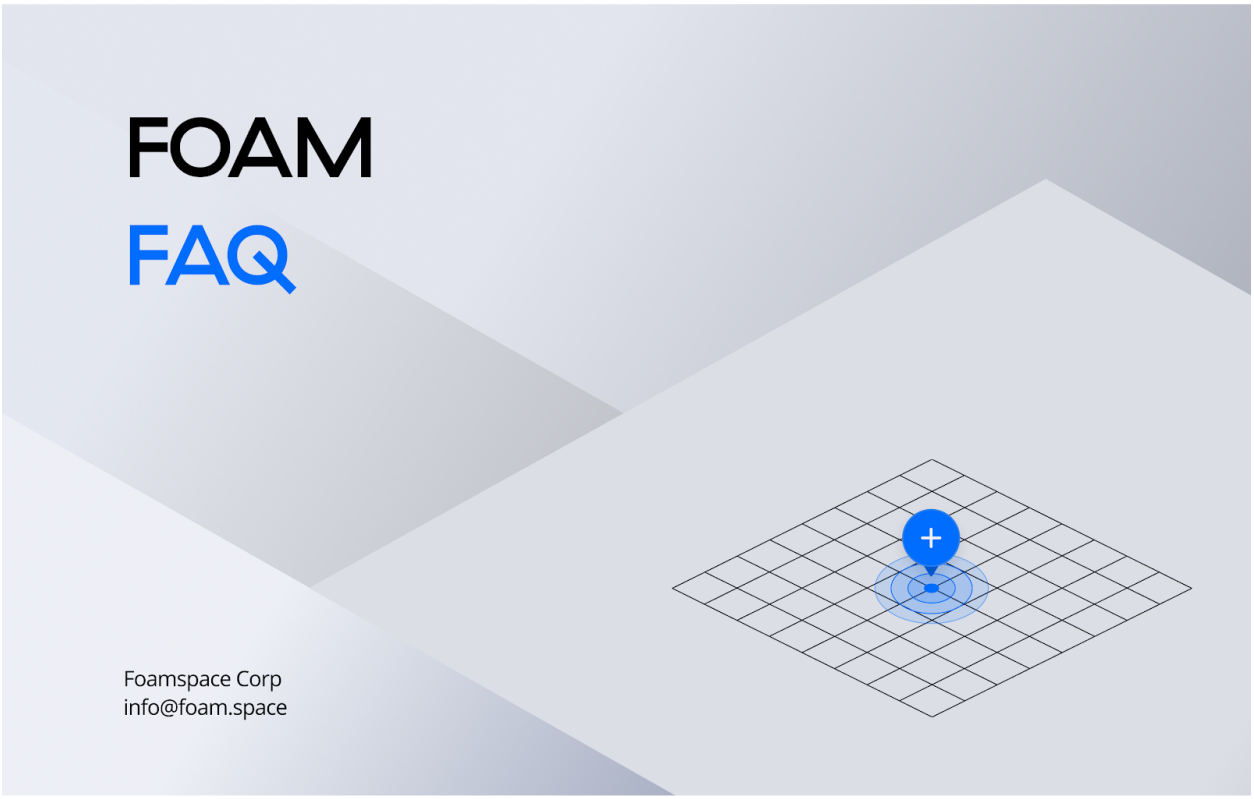

FOAM Frequently Asked Questions (FAQ)

We have gathered the most commonly asked questions into one place to help introduce the FOAM Protocol to beginners.

What is FOAM?

The FOAM protocol empowers users to build a consensus-driven map of the world that can be trusted for every application. FOAM secures physical space on the blockchain, harnessing the power of Ethereum with a cryptographic software utility token used to provide computational work and verification to the network. The component elements of FOAM are designed to provide spatial protocols, standards and applications that bring geospatial data to blockchains. Token mechanisms and crypto-economics underpin the elements of FOAM and empower the distributed users to coordinate and interact in a decentralized and permissionless manner.

What problems does FOAM solve?

1. Currently, there are no established standards for embedded locations, physical addresses, or coordinates in smart contracts. FOAM has developed the Crypto-Spatial Coordinate as an interoperable standard that allows smart contracts to make an immutable claim on the blockchain and a corresponding location on the map.
2. Blockchain applications that utilize these spatially-aware smart contracts, need to be able to visualize them on a map. The Spatial Index & Visualizer is a full-stack visual

blockchain explorer that we like to think of as a cross between Google Maps and Bloomberg terminal. It can serve as the front-end for any decentralized application that needs to visualize smart contracts on a map.

3. Today's geolocation tools are great for determining the location of a device, but cannot offer reliable and trusted location verification services. They are uni-directional and unencrypted, which makes it problematic to rely on GPS for smart contracts that need to execute when spatial parameters are met. Dynamic Proof of Location empowers a permissionless and autonomous network of radio beacons that can offer secure location verification services through time synchronization in a decentralized manner.
4. Point of Interest (POI) data comes in two varieties: proprietary and open. Proprietary data is centralized and costly. Open data like OpenStreetMap has no method to agree on verified truths and suffers from lack of incentives. Static Proof of Location enables a community of FOAM Cartographers to leverage Token Curated Registries to come to consensus on the location and metadata of POIs in the physical world.

What is the difference between Static and Dynamic Proof of Location?

We have a detailed blog post on this exact topic. Static Proof of Location leverages a new cryptoeconomic primitive called a Token Curated Registry and enables FOAM Cartographers to come to consensus on the location of static entities (geographic Points of Interest) and create a map of these locations. Dynamic Proof of Location enables mobile devices and entities to request proof that they were at a particular location and when. A decentralized network of radio beacons is used to produce that proof, called a Presence Claim.

Why exactly should we not rely on GPS?

GPS and GLONASS are amazing tools that have had profound effects on today's world, particularly in navigation. They are great for localizing a device, but they are one-directional and unencrypted. Thus, you cannot use them to prove a device's location to other entities. It is possible for malicious attackers to spoof other people's devices by sending out false GPS signals, and it is trivial for someone to fake their device's location on the client side by feeding an application fake GPS coordinates. FOAM overcomes these problems by allowing the device to communicate back to the radio beacons with encrypted messages.

Further, GPS is by no means a perfect system. It is unreliable for indoor use and dense urban areas because the a device requesting its location requires line of sight with at least four overhead satellites. By using ground based beacons, this problem can be mitigated. GPS is also not ideal for use with battery powered IoT devices that are designed to last for many years, because GPS is very power intensive to use.

What is the difference between a Zone Anchor and Zone Authority?

Zone Authorities maintain a shared state machine, where their clocks are periodically synced with other Zone Authorities in the Zone, and publish their time logs to the network (which requires an internet connection), where Verifiers check for fraud.
Zone Anchors keep their clocks synced with their respective Zone Authority. They are relatively cheap devices that simply consist of a CPU, radio transceiver, and a battery.

What is FOAM's business model?

FOAM is a non-rent seeking organization building an open-source protocol. No centralized fees in the protocol go to FOAM. A portion of the total token supply will be set aside for developer grants and for the FOAM Foundation to help fund ongoing and future development of the protocol. You can find more details in our token sale announcement blog post.

What are FOAM's use-cases?

FOAM can be used for any smart contract or application that needs to utilize spatial information and location verification. We see FOAM having applications in a variety of use cases including supply chains, IoT networks, autonomous vehicles, geospatial data marketplaces, and location based gaming. You can find examples in our blog post "The Future with FOAM."

Is my location data private with FOAM?

FOAM's mission is to create a decentralized and privacy preserving alternative to GPS. Users can generate verifiable Presence Claims and keep this info private until they choose to share it with another user or application. Users can rotate their public key for each Presence Claim to maintain anonymity. The Presence Claim can then be kept private until the user chooses to share it with an application or another party. Cryptographic protocols like Zero-Knowledge proofs can further enhance privacy in those exchanges.

How does FOAM plan to scale?

FOAM uses three consensus mechanisms at different levels of the protocol to ensure maximum efficiency. Synchronous, partially synchronous, and asynchronous. Currently, the asynchronous root chain in FOAM is Ethereum, but other root chains could be used. Each local Zone maintains semi-synchronization via a shared state machine running on Tendermint/Cosmos for Proof of Authority. Lastly, the time synchronization protocol is used to calculate the position of the requesting device.

What kind of hardware does Proof of Location require?

The Dynamic Proof of Location protocol is hardware agnostic. Our innovations are focused on the time synchronization protocol which can be applied to different radio technologies. However, we are excited to develop our proof of concept using a new class of radio called Low-Power Wide-Area Networks or LPWAN. LPWAN devices have long range and low power consumption. They are able to achieve this by using a low data bandwidth. By only sending and receiving small packets of data at a time, the devices can conserve power and provide extensive coverage.

The specific type of radio that FOAM is interested in using for its proof of concept is called LoRa. LoRa is a permisionless radio that operates on the ISM band, meaning there are no licensing fees to establish or operate a beacon. LPWANs are already used by industries and hobbyists all over the world. The Things Network is a large and vibrant community of LPWAN enthusiasts that have created an extensive radio network around the world.

What is the structure of the radio network?

In order to provide Dynamic Proof of Location services, a Zone needs to be established. A Zone requires three or more Zone Authorities, and at least one additional Zone Anchor. In the case of LoRa, a Zone Authority is a LoRa Gateway connected to the internet. Zone Anchors then connect to the Zone Authorities and all devices in the Zone maintain clock synchronization. Zone Anchors are LoRa end devices. A global network of Verifiers check for fraud proofs on the data coming from the Zone Authorities. They are constantly checking the Zone Authorities' time logs, and push data to Ethereum.

What does FOAM stand for?

FOAM's name is not an acronym and comes from an award winning design project during FOAM's early days. The name of the design project was Foamspace and it used large geofoam blocks to explore the relationship between decentralized infrastructure and the built environment.

How can I get involved as a developer?

Make sure to check out our developer portal. You can raise issues and make contributions on our github. You may also join our Gitter for developer discussion.

How can I get involved as a non-developer?

Joining a local community is a great first step to getting involved. You can find the list of local communities in the pinned message of our Telegram. If you would like to start a new community, you can reach out to Brandon, our community manager, in Telegram at @brandon_foam or via email. These local communities offer a great medium of discussion with other FOAM enthusiasts near you and a place to discuss and organize local meetups. When Dynamic Proof of Location opens for public testing, this is where you will be able to collaborate with other people in your community to create an optimal radio network for your city and discuss any location specific issues or synergies.

Once Dynamic Proof of Location enters the public testing period, we will need the help of the community to help test the protocol by setting up Zone Anchors in cities around the world. Public testing will help us determine the final specifications of the protocol and narrow down recommended hardware.

Upon our mainnet launch, anyone can get involved as a FOAM Cartographer by curating geographic Points of Interest in their local community. We will need the contributions of a global community in order to help us build a consensus-driven map of the world.

Where can I find more information about FOAM?

- FOAM Whitepaper
- Draft Technical Whitepaper and Literature Reviews
- FOAM Blog
- FOAM Twitter
- FOAM Reddit
- FOAM Telegram
- Email the FOAM team

The FOAM Utility Token

When is the token sale?

Mandatory registration will begin on July 16th and will be open through the end of the sale. The registration process will be hosted by Token Foundry.
The FOAM Token Sale will begin on July 31st and will end on August 7th.

Where can I buy the FOAM token?

The only place to buy the FOAM token is through the official token sale page on the Token Foundry platform. If anyone contacts you with a private offer to buy FOAM, it is a scam.

What are the token metrics?

- Total Supply: 1,000,000,000 tokens
- Token Sale Supply: 30%
- Foundation, founders, employees, advisors, partners : 25%
- Developer Grants Reserve: 10%
- Reserve for Mining Rewards: 35%

How much are you trying to raise?

300m tokens (30%) are for sale and the price will be approximately $.08 per token, denominated in an Ether value to be set shortly before the sale. Given the amount of tokens for sale and the price, if all tokens are sold, we anticipate receiving approximately $24m in sale proceeds.

Who can participate in the token sale?

We worked extensively to make sure that we can include as much of the global community as possible because it is important to FOAM that everyone may participate. We are glad to be able to include U.S. residents and the rest of the world. Unfortunately, there are a few exceptions. Residents of the following locations are not able to participate: Iran, China, North Korea, and the state of New York state.

Are there any requirements for participating in the token sale?

Yes, FOAM will be holding its token sale on the Token Foundry platform and will follow the Brooklyn Project framework. There are certain requirements by both the token sellers and purchasers to ensure a fair and quality token sale takes place. Token purchasers will be required to pass a questionnaire to demonstrate that they understand the utility of the FOAM token and that they understand it is not an investment vehicle. Purchasers must also show proof of use via FOAM's Static Proof of Location mainnet app. We will have a future blog post that will guide users on how to participate as a FOAM Cartographer and curate geographic Points of Interest. You can read more about Token Foundry's requirements here.

Is FOAM an ERC-20 token?

Yes. FOAM is being built on the Ethereum Virtual Machine. While FOAM is agnostic to the root chain it can use, there are currently not any plans to diverge from Ethereum.

Do I need to use a specific wallet for the token sale?

During the Token Sale, the FOAM smart contract address will only accept Ether from ERC-20 compatible Purchaser Wallets with adequate Ether balances belonging to persons who have completed Registration.

What is the timeline for token delivery?

FOAM will be delivered to Purchaser Wallets no later than 28 days from the time of each purchase. Upon delivery, FOAM tokens will be immediately usable by purchasers on the FOAM platform, but will not be transferable until the purchaser demonstrates proof of use and the the initial use period (45 days after the first tokens are delivered) has elapsed.

What is the utility of the FOAM token?

At mainnet launch, the FOAM utility token can be used for participating in Static Proof of Location via Token Curated Registries for Geographic Points of Interest or for Signaling, a method of staking the FOAM token in a spatial smart contract to signal demand for future Dynamic Proof of Location service. When Dynamic Proof of Location launches, the FOAM token must be staked in order to establish a Zone Anchor or Verifier. Through the staking mechanism, the protocol ensures honest behavior and that service is maintained through slashing mechanics enforced via Service Level Agreements.

Have any more questions or want to get in touch? Please feel free to email us at info@foam.space.