Pollen Mobile White Paper

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INTRODUCTION

Corporations, governments, and rogue non-state actors routinely exploit the centralized nature of existing wireless communications networks to oppress and profit. The world needs a private, anonymous, and decentralized global wireless communications network that is built, owned, and operated by its users.

Modern distributed ledger technologies (including Bitcoin, Ethereum, and Solana) have revolutionized the ability to anonymously conduct secure digital transactions and operate smart contracts via decentralized networks.

Predecessor initiatives (including Helium) have demonstrated that distributed ledger applications, a crypto-enabled incentive and payments system, open source technologies, and decentralized governance models can be harnessed to revolutionize the development and operation of physical world networks.

Recently, the US Federal Communication Commission's creation of the Citizens Broadband Radio Service ("CBRS") — the frequency band from 3.55 GHz to 3.70 GHz accessible without purchasing a spectrum license[1] — has democratized a portion of the US airwaves, no longer restricting access to the few corporations that can afford the multi-billion dollar prices required to win spectrum auctions.

Here we introduce Pollen - the first privacy focused, anonymous, decentralized, 4G / 5G, open source mobile network[2] enabled by a crypto economy that is owned and operated by its users.

The core elements of the Pollen network include:

- Utilization of CBRS spectrum (in the US)
- A distributed ledger-based digital infrastructure (initially built on the Solana blockchain)
- A crypto economy utilizing PollenCoin (PCN), a Solana token
- Gamified rewards (paid in PCN) to incentivize early adoption and network development
- Open source network infrastructure, including Magma Core

[1] There are 15 channels in the CBRS band, eight of which are open and seven of which can be leased on a zip code-by-zip code basis.

[2] We are building a "data-only" mobile network because legacy concepts such as "phone calls" and "text messaging" are inherently insecure, incompatible with our Core Values, as outlined below, and can be replicated with applications such as Signal, iMessage, FaceTime, and WhatsApp, which are compatible.

- Open source designs created by Pollen to enable community members to source / build their own hardware
- Decentralized governance via an Enhanced Distributed Autonomous Organization (DAO) model

Pollen Core Values

Freedom: Our most important Core Value. The right to freedom of expression has long been a core value in many parts of the Western world — enshrined in the US Constitution as the first amendment in the Bill of Rights. The advent of the internet initially promised to extend that right to all of humanity. Instead of delivering on that promise, the centralization of the world's digital communications systems and networks has in too many instances handed the tools of exploitation, oppression, and manipulation to increasingly powerful states and non-state actors.

Pollen was created to help deliver on that initial promise of the internet.

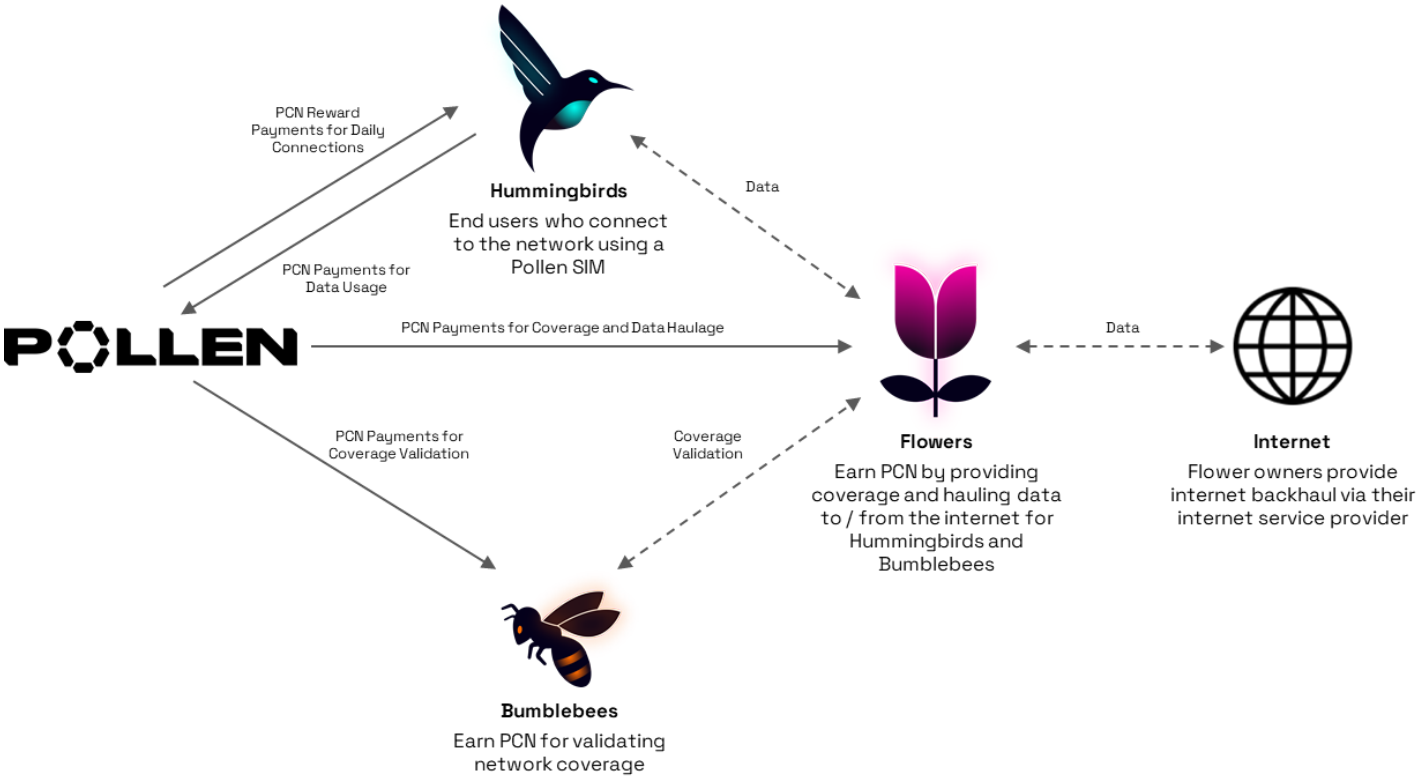
Anonymity: Individuals have the right to access the internet on an anonymous basis.

Privacy: Individuals have the right to privacy when accessing the internet.

Decentralization: No single corporation, government, or individual should control the world's communication networks.

Transparency: To ensure the integrity of the Pollen network, users' trust, and fulfillment of the first four Pollen Core Values, the network must be as open source as possible and controlled by its user community via a transparent governance structure (in this case via a proposed Enhanced Decentralized Autonomous Organization, or "eDAO").

Simplified Pollen Ecosystem Overview



Key Pollen Network Actors

The Pollen network involves the following key actors:

Network Providers ("Flowers"): Flowers are mobile network antennas[3] that are built to open standards. When connected to the internet, Flowers provide wireless coverage and earn their owners PCN, Pollen's Solana token, in return for the coverage provided and data hauled for end users. Pollen does not store the personal information of Flower owners. Flower ownership (and right to associated rewards payments) will be registered via a Non-Fungible Token that will be tied to the owner's Solana wallet, enabling owners to maintain anonymity and transfer ownership of devices without requiring any centralized approval or registration.

Acacia Flower

Camellia Flower

Validators ("Bumblebees"): Bumblebees are small embedded Linux devices with built-in LTE and GPS antennas, used to verify Flower network coverage. Bumblebees validate network coverage by reporting Pollen network coverage statistics as they move through the physical world. Data reported includes date / time, GPS location, and network traffic statistics (e.g., ping times, upload / download speeds, signal strength) in addition to their own unique identifier and the unique identifiers of Flowers for which coverage is verified.

Bumblebee owners are rewarded with PCN for their daily network validation activities. Pollen does not store the personal information of Bumblebee owners. Like Flowers, Bumblebee ownership will be registered via a Non-Fungible Token that will be tied to the owner's wallet, enabling owners to

[3] Antennas can range in size from a roof-mounted tower to a small pizza box-sized window mount.

maintain anonymity and transfer ownership of devices without requiring any centralized approval or registration.

In the initial phase of the network's deployment, Bumblebees will be able to connect to the network and transfer data for free - in Phase II, Bumblebee owners will need to purchase Data Credits using PCN for connectivity and data transfer.

Bumblebee

End Users ("Hummingbirds"): Hummingbirds are end user equipment ("UE"), such as mobile phones, that can utilize the Pollen network for mobile connectivity. In the US, CBRS and eSIM compatible devices will be able to download a Pollen eSIM which will enable them to become a Hummingbird and connect to the Pollen network. eSIMs will also be associated with an NFT to allow for anonymous payment of the daily rewards. Pollen does not store the personal information of Hummingbird owners.

In Phase I of the network's deployment, Hummingbirds will be allowed unlimited data consumption at no charge beyond the cost of the eSIM. Hummingbird owners will also receive PCN rewards every day the Hummingbird connects to the network.

Beginning in Phase II of the network's deployment, Hummingbird owners will pay for data consumption using PCN. To incentivize early adopters to join the network, the first 100,000 Hummingbird owners to purchase a Pollen eSIM will also receive 10 Data Credits, good for transferring 10 GB of data on the network.

Pollen will not support "phone calls" or "text messages / SMS" due to those technologies' incompatibility with Pollen's Core Values and the existence of alternative technologies that are consistent (e.g., Signal, FaceTime, WhatsApp).

We also plan to launch an adapter - called Wings - that provides network connectivity to devices that don't have built-in connectivity (e.g., a laptop), thereby enabling the device to become a Hummingbird.

Pollen Operating Company ("Opco"): The initial organization (Pollen Mobile LLC) that will guide development of and manage the network until other service providers are engaged and control over the network is fully turned over to the Pollen community via the eDAO. Pollen Opco will serve as the initial Mobile Core Administrator.

Pollen Foundation ("Foundation"): The Foundation is contemplated to be a non-profit legal entity which will own all Foundation Banks. The Foundation will be formed in conjunction with the establishment of the eDAO in consultation with the Pollen community during Phase II of the network's deployment. Ownership of the Foundation will be transferred to the Pollen eDAO in Phase III.

Pollen Enhanced Decentralized Autonomous Organization ("eDAO"): The Pollen eDAO will be established to take over management responsibilities and ownership of the network and Foundation from Pollen Opco in Phase III of the network's development. The eDAO is also intended to take over the Mobile Core Administrator role from Pollen Opco, or the community may elect to engage other third parties to fulfill the Mobile Core Administrator's roles. The eDAO will be owned and governed by PCN holders.

Unlike most precedent DAOs, we envision the Pollen eDAO being structured with enhanced governance features to address some of the shortcomings of current DAOs. For example, the full Pollen community may vote on certain key major decisions, including appointing a governing board, who will in turn appoint a community "management team" responsible for day-to-day decision making and operations.

Mobile Core Administrator(s): The Mobile Core is the collection of services that serve as the "operating system" of a mobile network. The Mobile Core facilitates activities such as authenticating authorized devices / users on the network, tracking user data consumption, and routing data through the network. Pollen utilizes the open source Magma Core software platform, which will initially be managed by Pollen Opco (the initial Mobile Core Administrator).

The Mobile Core Administrator will also be responsible for managing the Spectrum Access Service ("SAS") necessary to comply with the FCC's CBRS rules, as well as processing the per-Flower monthly payments charged by SAS providers.

The Administrator role may also be fulfilled by different / multiple service providers.

We segment the Mobile Core Administrator's responsibilities into three distinct categories:

- **Network Infrastructure Management:** Includes maintaining the Mobile Core software infrastructure, PCN payments processing (centralized in Phase I of Pollen's deployment and moving to blockchain smart contracts in Phase II), managing the Internet Egress Privacy Service, managing / processing payments to the SAS, and providing initial customer / technical support to community members.

- **Identity Management**: Pollen Subscriber Identity Modules (physical cards inserted into mobile devices, also known as "SIMs") and Embedded SIMs (also known as "eSIMs"; both can be generically referred to as a "SIM") are created and issued by a commercial provider of SIMs.

  SIMs contain an International Mobile Subscriber Identity ("IMSI") number, which is used to uniquely identify / authenticate user equipment ("UE") in order to provide network access and track data consumption for billing purposes. The SIM also enables encrypted communications within the network.

  The Mobile Core Orchestrator will maintain the IMSI mapping to an associated NFT, and the blockchain will be used to map the NFT to the Solana wallet of the UE's owner for purposes of routing PCN transfers while maintaining wallet owners' anonymity.

  To further support anonymity and prevent IMSIs from being tied to a user's identity, a development priority will be enabling the network to roll IMSIs on a periodic, random basis, such that even if a hostile actor manages to associate an IMSI to a UE, it will be temporary. Additionally, we envision the ability for users to be able to request a new IMSI on demand.

- **Data Credits Management:** The Mobile Core will track all Data Credit purchases, balances, and consumption for Hummingbirds and Bumblebees via its billing functionality.

Key Pollen Network Concepts

Key concepts of the Pollen network include:

PollenCoin ("PCN"): A token built on the Solana blockchain according to the SPL token standard and utilized within the Pollen network for: 1) Data Credit purchases from the Foundation; 2) to compensate Flower owners for a) providing network coverage, and b) transferring data for Hummingbirds and Bumblebees; 3) to compensate Bumblebee owners for validating Flower coverage; and 4) to reward Hummingbird owners for utilizing the network.

Initially, the value of one PCN will be pegged to the US Dollar ("USD") at a value of 1 PCN : USD $0.10 for the purposes of purchasing Data Credits. The price of PCN may be changed in the future by Pollen Opco or the eDAO.

The number of PCN minted is permanently fixed at 1,000,000,000 (one billion).

Data Credits ("DCs"): Beginning in Phase II of the network's deployment, Hummingbird and Bumblebee owners will use PCN to purchase Data Credits ("DCs"), each of which entitles a user to 1 GB of data transfer on the Pollen Network. The price of DCs are initially fixed at 1 DC : USD $0.50. The price of DCs may be changed in the future by Pollen Opco or the eDAO.

Pollen Hex ("Hex"): Pollen network coverage is measured on a hexagonal grid defined by the H3 hierarchical spatial index. Pollen utilizes Hex Level 9 as its primary Hex. Hexes are utilized for various purposes, including for calculating PCN payments to network participants (e.g., Flower coverage payments are tied to the number of unique daily combinations of Bumblebee-Hex connections) and placing Pollen Drops.

Pollen Flower Placement (Beta as of 1/31/22)

Internet Egress Privacy Service ("IEPS"): SIMs encrypt all user data traffic between user equipment (Hummingbirds), the radio network (Flowers), and the Mobile Core. Where the Mobile Core delivers traffic to the internet (called the internet egress point), user traffic can be monitored and intercepted by parties conducting network surveillance and traffic analysis, including Internet Service Providers and governments.

Pollen Opco will initially utilize open source WireGuard software that will ensure all network traffic is aggregated and encrypted in order to prevent user data from being surveilled and / or intercepted. Eventually the community will be able to implement additional and / or alternative services once management of the network is turned over to the eDAO.

POLLEN'S CRYPTO ECONOMY

Initial PollenCoin Allocations

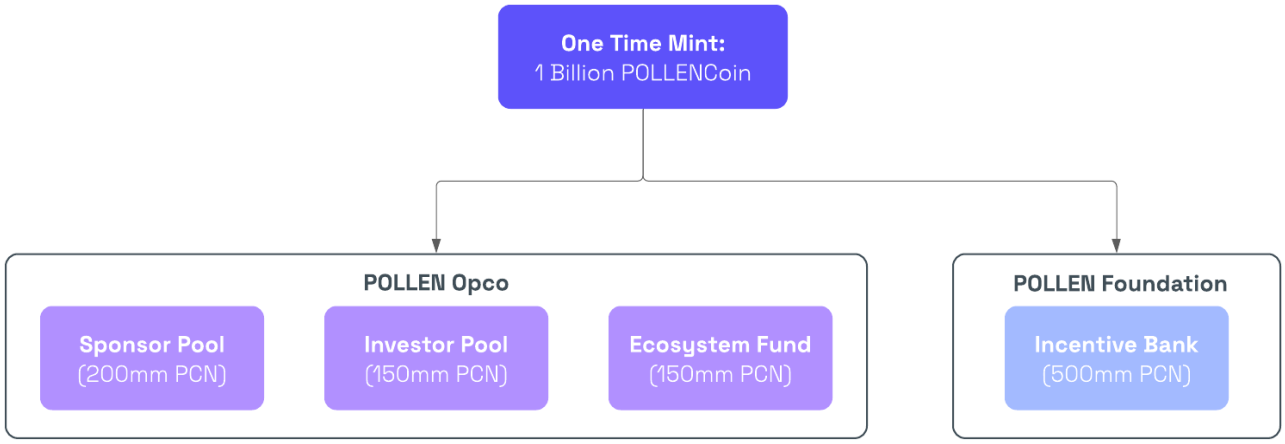
The permanently fixed one billion PollenCoin supply will be initially allocated as follows.

500 million - Pollen Foundation Incentive Bank: Earmarked for Incentive Payments, as further described in Foundation Banks.

200 million - Sponsor Pool: Subject to a three-year vesting / lockup schedule with a one year cliff (i.e., 1/3rd will vest on the one year anniversary of granting, with 1/36 of the initial balance vesting monthly thereafter).

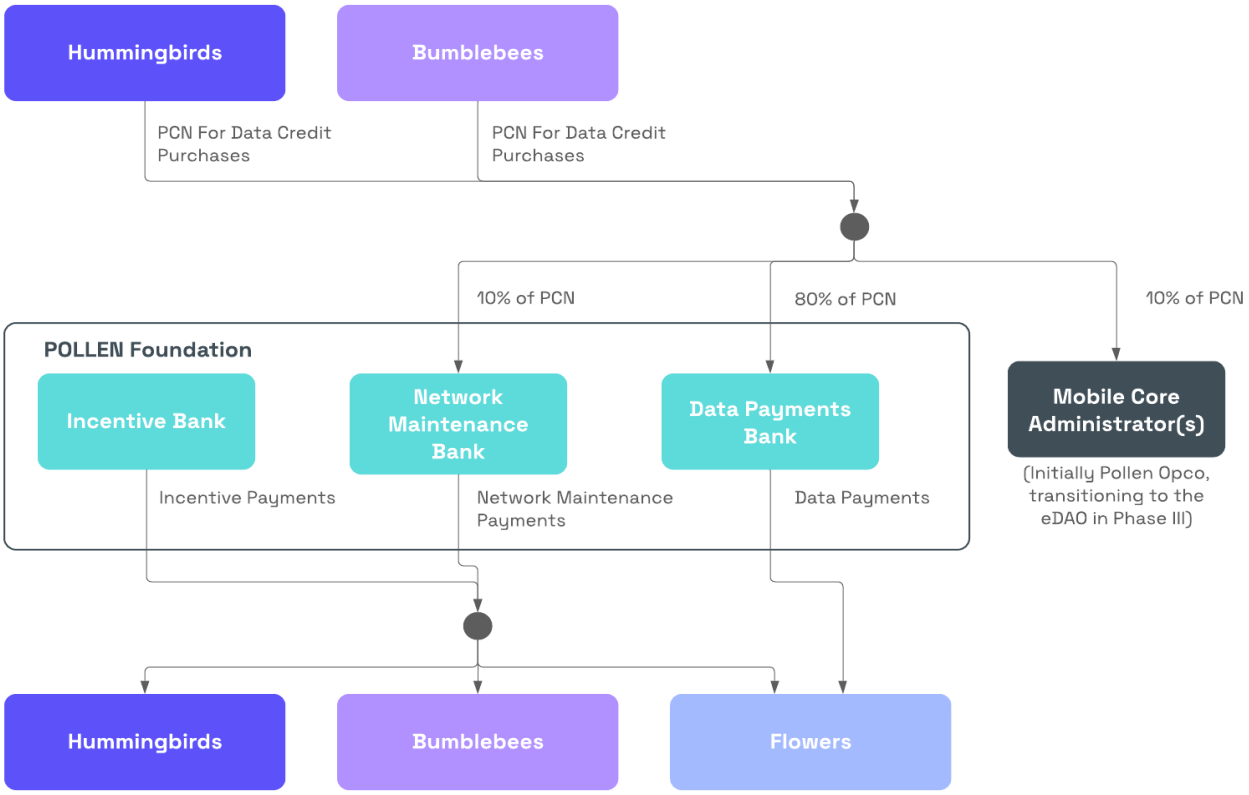
150 million - Investor Pool: Earmarked for outside investment in the network and subject to the same vesting / lockup schedule as the Sponsor Pool.

150 million - Ecosystem Fund: Earmarked for payment to teams / partners providing critical services to the network (e.g., software development, hardware development or marketing). May be subject to vesting schedules that differ from the Sponsor and Investor Pools.



Initial PollenCoin Allocations

Pollen Crypto Economy Overview



Overview of Pollen's Crypto Economy

Foundation Banks

Within the Foundation there will be three banks maintained on the Solana blockchain:

Incentive Bank: The initial deposit of 500 million PCN that will be used for Incentive Payments to reward community members for deploying Flowers / providing coverage, validating coverage utilizing Bumblebees, and connecting to the network (Hummingbirds).

Network Maintenance Bank: Beginning in Phase II, 10% of PCN spent purchasing Data Credits will be deposited here. PCN deposited in the Network Maintenance Bank will be used on an ongoing basis to compensate Flower owners for providing coverage, Bumblebee owners for verifying coverage, and Hummingbird owners for utilizing the network.

Data Payments Bank: Beginning in Phase II, 80% of PCN spent purchasing Data Credits will be deposited here - balances are used to compensate Flower owners for hauling networlk data traffic.

Payments

Initially all payments calculations will be centrally computed by Pollen Opco. Pollen Opco will also initiate all payments. In the interest of transparency, aggregated log data and payments calculations will be publicly posted for the community to audit. All payments will be migrated to smart contracts on the blockchain in Phase II.

Incentive Payments: The purpose of Incentive Payments is to provide an incentive for early adopters to build, validate, and begin utilizing the network.

The 500 million Incentive PCN will be distributed in regular base installments of 300,000 per day to Flower, Bumblebee, and Hummingbird owners to reflect their respective contributions to the network.

Incentive Payments will be made according to the number of PCN Incentive Credits ("PICs") earned each day (days begin at 00:00 UTC).

- Flowers: Earn 10 PICs for every unique Flower-Bumblebee-Hex validation per day, subject to a maximum number of daily validations per unique Bumblebee, which will vary based upon Flower type (e.g., a Camellia Flower will be capped at seven Hex validations per unique Bumblebee in a given day).

- Bumblebees: Earn 1 PIC for every unique Bumblebee-Flower-Hex validation per day, subject to a maximum number of daily validations per unique Flower, which will vary based upon Flower type (e.g., a single Bumblebee will be capped at Hex connections per unique Flower in a given day, based upon the Flower type, so a single Bumblebee will only receive credit for connecting to the same Camellia in a maximum of seven different Hexes in any given day).

- Hummingbirds: Earn 1 PIC for every daily connection to the Pollen Network.

The payouts for each day will be distributed according to each participant's daily PIC earnings relative to the network's overall daily PIC earnings:

$$Individual\ Daily\ PCN\ Earned\ = \left(\frac{Individual\ Daily\ PICs\ Earned}{Total\ Network\ Daily\ PICs\ \ Issued}\right) \times (Total\ Daily\ PCN\ Incentive\ Payment)$$

For example, if a given Flower earns 200 PICs in a given day, 100,000 total PICs were earned across the network, and 300,000 PCN were being paid as the total Incentive Payment for that day, the

Flower owner would receive 600 PCN. In this same scenario any Hummingbird who connected to Pollen that day would receive 3 PCN.

In order to provide an incentive to be an early participant in the network, the number of PCN paid out in daily Incentive Payments will halve at two milestones:

- First Halving (to 150,000 PCN per day): Occurs when the Incentive Bank is ⅓ depleted (i.e., drops below a balance of 333,333,333 PCN).

- Second Halving (to 75,000 PCN per day): Occurs when the Incentive Bank is ⅔ depleted (i.e., drops below a balance of 166,666,667 PCN).

If any PCN remains in the Incentive Bank on the 10-year anniversary of the first Incentive Payment, all remaining PCN will be paid out in the Incentive Payments for that date.

To incentivize early adopters to utilize the network, the first 100,000 Hummingbird owners to purchase a Pollen SIM will also receive 10 Data Credits, which will be purchased from the Foundation using PCN from the Incentive Bank.

Pollen Drops (or "PCN Drops"): Each Hex will contain a cache of PCN. The amount of PCN dropped will vary by Hex and will be strategically placed to incentivize network development. The first Flower to provide coverage in a given Hex for 30 consecutive days will be rewarded with the PCN Drop. If the original Flower interrupts coverage during the 30 days, the clock will reset. If a second Flower achieves 30 days of consecutive coverage before the original Flower is able to do so, the second Flower's owner will earn the PCN Drop.

Data Payments: Beginning in Phase II of the network's deployment, on a daily basis, PCN will be paid to Flower owners from the Data Payments Bank. The total amount of PCN paid out each day will be calculated according to the following formula:

$$Total\ PCN\ Paid\ to\ All\ Flowers\ = \left(\frac{Total\ Data\ Credits\ Consumed}{Beginning\ Data\ Credits\ in\ Mobile\ Core + Data\ Credits\ Purchased}\right) \times (End\ of\ Day\ PCN\ in\ Data\ Payments\ Bank)$$

For example, if the end of day PCN balance in the Data Payments Bank was 15,000,000 PCN, the beginning total Data Credit balance was 5,000,000 with 1,000,000 purchased during the day and 500,000 DCs / GBs consumed during the day, the total amount of PCN paid out in Data Payments for the day would be:

$$Total\ Daily\ Data\ Payments\ = \left(\frac{500{,}000\ DCs}{5{,}000{,}000\ DCs + 1{,}000{,}000\ DCs}\right) \times\ 15{,}000{,}000\ PCN\ = 1{,}250{,}000\ PCN$$

Data Payments are allocated pro rata according to the amount of data hauled by each Flower relative to the collective amount of data hauled by all Flowers on the network.

$$PCN\ Paid\ to\ An\ Individual\ Flower\ =\ \left(\frac{Data\ Transferred\ by\ Flower}{Total\ Data\ Transferred\ by\ All\ Flowers}\right)\ \times\ (Total\ PCN\ Being\ Paid\ as\ Daily\ Data\ Payment)$$

To continue the illustrative example, if the total PCN being paid out in daily Data Payments is 1,250,000; Flower 1 hauled 100 GB of data, and the entire network hauled 500,000 GB of data, Flower 1 would receive 250 PCN.

$$Flower\ 1\ Data\ Payment\ =\ \left(\frac{100\ GB}{500{,}000\ GB}\right)\ \times\ 1{,}250{,}000\ PCN\ =\ 250\ PCN$$

CBRS rules require every Flower to be connected to a Spectrum Access System ("SAS") to ensure CBRS networks are not interfering with other priority users of the spectrum, such as US Navy radar systems. SAS services are provided by multiple companies (e.g., Federated Wireless, CommScope) that have been authorized by the FCC, which are allowed to charge a "reasonable fee" (generally ranging from a few dollars to as much as ~$15 per month) depending upon Flower type (e.g., larger, higher power Flowers that are classified as "Class B" devices incur higher monthly SAS charges).

For the first twelve months following the launch of Pollen, Pollen Opco will cover all SAS costs for all Flowers.

After the first twelve months, beginning on the first of each month, PCN will be withheld in the Data Payments Bank from Data Payments to each Flower to cover its respective SAS cost. For example, if a Flower's monthly SAS cost is $5 and the price of PCN is $0.50, then the first 10 PCN earned in a new month will be retained by the Foundation to cover SAS fees, and every additional PCN earned that month will be paid to the Flower owner.

If an individual Flower's monthly earnings are ever insufficient to cover its SAS cost, its SAS payment will be borrowed from the Data Payments Bank, subject to limitations, to be paid back from future PCN earnings or direct PCN payments made to the Foundation from the Flower owner.

Network Maintenance Payments: Beginning in Phase II when data consumption becomes paid, daily Network Maintenance Payments are paid pursuant to a calculation that blends elements of both Data Payments and Incentive Payments, with the intent of providing a reward beyond Data Payments for maintaining the network after the Incentive Bank is depleted.

The formula for calculating the total daily Network Maintenance Payments is as follows:

$$Total\ PCN\ Paid\ =\ \left(\frac{Total\ Data\ Credits\ Consumed}{Beginning\ Data\ Credits\ +\ Data\ Credits\ Purchased}\right) \times (End\ of\ Day\ PCN\ in\ Network\ Maintenance\ Bank)$$

Network Maintenance Payments will be allocated according to a similar formula as Incentive Payments, only will be calculated using PCN Maintenance Credits ("PMCs"):

- Flowers: Earn 10 PMCs for every unique Flower-Bumblebee-Hex validation per day, subject to a maximum number of daily validations per unique Bumblebee, which will vary based upon Flower type (e.g., a Camellia Flower will be capped at seven Hex validations for any single Bumblebee in a given day).

- Bumblebees: Earn 1 PMC for every unique Bumblebee-Flower-Hex validation per day, subject to a maximum number of daily validations per unique Flower, which will vary based upon Flower type (e.g., a single Bumblebee will be capped at Hex connections per unique Flower in a given day, based upon the Flower type, so a single Bumblebee will only receive credit for connecting to the same Camellia in a maximum of seven different Hexes in any given day).

- Hummingbirds: Earn 1 PMC for every day a connection to the Pollen network is established.

As an illustrative example, if the total PCN to be paid out in Network Maintenance Payments for a given day is 10,000 PCN, a Flower earned 100 PMCs, and a total of 50,000 PMCs were issued, the Flower would receive 20 PCN in Network Maintenance Payments.

Mobile Core Administration Payments: Of every PCN spent purchasing Data Credits, 80% will be deposited to the Data Bank and 10% will be deposited to the Network Maintenance Bank. The remaining 10% will be allocated to the Mobile Core Administrator, which will be compensation for services provided and funding to pay for third party service providers other than SAS costs (e.g., Mobile Core server costs, IEPS provider costs, etc.)

The initial Mobile Core Administrator will be Pollen Opco. The eDAO is expected to become the Mobile Core Administrator in Phase III, though the community / eDAO may elect to have multiple parties fulfill the various roles played by the Mobile Core Administrator.

Data Credit Payments: Beginning in Phase II of the network's deployment, Bumblebees and Hummingbirds will be required to purchase Data Credits ("DCs") in order to transfer data over the Pollen network (1 DC purchases 1 GB of data transfer).

DCs are purchased in PCN from the Pollen Foundation and will be tracked by the Mobile Core Orchestrator.

Flower-Bumblebee Daily Validation Limits: In order to help prevent abuses of Incentive Payments and Network Maintenance Payments, the number of daily unique Flower-Bumblebee-Hex combinations that can earn PICs / PMCs for Flower and Bumblebee owners will be capped by Flower type according to the following schedule, defined in Level 9 Hexes:

- Camellia: 7 Hexes
- Dandelion: 10 Hexes
- Buttercup: 50 Hexes
- Acacia: 100 Hexes

For example, if Bumblebee 1 connects to Camellia Flower 1 in seven different Hexes in any given day, it will receive seven PICs for those connections, and Camellia Flower 1 will receive 70 PICs. Any additional connections that day between those two unique devices will not earn any additional PICs for their respective owners.

Limits may be changed in the future by Pollen Opco or the eDAO, and new Flower models will have their own limits based upon their technical specifications.

Additional Rewards

In addition to the incentives embedded in Pollen's crypto economy, there are several additional rewards mechanisms designed to further incentivize the development of a high quality, dense coverage network.

All Additional Rewards and the wallets they were rewarded to will be publicly posted on the blockchain.

SIM Data Credits: The first 100,000 SIMs purchased will also include 10 free Data Credits, worth 10 GB of data transfer on the network.

Geographic Boosts: Hexes may be given "boosts" that result in a multiplier being applied to all PCN earnings in the Hex. One potential use case for Geographic Boosts is strategically encouraging network development in a specific city.

For example, if network coverage is strong in San Francisco but weak in Oakland, a 2x Geographic Boost may be applied to all Oakland Hexes for a limited amount of time to incentivize new Flower deployments, Bumblebee coverage verifications, and Hummingbird connections.

Top Pollinator Rewards: Pollen Opco or eventually the eDAO may implement Top Pollinator rewards - for example, Bumblebees that log the most unique daily Flower validations in each Level 6 Hex will receive a 2x multiplier on all PCN earned during the next day.

Loot Boxes: In addition to Pollen Drops, Loot Boxes may be strategically dropped into Hexes at any time (by Pollen Opco or eventually the eDAO) that provide additional rewards for Flowers, Bumblebees, and / or Hummingbirds subject to certain conditions.

POLLEN'S MOBILE NETWORK INFRASTRUCTURE

Mobile Network Infrastructure Overview

Mobile network infrastructure consists of three high level elements: User Equipment, the Radio Access Network, and a Mobile Core Network.

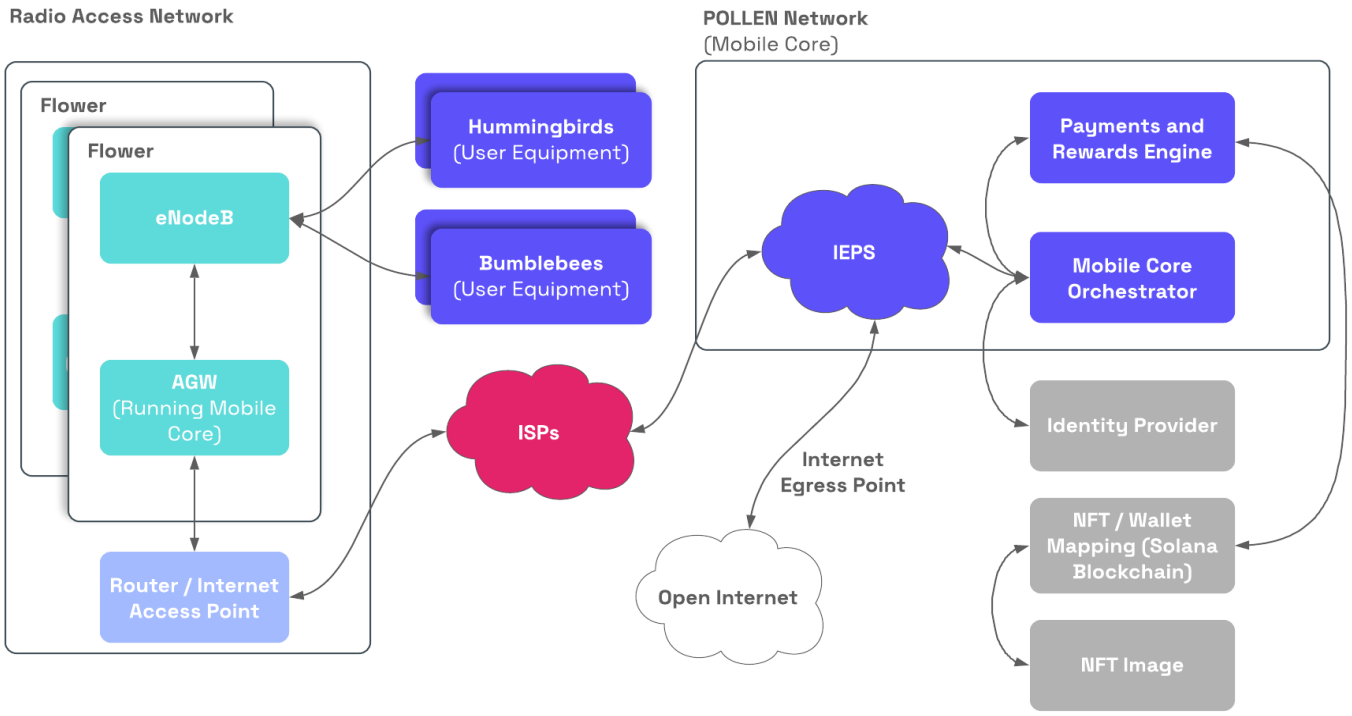
- **User Equipment ("UE"):** Devices used by end users (e.g., mobile phones) to connect to the RAN in order to send / receive data and voice communications.

- **Radio Access Network ("RAN"):** The network of radio base stations that connect UEs to the Mobile Core network, voice services, the open internet, etc. Radio base stations generally require a high speed backhaul connection to route data from the base station to the operator's network / Mobile Core / internet.

- **Mobile Core:** The Mobile Core is the heart of a wireless network and consists of a complex set of services that include the handling of user data metering, user validation and authentication, radio management, and voice and data services.

Pollen's Network Infrastructure

Legacy wireless carriers operate centralized networks that track and aggregate highly personal usage data, including location history, call / SMS history, websites visited, etc. As the world's first decentralized, privacy-first mobile network, Pollen's infrastructure is designed to make such personal data collection impossible.



Simplified Pollen Network Architecture

Key components of the Pollen network include:

- Hummingbirds (UE): Devices used for communications (e.g., mobile phones) capable of connecting to Flowers (in the US, via the CBRS spectrum).
- Bumblebees (UE): Pollen-designed devices that verify network coverage and report statistics back to the Pollen network via Flowers.
- eNodeB: An eNodeB is an LTE radio that operates on the CBRS spectrum (3.55 - 3.70 GHz) to communicate with UE / mobile devices. The eNodeB is connected to a GPS receiver used to determine geographic positioning (a requirement of utilizing CBRS). The eNodeB is in turn connected to the AGW via a local ethernet connection. For 5G service, this device is called a gNodeB, which Pollen will support when 5G becomes available.

- Access Gateway ("AGW"): The AGW is a small computer that is part of the Flower and runs a reduced instance of the Mobile Core. Unlike legacy mobile networks that run a fully centralized Mobile Core, Pollen runs services on a partially decentralized instance of the Mobile Core at the edge of the network.
- Router / Internet Access Point: Flower owners need to provide internet connectivity to the Flower (in addition to electricity). The AGW connects via a local ethernet connection to the Router / Internet Access Point, which is in turn connected to the Flower owner's Internet Service Provider.
- Internet Service Provider ("ISP"): A service provider the Flower owner contracts with to connect to the internet.
- Internet Egress Point: The point at which data is delivered to / received from the open internet.
- Internet Egress Privacy Service ("IEPS"): A Pollen-provided service that further encrypts communications and moves the Internet Egress Point from the ISP to the IEPS provider, preventing any actor from intercepting data or running network data analyses. Pollen will initially utilize the open source WireGuard service to provide the IEPS.
- Mobile Core Orchestrator: The Orchestrator is a concept from Magma that facilitates subscriber management and communications with AGWs running on the edge of the network. Key functions performed by the Orchestrator include authenticating users (including mapping IMSI to NFT) and metering data usage, i.e., tracking Data Credits and authorizing users to transfer data if they possess enough Data Credits.
- Payments and Rewards Engine: Where all data consumption and network verification log data are processed for purposes of making PCN payments to network participants (e.g., Incentive Payments, data haulage payments, etc.) Initially the engine will be centrally managed by the Mobile Core Administrator, but will be migrated to the blockchain in Phase II.
- Identity Provider: The Identity Provider is the entity that produces the SIMs. We anticipate having multiple Identity Providers in order to avoid reliance on any single third party.
- NFT / Wallet Mapping: The mapping of each Pollen NFT to the Solana wallet of the current NFT owner is maintained on the Solana blockchain.
- NFT Image: The image associated with each Pollen NFT is stored on Arweave, a blockchain-based, decentralized "hard drive".

NETWORK DEPLOYMENT PHASES

Phase I: Network Launch; Centralized Mobile Core Administration

The focus of Phase I will be developing a high quality, dense network of Flowers:

- **Flower and Bumblebee Sales**: Pollen Opco will make Flowers and Bumblebees available for sale via the Pollen website (www.pollenmobile.io). Flower and Bumblebee owners will begin earning PCN rewards for providing and verifying network coverage, respectively.

- **SIM Sales**: Pollen Opco will make eSIMs available for purchase via the Pollen website (www.pollenmobile.io). Purchasers of eSIMs will receive an email that includes a QR code that will facilitate the activation of the Pollen eSIM on their mobile device.

  In future Phases we plan to implement a more robust process for maintaining Hummingbird owners' anonymity in purchasing and receiving eSIMs.

- **Hummingbird Activation**: Once an eSIM is imported into a CBRS-capable mobile device and it becomes a Hummingbird, the owner will be able to begin utilizing the Pollen network and earning PCN rewards for daily utilization. Hummingbirds will receive unlimited data usage at no charge beyond the cost of the eSIM during this phase.

- **Centralized Mobile Core Administrator Functions**: Pollen Opco will fulfill the Mobile Core Administrator functions in a largely centralized manner. In the interest of transparency, aggregated log data and payments calculations will be publicly posted for the community to audit.

Phase II: Data Payments Go Live; Decentralized Mobile Core Administration

Phase II is when the Data Credit system will go live (i.e., Hummingbird and Bumblebee owners will begin paying for data usage and Flower owners will begin receiving payments for data haulage) and Mobile Core Administrator functions are migrated to the blockchain on smart contracts.

- **Data Credit Sales**: Hummingbird and Bumblebee owners will begin purchasing and utilizing Data Credits (with PCN) to transfer data on the network.

- **Data Transfer Payments**: Flowers will begin receiving PCN payments for data hauled for Hummingbirds and Bumblebees.

- **Network Maintenance Payments**: The Network Maintenance Bank will begin receiving PCN as part of every Data Credit purchase. Network Maintenance payments to Flowers, Bumblebees, and Hummingbirds will begin.

- **Decentralized Mobile Core Administrator Functions**: Mobile Core Administrator functions will be migrated to the blockchain using smart contracts, e.g., PCN payments to Flowers are automatically calculated and distributed to Flower owner wallers.

- **Fully Anonymized eSIM Sales**: eSIM sales and delivery will be fully anonymized, i.e., no longer delivered via email.

- **Establish eDAO**: In consultation with the Pollen community, Pollen Opco will form the Foundation and establish the eDAO architecture in preparation for turning full network ownership and governance over to the eDAO.

- **Publish Open Source Protocols**: Network infrastructure, software, and hardware open source protocols will be published.

Phase III: eDAO Ownership and Governance

Phase III will begin once Phase II is complete and the eDAO has been established. At that point, ownership of the Foundation and management of the network will be turned over to the community via the eDAO.