

Pi Mainnet Launch

Pi Mainnet is now live, initiating the **Enclosed Network period** of Mainnet phase where the Mainnet blockchain is firewalled to prohibit external connectivity but allows peer-to-peer and peer-to-app transfers within the enclosed network. Mainnet can be viewed in the Pi Block explorer. **Pi wallet can now show both Testnet and Mainnet balances, although everyone's balance on Mainnet is 0 right now.** As more Pioneers pass KYC, they will be able to transfer their balance to the Mainnet. The KYC solution is coming soon to start verifying Pioneers' identity and onboarding identity validators.

Note that **Pi Network is NOT running an ICO or any type of crowd funding sales of Pi.** Thus, any party impersonating Pi Network or its founders to conduct a sale or listing is illegal and fake. Any sales of Pi towards Pioneers are unauthorized and have no affiliation with the Pi Core Team. Pioneers should beware of any scams and not participate. Pi can be mined freely by contributing to the ecosystem through our mobile app. Further, any mined Pi can only be claimed from inside the official Pi App through the Mainnet dashboard and then transferred into your Pi wallet. Any website asking Pioneers to claim Pi by other means is fake.

Below is the new draft of the **Pi supply and mining sections of our whitepaper.** Mining will continue in the Mainnet phase but with a mining rate dynamically adjusted within limited supply.

For more details, read the new whitepaper sections that review how supply and mining worked before Mainnet and describe how and why they will change at Mainnet. We will also keep the previously released Roadmap chapter at the bottom for reference. Your feedback is welcome before we update the official whitepaper on our website when Open Network begins.

Today we are also releasing a **preview of the new mining interface** for you to view the new simulated Mainnet mining mechanism in a hypothetical setting and to help you calibrate your lockup setting. **The new mining mechanism will not yet go into effect until more people pass KYC and migrate to the Mainnet.** Before that, all Pioneers can continue mining on the pre-Mainnet mechanism just like before. Once the simulations and calibrations are done and enough Pioneers have migrated into Mainnet, the new Mainnet mining mechanism will take effect and be announced on the home screen.

Token Model and Mining

A well thought-out, sound token design is critical to the success of a cryptocurrency network. It has the potential to create incentives to bootstrap network formation and growth, build a utilities-driven ecosystem, and thereby support the cryptocurrency underpinning such a system. What a network incentivizes says a lot about what a network needs—for example, network growth or fundamentals-driven utility creation, a mere store of value or a medium of exchange for the cryptonative ecosystem. This chapter covers the supply of Pi and

how Pioneers can mine Pi in different phases of the network, and the underlying design rationale for different mining mechanisms including to build and grow the network and to incentivize utilities and demand. Note that Pi is a layer one cryptocurrency running on its own blockchain, which “token” here refers to.

Pi Supply

Pi Network’s vision is to build the world’s most inclusive peer-to-peer economy and online experience, fueled by Pi, the world’s most widely used cryptocurrency. To deliver on this vision, it is important to grow the network and make Pi widely accessible while maintaining the security of the blockchain and the scarcity of Pi. While these goals have always guided the token supply model and mining design, the key distinction is: the pre-Mainnet phases focused on driving network growth and widely distributing Pi and the Mainnet phase will focus on rewarding more diverse forms of Pioneer contributions while cementing the supply of Pi.

Pre-Mainnet Supply

In the early stages, the focus of Pi Network was on growing and securing the network. Bootstrapping to build a critical mass of participants is paramount to any network and ecosystem. Driven by the vision to make Pi the world’s most widely used cryptocurrency, distributing Pi and making it accessible globally further added to the focus on growth. Pi’s consensus algorithm relies on a global trust graph, which is aggregated from the Security Circles of individual Pioneers. It was, therefore, critical

to incentivize Pioneers to form individual Security Circles. This meant a supply of tokens available as mining rewards that was not explicitly capped before Mainnet.

At the same time, maintaining a certain scarcity of Pi was important. As explained under the Mining section, the network adopted a mining mechanism where the network mining rate halves every time the network size increases by 10 times, resulting in a series of halving events when it reaches various milestones of engaged Pioneers. The next halving event based on this model would be when the network reaches 100 million engaged Pioneers. Currently, we are over 30 million engaged Pioneers. The network also retained an option to stop all mining altogether in the event that the network reached a certain size, which was, however, yet to be determined. The option to cap the supply of Pi was not exercised before Mainnet, therefore leaving the total supply undefined.

The pre-Mainnet supply model with a mining mechanism tailored to accessibility, growth and security has bootstrapped a community of over 30 million engaged Pioneers with millions of intertwined Security Circles. A simple, accessible means to mine Pi on a mobile phone helped distribute the tokens widely throughout the world, including among populations that have been left out of the crypto revolution because of a lack of capital, knowledge or technology. In doing so, the network avoided the extreme wealth concentration evident in Bitcoin and other cryptocurrencies, preparing itself to become a true peer-to-peer

decentralized ecosystem with a large enough volume of participants and transactions for utility creation.

Mainnet Supply

Supply fuels growth and incentivizes necessary contributions to the network to achieve an organically viable ecosystem. To that end, mining rewards will continue after Mainnet but will take diverse forms to incentivize different types of contributions, which will be explained in the Mining section below. In regard to supply, the undetermined supply due to the pre-Mainnet mining mechanism that optimizes for accessibility and growth of the network presents a few problems for the Mainnet phase, including unpredictability in planning, over-rewarding and under-rewarding different types of necessary contributions in the new phase, and challenges to scarcity. To address these issues, the network will shift from its pre-Mainnet supply model that is completely dependent on network behavior to the Mainnet supply model where there is a clear maximum supply.

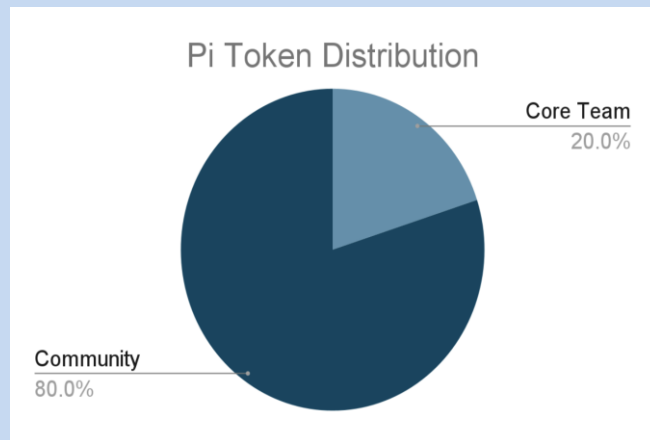
The issue of unpredictability for planning in the pre-Mainnet supply model surfaced in Pi Network's first COiNVENTION in September-October 2020 where the community panel and community submissions discussed whether mining should be halved or stopped at the network size of 10 million at the time. The diverse voices of community members presented the following dilemma for the network. If mining continued based on the ongoing (pre-Mainnet) mining mechanism, then it raised concerns for the supply due to uncertainty, and thus, the scarcity of Pi. However, if mining stopped, it would hurt the growth of the

network and prevent new Pioneers joining the network as miners, thereby undermining the accessibility of Pi. Even though the network moved on from that decision and halved the mining rate at its 10 Million size, this dilemma still remains and needs to be resolved.

How the community can achieve continued growth and accessibility while addressing concerns about supply is one of the main factors considered in the design of the Mainnet token model. In addition, the undefined and unpredictable total supply makes it hard to have overall network token planning because the community as a collective and the ecosystem itself have needs to use some Pi for purposes that benefit the community and ecosystem as a whole, other than only mining rewards for individuals, as evidenced by almost every other blockchain network. Clear allocations for such collective community purposes need to be defined. Hence, given the current network size of over 30 million Pioneers and the expected volume of transactions and activities in the future, the Mainnet supply model has a clear **maximum total supply of 100 billion Pi** allowing incentivizations of continued growth and new contributions while removing the concerns about the unpredictability of the supply.

The supply distribution will honor the original distribution principle in the March 14, 2019 white paper—the Pi community has 80% and the Pi Core Team has 20% of the total circulating supply of Pi, regardless of how much circulating supply there is in the Pi Network at any given point in time. Thus, given a total

max supply of 100 billion Pi, the community will eventually receive 80 billion Pi and the Core Team will eventually receive 20 billion Pi. The following pie chart depicts the overall distribution. The Core Team's allocation gets unlocked at the same pace as the community progressively mines more and more Pi and may be subject to additional lockup through a self-imposed mandate. This means that if the community has a portion of its allocation in circulation (for example, 25%), only the proportional amount in Core Team's allocation (in this example, 25%) can get unlocked at most.



This distribution above shows that Pi Network does not have any allocation for ICO and is NOT running any type of crowdfunding sales of Pi. Thus, any impersonation of Pi Network or its founders to conduct a sale or listing is illegal, unauthorized and fake. These impersonators have no affiliation with Pi Core Team. Pioneers should beware of any scams and not participate. Pi can be mined freely by contributing to the ecosystem. Further, all mined Pi can only be claimed from inside the Pi App through the Mainnet dashboard and then transferred into your Pi wallet. Any website asking Pioneers to claim Pi in other means is fake.

The 80% of the community supply is further divided into: 65% allocated for all past and future Pioneer mining rewards, at address

GBQQRIQKS7XLMWTTTRM2EPMTRLPUGQJDLEKCGNDIFGTBZG4GL5CHHJI25 on the Mainnet, 10% reserved for supporting community organization and ecosystem building that will eventually be managed by a Pi Foundation, a non-profit organization in the future, at address GDPDSLFGVGPX6FJKGZXSTJCPTSKKAI4KBHBAQCCKQDXISW3S5SJ6MGMS, and 5% reserved for the liquidity pool to provide liquidity for Pioneers and developers in the Pi ecosystem at address

GB7HLN74IIY6PENSHHBBJJXWV6IZQDELTBZNXXORDGTL7504KC5CUXEV. The following table depicts the community supply distribution:

Community Allocations	Pi Community Distribution (Out of Projected 80 Billion Pi Total)
Pre-mainnet Mining Rewards	20 billion Pi (approx.)
Mainnet Mining Rewards	45 billion Pi (approx.)
Liquidity Pool reserve	5 billion Pi (approx.)
Foundation reserve	10 billion Pi (approx.)

(Grants, Community events, etc.)	
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65 Billion Pi will be allocated for all mining rewards—both past and future mining. For past mining rewards, the rough sum of all Pi mined by all Pioneers so far (before Mainnet) is about 30 Billion Pi. However, after discarding Pi mined by fake accounts and depending on the speed and participation of KYC, the pre-Mainnet mined Pi at the beginning of the Open Network can be estimated to range from 10 to 20 Billion. The remaining amount in the 65 billion Pi supply for mining rewards will be distributed to Pioneers through the new Mainnet mining mechanism with conceptual yearly supply limits.

Such yearly supply limits will be determined based on a declining formula. The yearly limit may be computed on a more granular basis such as by the day or by an even smaller time epoch dynamically, depending on factors such as the lockup ratio and the remaining supply of the network at the time. Such calculation of supply limits based on granular time epochs helps achieve a better and more smooth allocation curve through time. For the sake of simplicity here, let's suppose that the time epoch is yearly. The declining formula would mean that the yearly supply limit for the first year of new Mainnet mining will be higher than for the second year, the second year's higher than the third year's, and so on. The yearly declining formula and these numbers will need to be finalized closer to the launch of the Open Network period of Mainnet once we will have seen how

many Pioneers have KYC'ed and how much of their mined Pi they have transferred into Mainnet.

At Mainnet, Pioneers will be rewarded for their continued contributions to the growth and security of the network. As explained in the Mining section, Pioneer rewards will be further diversified because the network needs more diverse and in-depth contributions related to app usage, node operation, and Pi lockup. Pre-mainnet Pioneers will continue to contribute to Pi and mine from the Mainnet mining rewards, along with any new members joining the network, to ensure growth and longevity of the network.

10 Billion Pi will be reserved for community organization and ecosystem building that will be, in the future, managed by a non-profit foundation. Most decentralized networks or cryptocurrencies, even though they are decentralized, still need an organization to organize the community and set the future direction of the ecosystem, e.g., Ethereum and Stellar. The future Pi foundation will (1) organize and sponsor community events, such as developer conventions, global online events and local community meetings, (2) organize volunteers and committee members, and pay full-time employees who are dedicated to building the community and ecosystem, (3) gather opinions and feedback from the community, (4) organize future community votings, (5) build branding and protect the reputation of the network, (6) represent the network to interact with other business entities including governments, traditional banks, and

traditional enterprises, or (7) fulfill any number of responsibilities for the betterness of the Pi community and ecosystem. Further, in order to build a utilities-based Pi ecosystem, various community developer programs will be designed, created and carried out by the foundation to support community developers in the forms of grants, incubations, partnerships, etc.

5 billion Pi will be reserved for liquidity pools to provide liquidity for any ecosystem participants, including Pioneers and Pi apps developers. Liquidity is key for an ecosystem to be viable, active, and healthy. If businesses or individuals want to participate in ecosystem activities (e.g., by selling and buying goods and services in Pi), they must have timely access to Pi. Without liquidity, the ecosystem will not have a healthy flow of Pi, hence harming the creation of utilities.

As discussed in the Roadmap chapter, one benefit of the Enclosed Network period of the Mainnet is to allow calibrations on the token model, if any, based on the early Mainnet results. Therefore, the token model is subject to tweaking before the Open Network period starts. Also, in the future, for the health of the network and ecosystem, the network may face questions such as whether there needs to be any inflation after the completion of the distribution of the 100 Billion Pi. The inflation may be necessary to further incentivize contributions through more mining rewards, make up for any loss of Pi from circulation due to accidents or death, provide for more liquidity, mitigate

hoarding that inhibits usage and utility creation, etc. At that time, the foundation and its committees specialized in these matters will organize and guide the community to reach a conclusion on the matter in a decentralized way.

Mining Mechanism

Pi Network's mining mechanism has been allowing Pioneers to contribute to the growth, distribution and security of the network and be rewarded in Pi meritocratically. The pre-Mainnet mining mechanism has helped the network achieve an impressive growth of over 30 million engaged members, a widely distributed currency and Testnet, and a trust graph of Security Circle aggregates that will feed the consensus algorithm of the Pi blockchain.

Looking ahead into the Mainnet phase, Pi Network needs further contributions, as well as more diverse types of contributions from all its members, to become a true economy while continuing its growth and inclusion. In the Mainnet phase, we want to further achieve **decentralization, utilities, stability** and **longevity**, in addition to **growth, inclusion, and security**. These goals can only be achieved if all Pioneers in the network work together. Hence, the new Pi mining mechanism is designed to achieve these goals by incentivizing all Pioneers to contribute diversely to the network based on the same meritocratic principle. Below, we first describe the pre-Mainnet mining formula, followed by the changes in the Mainnet formula.

Pre-Mainnet Formula

The pre-Mainnet mining formula demonstrates a meritocratic determination of a Pioneer's hourly mining rate. Actively mining Pioneers received at least a minimum rate and were further rewarded for their contributions to security and growth of the network. The following formula determined the rate at which Pioneers mined Pi per hour:

$M = I(B, S) + E(I)$, where

- M is the total Pioneer mining rate,
- I is the Individual Pioneer base mining rate,
- B is the systemwide base mining rate,
- S is the Security Circle reward, which is a component of the individual Pioneer base mining rate from valid Security Circle connections, and
- E is the Referral Team reward from active Referral Team members.

The systemwide base mining rate B started as 3.1415926 Pi/h and halved every time the network of Engaged Pioneers increased in size by a factor of 10x, starting at 1000 Pioneers. As listed below, there have been five halving events thus far:

Engaged Pioneers Milestone	Value of B (in Pi/hr, rounded to two decimals)	Value of I, with full Security Circle (in Pi/hr, rounded to two decimals*)
< 1,000	3.14	6.28

1,000	1.57	3.14
10,000	0.78	1.57
100,000	0.39	0.78
1,000,000	0.19	0.39
10,000,000	0.10	0.19

Here,

- $I(B,S) = B + S(B)$
- $S(B) = 0.2 \cdot \min(S_c,5) \cdot B$, where S_c is the count of valid Security Circle connections.
- $E(I) = E_c \cdot I(B,S) \cdot 0.25$, where E_c is the count of active Referral Team members who mine concurrently.

The mining formula can also be written as a multiple of B:

- $M = I(B,S) + E(I)$
- $M = [B + S(B)] + [E_c \cdot I(B,S) \cdot 0.25]$, or
- $M = [B + \{0.2 \cdot \min(S_c,5) \cdot B\}] + [E_c \cdot 0.25 \cdot \{B + \{0.2 \cdot \min(S_c,5) \cdot B\}]$, or
- $M = B \cdot [1 + \{0.2 \cdot \min(S_c,5)\} + \{E_c \cdot 0.25 \cdot \{1 + 0.2 \cdot \min(S_c,5)\}\}]$, or
- $M = B \cdot [(1 + E_c \cdot 0.25) \cdot \{1 + 0.2 \cdot \min(S_c,5)\}]$

Pre-Mainnet Systemwide Base Mining Rate

Every active Pioneer received at least the system wide base mining rate (B). That is, if $S_c = 0$ and $E_c = 0$ in the mining formula

above, then $M = B$. In any case, the total Pioneer mining rate was a multiple of the systemwide base mining rate. The value of B was pre-determined before the Mainnet, and as shown in the table above, it changed only five times. The max supply was undetermined due to the dynamic progress of the pre-Mainnet mining mechanism, e.g. how large the network is and how fast the network reaches the next halving event. It would only be determined when B dropped to 0. However, as explained in the next section, the value of B at Mainnet is calculated in real time, dynamically adjusting based on the total annual Pi supply and the total mining coefficient across all the Pioneers. The supply of Pi is finite at Mainnet.

Security Circle Reward

Pi's consensus algorithm relies on a global trust graph, which is aggregated from the millions of intertwining Security Circles of individual Pioneers. Thus, a Pioneer was rewarded with additional Pi per hour for each new valid Security Circle connection, up to 5 such connections. The Security Circles are so central to the security of the Pi blockchain that the Security Circle reward raised the total Pioneer mining rate in two ways:

- by directly adding to the individual Pioneer base mining rate (I), and
- by boosting the Referral Team reward, if any.

In fact, a full Security Circle—that is, having at least five valid connections—doubled both the individual Pioneer base mining rate and the Referral Team reward.

Referral Team Reward

Pioneers can also invite others to join Pi Network and form their Referral Team. The inviter and invitee share an equal split of the Referral Team bonus rewards, that is a 25% boost to their respective individual Pioneer base mining rates, whenever both are mining concurrently. Pioneers mined more Pi per hour with each concurrently mining Referral Team member. This Referral Team reward recognized the Pioneers' contribution to the growth of the network and the distribution of the Pi token.

Mainnet Mining Formula

The goals of the Mainnet phase are to make further progress in *decentralization* and *utilities*, ensure *stability* and *longevity*, and retain *growth* and *security*. The new formula, as written below, incentivizes more diverse contributions of Pioneers to support these Mainnet goals while retaining the incentives to secure and grow the network. As before, it is meritocratic and expressed as the rate at which Pioneers mine Pi per hour.

$M = I(B,L,S) + E(I) + N(I) + A(I) + X(B)$, where

- **M** is the total Pioneer mining rate,
- **I** is the individual Pioneer base mining rate,
- **B** is the systemwide base mining rate (adjusted based on the available pool of Pi to distribute for a given time period),
- **L** is the lockup reward, which is a new component of the individual Pioneer base mining rate,

- **S** is the the Security Circle reward, which is a component of the individual Pioneer base mining rate from valid Security Circle connections the same way as in the pre-Mainnet mining formula,
- **E** is the Referral Team reward from active Referral Team members the same way as in the pre-Mainnet mining formula,
- **N** is the Node reward,
- **A** is the Pi apps usage reward, and
- **X** are new types of contributions necessary for the network ecosystem in the future, which will be determined later, but will also be designed as a multiple of B.

In short, S and E remain the same as in the pre-Mainnet mining formula, while new rewards such as L, N and A have been added to the current formula. L is added as part of I; N and A are added as additional rewards calculated based on I. In other words, the network still rewards *growth* through E and *security* through S, while incentivizing Pioneers' contributions to running nodes for *decentralization* through N, using apps for *utilities* creation through A, and locking up for *stability* especially during the initial years through L. Further, new types of rewards to Pioneers through X in the future may be added for building a fully functioning ecosystem, such as rewards for Pioneer developers creating successful Pi apps. B continues to exist over a long period of time while having a yearly cap to

ensure *longevity* of network growth while maintaining scarcity. In fact, all the rewards can be expressed in B as follows.

Here,

- $I(B,L,S) = B + S(B) + L(B)$
- $S(B) = 0.2 \cdot \min(Sc,5) \cdot B$, where Sc is the count of valid Security Circle connections.
- $E(I) = Ec \cdot 0.25 \cdot I(B,L,S)$, where Ec is the count of active Referral Team members.
- $L(B) = Lt \cdot Lp \cdot \log(N) \cdot B$, where Lt is a multiplier corresponding to the duration of a lockup,

Lp is the proportion of Pioneer's mined Pi on the Mainnet that is locked up with the maximum being 200%, and N is the total number of Pioneer's mining sessions preceding the current mining session.

- $N(I) = \text{node_factor} \cdot \text{tuning_factor} \cdot I$, where
Node_factor = $\frac{\text{Percent_uptime_last_1_days}}{(\text{Uptime_factor} + \text{Port_open_factor} + \text{CPU_factor})}$,
where

Uptime_factor = $(\text{Percent_uptime_last_90_days} + 1.5 \cdot \text{Percent_uptime_last_360_days}(360-90) + 2 \cdot \text{Percent_uptime_last_2_years} + 3 \cdot \text{Percent_uptime_last_10_years})$,

Port_open_factor = $(1 + \text{percent_ports_open_last_90_days} + 1.5 \cdot \text{percent_ports_open_last_360_days} + 2 \cdot \dots)$

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percent_ports_open_last_2_years          +
3*percent_ports_open_last_10_years,
CPU_factor = (1 + avg_CPU_count_last_90_days +
1.5*avg_CPU_count_last_360_days          +      2*
avg_CPU_count_last_2_years              +
3*avg_CPU_count_last_10_years)/4.
```

Percent_uptime_last*_days/years is the percentage of the last * time period when the individual Node was live and accessible by the network.

percent_ports_open_last*_days/years is the percentage of the last * time period when the ports of the individual Node were open for connectivity to the network.

avg_CPU_count_last*_days/years is the average CPU that the individual Node provided to the network during the last * time period.

tuning_factor is a statistical factor that normalizes the node_factor to a number between 0 and 10.

- $A(I)^* =$
 $\log [$
 $\Sigma_{\text{across_apps}} \{$
 $\log(\text{time_spent_per_app_yesterday_in_seconds})$
 $\}$
 $]$ •
 $\log [\log($
 $0.8 \cdot \text{avg_daily_time_across_apps_last_30_days} +$
 $0.6 \cdot \text{avg_daily_time_across_apps_last_90_days} +$

$$0.4 \cdot \text{avg_daily_time_across_apps_last_180_days} + \\ 0.2 \cdot \text{avg_daily_time_across_apps_last_1_year} + \\ 0.1 \cdot \text{avg_daily_time_across_apps_last_2_year} \\)] \cdot I$$

time_spent_per_app_yesterday_in_seconds is, for each Pi app, the total amount of time in seconds that the Pioneer spends using the app on the prior day.

Σ _across_apps sums up the logarithmic value of the Pioneer's **time_spent_per_app_yesterday_in_seconds** across all the Pi apps.

avg_daily_time_across_apps_last_* is the average daily time in seconds the Pioneer spends across all the Pi apps in the aggregate during the last * time period.

* Note that when any of the logarithmic functions returns an undefined value or a value below 0 (that is, when, the input to the logarithmic function is below 1), the formula resets the value of the logarithmic function to be 0 in order to avoid negative mining rewards or an error in the function.

- X(B) is to be determined in the future based on the new types of contributions, but will be a multiple of B and kept within the yearly supply limit along with other rewards.

As shown above, the expressions of S and E remain the same as in the pre-Mainnet mining formula, and will not be explained further here. Next, we will focus on explaining the changes to B, changes to I through L, and the additions of N and A.

Systemwide Base Mining Rate

Like in Pre-Mainnet mining, all of the terms in the Mainnet mining formula above can be expressed in Pi per hour and are designed to be a multiple of B. Hence, the equation can also be re-written as below. Every Pioneer can mine at least the Systemwide Base Mining Rate everyday, and will be able to mine at a higher rate if they also have other types of contributions that are calculated as multiples of B.

$$M = B \cdot (1 + S + L) \cdot (1 + N + E + A + X)$$

Unlike in the pre-Mainnet mining, B in Mainnet mining as in the formula above is no longer a constant across all Pioneers at a given point in time, but is calculated in real time and dynamically adjusted based on a yearly supply cap.

Given a yearly supply limit, it is impossible to keep a constant B like in the pre-Mainnet period because it's unpredictable how much each Pioneer mines and how many Pioneers are actively mining during a period of time. The pre-Mainnet model was designed to incentivize growth during the beginning years to bootstrap the network. As the network achieves a certain scale, it also needs to ensure the overall health of the ecosystem. Therefore, an exponential issuance of the tokens through

exponential network growth and a constant mining rate does not make sense any longer. The shift of B from being a constant to being dynamically adjusted throughout the year results from the need to incentivize Pioneers' contributions meritocratically but also to keep the total rewards within a limit.

Thus, to solve the yearly limit problem while ensuring fairness for whoever mined Pi, B of a given day in the year is calculated as below. Here a day is defined as the last 24 hours before the moment a Pioneer starts a new mining session. Hence, different Pioneers will have slightly different days relative to their time of mining, and thus, potentially a slightly different B based on the calculation below. Each Pioneer's B of their day stays constant through their mining session, that is, over the next 24 hours from the moment they start their mining session. B is calculated as follows:

- Divide the remaining total Pi supply of the year by the number of days left in the year to get day_supply based on the remaining yearly supply,
- add the multiples of B from all Pioneers actively mining within the last 24 hours, which represents a diverse set of Pioneers' contributions, in the Mainnet mining formula above to get the sum_of_B_multiples of the whole network for that 24-hour window, and
- further divide day_supply by sum_of_B_multiples and 24 hours to get B of that specific mining session.

Hence, for a given day of the year,
 $B = \text{day_supply} / (\text{sum_of_B_multiples} \cdot 24\text{h})$

Under this framework, B on different days of the year will be different depending on how many Pioneers mined in the last 24 hours as well as what and how much contributions they made to receive the extra multiples of B by running nodes, using utilities apps or lockups, etc. This model also addresses any uncertainty with having X(B)—future types of contribution rewards for Pioneers—in the formula. Regardless of how much X is going to be, it will be kept within the same yearly supply limit without increasing the total supply and will only affect the division of rewards among different types of contributions. This dynamic mechanism allows Pioneers themselves, in a decentralized way, to make sure that (1) the rewards do not exceed the yearly supply limit, (2) the distribution of the yearly supply does not end early in the year, and (3) the rewards are divided meritocratically.

For purposes of illustration, let's suppose there are only two Pioneers on a given day and B is the mining rate (expressed in Pi/day for this illustration)—a constant during a specific Pioneer mining session, but dynamically adjusted across different days:

Pioneer 1 has no app engagement ($A=0$), is not operating a Node ($N=0$), has no security connections ($S=0$), and has no active Referral Team members ($E=0$). They are in their 11th mining session ($N=10$) and are locking up 100% of their mined Pi ($Lp=1$) for 3 years ($Lt=2$). Pioneer 1's mining rate on this day is:

- $M1 = I(B,L,S) + 0 + 0 + 0$, or

- $M1 = B + \{2 \cdot 1 \cdot \log(10)\} \cdot B + 0$, or
- $M1 = 3B$

Pioneer 2 has no app engagement ($A=0$), is not operating a Node ($N=0$), has no lockup ($L=0$), and has no active Referral Team members ($E=0$). They have a full Security Circle. Pioneer 2's mining rate on this day is:

- $M2 = I(B,L,S) + 0 + 0 + 0$, or
- $M2 = B + 0 + \{0.2 \cdot \min(Sc,5) \cdot B\}$, or
- $M2 = B + \{0.2 \cdot 5 \cdot B\}$, or
- $M2 = 2B$

Here, Total Pi to be mined in the whole network on this day = $M1 + M2 = 5B$ Let's assume there are 500 Pi and 50 days left in the year.

Therefore, Total Pi available to be mined for this day = $500 \text{ Pi} / 50 \text{ days} = 10 \text{ Pi/day}$

Solving B based on the two equations above,

- $5B=10 \text{ Pi} \Rightarrow B = 2 \text{ Pi/day}$ (or 0.083 Pi/hour)

Accordingly, Pioneers 1 and 2 will have their actual mining rates as follows:

- $M1 = 3 \cdot 2 \text{ Pi/day} = 6 \text{ Pi/day}$ (or 0.25 Pi/hour)
- $M2 = 2 \cdot 2 \text{ Pi/day} = 4 \text{ Pi/day}$ (or 0.17 Pi/hour)

Pioneer Base Mining rate

By comparison, the individual Pioneer base mining rate in the pre-Mainnet mining formula includes only system-wide base mining rate and Security Circle rewards. At Mainnet, a new component, lockup reward, is added to individual Pioneer base

mining rate I. Lockup rewards L, along with the system-wide base mining rate B and Security Circle reward S, constitute the individual Pioneer base mining rate I. Since I is used as an input to calculate all the other rewards, as a result, the Security Circle and lockup rewards enhance the total Pioneer mining rate by: (1) by directly adding to the individual Pioneer base mining rate and (2) by boosting the any Referral Team reward E, nodes reward N, and app usage reward A.

Lockup Reward

At Mainnet, the lockup reward is meant to support a healthy and smooth ecosystem and incentivize long-term engagement with the network, while the network is bootstrapping the economy and creating demands. It is an important decentralized macroeconomic mechanism to moderate circulating supply in the market, especially in the early years of the open market when utilities are being created. One important goal of the Pi Network is to create a utility-based ecosystem of apps. Transactions for real goods and services in the ecosystem, rather than just speculative trading, are intended to determine the utility of Pi. As we launch the Enclosed Network phase of the Mainnet, one of the main areas of focus will be to support and grow the Pi app developer community and nurture more Pi apps to grow. In the meantime, Pioneers can choose to lock up their Pi to help create a stable market environment for the ecosystem to mature and for more Pi apps to emerge and provide compelling use cases for spending Pi – to ultimately create organic demands through utilities.

The lockup reward formula is reprinted here:

L(B) = Lt • Lp • log(N) • B, where

Lt is the *Lockup Time period multiplier* of B.

- 0 → Lt = 0
- 2 weeks → Lt = 0.1
- 6 months → Lt = 0.5
- 1 year → Lt = 1
- 3 years → Lt = 2

Lp is the *Lockup Percentage multiplier* of B, where the Lockup Percentage is the lockup amount over the Mainnet Balance transferred from one's previous mining rewards (Lb), and the *Lockup Percentage multiplier* is as follows.

- 0% → Lp = 0
- 25% → Lp = 0.25
- 50% → Lp = 0.5
- 90% → Lp = 0.9
- 100% → Lp = 1.0
- 150% → Lp = 1.5
- 200% → Lp = 2

log(N) is the logarithmic value of the total number of previous mining sessions (N).

Pioneers will have the opportunity to voluntarily lock up their Pi to earn the right to mine at a higher rate. First of all, the prerequisite of the lockup reward is that the Pioneer must be actively mining. Without mining in the first place, there will be no lockup rewards for any inactive mining sessions, even if Pi is locked up. As expressed in the formula above, all that the lockup

does is to provide multipliers to B , so there will be no lockup rewards if B is 0 (which means the Pioneers is not mining).

Secondly, the lockup reward is positively associated with the contribution to the lockup, i.e. the duration of the lockup time period (L_t) and the amount locked up. However the lockup amount is accounted for by the percentage of a Pioneer's total P_i mined (L_p). The maximum P_i that a Pioneer can lock up is twice as much as their Mainnet Balance that got transferred from their prior mining in the mobile app (L_b), i.e. 200% L_b . The reasons for having a 2X maximum lockup amount of one's transferred Mainnet Balance (L_b) are to 1) prevent exploitation of the lockup reward and 2) further encourage other contributions to the P_i ecosystem, such as further boosting their mining, running nodes and using apps. This, in a sense, favors Pioneers who mine and make other types of contributions to the network.

Thirdly, $\text{Log}(N)$ offers a higher lockup incentive to Pioneers who have a long mining history and presumably a large transferable balance to lock up. While the lockup reward formula generally favors equality by accounting for not the absolute amount but the percentage of their transferred balance (L_p) — which allows smaller accounts with a short mining history to lock up small amounts and yet receive the same lockup reward multiplier as big accounts — we need to add a $\text{Log}(N)$ factor that accounts for miners with a long mining history, to counterbalance the bias in favor of Pioneers with small balances and provide enough incentive for long-history Pioneers with bigger balances. However, the effect of mining history on lockup rewards also needs to be capped. Thus, the formula applies a logarithm to the

number of previous mining sessions N . For example, if a Pioneer mined almost everyday for the last 3 years, their total previous mining sessions (N) will be about 1,000. In this scenario, $\text{Log}(1,000)$ equals 3, adding another multiplier to B in their lockup rewards. Keep in mind that to achieve meaningful lockup rewards for long-mining-history Pioneers, the amount of P_i they have to lock up is much more than smaller accounts.

Fourthly, one Pioneer can voluntarily have multiple lockups at different times with different amounts and durations. The calculation of the total lockup rewards for this Pioneer with i number of different lockups is to find the total lockup reward multiplier of B , as expressed in the formula below. The formula below is the equivalent to the lockup reward formula above, with the only difference being that it accounts for multiple lockups of the same Pioneer to calculate their total lockup rewards, e.g. different durations (Lt_i) and different amounts (Lc_i) of each lockup at different time:

$$L(B) = \frac{\left(\sum_i Lt_i \cdot Lc_i \cdot \log(N_i) \right)}{Lb} \cdot B$$

The purpose of this formula is to calculate the total lockup rewards based proportionally on each lockup's amount (Lc) over the total Mainnet Balance from previous mining (Lb) as a weight, multiplied by their respective lockup time period (Lt) and $\text{Log}(n)$. So that, even though there are multiple lockups of the same Pioneer, more lockups with different settings will proportionally add to their total lockup rewards. The values of Lt , Lc , and $\log(N)$ are calculated and multiplied for each lockup i

and then summed across various i 's, which is then divided by the value of L_b at a given mining session, to arrive at the value of $L(B)$ for that mining session. This formula ensures that regardless of the L_b , as long as the Pioneer maintains the same percentage of their lockup amount over their L_b , the total lockup rewards multiplier will remain the same.

Lastly, when can a Pioneer lock up P_i ? Pioneers can decide their lockup duration and lockup percentage of their transferable balance anytime they want as an overall account setting in the P_i app. They can even preselect these settings before they're KYC'ed or ready to migrate to the Mainnet. As they and their Referral Team/Security Circle pass KYC, more of their Mobile Balance will become transferable. At the moment of the migration of their Transferable Balance to Mainnet, their preselected setting of lockup duration and percentage will automatically apply to the amount of balance transferred, resulting in two types of balances on the Mainnet: lockup balance and free balance, both of which will be recorded on the Mainnet blockchain and reside in the Pioneer's non-custodial P_i wallet. Thus, lockups cannot be reversed once confirmed and must remain locked up for the entirety of the chosen duration due to the nature of blockchain. Any changes to this Pioneer's lockup setting will take effect in their next balance transfer to the Mainnet.

This account-wide lockup setting allows Pioneers to lock up a maximum of 100% of their transferable balance from mobile to

Mainnet. After Mainnet launches and Pioneers transfer their balances, Pioneers can also lock up more Pi directly on the Mainnet through a slightly different lockup interface later on. At that time, Pioneers can lock up as much as 200% of their already-transferred Mainnet balance acquired from their previous mining. The additional lockup allowance for more Pi than individually mined by the Pioneer can come from utility-based Pi apps transactions, i.e., making Pi from selling goods and services.

App Usage Reward

An overarching goal of the Pi Network is to build an inclusive peer-to-peer economy and online experience fueled by the Pi cryptocurrency through our app ecosystem. Therefore, Pioneers will have additional mining rewards for using Pi apps on the Pi apps platform through the Pi Browser, including ecosystem apps and third-party apps in the Pi Directory. The app usage reward for Pioneers helps the ecosystem in two ways.

First, it will give Pi app developers market access and increased impressions of their apps. Pi app developers will gain usage and product iteration opportunities from Pioneers, which has been one of the biggest barriers to creating viable decentralized applications in the blockchain industry. Decentralized application (dApp) developers do not yet have a plentiful, stable, and utility-seeking consumer market environment to test and hone their consumer products to create consumer utilities. Pi

Network's apps platform and the app usage reward are meant to provide that environment for dApp developers.

Second, the increased impressions and usage will potentially lead to increased spending of Pi by Pioneers in the Pi apps, thus increasing utility-based Pi demand in the market. Even though the impressions are incentivized through the app usage reward, the spending of Pi is not. This means that the Pi app usage reward to Pioneers helps the Pi app developers to the extent that Pioneers are at their door. Now what determines whether Pioneers will actually stay and spend Pi in their apps is how useful and engaging their products are and what values the apps can provide for Pioneers. This framework ensures that, for the purpose of Pi demand creation, organic market forces are at work that allow apps to compete on the basis of product quality and utility, ultimately allowing the best apps to emerge and stay in the market and generate real utilities and even more Pi demands.

Through the above two mechanisms, the app usage reward aims to achieve the gradual transition from extrinsic incentives to intrinsic motivations among Pioneers visiting Pi apps, and thus the transition from incentivized to organic usage of Pi apps in order to ultimately bootstrap a utility-based ecosystem of apps using Pi.

The app usage reward formula is reprinted here:

$A(I)^* =$

$\log [\Sigma_{\text{across_apps}} \{$

$$\log(\text{time_spent_per_app_yesterday_in_seconds}) \}] \cdot \log [\log(0.8$$

- $\text{avg_daily_time_across_apps_last_30_days} + 0.6$ •
- $\text{avg_daily_time_across_apps_last_90_days} + 0.4$ •
- $\text{avg_daily_time_across_apps_last_180_days} + 0.2$ •
- $\text{avg_daily_time_across_apps_last_1_year} + 0.1$ •
- $\text{avg_daily_time_across_apps_last_2_year})] \cdot I$

time_spent_per_app_yesterday_in_seconds is, for each Pi app, the total amount of time in seconds that the Pioneer spends using the app on the prior day.

$\Sigma_{\text{across_apps}}$ sums up the logarithmic value of the Pioneer's **time_spent_per_app_yesterday_in_seconds** across all the Pi apps.

avg_daily_time_across_apps_last_* is the average daily time in seconds the Pioneer spends across all the Pi apps in the aggregate during the last * time period.

* Note that when any of the logarithmic functions returns an undefined value or a value below 0 (that is, when, the input to the logarithmic function is below 1), the formula resets the value of the logarithmic function to be 0 in order to avoid negative mining rewards or an error in the function.

Generally, the app usage reward formula takes into account two factors: time spent in apps and the number of apps used while crediting the history of app usage in the long term and capping the rewards to avoid exploitation. There are two main parts to

the formula. The first part aggregates a Pioneer's time spent across each app in the last mining session (i.e., in the previous day). The logarithmic function provides a positive function with diminishing returns, meaning that an increase in time spent on any one app will generally increase the rewards, but the positive effect of time spent on rewards decreases as more time is spent. This setup encourages Pioneers to generally spend more time on multiple diverse apps, helping the network to bootstrap the creation of diverse utilities. At the same time, it caps the rewards to prevent users from exploiting this reward by artificially keeping the apps open all day, which would not meaningfully contribute to utilities creation.

The second part of the app usage reward formula looks at a Pioneer's rolling average of daily time spent across all apps in various time periods. The further back the time period goes, the less it is weighted. In other words, a Pioneer mines more Pi the longer they have been using the Pi apps, but their recent time spent on the apps counts more toward mining than their previous time spent further back in the past. In addition, as a matter of fact, the app usage history takes effect on the current mining reward only if the Pioneer also used Pi apps during their last mining session. This means that there is no passive reward for only the past usage. Once again, the use of logarithmic functions helps moderate the mining boost from app usage to avoid exploitation of the app usage reward. A noteworthy implication here is that Pi chat moderators who have been helping to guide Pioneers and monitor undesirable activities on

Pi chats over the last two years will mine the app usage reward at a higher rate when the Mainnet launches.

Node Reward

Like on any blockchain, Nodes are at the heart of the decentralization of Pi. In Pi, instead of relying on centralized institutional nodes, we decided to open up the Nodes to any Pioneer with a computer connected to the internet. Aided by the global trust graph aggregated from individual Pioneer's Security Circles from the mobile app, these Nodes will run the consensus algorithm to validate transactions and process blocks. Because the Nodes are critical to the decentralization, security, and longevity of the Pi blockchain, Node-operating Pioneers will receive additional mining rewards.

The node reward formula is reprinted here:

- $N(I) = \text{node_factor} \cdot \text{tuning_factor} \cdot I$, where
Node_factor = $\text{Percent_uptime_last_1_days} \cdot (\text{Uptime_factor} + \text{Port_open_factor} + \text{CPU_factor})$,
where
Uptime_factor = $(\text{Percent_uptime_last_90_days} + 1.5 \cdot \text{Percent_uptime_last_360_days}(360-90) + 2 \cdot \text{Percent_uptime_last_2_years} + 3 \cdot \text{Percent_uptime_last_10_years})$,
Port_open_factor = $1 + \text{percent_ports_open_last_90_days} + 1.5 \cdot \text{percent_ports_open_last_360_days} + 2 \cdot \text{percent_ports_open_last_2_years} + 3 \cdot \text{percent_ports_open_last_10_years}$,

CPU_factor = $(1 + \text{avg_CPU_count_last_90_days} + 1.5 * \text{avg_CPU_count_last_360_days} + 2 * \text{avg_CPU_count_last_2_years} + 3 * \text{avg_CPU_count_last_10_years}) / 4$.

- **Percent_uptime_last*_days/years** is the percentage of the last * time period when the individual Node was live and accessible by the network.
- **percent_ports_open_last*_days/years** is the percentage of the last * time period when the ports of the individual Node were open for connectivity to the network.
- **avg_CPU_count_last*_days/years** is the average CPU that the individual Node provided to the network during the last * time period. **tuning_factor** is a statistical factor that normalizes the **node_factor** to a number between 0 and 10.

The node reward depends on the uptime factor, port open factor, CPU factor, and the tuning factor. The uptime factor of a Node for a given period of time is the proportion of time the Node is active during that period. For example, a 25% uptime factor yesterday means that the Node was live and accessible for a total of 6 out of 24 hours yesterday. The Pi Node software tracks the time a particular Node is active. Starting in the Open Network phase, only a Node running functionally at a given point in time is

considered active. This is a proxy for the reliability of the Node. However, for the historical data relevant to the mining reward, a Node is considered active if the Node app is open and connected to the internet even if it is not running functionally. This exemption for the past performance recognizes that the Community Node operators running the Testnet provided the network with important data and infrastructure to enable multiple iterations of the Node software and Testnet, and that it was not always the fault of the Node operator that their Nodes were inoperative.

The port open factor of a Node for a given period of time is the proportion of time the Node's specific ports are detected to be accessible from the Internet during that period. Pi Nodes use ports 31400 through 31409, enabling other nodes to reach them through these ports and the network IP address. An open-port Node is able to respond to communications initiated by other Nodes, while closed-port Nodes are not able to receive such communications from other Nodes and can only initiate communications. Pi's consensus protocol relies on Nodes sending a series of messages among each other. Therefore, open-port Nodes are critical to the operation of the Pi blockchain, and thus, worthy of a mining reward boost. In fact, the network aims to have at least 1/8th of the Nodes with open ports, and having an open port is one of the prerequisites for being a Super Node.

The CPU factor of a Node for a given period of time is the average number of CPU cores/threads available on the computer during that period. A higher CPU factor prepares the blockchain for

future scalability, for example, the ability to process more transactions per block or more transactions per second. The Pi blockchain is not an energy and resource-intensive blockchain. The network is initially set to operate at one new block of up to 1,000 transactions (T) about every 5 seconds. Thus the network is effectively capable of processing up to about 200 transactions per second (TPS) or $\sim 17\text{M T/day}$. Should the blockchain get congested in the future, this limit can be increased to 2,000 TPS ($\sim 170\text{M T/day}$) by increasing the block size from 1000 to 10,000 transactions per block. The higher the CPU contributed by Pi Nodes, the more room the network will have to grow and scale further in the future. Furthermore, higher collective CPU from Pi Nodes will allow novel peer-to-peer node-based applications to be built on Pi Network, such as decentralized CPU sharing applications that let computing power-intensive applications run or provide distributed cloud services. Such services will be further rewarding contributing nodes with additional Pi paid by the clients of those services.

Finally, a tuning factor normalizes the Node reward to a number between 0 and 10. This is meant to make Node rewards comparable to other types of mining rewards that recognize other contributions to Pi Network. During the Enclosed Mainnet phase (as explained in the Roadmap section), the Node reward formula is expected to iterate. For example, the use of logarithmic or root functions may potentially obviate the need for a tuning factor.

Having reliable Nodes running predictably over a long stretch of time is critical to the health of the blockchain. It is not a one and done contribution. Therefore, the uptime factor, port open factor, and the CPU factor are all calculated over varying time periods, where the value from more recent time periods are more heavily weighted than the time periods of equal lengths from a more distant past. Note, however, that the Node reward is a multiple of the uptime factor of the previous mining session. Hence, a Pioneer will not receive any Node reward in a given mining session if their Node was inactive for the entirety of the immediately preceding calendar day. Similar to the app usage reward, there is no passive reward for only the past contribution as a Node operator. This also means that a low uptime factor in the previous calendar day (even if the Node is active for a part of the day) will substantially reduce the Node reward in a given day despite high past Node contributions.

The Effect of KYC on Mainnet rewards

There will be a rolling grace period of six calendar months for a Pioneer to complete KYC. Thereafter, the Pioneer loses all the Pi mined outside of the rolling 6-month window and is unable to transfer the lost Pi to the Mainnet. The retention of the mined Pi in the 6-month window continues indefinitely until they pass KYC or the KYC policy changes. Note that this KYC-window mining framework will only begin when the KYC solution is generally available to all eligible Pioneers in the future, and will be announced to the community beforehand. The six-month

restriction will not be immediately in place yet when we launch the Mainnet.

Because of the importance of true humanness in our social network-based mining, only the Pioneers who pass KYC will be able to transfer their Phone balance to the blockchain. Our objective is to have as many true Pioneers as possible pass KYC. As explained further below, the rolling six-month window serves the following important purposes:

- strike a balance between giving Pioneers adequate time to pass KYC and creating enough urgency to pass KYC,
- prevent unverified Pi beyond the rolling six-month KYC grace period from migrating to the Mainnet, instead freeing it up for mining by other KYC'ed Pioneers within the allocated Pi overall supply limit for Pioneer mining, and
- limit KYC spam and abuse (see 30-day delay in KYCing new members below)

If Pioneers do not pass KYC in time, it delays the Mainnet transfer of their balances and the balances of other Pioneers who have them on their Security Circles and Referral Teams. Without balances on the Mainnet, Pioneers are not able to use payments in Pi apps, thereby undermining the growth of our utility-based ecosystem. A six-month window creates a sense of urgency for Pioneers while giving them adequate time to retrieve their mined Pi. The KYC verification process will generally take into account Pioneers' likelihood of being real human beings based

on Pi's machine-automated prediction mechanisms run over the last three years. Newly created accounts will not be able to immediately apply for KYC verification, until after 30 days. This helps the network limit the ability of bots and fake accounts to spam and abuse our KYC process and prioritize KYC validation resources for real human Pioneers.

Finally, the lost Pi of the Pioneers who delay KYC verification beyond six months will not be transferred to the Mainnet and will not be accounted for in the calculation of the systemwide base mining rate (B) beyond the rolling six-month KYC grace period. Pioneers will, therefore, need to claim their Pi in time, or their lost Pi will be reallocated to B for mining in the same year by other verified Pioneers who can make full contributions to the network.

Roadmap

Pi Network is unique in our technological and ecosystem design as well as the significance of our community input in development. This uniqueness is best served by a thoughtful and iterative approach that allows for community feedback, testing of products, features, and user experience, and phases defined by milestones. There are three main phases to our development: (1) Beta, (2) Testnet, and (3) Mainnet.

Phase 1: Beta

In December 2018, we publicly launched our mobile app on the iOS App store as an alpha prototype that onboarded the initial

Pioneers. On Pi Day, March 14, 2019, the original Pi whitepaper was published, marking the official launch of the Pi Network. At this stage, our app allowed Pioneers to mine Pi by contributing to the growth and security of the future Pi blockchain. As the eventual goal was to launch the Mainnet and build an ecosystem around the Pi platform, the Pi app running on the centralized Pi server enabled mobile phone users (Pioneers) to contribute their security circles that, in aggregate, built the trust graph required by the consensus algorithm of the Pi Blockchain, and in return, the Pioneers received mining rewards. Furthermore, the centralized phase allowed the network to grow, the community to form, and the Pi token to be accessible and widely distributed. This phase also allowed for the iteration of many technical features and Pioneer experience by leveraging community input throughout the development process.

The following major accomplishments were made during the Beta phase:

- The Pi Network mobile app was listed and accessible through the iOS App Store and Google Playstore.
- Pi Network grew from 0 to over 3.5 million engaged Pioneers.
- The Pi Network community actively engaged with the project through the app home screen interactions and chat app.
- Pi Network reached 233 countries and regions around the world.

Phase 2: Testnet

This phase started on March 14, 2020, marking another critical preparation to the transition to a decentralized blockchain—a live Testnet with distributed Nodes from all over the world. Pi Network's Node software enabled individual computers to support running the Pi Testnet using Test-Pi coin. Test-Pi was available only for the purpose of testing and has no relation to Pioneers' account balances on the Pi app. The Pi Testnet has reached over 10,000 fully functional community Nodes and over 100,000 daily active Nodes on the waiting list, and as explained in a later section, will continue to exist for testing purposes in the Mainnet phase.

Pi Testnet allows for the testing of connectivity, performance, security, and scalability of the blockchain, and allows Pi apps developers to develop the Pi apps before they can deploy their app on the Mainnet. During the Testnet phase, 3 major strategies were adopted: (1) decentralization through Testnet Nodes, (2) growth through the main Pi app for mobile mining, and (3) utility creation through the Pi apps platform on the Pi Browser. The Testnet ran in parallel with the Pi mobile mining app from Phase 1 and enabled decentralized community Nodes to get online and ready for the Mainnet. Specifically, the Testnet Nodes helped with the assessment of the blockchain's performance, security, and scalability. It also helped Pi App developers test their apps against the Pi Blockchain. At the same time, the Pi mobile mining app continued to onboard millions of Pioneers, building the community and contributing to the security of the

blockchain. The Pi Browser, along with the Pi SDK, enabled the community to create utilities and develop the Pi ecosystem.

The following major accomplishments were made during the Testnet phase:

- Many versions of the Node software were released.
- The Pi Platform was released along with key ingredients of our ecosystem infrastructure: Wallet, Browser, Brainstorm and developer tools.
- Pilot version of the KYC app was introduced on the Pi Browser.
- The project ran its first ever worldwide online Hackathon with thousands of participants from within the Pioneer Community.
- Pi Network grew to over 30 million engaged Pioneers, and from 0 to over 10,000 fully functional community Nodes and over 100,000 daily active Nodes on the waiting list.
- Pi Network reached almost all countries and regions in the world.

Phase 3: Mainnet

In December 2021, the Mainnet of the Pi blockchain will go live. The migration of Pioneer balances from their phone account to the Mainnet starts during this period. KYC authentication of a Pioneer precedes their balance migration to the Mainnet. In order to allow for sufficient time for millions of Pioneers to successfully complete their KYC verification, create utilities in

the Pi ecosystem, and continue to iterate on our technology and ecosystem design, the Mainnet will have two periods:

1. at first, firewalled Mainnet (i.e., the Enclosed Network),
2. and then, open Mainnet (i.e., the Open Network).

The Enclosed Network Period

This period will begin in December 2021. The Enclosed Network period means that the Mainnet is live but with a firewall that prevents any unwanted external connectivity. Pioneers will be able to take time to KYC and migrate their Pi to the live Mainnet blockchain. Any balance migrated to the Mainnet can be used, by the choice of the Pioneer, to purchase goods and services in Pi apps, transfer to other Pioneers, or get locked up for a duration of time for a higher mining rate. KYC'ed Pioneers will be able to use their Pi on the Mainnet freely in an enclosed environment within Pi Network. However, this period will not allow connectivity between the Pi blockchain and other blockchains.

Advantages of the Two-Period Approach to Mainnet

There are multiple advantages to having an **intermediate** enclosed period to ramp up to the fully open Mainnet. This approach allows time for:

- millions of Pioneers worldwide to pass KYC,
- building and deploying more Pi Apps and allowing more utilities to be created and used,
- transitioning Pi Apps deployed on the Testnet to the Mainnet, and

- iterating on any modifications and adjustments to the Mainnet and the ecosystem before the Open Network.

The Enclosed Network period allows time for millions of Pioneers to KYC and migrate their Pi to the Mainnet. Only a small fraction of Pioneers have been able to complete their KYC around the launch of the Mainnet. Over the coming months, we will continue to roll out the KYC solution to more Pioneers and help them complete their KYC. If we moved directly from Testnet to Open Network, this would mean that the Pioneers who were able to KYC before others would have Pi available for use outside of the Pi platform while the Pioneers still waiting to complete their KYC would not yet have this privilege. The speed at which Pioneers all over the world are able to complete their KYC will depend on the speed at which each local community provides the KYC validator crowd work force as well as the speed at which individual Pioneers participate in the KYC.

Having the Enclosed Network period gives time for millions of Pioneers to complete their KYC and transfer their Pi to the Mainnet. This way, all the Pioneers who are willing and able to complete their KYC in a reasonable period of time get to use their Pi outside of the Pi platform at once. Given that external connectivity between the Pi Blockchain and other blockchains or systems is not allowed during the Enclosed Network period, this further helps Pioneers focus on transitioning into Mainnet without any influences external to the Pi Blockchain.

This period will also help the community focus on creating utilities and bootstrapping the ecosystem without any external distractions. Consistent with the vision of the Pi network to enable a utility-based ecosystem, this allows apps to deploy on Mainnet and create utilities for Pioneers. Pi apps will be able to switch from Testnet to Mainnet—to production mode for real Pi transactions. At this time, KYC'ed Pioneers will be able to spend their Pi on Pi apps, boosting utilities creation and bootstrapping the Pi ecosystem before the Open Network. This gradual and deliberate ramp to Open Network will help the apps, as well as the Pi Network, to uncover and resolve any glitches in the market and the technology. Thus, the Enclosed Network period is in line with Pi's vision of a utility-based ecosystem and its iterative philosophy.

Moreover, the Enclosed Network will allow the Mainnet to run with production data and real Pi, which differs from Testnet. Data gathered during the Enclosed Network will help calibrate and tweak any configurations and formulae, if necessary, to ensure a stable and successful Open Network.

KYC Verification and Mainnet Balance Transfer

“Know Your Customer/Client” (KYC) is a process that verifies identification to distinguish genuine accounts from fake ones. The vision of Pi Network is to build an inclusive and the most widely distributed token and ecosystem for all Pioneers. The mining mechanism of Pi Network is social network-based, and the mining rate has halved 5 times so far as the social network

size grew to over 1K, 10K, 100K, 1M, and 10M engaged members. Therefore, Pi has a strict policy of one account per person. This requires a high degree of accuracy to establish that members in the network are genuine human beings, preventing individuals from being able to unfairly hoard Pi by creating fake accounts. Pioneers' KYC results will depend on not only identity verification, but also their name matching with the Pi account and screening against government sanction list. KYC, thus, helps ensure the true humanness of the network and compliance with the Anti-Money Laundering (AML) and anti-terrorism regulations.

As communicated at the founding of the network, to ensure true humanness, fake Pi accounts and scripted mining are strictly prohibited. These accounts will be disabled, and will not be able to migrate to Mainnet. Over the past three years, multiple technical mechanisms have been implemented to identify bots and fake accounts. For the accounts identified as highly likely to be fake by Pi's algorithm, the weight is on these accounts to prove otherwise. These identified fake accounts will either be disabled or go through a much more rigorous review and appeal process. The allocation of KYC slots will be prioritized for accounts with a high likelihood of being true human holders.

Only the accounts with verified identities will be allowed to transition to Mainnet, and only the Pi balances attributable to identity-verified accounts will be allowed to transfer to the Mainnet balance. When a Pioneer and their referral team and security circle members pass the KYC determines if and when,

and to what extent, a Pioneer can transfer their balances. Below is a hypothetical example to illustrate how the KYC verification of Pioneers affects their balances in migration to the Mainnet. For simplicity, we define different concepts of Pi balances as follows:

- **Mobile Balance:** The Pi balance currently shown in a Pioneer's account in the Pi mobile app
- **Transferable Balance:** The balance that has been allowed to be transferred to the Mainnet because the Pioneer and their specific associated individuals in the referral teams and security circles have passed KYC
- **Mainnet balance:** The balance that has been migrated and transferred by the Pioneer to the Mainnet

Suppose individual **A** is the owner of a Pi account who wants to transfer their Mobile Balance. Pioneer A will only be allowed to transfer any of the Mobile Balance to the Mainnet when their identity is verified, i.e., when they pass the KYC. Let's say this individual has Individuals **B**, **C**, **D**, and **E** on their referral team and Individuals **D**, **E**, **F**, and **G** in their security circle. So far, only individuals **A**, **B**, **D**, and **F** have completed their KYC verification.

In this example setup:

- **A** is a mining Pioneer who has passed KYC.
- **B**, **C**, **D**, **E** are in the Referral Team of **A**.
- **D**, **E**, **F**, **G** are in the Security Circle of **A**.
- **A**, **B**, **D**, and **F** have passed KYC.

Here, A's Transferable Balance is the sum of the following three components:

- **Pioneer Rewards:** Pi mined based on A's Pioneer status across all mining sessions
- **Contributor Rewards:** D and F's contribution to A's mining rate as Contributors in all mining sessions
- **Ambassador Rewards:** Mining bonuses from all mining sessions when B and D as referral team members mined during the same session as A mined

As more of Pioneer A's referral team and security circle members (i.e., C, E, and G) pass KYC, more portions of A's Mobile Balance will become Transferable Balance—ready for A to migrate to the Mainnet, and ultimately become A's Mainnet Balance.

During the Enclosed Mainnet period, any Mobile Balance that has not become Transferable Balance will remain in the Mobile mining app until the associated Pioneers in the referral team and security circles pass KYC and the corresponding amount becomes transferable to Mainnet. In the case of the above example of Pioneer A, the balance contribution by C, E, and G will remain as Mobile Balance for A in the mining app waiting for them to pass KYC in order for such balance to become transferable. If such associated accounts never pass KYC, the balance attributed to these non-KYC'ed accounts will expire at a certain date which will have allowed enough time for the whole network to KYC. The unclaimed balances due to lack of KYC will be discarded by not being transferred to the Mainnet at all,

instead freeing it up for mining by other KYC'ed Pioneers within the allocated Pi overall supply limit for Pioneer mining as explained in the Pi Supply section.

Restrictions in the Enclosed Network

While transactions between Pi apps and Pioneers and Pioneer-to-Pioneer transactions are allowed within Pi Network, the Enclosed Network will have in place the restrictions as listed below. These restrictions at this stage help enforce the enclosed nature of the network:

- There will be no connectivity between Pi and other blockchains or crypto exchanges.
- Mainnet can only be accessed through the Pi Wallet and Pi apps on the Pi Browser.
- The Mainnet blockchain will be accessible to any computer on the internet but only through a firewall to enforce the above rules.
- There will only be Core Team Nodes on the Mainnet to ensure that the firewall is in place at all times.

The Enclosed Network will support the economic activities and growth of the Pi ecosystem. Thus, Pioneer-to-Pioneer transactions are possible through the Pi Wallet as KYC'ed Pioneers will be able to use the Pi Wallet to transact in Pi. Pioneers can also spend Pi in Pi apps on the Pi Browser, which can access the Mainnet through the Pi Apps SDK and the Pi Blockchain API. During the Enclosed Network period, an app on

the Pi Browser can only use the Pi blockchain APIs whitelisted by the firewall to interact with the Mainnet.

The following uses of Pioneer-to-Pioneer, Pioneer-to-App, and App-to-Pioneer transactions will be allowed:

- Exchange of Pi for goods and services through Pi Apps
- Transfer of Pi between Pioneers for goods and services

The following uses will be prohibited:

- Exchange of Pi for fiat currency
- Exchange of Pi for other cryptocurrencies
- Transfer for Pi for a future promise of fiat or other cryptocurrencies

We will enforce the above restrictions by adding a firewall to the Mainnet and by exclusively running the Mainnet Nodes for this **interim period**. Community Nodes will continue to run on the Testnet in the Enclosed Network period. We will continue to implement interface and other changes to the Nodes in preparation for the Open Network period where the Community Nodes will be able to run on the Mainnet. The restrictions of the Network to keep it enclosed will be relaxed as it reaches the next period—Open Network.

The Open Network Period

Depending on the maturity of the Enclosed Network economy and the progress of the KYC, this period may begin on Pi Day (March 14, 2022), Pi2 Day (June 28, 2022), or later. The Open Network period means that the firewall in the Enclosed Network

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period will be removed, allowing any external connectivity, e.g., to other networks, wallets, and anyone who wants to connect to Pi Mainnet. API calls will not be firewalled, and Pioneers will be able to run their own Pi Nodes and API services. Pioneers will have connectivity with other blockchains. Community Nodes can also run the Mainnet.