when upgrading antennas - TBD*

- *4. To support the Antenna WG in the new test activity **to check available individual antenna calibrations** in the existing IGS stations - REQUESTED*

- *5. To request **NSWE pictures from station antennas** especially for those that do provide individual antenna calibrations - REQUESTED*

- *6. To request **antenna's ground plane distance to the ground** (local height) (< 10cm accuracy) - TBD*

Infrastructure Status

- Supporting new multi-GNSS stations:
  - Accepting only multi-GNSS stations to grow IGS capabilities

- Improving **BRDC00IGS** file :
  - Implemented ~30 improvements after IGMA/MGEX analysis and recommendations
  - Asked receiver firms to adhere better to RINEX Nav standard

- Improving **brdc** file:
  - Detected & corrected rogue CNAV message in LNAV file
  - Need alternative to old merging code; CCRINEXN CCRINEXG

- Need better feedback from analyst on station and merged navigation files

IGS Network

- 501 IGS stations total, 421 stations have data in last 10 days.
- 242 **multi-GNSS stations** (48%)
- 190 real-time stations
- 12 new stations have been added
- 18 stations have been decommissioned
- 37 Equipment models added to the rcvr_ant.tab (with the AWG)
- Convert SLM and IGS CB scripts/web to 9 character station IDs
- Convert the rt.igs.org caster to 9 character station IDs

Provide user support for Site Log Manager (SLM):
- 512 site log updates (~30 per month)

IGS Data Centers

http://www.igs.org/about/data-centers

The roles of the different IGS Data Centers are described within the Charter for IGS Data Centers. For data access please visit the centers.

Global Data Center

Institution	Abbreviation	Country
Wuhan University	WHU	China
Institut Geographique National	IGN	France
Korean Astronomy and Space Science Institute	KASI	Korea
European Space Agency / ESAC	ESA / ESAC	Spain
Crustal Dynamics Data Information System	CDDIS	United States
Scripps Institution of Oceanography	SIO	United States

Regional Data Center

Institution	Abbreviation	Country
Geoscience Australia (formerly AUSLIG)	GA	Australia
Wuhan University	WHU	China
Bundesamt für Kartographie und Geodäsie	BKG (IfAG)	Germany
RDAAC-IRIS	RDAAC-IRIS	Russia
Hartebeesthoek Radio Astronomy Observatory	HRAO	South Africia
NGS/NOAA Operational Data Center	NGS/NOAA	United States
Jet Propulsion Laboratory	JPL	United States

Global DC   Regional DC

GNSS sites @ CDDIS

Data Type	Total Unique	Total RINEX V2	Total RINEX V3	Both V2 + V3	Only RINEX V2	Only RINEX V3
Daily	595	560	283	248	312	35
Hourly	389	385	171	167	218	4
High-rate	307	274	88	55	219	33

Proposed tasks for DCs

- **Creating hourly or daily high-rate tar files by site**
  - For each high-rate site; tar 96 sub-hourly files $\Rightarrow$ 1 daily high-rate tar file
    - SSSSDDD0.YYT.tar · ~ 20 Mb files

  OR

  - For each high-rate site, tar 4 sub-hourly files $\Rightarrow$ 1 hourly high-rate tar file
    - SSSSDDDH.YYT.tar · ~ 800 Kb files
  - Simplifies downloads, directory structure and reduces storage
  - DCs would like feedback from IC/users on this proposal to aid in improving DC archive structure

- **Merge DCWG into the IGS Infrastructure Committee**
  - Unfortunately, DCWG activity in recent years has been rather sparse
  - DCWG tasks/actions coordinated into IC splinter meetings during last few workshops
  - Most DC-related tasks/actions affect entire IGS infrastructure (e.g., network, ACs)
  - Therefore, **DCWG chair suggests merging DC activities into IC**; chair would remain involved in the IC

RINEX 3.04

- Supports new:
  - BeiDou 3 signals
  - QZSS II signals
  - GLONASS CDMA (G1a/G2a) signals

- Numerous clarifications and description improvements

- Must be approved by RWG, RTCM SC-104, and IGS Governing Board

- Plan to release R3.04 by November, 2018

RTCM SC-104 Status

- **RTCM-Multiple Signal Messages (MSM from stations)**
  - Binary format (GPS, GLONASS, Galileo, BDS, QZSS & IRNSS)
  - Fully compatible with RINEX 3.0x
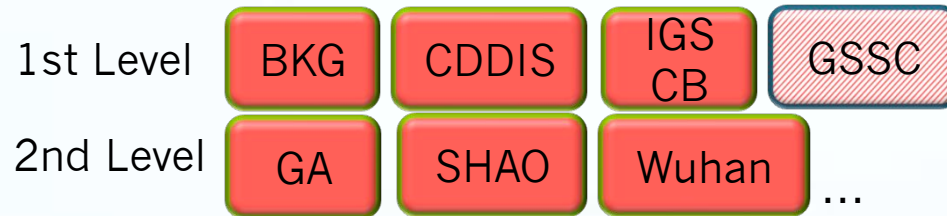 - BeiDou 3, QZSS II and GLONASS CDMA (G1a, G2a) planned

- **RTCM-State Space Representation (SSR corrections to users)**
  - GNSS Correction format (clock, orbit, atmosphere and biases)
  - Approval of phase bias messages stalled as a result of uncertainty concerning the required interoperability testing
  - Working Group now resuming activities

- **Two New GNSS committees**
  - **SC-134** Focus is: Integrity for Accuracy GNSS-Based Applications
    - DGNSS Integrity Messages under development
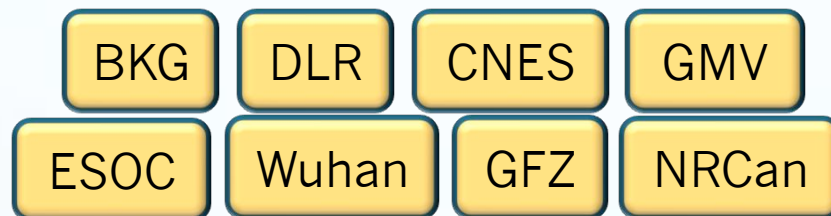 - **SC-135** Focus is: Radio Layer for Real-Time DGNSS Applications

RT Infrastructure

Observation Stream Casters (using MSM)

1st Level: BKG | CDDIS | IGS CB | GSSC

2nd Level: GA | SHAO | Wuhan ...

RT Analysis Center

BKG | DLR | CNES | GMV

ESOC | Wuhan | GFZ | NRCan

RT Combination Center

ESOC | BKG

RT Stream Products (using SSR)

ESOC: GPS only (epoch approach): IGS01/IGC01

BKG: GPS only (Kalman approach): IGS02

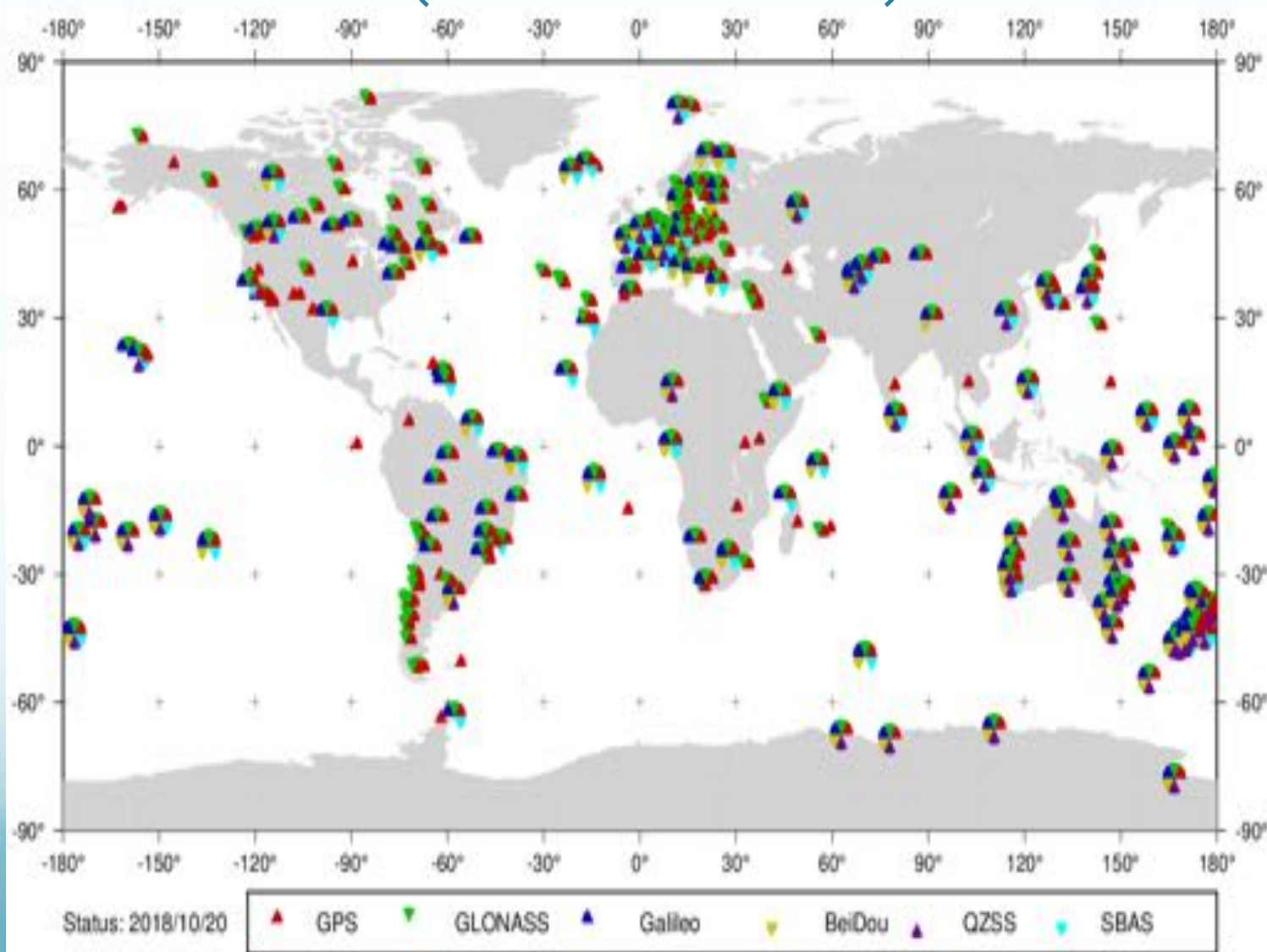BKG: GPS + GLONASS (Kalman approach): IGS03

New:
- Long mount point names implemented
- Proposal for new 1st level caster by GSSC/ESA, Madrid
- New Multi-GNSS solution by DLR

Challenges:
- More receiver generated MSM streams
- More RT Multi-GNSS analysis
- Multi-GNSS combination products
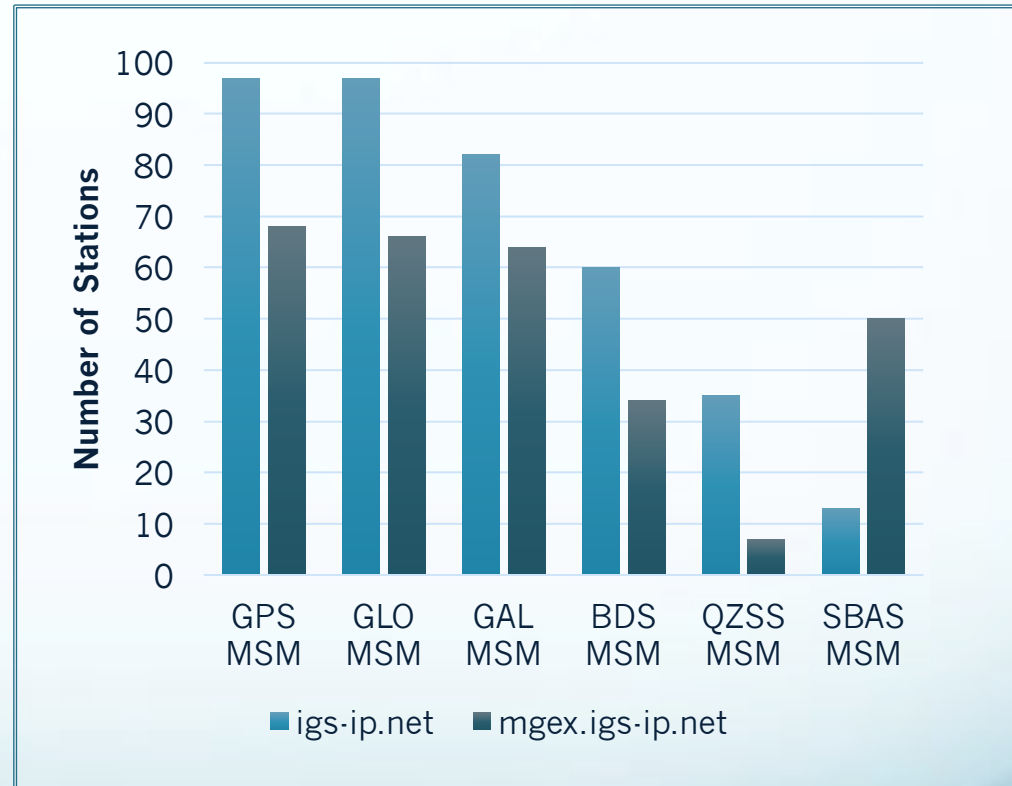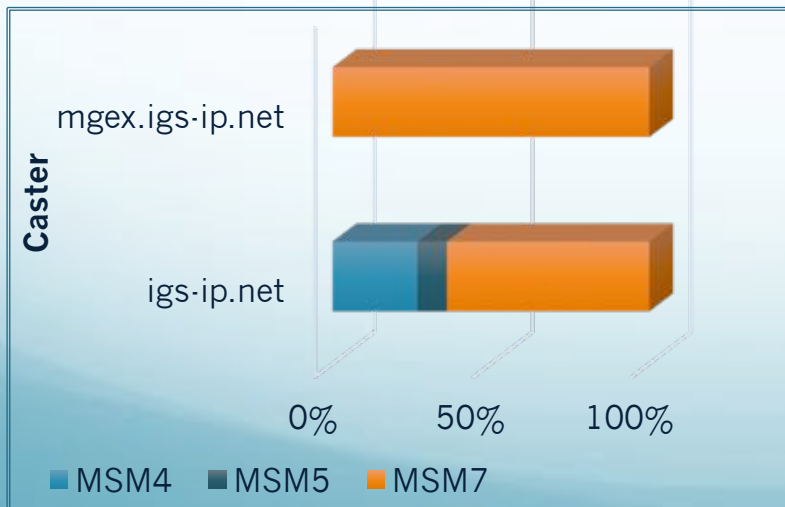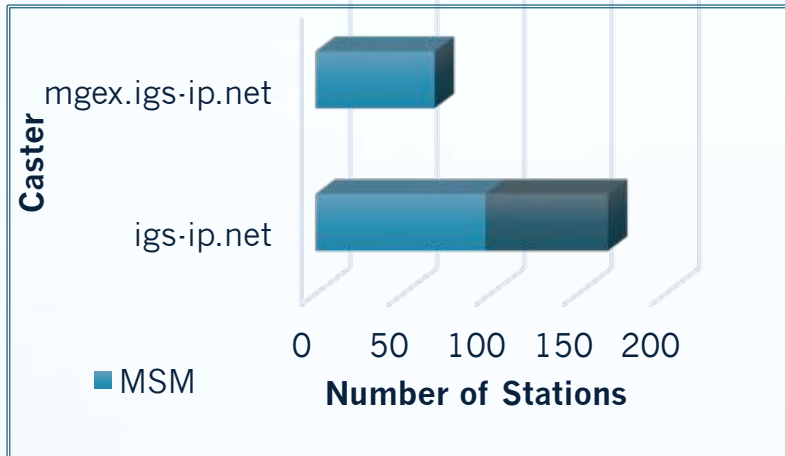- Standardization of SSR product streams

RT Stations
(1st level caster)

RT Infrastructure
(at BKG)

Observation Data stream types

igs-ip.net: receiver generated data streams
mgex.igs-ip.net: software generated MSM streams

Splinter Meeting Agenda IGS

- Infrastructure topics
  - Outstanding Actions / New Actions
  - BRDC00IGS / brdc file generation
  - Implement Global/Regional DC data/performance checks
  - Product formats adaptations for RINEX3 station 'a9' names

- Data Center topics (DC WG)
  - XML project
  - Merging high-rate files
  - DC WG into IC

- Data Format topics (Ken MacLeod)
  - RINEX 3 / RTCM developments
  - CNAV proposals

Infrastructure + DCWG +
RINEX Splinter Meeting:

Wed 15:00-16:30
SM04