General Coordinates Network: Medium Medium Missions Missions Missions Multimessenger Alert System

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Abstract: Gamma-ray Coordinates Network (GCN) is a collaborative platform operated by NASA to facilitate the sharing of alerts and quick communications regarding highenergy, transient, and multimessenger phenomena among the astronomy research community. Over the last 30 years, GCN has enabled significant advances by disseminating observations, predictions, requests for follow-up observations, and observing plans. GCN distributes alerts between space and ground-based observatories, physics experiments, and thousands of astronomers worldwide. As new transient instruments spanning the electromagnetic spectrum and multimessenger facilities become available, coordinating efforts have become more vital and complex than ever. Introducing the General Coordinates Network (GCN), an updated version of GCN designed with modern, open-source, reliable, and secure alert distribution technologies, and deployed in the cloud. The new GCN is built on Apache Kafka, the same alert streaming technology that the Vera C. Rubin observatory uses. We will present the current status and design of the new GCN, the streaming of notices and circular alerts with Kafka, and a vision of its growth as a community resource in the future.

TITLE

GRB INTEN

ransient

Large

Network

Ground Station

Early history of GCN

General Coordinate Network (GCN) is a modern evolution of the Gamma-ray Coordinate Network.

Tape Failure Alerts	werts Alerts	ALEXIS	esic lover katt
CGRO Phone CC anality	Gamma-ray burst	AT 6 2009 - 2022 - Gamma-	ray GCN Cito NKo 2022 onward -
BACODINE	Coordinates Network	Coordinates Network	General Coordinates Network

GCN Data Products				
GCN Notices	GCN Circulars			
GCN/FERMI NOTICE 'E: Wed 26 Aug 20 22:10:07 UT 'E: Fermi-GBM Flight Position 1: 45 IM: 620172587 296.300d {+19h 45m 12s} (J2000), 296.250d {+19h 45m 00s} (current), 296.416d {+19h 45m 40s} (1950) +71.817d {+71d 49' 00"} (J2000),	TITLE: GCN CIRCULAR NUMBER: 28298 SUBJECT: GRB 200826B: Fermi GBM detection DATE: 20/08/27 21:10:30 GMT FROM: Christian Malacaria at NASA-MSFC/USRA <cmalacaria@usra.edu> C. Malacaria (NASA-MSFC/USRA) and C.Meegan (UAH) report on behalf of the Fermi GBM Team:</cmalacaria@usra.edu>			
+71.868d {+71d 52' 03"} (current), +71.693d {+71d 41' 35"} (1950) 5.50 [deg radius, statistical plus systematic] 1078 [cnts/sec] F: 22.80 [sigma]	"At 22:09:42.72 UT on 26 August 2020, the Fermi Gamma-Ray Burst Monitor (GBM triggered and located GRB 200826B (trigger 620172587 / 200826923). The on-ground calculated location, using the GBM trigger data, was reported in GCN 28292.			

General Coordinates

Network (GCN)

Ground

Stations

Optical

Low-frequency

Cherenkov Telescopes

Neutrino Detectors Interferometers

Ground



Unified Schema

General Coordinate

Create New Notice Types

- New notice topics streamed by only GCN Kafka
- See <u>step-by-step instructions</u>
 Circulars Style Guide
 Contributing
- Preferred notice format: JSON | New Notice Producers

New Notice Producers

The following steps guide new instrument, mission, or observatory producers into setting up new notices streams that are distributed to the user community via <u>Kafka</u>. This process requires interaction with the <u>GCN Team</u> ⊠ to enable accounts and Kafka topics creation on the GCN Kafka broker. The GCN Team is also happy to work with the mission teams to help construct your alerts.

Schema and alert format for GCN Kafka

About GCN

Client Configuration

IceCube Schema

"\$id": "https://gcn.nasa.gov/schema/gcn/notices/icecube/GoldAndBronze
"\$schema": "https://json-schema.org/draft/2020-12/schema",
"type": "object",
"title": "IceCubeGoldAndBronzeTracks",
"description": "IceCube Astrotrack Gold And Bronze track alert events'
"allOf": [

{
 "\$ref": "/schema/gcn/notices/core/AdditionalInfo.schema.json"
},

IceCube Schema Example

"\$schema": "https://gcn.nasa.gov/schema/gcn/notices/icecube
"additional_info": "IceCube Bronze Neutrino Track Alert",
"id": ["137840", "57034692"],
"alert_datetime": "2023-04-16T05:22:29.55Z",
"alert_type": "initial",
"ra": 345.82,
"dec": 9.01,
"uncertainty_shape": "circle",
"ra_uncertainty": [0.51],

- JSON schema with common core fields
- Instrument/mission/observatory specific fields where needed
- https://github.com/nasa-gcn/gcn-schema

Enhancements

Coming soon to GCN Circulars

- Receive Circulars over Kafka
- Real-time integration with NASA ADS
- Link multiple emails with your account
- Link your ORCID to your account

https://nasa-gcn.github.io/gcn-

- DOIs and BiBTeX entries
- Browse Circulars by event

Presentation:

presentation/

• Embed tables, coordinates, images, and styled text with "Astro Flavored Markdown"

What's next for GCN

- New alert types and alerts from new missions and facilities
- Unified schema and alert format for GCN Kafka
- Integrated, searchable database of Notices and Circulars (GCN Viewer)

Useful Links

Questions or comments? Contact GCN

Have you found a bug in GCN? Open an issue Want to contribute code to GCN? Get

involved on GitHub