

HyperMesh Transactive Energy System (HTES)

The HyperMesh Transactive Energy System (HTES) combines several technologies to form a next-generation Distributed Electric Power System capable of minimizing costs and probability of failure, while meeting load requirements for Internet-of-Things. HTES is composed of the following.

- New Distributed EPS, including Smart Monitor for T3DP Solar Panels, other DERs, and Routing of energy between Sites via a Fractal Energy Network (potentially using solid state circuit breaker technology from Atom Power, based in North Carolina)
- Fractal Mesh communication network, overlaid on top of Fractal Energy Network
- SmartMesh Photon Machine-to-Machine payment network with secured backing on the SmartMesh public blockchain Spectrum
- Transactive Real-time AI Negotiator to optimize total and peak energy usage and cost.

Blockchain Differentiation

A key component in HTES is the blockchain technology which allows for all of the DERs and Loads at the numerous Prosumer sites to pay each other for the energy being traded. Conventional blockchains cannot scale to a high enough Transaction-per-Second metric to support the large universe of IoT devices (representing Solar DERs and Loads).

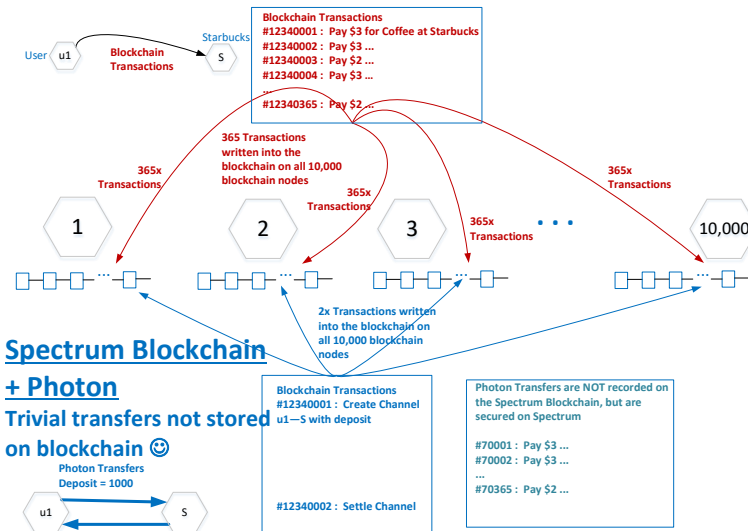
Solutions for this performance issue include a secondary architecture which supports the high throughput, low-latency requirements of such IoT transactions. Examples include Bitcoin's Lightning, Ethereum's Raiden (not yet commercially ready), and SmartMesh's Photon.

However, Photon is unique in that it supports **offline payments** with secured backing on SmartMesh Spectrum. That is, after a Channel is established between Photon nodes, token transfers are allowed to take place Off-Chain (Off-Spectrum), and furthermore, such transfers can take place even when the Photon nodes are NOT connected to the Internet (and thus not connected to Spectrum). In comparison, all other payment methods, such as Lightning, Raiden, Wechat, Alipay, Applepay, etc, require an internet connection in order to function.

American Made HeroX application: 3D Solar PV in HyperMesh Transactive Energy System Technical Description

Blockchain ONLY

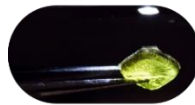
Large amount of trivial information is stored on all nodes, forever ☹️



In the case of Spectrum, with Photon, such trivial transactions can be carried over Photon. Photon Channels are Smart-Contracts on Spectrum Blockchain which execute in parallel (peer-to-peer) and thus do not impact Spectrum TPS, except for two events: (1) Initial *Deposit* onto Channel and (2) when Channel is *Settled*. Thus, after a channel is established between two Photon nodes, many transfers can take place between the two nodes, as long as the Available-Balance remains positive, with such transfers taking place Off-Chain (not registered on the Spectrum blockchain). This saves a great deal of disk space on the main chain. In addition, since Photon transfers are off-chain, a blockchain-type consensus protocol is not needed. And thus, Photon transfers are highly parallelizable, so TPS scales with the number of Photon nodes to Millions+.

3D Solar PV Differentiation

T3DP is developing 3D Solar PV panels with target performance of 2X energy capture efficiency compared to conventional 2D Solar panels.



This advanced 3d solar design above on the left uses a solar grade silicon carbide which can reach power efficiencies of above 60% while concentrating sunlight. Chilled mineral oil is pumped into 3d smart solar design and submerges solar grade Si3C and Tandem Solar Cells. Once mineral oil reaches a certain temperature threshold it is expelled with our advanced heat transfer process which is controlled by the HyperMesh Transactive Energy System. Recycled mineral oil can be used for heating homes or recirculated underground where it cools then can be pumped back up into design.