Overview of the Transient Name Server (TNS), in light of the advancing MMA realm
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With the emergence and growth of robotic, wide-field high-cadence optical sky surveys during the last two decades (e.g. PTF, Pan-STARRS, ATLAS and more), the discovery of supernovae has considerably grown from a few tens per year to the hundreds and thousands domain. It became apparent to the members of the extragalactic transient community that in order to be able to reliably and rapidly inform the community about discovered events, an automatic name server and platform for reporting potential supernovae (and other transients of interest) must be put in place. With these needs in mind, the IAU SN working group was revived, and the TNS was developed and began full operation on January 1st, 2016, immediately replacing the previous almost entirely manual/human-managed mechanism that has been in operation until that point.

Besides operating as a name server that provides unique and unified names for transients (that are often discovered by several facilities independently, and have different internal survey names), the TNS manages and addresses a variety of related aspects – such as deciding whether a submitted discovery report should create a new object/event or be associated with an existing one, the official crediting and ADS indexing of the discovery/classification entries, distribution of the discovery alerts (to registered users, based on their defined preferences), self-management of reporting groups, memberships and bots, enabling search queries and retrieval of data using both scripted solutions (APIs, staged CSVs) as well as web interfaces, and the AstroNotes notifications platform that has been serving the community since 2019.

Currently all major optical sky surveys, as well as individuals and amateur transient hunters, report their discoveries and classifications to the TNS; the vast majority of the reports are submitted by computer-to-computer (bot) communication, utilizing the provided APIs.

As a central hub that collects in real time discovery reports of astronomical transients and provides the official IAU designations of the events, two major requirements and guidelines of the TNS are:

- To provide quick (low-latency) and robust processing of the incoming reports, and in strict order of arrival. In this respect, the requirements from the web application are that no downtime is allowed (downtimes are kept on the level of a few hours per year), and that a high-availability and scalable system configuration is provided.
- Continuous adaptation to the needs of the community and its working protocols, as well as the inclusion of new communities and system components.

Regarding the latter; whereas the TNS was originally aimed to meet the needs of the “optical” extragalactic transient community (mostly SN-related), the exploding emergence of multi-messenger astronomy in recent years has naturally led to expansions of the TNS. The Fast Radio Bursts (FRB) community has joined the TNS during 2020; the required adaptations for the Gamma-Ray Bursts (GRB) community are now in design phase, and discussions have been initiated with the Gravitational-Wave collaboration.

To emphasize, the inclusion of various communities within the scope of the TNS means that for each type of event a specific set of properties and functionalities must be tailored and implemented. Also, several separate “naming wheels” clearly have to co-exist in parallel, be it of the AT/SN YYYYxyz format, or the FRB/GRB/GW… YYYYMMDDxyz format, which relates to events/bursts that, by definition, are being designated to the day (DD) level. The envisioned goal to be able to manage and directly associate and couple different “messengers” of an astronomical event (like we’ve experienced with the GW170817/AT2017gfo kilonova), all within the scope of a unified system, is a very challenging one, but certainly has many advantages and a potential to be beneficial to all the relevant communities.