

Emrit - TiE University Global Hackathon -- biz challenge

Helium Hotspot HNT Earnings Estimator for New

Deployments:

Emrit is a leading provider of Helium network compatible hotspots (aka Emrit CoolSpots). The Helium network is the first global decentralized IoT network incentivizing hosts through block-chain and crypto currency (HNT). Full background and documentation can be found at:

- <https://emrit.io/>
- <https://www.helium.com/>
- <https://github.com/helium/HIP>

Unique to the Helium block-chain implementation is the concept of using Proof of Coverage (PoC) instead of Proof of Work (Bitcoin) or Proof of Stake (Ethereum) as a key token earnings and incentive engine. In principle, Hotspot hosts on the Helium network earn HNT for providing network coverage. The block chain algorithm and chain variables define the PoC rewards based on a hotspot's ability to verify coverage with other nearby hotspots. This is detailed in:

- <https://github.com/helium/HIP/blob/master/0015-beaconing-rewards.md>

There are multiple factors that determine the amount of HNT earned by a Hotspot including;

- Number of witness hotspots
- Distance and RF signal quality (RSSI/SNR)
- Network topology

Emrit provides Helium network planning service to our customers and CoolSpot hosts and needs to quantify the effect of network topology on PoC HNT token earnings and work coverage.

Challenge Expectation

Create a website that allows the **potential earnings** of a new CoolSpot to be estimated based on its proposed latitude-longitude deployment coordinates. CoolSpot earnings are proportional to the number of other nearby Helium hotspots that are in RF communication range of each other. The web application will need to query the Helium Block-Chain ETL to find the Lat/Long coordinates of nearby (within 15km of the proposed location) hotspots. Then calculate the distance between the proposed site and ALL the nearby hotspots. Estimate the RF link budget and path loss to determine which nearby hotspots are in range. Build an HNT earnings estimate algorithm based on beaconing rewards block chain algorithm referenced above.

- Web Site Inputs:
 - Enter proposed latitude-longitude coordinates of deployed CoolSpots
 - Bonus: enter mailing address instead of lat/long
 - Bonus: Include interactive map
 - Enter RF attenuation factor (path loss) ; default is free air

- Web App Outputs:
 - # of Nearby hotspots (pulled from Helium Block-Chain ETL)
 - within radius of 500m
 - within radius of 1km
 - within radius of 2km
 - Upto 15km
 - Estimated RSSI
 - Estimated RSSI / path loss / link budget between new CoolSpot at proposed location vs. all the nearby hotspots found in ETL.
 - reference :
 - LoRa Link Budget calculator: [SX1272 LoRa Calculator](#)
 - Estimate monthly HNT earnings
 - Estimated HNT earnings for the new CoolSpot at proposed location
 - Bonus:
 - Display results overlaid on map (Google Maps / Google Earth)
 - Capture and analyze HNT earnings results using ETL tools.
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- Compare Estimator output to at least 10 actual live Helium Hotspot clusters
 - By entering the location of a currently deployed hotspot into the application it will return an estimated HNT earning; this should be compared to actual earning which can be pulled from the ETL.
 - Actual data can be found here:
 - Example: <https://www.sitebot.com/helium/hotspot/noisy-butter-pony/challenges>

Resources & References:

- Participants must provide:
 - Access to computer and programming tools.
- All Helium blockchain software and algorithms are published in open source - see links provided.
 - <https://github.com/helium/HIP/blob/master/0015-beaconing-rewards.md>
- <https://explorer.helium.com/>
- <https://www.sitebot.com/helium/hotspots/search>
- <https://helium.place/>
- Semtech LoRa Link Budget calculator: [SX1272 LoRa Calculator](#)

Participant Skillset:

- Knowledge of RF and RF propagation; ability to interpret RF data and translate into simple propagation map, including path loss.
- Block Chain coding and algorithm analysis; ability to inspect Helium block chain source code to extract PoC algorithm and chain variables (C-code). Translate and build simulation tool (python, excel spreadsheet, other).

Frequently asked questions:

- Emrit will set-up a Discord channel to provide support throughout the project.