Lat/Long Tx ID
Detail of Implementation

Presented by

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Lat/Long Tx ID – PDT Overview

- A PDT (Platform Definition Table) is maintained in DADDS for all platform assignments
- The PDT includes over 50 fields to fully define each platform
- NOAA authorizes platform assignments for each user platform by defining:
  - DCP address
  - Prime and Secondary Channel and Type
  - Time assignment (first transmit, transmit period, window , transmit window)
  - Data Rate and Format (100/300/1200) / (ACSII,BINARY,PSEUDO-BINARY)
- After deployment, the user is expected to define items like:
  - Location of the platform
    - Friendly Name or Location
    - Latitude / Longitude
    - Country / State / Province
  - Transmitter manufacturer / model
  - Platform Owner Name and Contact Information

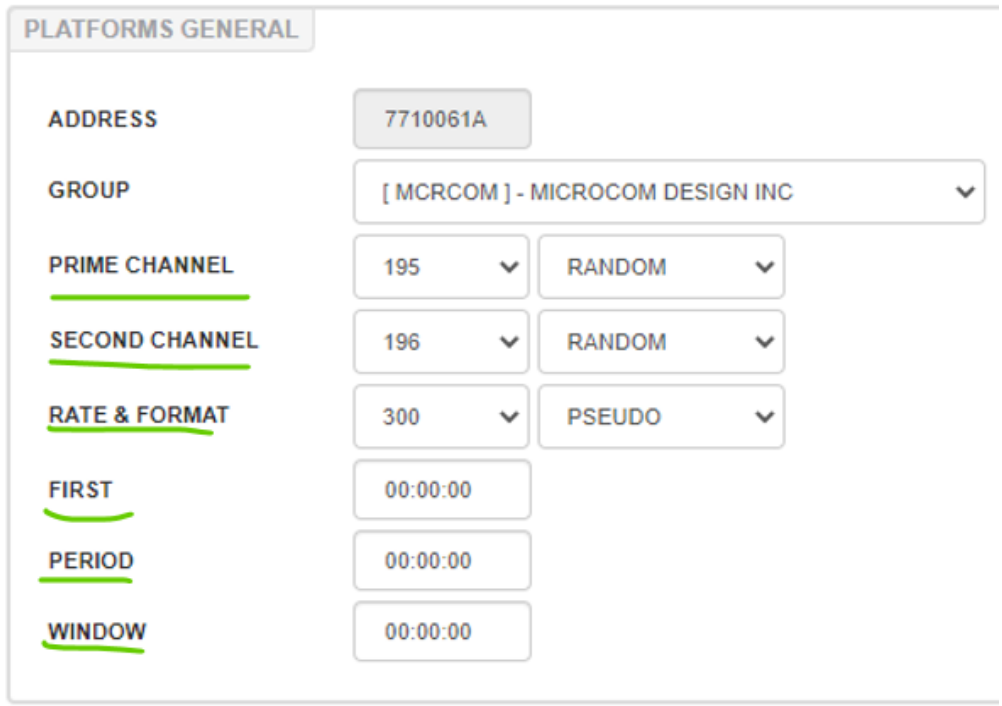
Lat/Long Tx ID – PDT Data Accuracy/Completeness - Issue

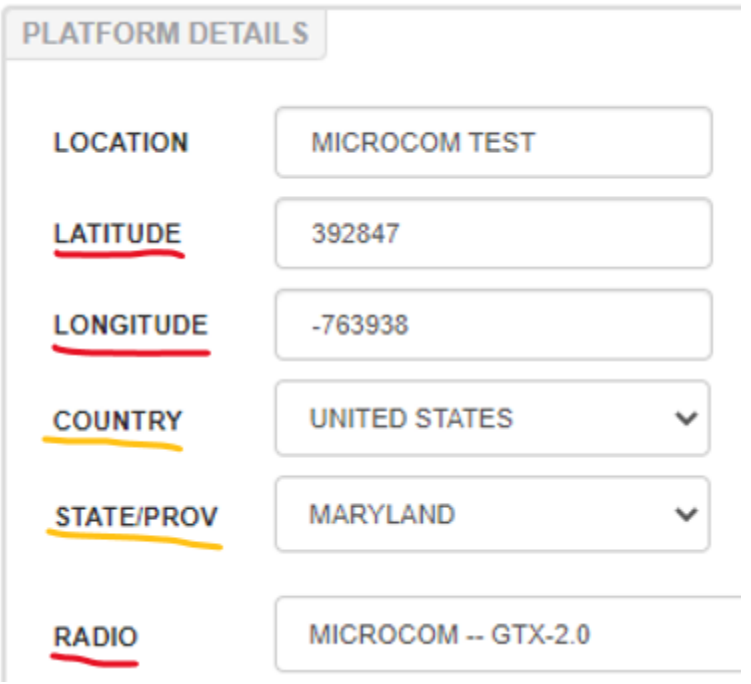
- With 42,000 currently defined platforms, the issue of completeness and accuracy of the user entered PDT fields becomes apparent.
- Users are asked to update platform information when a platform is deployed or redeployed to another location.
- Audits of the PDT database show that many platform records are incomplete or inaccurate.

Lat/Long Tx ID – PDT Accuracy/Completeness - Improvement

- An initial solution to automatically improve the PDT database was proposed and accepted to show proof of concept.
- A DCP shall be demonstrated to Transmit (Tx) a new Identification Message (ID) upon initial deployment and possibly at random intervals.
- This Tx ID message shall transmit static and measured platform and transmitter information that can be used to update the PDT.
- Tx ID Messages can be automatically processed by DADDS and utilized to …
  - Populate or update key fields in the DADDS Platform Database Table (PDT); fields such as latitude, longitude, and transmitter type.
  - Optionally, Country and State/Province fields could be calculated and updated from the received LAT/LON.
  - Additionally, key configuration parameters could also be compared to NOAA assigned values. DADDS can generate email warnings of a misconfigured platform.

Lat/Long Tx ID – PDT Fields Determinable from a Transmitter Message





- PDT fields known by the transmitter that are automatically updatable in the database (RED).
- PDT fields could be calculated from the LAT/LON (YELLOW)
- PDT fields that are known by the transmitters that could be checked in the database (GREEN)

Lat/Long Tx ID – Proof Of Concept – Approach

- To improve database accuracy related to static platform information, NOAA has authorized a proof of concept prototype and demonstration, including ...
  - Definition of the first cut of a DCP Tx ID Message structure.
  - Making the necessary changes to DADDS to process received Tx ID Messages.
  - Making the necessary changes to have DADDS populate/update key fields.
  - Utilizing Microcom's GTX-2.0 or the NOAA Test Transmitter to demonstrate the concept.

Lat/Long Tx ID – DCP ID Message Format

- An initial message format for the proof of concept
  - Additional fields are not currently in DADDS, but might be desirable to add.
  - ASCII would require 64 bytes (72 if separators are used); Pseudo-Binary could reduce to 33 bytes.
  - This is a preliminary format. The implementation of this format end-to-end may point out potential issues. Also, user and manufacturer input may suggest additional improvements.

Field	Num or Alpha	Min	Max	Res	ASCII Format	ASCII Chars	ASCII Sep	PB Chars	Notes
ID Format Type	N	1	9	1	n	1	N	1	To Allow for New Messages Formats
Latitude	N	-90	90	0.00001	sll.ddddd	9	N	5	Approximate distance accuracy is 4 feet
Longitude	N	-180	180	0.00001	slll.ddddd	10	Y	5	Approximate distance accuracy is 4 feet (at equator)
Transmitter ID	N	1	999	1	tt	3	Y	2	NOAA to assign Tx ID Numbers to CS2 platforms
Serial Number	N/A					6	Y	3	Not in DADDS; would need input from manufacturers
Firmware Version(s)	N/A					8	Y	4	Not in DADDS; would need input from manufacturers
Prime Channel	N	0	566	1	ccc	3	N	2	
Prime Rate	A					1	N	1	H=1200,L=300
Prime Format	A					1	N	0	A,P,B (Combined with Rate in Pseudo-Binary)
First	N	00:00:00	23:59:59	00:00:01	hh:mm:ss	8	Y	3	
Period	N	00:00:00	12:00:00	00:00:15	hh:mm:ss	8	Y	3	
Window	N	1	120	1	www	3	Y	2	Seconds
Second Channel	N	0	566	1	ccc	3	N	2	
Second Rate	A					1	N	1	H=1200,L=300 - Not in DADDS - assumed to be same at Prime
Second Format	A					1	Y	0	A,P,B - Not in DADDS - assumed to be same as Prime
CRC Check	A					4		3	Reported as Hexdeciamal in ASCII
					Totals:	65	8	33	

Lat/Long Tx ID – Message Decisions and Constraints

- Cannot use a self-timed approach, must be random messages.
- Random Message Limitations …
  - 300 bps: 3 second max message, which equates to just under 80 bytes.
  - 1200 bps: 1.5 second max message, which equates to 175 bytes.
  - Presently there are no 1200 bps random channels.
- Dedicated or Random Channel for Tx ID
  - DADDS shall process any Tx ID formatted message and act appropriately. In the initial implementation of this feature, a platform shall transmit on its defined random channel.
  - For the final implementation, if desired, a special channel could be defined for the transmission of this message. If implemented, this channel would either be configurable or hard-coded in a DCP.
- It is anticipated that manufacturers will update transmitters to support Tx ID features with a firmware update.

Lat/Long Tx ID Message - Initial Recommendations at the DCP

- Use ASCII for prototype and possibly in long term.
  - Proposed message structure is small enough to fit in existing 300 bps random length.
  - ASCII would make reports human readable and therefore easy to manually check.
  - Switching to Pseudo-Binary would not be too difficult in the future; could also use mix of ASCII and PB as NOS does (if needed).
  - If a switch is made to PB in future, DADDS could show decoded message on website in place of or in addition to the raw message.
    - Have to decode data anyway to populate/check the fields.
- Use Decimal Degrees to five decimal places for Latitude and Longitude.
  - Not current format for DADDS, but can be readily converted.
  - A future DADDS enhancement could make use of higher precision.
- Include 4 additional fields in demo, but do not process them in DADDS.
  - i.e. Do not add additional database fields at this time.

Technical Approach – DADDS Processing of ID Messages

- DADDS shall compare all received messages to the Tx ID Message format.
- A Tx ID Message shall be valid only if the CRC is verified and all fields range check to allowable values.
- If a the received Platform Address for a validated message is found in the PDT, update:
  - Latitude
  - Longitude
  - Transmitter Identifier
- Future: From the Latitude and Longitude determine and update:
  - Country
  - State/Province
- Future: Verify and email DCP owner regarding any configuration issues for:
  - Transmit channel(s) / Transmit window / Baud rates

Technical Approach – DCP Transmitter – Typical Modifications

- The required changes to implement Tx ID for any manufacturer's DCP are probably similar.

- When enabled for operation, enable the GPS receiver to acquire DATE / TIME / LAT / LON.

- The Tx ID Message shall be transmitted at first power on a platform's defined random channel using the same algorithm as a standard random transmission and complying with the GOES Data Collection Platform Radio Set (DCPRS) Certification Standard.

- It is recommended that the Tx ID Message be transmitted randomly thereafter every (15) days. (this feature and interval to be defined by NOAA)

Lat/Long Tx ID – Additional Long Term Considerations

- *Is including transmitter Serial Number and Firmware version worthwhile?*
  - Certainly could have been useful during GPS WNRO updates.
- *Is Second Rate and Format needed?*
  - Can envision Self-Timed using one rate/format and Random using something different.
- *Would adding Altitude from GPS receiver be of value?*
- *Would repeating ID Messages on some period basis (e.g. monthly) be useful?*
- *Would allowing Manufacturer Specific data after CRC Check be a good idea?*
  - Would obviously require longer permissible transmission time if ASCII is utilized.
  - DADDS would ignore additional data

Lat/Long Tx ID – Summary and Next Steps

- Summary
  - The Tx ID proof of concept shall be demonstratable to NOAA by the end of May 2022.
  - Implementing the features of a Tx ID Message will improve the accuracy of the PDT database.
  - ASCII could be utilized long-term, but not much room for expansion with 300 bps and current certification limits.
- Next Steps
  - Bring DADDS processing online. As a start, only on one of the NSOF processing rails.
  - Allow manufacturers and users to implement the current approach in their DCPs.
  - Allow a time period for comments and implementation of final features.
  - Publish a final specification and an implementation date.
  - Update to DCP Certification Standard 2 (CS2) and develop a timeline for system wide implementation.