THE
SMARTMESH
PROJECT

THE SMARTMESH WHITE PAPER

SmartMesh
Tokenized Mobile Mesh
Network

If the Internet was conceived today, it would have been a P2P network that connects smartphones, and it would have been safer, cheaper, faster.

Abstract

1) Mesh network is an ad hoc network that can be automatically established between radio nodes such as mobile devices. It is more private, resilient, and efficient and often comes free, yet it has a challenge to scale, one of the reasons is the lack of economic incentives. In this project, we provide with such an incentive by introducing a crypto token, of which people can "mine" when they share their nodes.

2) To do that, there are issues that we need to address:

3) Mesh network is often used and deployed in areas where Internet is not available, which means payment transactions between nodes need to be made without access to the blockchain, obviously this is a paradox.

4) Even when the device in this mesh has access to the Internet, there is still a problem: Because of a hard-coded limit on computation per block, the Ethereum blockchain currently supports roughly 15 transactions per second compared to, say, the 45,000 processed by Visa. To make Ethereum based ERC-20 token a viable payment solution for the mesh network we build, we need to make it faster.

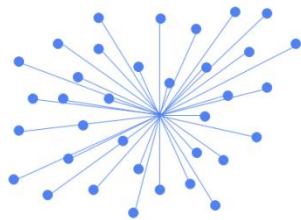5) How to scale up blockchain to make the payment fast and economical?

The core enabler is to develop an off-chain payment channel by which such micro payment transactions to be both scalable and cost effective.

This white paper examines how we have solved and will solve these problems to achieve our goal, a mesh of nodes that self-sustain, self-govern and grows.
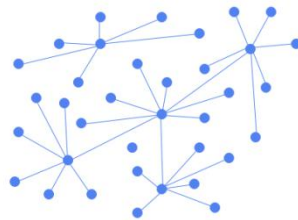
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Genesis

Centralised   Decentralised   Distributed

In the beginning Men created the Internet.

People see the Internet is good. However, on the Internet, people do not trust each other.

Then people created the blockchain. It allows people to work with each other without mutual trust. Blockchain is good, but it's slow.

Then people created Lightning, Raiden and Plasma. They allow people to do things. But people can not work without the net.

Then people created SmartMesh, the spirit of SmartMesh saying: Make everything connected, even without the internet.

SmartMesh connects everything without internet. Everything is always connected.

About SmartMesh

SmartMesh Foundation

At business level we are committed to the followings:
Through incubation, cooperation and other means we will encourage third-party development team to join the SmartMesh ecosystem and create different applications. Together we will build the future of the Internet of Things ecosystem.

Solve

Information Security and Privacy

Network Congestion

Off-internet Communication

Off-internet Transaction

Global Inclusive Finance

We will focus on the technical aspects: Development of the underlying Internet of Things SmartMesh protocol

What is the SmartMesh protocol

SmartMesh is a blockchain-based IoT underlying protocol that enables smartphones, onboard devices and other devices to connect to each other without the internet. SmartMesh has built-in blockchain light nodes and extends Raiden network protocol for Tokenless Meshless Pay. Motivated by blockchain tokens, SmartMesh can self-organize to create a resilient, decentralized, self-healing Mesh Network that offers higher near-field communication speed and bandwidth than the Internet and it will be generally free. It is possible to achieve a network parallel to the existing Internet.

SmartMesh positioning:

Mobile MESH technology pioneer, focus on technology, andecosystem incubator.

The Serval Project in Australia and NextApp in China optimized Wi-Fi Direct, Bluetooth, Bluetooth LE, ANT and other wireless protocols and the above applications to make the near field communication of Android and iOS mobile phones become a reality.
Every Mesh Network-based messaging application does the same thing: They allow you to stay in touch with others without a SIM card. Their user scenarios may be slightly different, some focus on chatting, others focus on research, and some may focus on social interactions, but together they have tens of millions of user groups.
Based on existing technological advantages and ecological resources, SmartMesh will mainly continue to develop the underlying IoT protocol in the future, and continuously integrate the world's top off-internet communication companies to devise a uniform standard for global IoT communications. At the same time, the SmartMesh Foundation will continue to introduce various application scenarios based on the SmartMesh protocol through third-party development teams such as incubation and cooperation.

SmartMesh Third-Party Ecosystem

SmartMesh builds a mesh network that is parallel to the internet based on P2P direct connection of smartphones, so that traffic would not need to be sent to the center servers but through communication in the local mesh network, saving traffic resources, reducing radiation and waste of power communication. The SmartMesh Foundation will make it easier and more convenient to make people to people, people to things and things to things connections. It is the future direction of off-internet communication, off-internet payment and off-internet gaming.

Information Security Issues: Point-to-point no network transmission

Have you ever wondered if all of the mobile apps we use have the risk of information disclosure? Why? Because all of our chat history, browsing habits are all saved in the third-party server. American daddy, Visa and other big companies have had many times the more common customer data breach leaked small businesses. With SmartMesh all messaging is just point-to-point, thus isolating the risk of third-party information being exposed.

Network congestion Problem

Whether in the train, subway, plane, outdoor camping or sports stadium, User density congests data traffic and people cannot access the internet properly. However, with SmartMesh, users can send messages to people around during these entertainment and sports events, which can be wonderful moment if shared with the outside world. As the density of devices increases, the quality of the network improves, and the speed will be faster. SmartMesh fulfills this last mile of social connectivity, and entertainment will be more enjoyable.

Off-internet Communication

Some time ago, the United Nations Broadband Commission (hereinafter referred to as "UNBC") released a report saying that there are 3.9 billion people in the world without regular access to the Internet. Although internet infiltration in the developed countries is very high. And yet, in the world's poorest 48 countries, 90% of the population has no access to the Internet. SmartMesh will change the situation for those people with the rollout of SmartMesh App. People can connect to each other to form a local mesh network. Within one local mesh network, as long as that one of the mobile phones has internet connectivity, everyone on the Mesh will be able to connect to the world.

Off-internet Payment

Current payment application platforms cannot work without internet, SmartMesh will allow payment through the SmartMesh Mesh Network, where each phone will become a node to form a dense network. This new network will break the traditional boundary of payment service and make payment easy.

Inclusive Finance

As of 2016, about 2.9 billion people around the world have no bank accounts, and at present, basically all the products in the field of mobile banking and payment are implemented using the

internet. SmartMesh will build upon its own communications protocol to build a rich ecosystem of communications and inclusive finance to fulfill the demand of these 2.9 billion people.

Vision: a global mesh network

As pioneers in mesh network, we had faced the dilemma of scalability. A global Mesh Network requires global collaborations of technologists and entrepreneurs to work together, and users need to be incentivized to share nodes, hence to increase user density to make the mesh network to be stable and accessible.

Today three leaders in mesh network decide to pursue the vision together. With progress of the Raiden Network in off-chain micro-payment and SmartMesh Raiden Extension, off-Internet high speed payment is achievable. The team of dreamers and technologists are working together to make this shared vision a reality.

We propose to build a mesh network that connects mobile phones, on which people who share their own mobile phone as nodes are rewarded in crypto tokens.
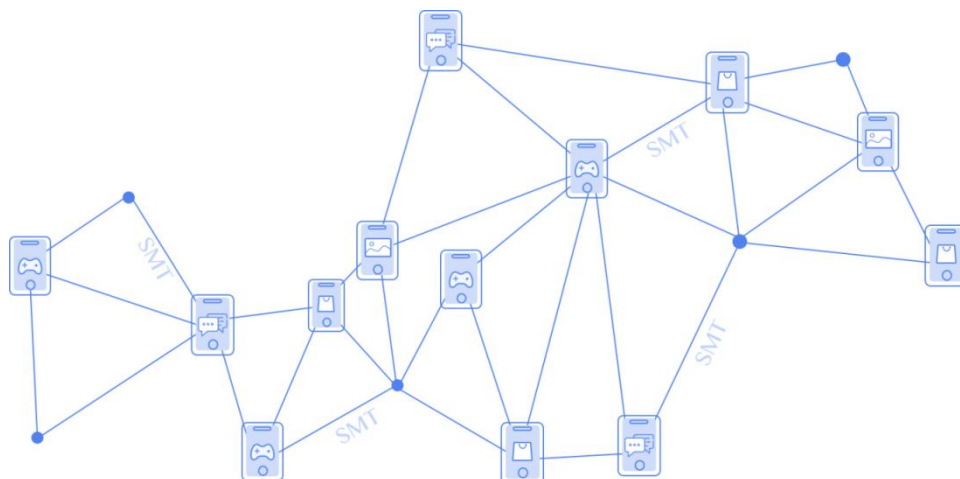
SmartMesh is a marketplace of nodes, like an Airbnb of smart phone nodes. Anyone with a smart phone can send text messages, photos, or voice to other nodes; and they are rewarded with tokens by helping transfer the data, and of course the data packets are encrypted.

To deal with daunting task like this, the biggest challenge is to transfer crypto tokens between mobile phones quickly so that people can share their nodes and get paid quickly, which was not possible on blockchain. As we all know, transaction confirmation on blockchain is too slow and too expensive to be applied on sharing mobile phone nodes.

Since inception, Bitcoin and blockchain have been plagued with its inherent technical issues, only 7 transactions can be processed per second, and every transaction need be confirmed by 6 blocks deep to be verified as effective. This level of throughput could not be regarded as a currency, by which people can use to conduct business, not to mention the ultra-high speed of micropayments between mobile phone nodes.

Fortunately, since 2015, we have the new technologies that we didn't have, which are blockchain, crypto token, especially Lightning Network and Raiden Network as an off-chain payment accelerator.

Lightning Network proposes to achieve peer to peer micro-payment transactions off-chain with on-chain validation and settlement. The blockchain processing bottleneck is broken; issues such as latency, finality, throughput and privacy are all solved. Raiden Network is based on the same concept and built on Ethereum. Plasma expands Lightning Network to computation in addition to payment.

Hereafter is the plan to construct the SmartMesh Mesh:

1. To create an incentive mechanism by which people are rewarded. This is implemented with blockchain and token.
2. To make token transaction fast enough, we need to build a Ethereum based Raiden Network Micropayment
3. Raiden Network runs fast enough, but it could not work without access to the Internet. We have designed SmartMesh Extension to enable off-Internet micropayment on mobile phones;
4. When off-Internet micropayment is ready, people can participate in SmartMesh Mesh by sharing their mobile phone nodes to co-build the global mesh network we conceive.

In the following passages, we will describe with reasonable technical details about what we have done, what we are doing, where this journey lead us to, you should be able to understand whether you are of technical or non-technical background.

Mesh Overview

Nodes

The base primitive that SmartMesh Mesh is built upon is a pay-for-forward network, of which no infrastructures are needed; instead all people use their smart phones to connect together.

These smart phones, or called nodes, can pay each other for the service of forwarding data, and verify that the data forwarding is performed well.

It is like an Airbnb of mobile phones, which share nodes and provide with data-forwarding services rather than bed and breakfast. This mesh network not only handle "local traffic" such as text and phone sharing inside the mesh but also provide with Internet access if at least one node is connected to the Internet with a "uplink".

There are three types of nodes in SmartMesh Mesh.

User nodes

Anyone who connects with SmartMesh Mesh is a user node. They pay their neighboring node to send out data packets. For example, if there are 3 nodes between Alex and Brandon, then Alex pays

the 3 nodes for forwarding the data packets to Brandon through a mesh payment channel, which will synchronize to the blockchain and settle in crypto tokens. In this case, Alex is user node here.

Carrier nodes

Carrier nodes are smart phones that forward data packets for other nodes. They are paid in tokens for their services. In this case, Brandon is a carrier node.

Internet nodes

Internet nodes are like carrier nodes, but they have internet access and offer to others.   They can be smart phones with big data plans they would like to resell to others who need it.

Tech Stack
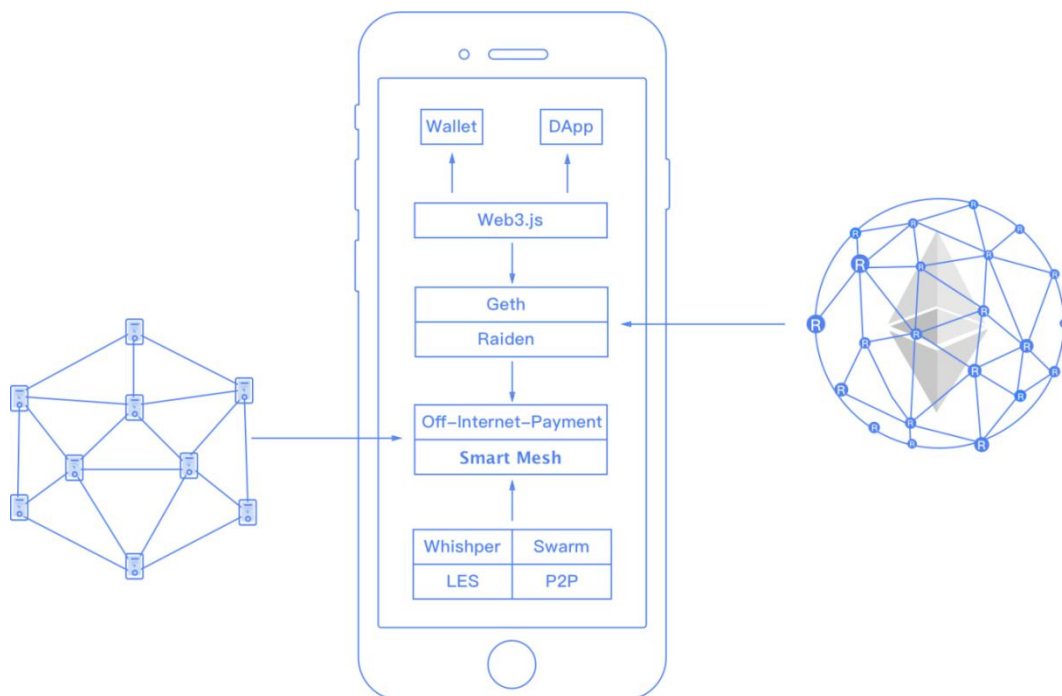
SmartMesh Mesh Architecture

SmartMesh Mesh is a decentralized peer-to-peer distributed network that functions either Internet access is available or not.

SmartMesh embeds the Ethereum light node, which is based on the Light Ethereum Sub-protocol (LES), and is connected to the Ethereum via Geth. LES is a protocol designed for a light client such as

a smart phone. It downloads only the block header instead of the entire block when the block chain is synchronized. It provides a fully secured blockchain access function, but does not participate in mining and the formation of consensus.

Decentralized Application, on the top layer, interacts with the SmartMesh contract layer through Web3.js. The user uses Wallet to store their private key, make transfer, and make query and other operations.

SmartMesh uses Swarm to implement to host personal files in shared storage space, uses Whisper to build a peer-to-peer messaging network, off-chain transactions via Lightning Network or Plasma to accelerate transaction confirmation and incentivize users to contribute storage space and network resources through checkbook contracts.

Near-field, peer-to-peer connection based on Wi-Fi, Bluetooth, ANT and other protocols, with the increase of distributed nodes, this mesh networks will be better, and ultimately becomes a world parallel network to the Internet.

We believe SmartMesh Mesh has the potential to support applications far more beyond off-Internet chat, data transmission and off-Internet payment.

SmartMesh Token

SmartMesh token, or SMT, is a contract token based on Ethereum. Ethereum is an open source, public distributed computing platform that provides a distributed Turing Complete Virtual Machine to support execution of SmartMesh contracts.

SMT is used to incentivize SmartMesh Mesh node contributors and to purchase products and services in the SmartMesh Mesh ecosystem. When users connect their SmartMesh phone nodes to the SmartMesh mesh network, they are rewarded with the SMT tokens. The longer the user stays on the network, the more SMT that they amass on the SmartMesh Blockchain.

SmartMesh Token Contract

SmartMesh Token Contract is based on the ERC20 Token standard. We implemented a number of features on SMT to support SmartMesh Mesh, of which include Signed Authorized Agent Transactions etc.

ERC20 Token Standard has won recognition in the Ethereum community. A large number of well-known Ethereum applications are in compliance with this standard and has proven the ERC20 Token Standard to be successful.

Signed Authorized Payment

The Ethereum-based SmartMesh contract consume gas to run, which is one of the precautions that Ethereum has taken for security, but gas needs to be paid in ETH, which increases the complexity of Decentralized Applications (DAPP) to mainstream users. To help these users, we have developed a

Signed Authorized Payment Agent, which is to let a third party to assist a user to pay ETH to cover gas consumption.

The service fee of the third party is paid in SMT. The process requires the user to authorize by providing with a specified format signature to activate the SmartMesh contract to operate on users assets.

Minimal information required for the he user signature include the agent address, service fee and statement of asset change, which means the user, has complete control and it is as safe and sound as if the user is doing it in person.

SmartMesh Micro Payment

With progress of blockchain technologies, the PC based wallet applications are no longer good enough for users. Data on nodes are too large to be synchronized and PCs are not convenient to be carried around.

The present light wallet apps still rely on centralized services, which require the signature data to be sent to servers for the transaction data to be broadcast. If the servers are hacked, the request of service would be denied and this is potential security vulnerability. Plus, in the process of transactions, it would need confirmation of other blocks and consumes gas. This is contradictory to the very idea of decentralization and could not complete micropayment quickly.

SmartMesh App is a truly decentralized mobile node with micro-payment wallet, which uses the LES-enabled Geth node on the smart phone to verify and synchronize the block header. The Light Ethereum Sub-protocol, often referred to as LES, is a sub-protocol of Ethereum, which is designed to maintain the high security of certain instances of Ethereum on the current state in a light client (such as a smart phone).

Meanwhile, SmartMesh App has integrated Raiden Network technologies to accelerate micro-payment transactions. The Raiden Network is a state channel technology based on Ethereum, which increases the processing power of the Ethereum The basic idea, is that users can have transaction with signed messages off-chain, rather than to have all transactions to be processed on-chain.

Through PEER-TO-PEER payment and deposit on Ethereum, Raiden retains the protection mechanism that the Blockchain has provided.

Raiden network has the advantages of scalability, fast transaction, confidentiality, interoperability, low cost, micropayment-ready. It could process up to one million transactions per second.

Confirmation and termination of transfer is completed within a 1 second. The cost of transaction could be as low as 1 millionth that of on-chain, which makes SmartMesh a viable micropayment solution.

SmartMesh Off-Internet Payment

Today, electronic payment without Internet remains a technological challenge, even when payment apps such as Alipay and Wechat Pay have become so popular that people living in China could hardly live one day without. Yet, in locations where Internet is either unavailable or the mobile service signal is low, none of these apps could complete a transaction without Internet access until SmartMesh. For the first time, SmartMesh makes crypto payment without Internet possible.
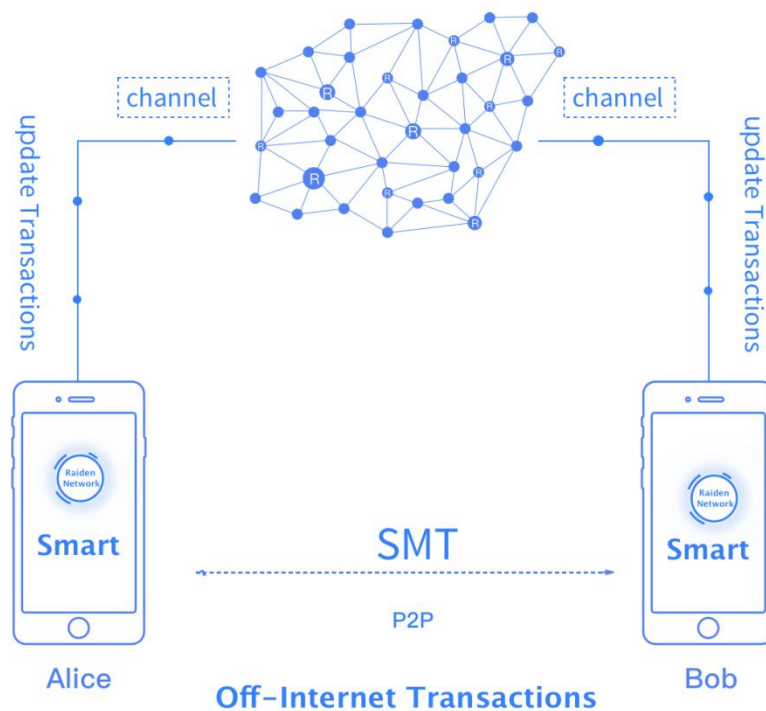
SmartMesh Off-Internet Micropayment is the SmartMesh Payment Protocol based on Raiden Network Extension. Users transfer signed encrypted transaction data through direct peer to peer such as Wi-Fi, aka, to allow Off-Internet payment.

Alice and Brandon establish a channel on Raiden Network through SmartMesh App; they both commit a certain amount of assets as deposits, then they are ready to make payment with SmartMesh Micro Payment.

Alice and Brandon establish off-Internet connection through SmartMesh App
Alice pays Brandon 5 tokens
Alice sends crypto transaction data to Brandon without the Internet, both sides store crypto transaction information.
When there is internet access, Alice and Brandon synchronizes the transaction information up to Raiden Network node; verify transaction settlement within the transaction verification channel.
If Alice closes the transaction channel, Alice submits a signed Update Transaction message to the blockchain contract, which will wait for the Hold Period. During which if Brandon could submit a

higher Update Transaction message with a higher sequence number; the contract will confiscate all pledged assets of Alice in the channel and transfer it to Brandon. If there is no objection until wait for Brandon is timeout, the contract will complete the transfer payment and close the channel in the block chain according to the message content. Vice versa.

If Alice closes transaction channel, Alice submit a Update Transaction

Compared to Lightning Network, Raiden Network introduces a more common SmartMesh Condition than Hash Timelock Contract of Lightning Network. In the event of a dispute, the contract can be enforced by presenting the latest version of the Update Transaction message to the SmartMesh contract on blockchain, and requesting SmartMesh contract to process the SmartMesh Condition in the message. If there is no dispute, none of these will appear on Ethereum blockchain, which enhances the privacy as well as performance.

When Alice and Brandon make off-the-Internet transactions, the two sides store encrypted transaction information off-chain, which will be synchronized, verified when the Internet access is available. This guarantees security of the transactions and untamperable.

SmartMesh has integrated Ethereum Light Node, Raiden Light Node and a SmartMesh Off-Internet Extension of Raiden Network, by which a parallel global mesh network incentivized by crypto tokens will emerge and thrive.

# Universal connectivity architecture
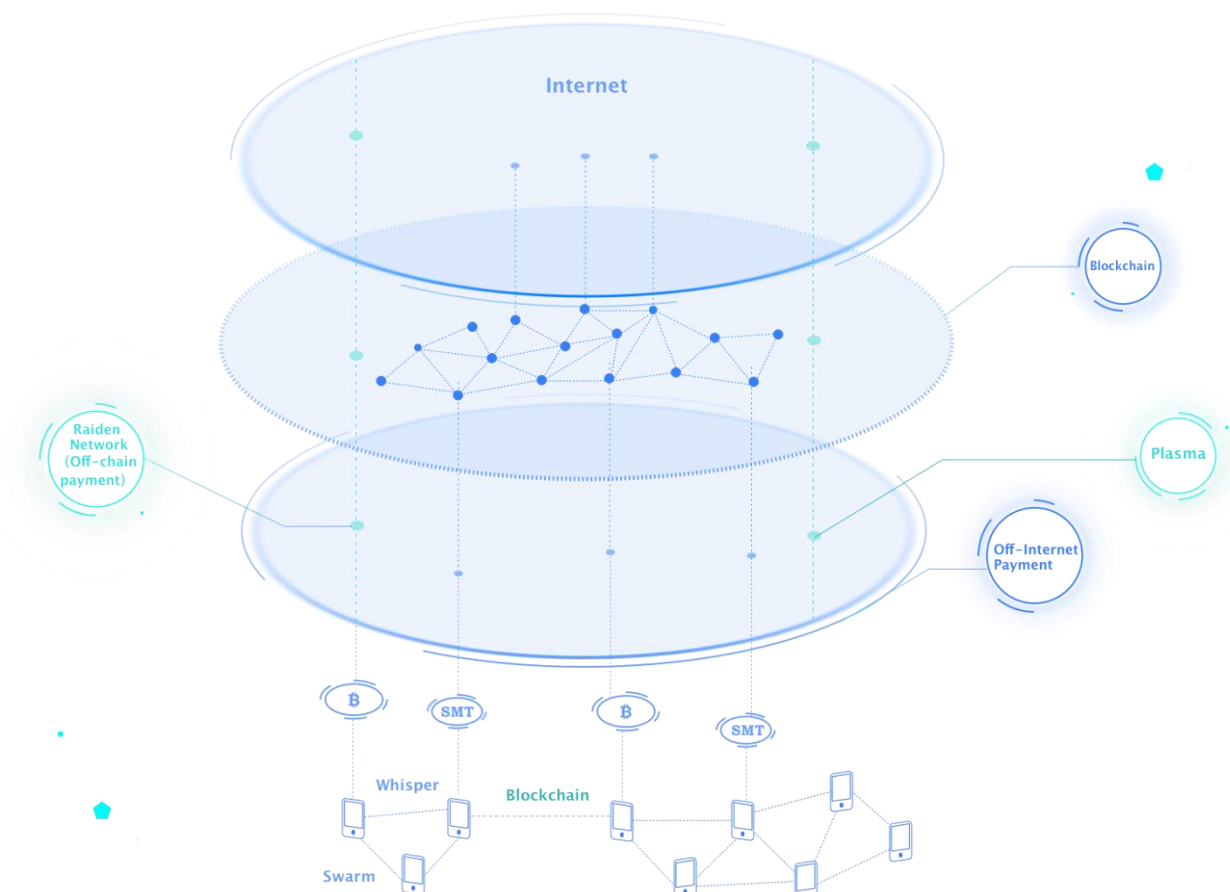
SmartMesh Mesh aim to enable a Global Mesh Network parallel to the Internet. Every SmartMeshphone is like a SmartMesh. A single spark can start a wild fire on a prairie. With the increase in Fireflies, mobile SmartMesh nodes create a network of their own; the apps would be SmartMesh enough to choose a path for each data packet, over Internet or SmartMesh Mesh. Blockchain was on PC nodes only, and now they are making their ways to SmartMeshphones with mobile light node technologies, which allows crypto currencies trading whether access to the Internet is available or not. SmartMesh off-Internet Payment lets crypto currencies can be traded even when the Internet is off.

For the future generation of communications, the Internet and SmartMesh Mesh complement each other, SmartMesh Mesh will be carrying a large number of local traffic and it will be the most optimized universal connection.

SmartMesh governance

SmartMesh Foundation
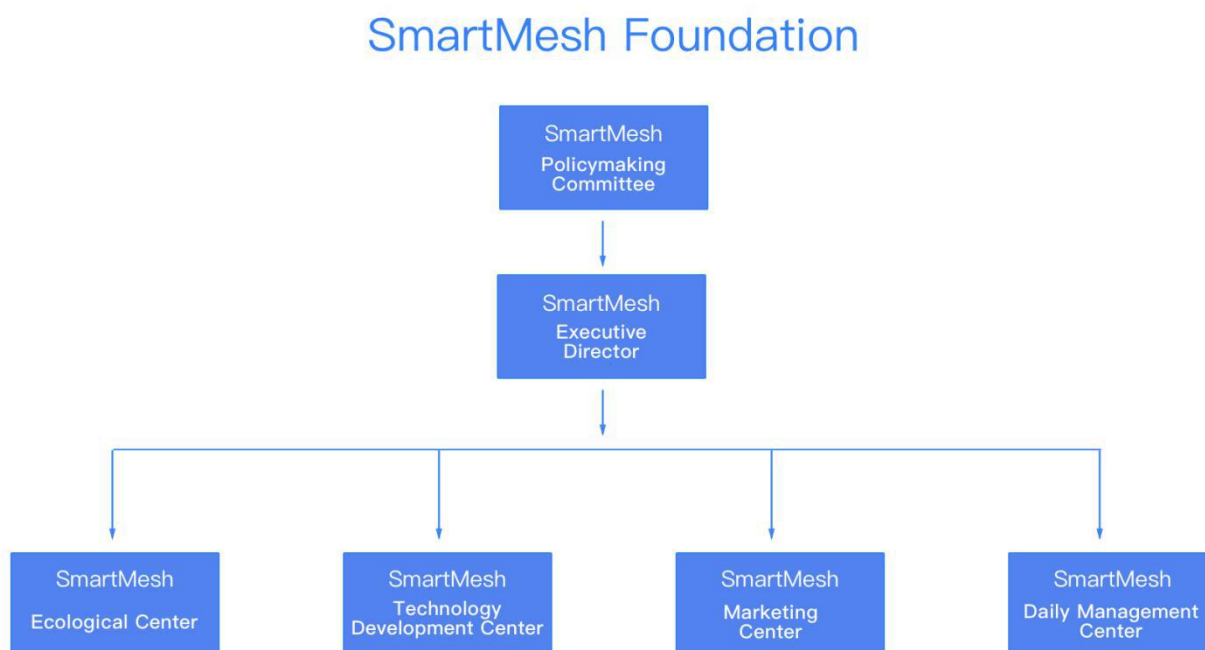
SmartMesh Decision Making Committee

The SmartMesh Blockchain Decision Committee is responsible for the management and decision making of significant matters, including the appointment and dismissal of executive officers and directors of each committee and important decisions. Members of the decision-making committee

term of office are three years. The committee will appoint a chairperson and specifics shall be determined later.

The members of the First Decision Committee will be appointed by SmartMesh Founding Team and Investors.

SmartMesh Ecosystem Center

The purpose of SmartMesh Ecosystem Center is to explore the potential use cases and facilitate business applications, to promote applications in education, e-commerce and social networks, to achieve artificial intelligence, cross-border transactions, interoperability and sharing of value.

SmartMesh Research and Development Center

The SmartMesh Research and Development Center is responsible for the research and development of infrastructure layer technologies, including testing, launch and verification. The SDK supports mainstream programming languages and provides technical support in all domains and offer open source code.

SmartMesh Marketing Centers

The Marketing Center is responsible for technical marketing, product marketing and marketing of related applications.

SmartMesh Daily Operation Center

The Daily Operation Center performs financial, legal affairs, Human Resources, office administration managerial duties. Finance Department is responsibility for the use and audit of the fund; Drafting and examination of official documents, to prevent potential legal risks; Administration and HR are responsible for personnel management, compensation and daily administrative work.

Development team

Henry Wang

Founder of SmartMesh
The Founder and President of International Blockchain Application Federation (IBAF).

Kraken Yu

VP Global Engineering
Former Chief Strategy Officer for Cubits, leading European Crypto Payment Exchange in Berlin / UK

Ashton Addison

Chief Marketing Strategist
CEO & Founder at EventChain.io
A leader, entrepreneur and technology enthusiast in blockchain technology since 2013.
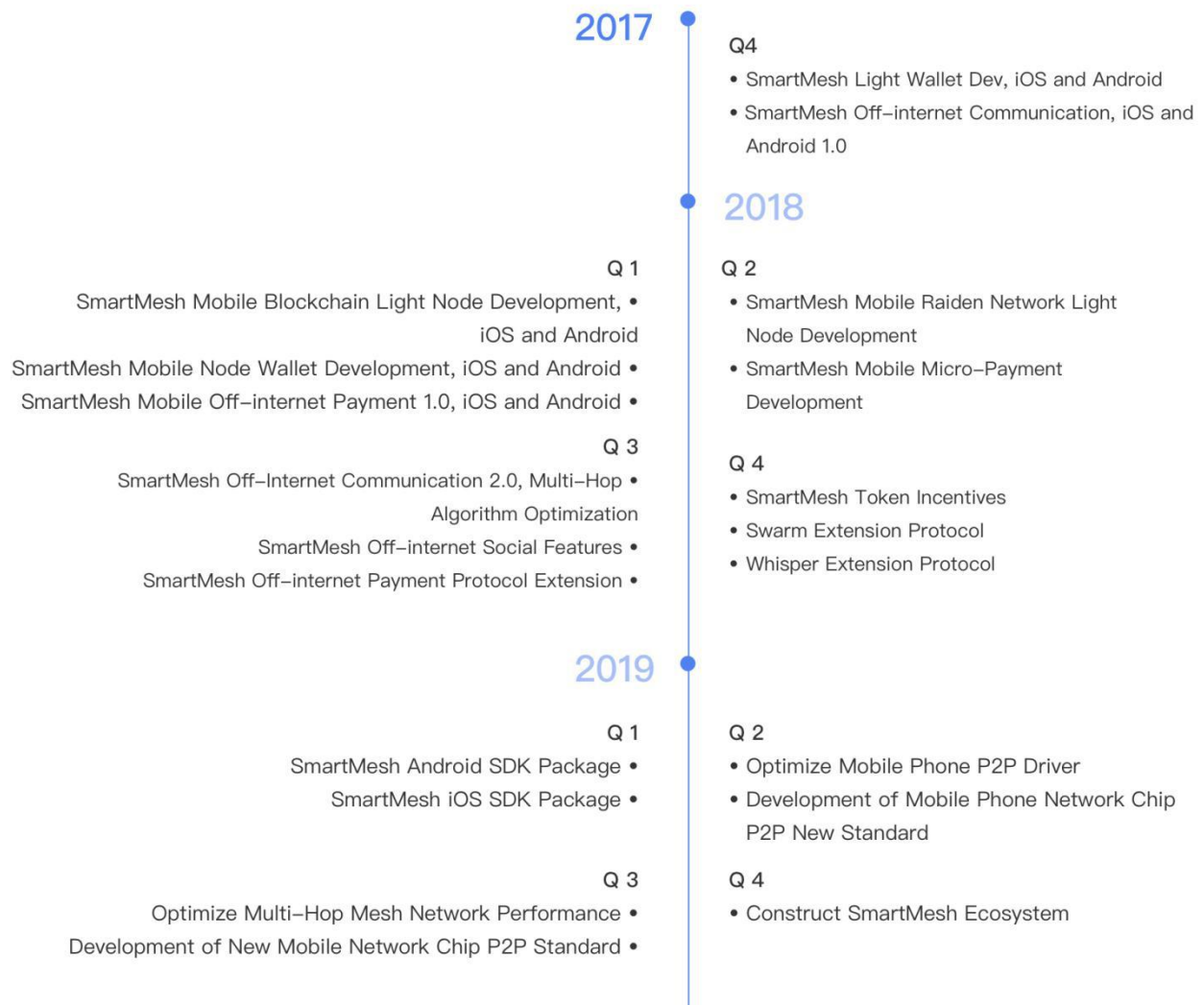

Leo Yao

VP Mesh Networking
Former Head of Huawei Mesh Networking Product Line

Maxim Prishchepo

Founder&CEO Integral LLC
Maxim is a founder and CEO of two innovative IT companies.

Roadmap

2017

Q4
- SmartMesh Light Wallet Dev, iOS and Android
- SmartMesh Off-internet Communication, iOS and Android 1.0

2018

Q 1
SmartMesh Mobile Blockchain Light Node Development, •
iOS and Android
SmartMesh Mobile Node Wallet Development, iOS and Android •
SmartMesh Mobile Off-internet Payment 1.0, iOS and Android •

Q 2
- SmartMesh Mobile Raiden Network Light Node Development
- SmartMesh Mobile Micro-Payment Development

Q 3
SmartMesh Off-Internet Communication 2.0, Multi-Hop •
Algorithm Optimization
SmartMesh Off-internet Social Features •
SmartMesh Off-internet Payment Protocol Extension •

Q 4
- SmartMesh Token Incentives
- Swarm Extension Protocol
- Whisper Extension Protocol

2019

Q 1
SmartMesh Android SDK Package •
SmartMesh iOS SDK Package •

Q 2
- Optimize Mobile Phone P2P Driver
- Development of Mobile Phone Network Chip P2P New Standard

Q 3
Optimize Multi-Hop Mesh Network Performance •
Development of New Mobile Network Chip P2P Standard •

Q 4
- Construct SmartMesh Ecosystem

SmartMesh ico Allocation and distribution

Only 3,141,592,653 SMT tokens will ever be created. The SMT tokens are intended to be allocated as follows:

 - 40% to be sold by the Company to Crowdsale and pre-crowdsale purchasers pursuant to the offering or through Company Approved Affiliates.
 - 25% reserved by the Company to incentivize future developements.
 - 12% reserved by the Company early investors.
 - 10% to be distributed by the Company to the SmartMesh team.
 - 5% to be used for marketing purposes throughout the entire project.
 - 4% reserved by the Company advisory board.
 - 4% reserved by the Company angel investors.
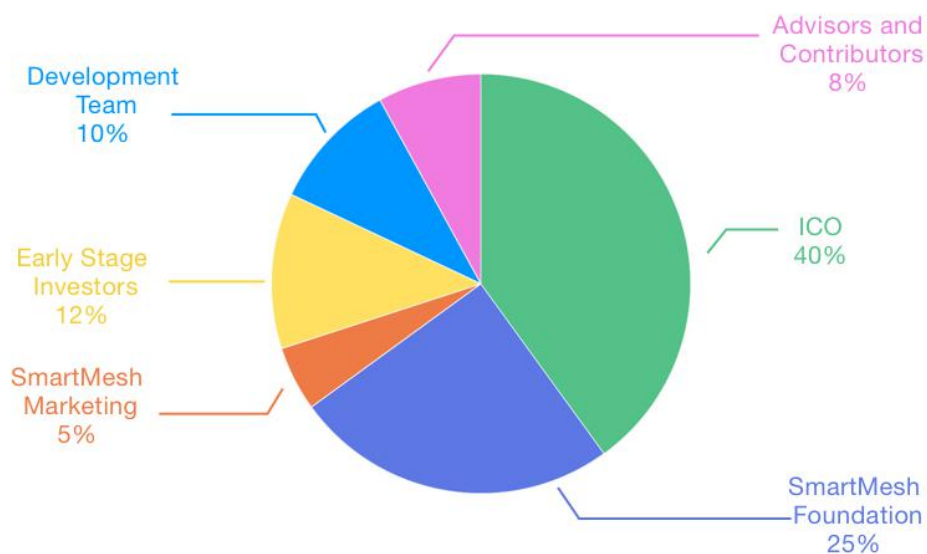
 - SmartMesh platform and Company Staff tokens will be locked for 24 months after the end of the Crowdsale.
 - Company angel investors and early investors tokens will be locked for 12 months after the end of the Crowdsale.
 - Company advisory board tokens will be locked for 12 months after the end of the Crowdsale, and released at a rate of 25% per quarter thereafter.