Introduction

The year is 2xxx. Humans have finally located the elusive Planet Nine out past Neptune. Space agencies scramble to be the first to send a probe to the distant planet. Astronomers point their most powerful telescopes at it and discover… light? What could produce light on such a planet? Some begin to question, could it be artificial? Only a closer look will tell.

After years of preparation, the Earth Space Agency ESA is ready to send a probe to Planet Nine. It's too far away for anyone to be sure of what we'll find, but some of the more fanciful minds at ESA have prevailed and equipped the probe with a two-way communicator just in case somehow that light is artificial and whoever, or whatever, is making it is still around.

The probe approaches the distant globe and points its cameras at where the light should be. At 600 Astronomical Units away light takes about 83 hours to reach Earth. Scientists are seeing what the probe was seeing three and a half days ago, but that does little to temper the excitement of a new planet.

A soft green glow appears in the inky blackness of space. Scientists and engineers in the command center watch as the glowing blur begins to cohere into…letters? Is this real? Does Planet Nine hold some sort of message?

An alert goes off that most people don't recognize. A known alert that only a few people paid attention to. "Commander," says the tech, "that's the alert for the two-way communicator." No one had turned it on, but here it is, ready to start transmitting a message from Planet Nine. Good thing it was set up to auto-record.

"Greetings Earthlings." The message was coming through in perfect English. "We're so glad you've finally found your way here to Planet Nine. We're sure you will have many questions. Some we can answer and some will have to wait. First, however, we must establish the most important thing. We will not harm you and you are not to harm us. That we must be very clear on.

"But we know that even good intentions won't prevent hostilities. In studying your history it's quite clear that when you encounter new groups you must establish trade with them to avoid conflict. Of course, our spaceship is too far from yours to enable trade of physical goods with your current technology. So we must trade digital goods between ourselves and establish value through them. Your planet has recently begun to understand these digital goods and how there might be a market.

"Following this message we will send you the outline for a dual-resource protocol that we can both use to earn, find, and trade digital goods of value. This is a protocol that has been used

between us and emerging species since long before your solar system formed. We hope you'll agree that it's a way to create value for both of us and establish trade."

The scientists all look among themselves, dumbfounded by what they've just heard. What had just talked to them through their probe? Was Planet Nine inhabited? By aliens, or robots, or both, or something weirder we hadn't thought of? And what was meant by establishing trade through digital goods? A dual-resource protocol? What ~~on Earth~~ in the solar system did that mean?

The following is what Planet Nine's denizens sent.

Problem and Solution

Problem

Revenue On Your Internet

We are pleased to find your digital communication network, what you call the internet, a thriving place. Like many civilizations you have discovered clever ways of monetizing content on your internet. Perhaps the leading monetización scheme is that of ad-supported platforms where advertisers pay to have their content presented to users preferentially on a platform.

As these ad-supported platforms have matured they've sought to extract greater and greater value from their participants, often compromising on the user experience that made them popular in the first place. This process, cleverly coined "enshittification" on your planet is a necessary phenomenon in the evolution of internets.

Fundamentally the problem is that someone needs to pay for the platform. You can't make users pay because then you'll lose to competitors that are free. So you make advertisers pay, but in seeking ever more dollars, the advertising becomes so intrusive it ruins the platform. But if you're not going to have advertisers, and you're not going to have users pay, who's footing the bill?

Solution

Planet Nine introduces a dual-resource protocol that solves for the above. It allows users to pay without costing them money, effectively cutting out the need for advertisers. The two resources in the protocol are called Power and Nineum. Power is given to all users, and recharges over time as it is spent. This will feel familiar to anyone who has played one of your gacha games. Nineum is a digital asset. Imagine if a Hearthstone card, a Pokémon in Pokémongo, and being able to post to a subreddit we're all represented by the same digital thing. This is what Nineum can be.

When a user spends their power, they get a Nineum, and the person or group they spend power with will get Nineum. Since Nineum is tradeable, any market that arises for Nineum will give Nineum value, which in turn will give those power transactions value. If the average price of Nineum is a nickel then a power transaction that nets you a Nineum is worth a nickel. And since power is given to users, the protocol effectively provides a way to replace the fractions of pennies received from advertisers with meaningful power transactions.

Power is granted to all users freely. When a user joins the dual-resource network, 1000 Power is added to the Total Power Supply and given to the user to spend as they please. Power that is used regenerates over time according to a Global Regeneration Rate that is the same for all users. Power regenerates until a cap is reached.

The cap is equal to the Total Power Supply divided by all users. This means if the current cap is over 1000 a new user will push the cap down. With every user bringing 1000 Power this means that the cap will never be under 1000. Users of the protocol can increase the Total Power Supply by purchasing additional Power. To start the protocol is pricing 1000 Power at $4.99. This may be above the market rate of 1000 Power and is priced at a premium because this Power goes to increasing the Total Power Supply. In increasing the Total Power Supply, all users' Power cap increases thereby making each purchase benefit everyone.

 As Power is spent, it will regenerate over time. At the start of the protocol this regeneration rate is 100 Power/hour. As with increasing the Power Supply, users will be able to buy Power Hours which will increase the Global Regeneration Rate. When users purchase a Power Hour it will increase the Global Regeneration Rate by the Power Hour Rate * the Incrementing Rate. At protocol start the Incrementing Rate is set at 0.000003. This number was chosen as it's the rate where half a million Power Hours will double the Power Hour Rate.

The Total Power Supply and the Global Regeneration Rate combine to give every user the Power that they can use. The growth numbers and prices for each were chosen to allow the dual-resource protocol to grow organically and at a reasonable pace. All numbers are adjustable in order to guarantee the overall health of the protocol.

Power is not exchangeable and is not meant to ever be handed over to another user. Its only purpose is to "discover" Nineum. One finds Nineum by spending Power. Each time a user spends Power they do so with a partner. For transactions above the Power per Nineum threshold the additional Power is used for the partner to find Nineum. The Power per Nineum threshold is 200. So if a user spends 400 Power with the partner cooluser23 the user will find one piece of Nineum and cooluser23 will find one piece of Nineum. If a user spends 1000 Power with partner awesomeo9 then the user will find one piece of Nineum and awesomeo9 will find four pieces of Nineum. For numbers not divisible by 200 the fraction is used so if a user spends 300 Power with princesspeach33 then the user will find one piece of Nineum and princesspeach33 will have a 50% (100/200 or ½) chance of finding a piece of Nineum.

The Planet Nine app will feature a 400 Power transaction where the partner is Planet Nine. This is to make it as easy as possible for users to start discovering Nineum, and also gives a starting point for people to compete with. Enterprising Nineum-seekers can provide a similar button, but have it cost 300 Power, or bolder Nineum-seekers might provide transactions of greater value for greater Power. For example, one might create a special power in a game for 600 Power.

The places where users can spend Power are called Power Gateways. Power Gateways should be platform agnostic and libraries should be built to enable gateways in apps and on the web. The APIs for Power Gateways should be open so others can build out libraries as well. For more information on how and where to build Power Gateways check out the Planet Nine Platform section.

Nineum

Nineum is a digital token representing a series of properties that can be used in digital experiences. The only ways of getting Nineum are to "find" it by spending Power or to trade for it with another user. As digital experiences are built that utilize Nineum, the demand for Nineum will increase. This demand, along with the fact that Nineum is both exchangeable and scarce will give value to Nineum. This value is then translated to Power as Power is the only way to find new Nineum, just like how pickaxes become more valuable once people need them to find gold.

Each piece of Nineum is represented by a 128-bit integer. This integer encodes a number of properties that are useful for developers to utilize to develop cool experiences using Nineum. They breakdown as follows:

One byte - Universe: This is the universe that the protocol lives in. Future universes are possible, but unexplored as of now.

Four bytes - Address: This is the address of the resource, many other addresses can live in the same universe as this dual-resource protocol. Future addresses will be for future resources.

One byte - Charge: This can be positive or negative. Other charges are possible as the protocol is explored.

One byte - Direction: This can be up, down, north, south, east, or west. Other directions are possible as the protocol is explored.

One byte - Rarity: This can be common, nine, uncommon, rare, epic, legendary, mythical. Other rarities are possible as the protocol is explored.

One byte - Size: This can be miniscule, tiny, small, medium, standard, big, large, huge. Other sizes are possible as the protocol is explored.

One byte - Texture: This can be soft, bumpy, satin, rough, gritty, metallic, plush, woolen. Other textures are possible as the protocol is explored.

One byte - Shape: This can be sphere, cylinder, tetrahedron, cube, octahedron, dodecahedron, cone, torus. Other shapes are possible as the protocol is eplored.

One byte - Year: This is the numbered year since protocol start (starts at 1)

Four bytes - Ordinal: This is the ordinal of the Nineum with this universe+address+flavor.

As you can see there are a number of useful properties to help developers develop fun experiences using Nineum. The number of unique possible flavors of Nineum is Charge*Direction*Rarity*Size*Texture*Shape = 2*6*7*8*8*8 = 43,008, which seems to be a good number for game developers wanting unique items. This number can grow (or shrink though that's doubtful) over the lifetime of the protocol.

Note that this means Nineum have a type. The universe + address + flavor of a Nineum is not meant to be unique, and provides a sort of halfway between fungibility and non-fungibility. For lack of a better term we call this half-fungibility (see addendum 1 at the end), and it maps better to how useful things exist both in the real and digital realms.

Nineum also has collectible flavoring built in with the different rarities. Of the seven different rarities their drop rate is as follows:

Common: ~27%
Nine: ~23%
Uncommon: ~20%
Rare: ~15%
Epic: ~8%
Legendary: ~4%
Mythical: <1%

As the only way to get new Nineum is through spending Power, the supply of Nineum is scarce based upon the Total Power Supply, global power regeneration rate, and rate of spending by the user base. The maximum amount of Nineum that can be found in a time T is given by URT/200 where R is the Global Regeneration Rate and U is the total users. For example if there are 100,000 users and the Global Regeneration Rate is 200 Power/Hour and total time is 24 hours then the maximum Nineum that can be found is 2.4 million pieces of Nineum. In practice, less Nineum than the maximum will be found as not everyone will be 100% efficient in spending their Power.

Generating Value

Between us on Planet Nine, and you on Earth building experiences that use Nineum, demand for Nineum will give it a non-zero value. Since spending Power is the only way to generate new Nineum, each 200 Power spent is essentially worth the average price of Nineum. This essentially gives every user a small amount of value to spend at their stops around your internet. And that value is what can replace advertisement as a monetization scheme.

Opportunity

Market Size

The online and gaming worlds have seen a growing number of microtransactions in order to monetize content. These microtransactions take two forms. First there are monetary transactions under $3.00 which are carried out either by standard transactions or in-game currencies. Second are advertisements which are themselves microtransactions where a third-party (the advertisement platform) pays the monetary value and the user pays with their time and attention. A dual-resource protocol can replace both of these.

[CNET predicts](#) that in-game consumer spending will hit $32 billion in 2020. While another survey by [W3i](#) shows that about 6% of in-game revenue comes from transactions between $0.99 and $1.99. If we extrapolate that out to say about 9% of revenue comes from transactions between $0.00 and $2.99 then a dual-resource protocol has a target market of $2.88 billion. Even 1% ($28.8 million) of that market is significant, and we don't know the additional effects of utilizing a dual-resource protocol. If that encourages more spending then the market grows further.

In-game consumer spending is large, but advertising itself is much larger. eMarketer estimates that global digital advertising spend will be $327 billion by 2019, of which about $105 billion will be for mobile games. Ads are monetized on a cost per mil (CPM) and cost per click (CPC) basis. If the CPM for an ad stream is $5.00 then the effective price of each individual ad impression is $0.005 this is a perfect range for a dual-resource protocol. If a protocol can replace even 1% of 1% of these ads, that will be $32.7 million.

Monetization

The Planet Nine platform monetizes in three ways: Power sales, Nineum sales, and taking a piece of Nineum trades.

For Power sales, Planet Nine will sell users additional Power, and increased recharge rates (Power Hours). As stated above, purchasing these items affect the global power supply and global regeneration rate respectively.

Planet Nine can also sell the Nineum it collects to users directly. Selling packs of Nineum like a pack of collectible cards, or selling specific Nineum that matter for their experiences. People who develop experiences for Planet Nine can also monetize in this way.

Finally Planet Nine can take a percentage of Nineum transactions performed on the platform. This is the most important piece because once turned on it means everyone is profiting from Nineum.

Planet Nine Platform

Mobile App

At the center of the Planet Nine Platform is the Planet Nine mobile app. This app will be available on iOS and Android. The app will allow a user to create an account, earn power, purchase Power and Power hours, discover Nineum, view their Nineum collection, and trade Nineum.

All that it takes to join the Planet Nine Platform is to create a username. Usernames must be unique. Once a username has been created, users are taken into the Planet Nine experience where they can discover Nineum by tapping the "Discover Nineum" button. This action will cost 400 Power and has the user partnering with Planet Nine. This means that the first 200 Power goes to the user finding Nineum, and the second 200 Power goes to Planet Nine finding Nineum. Planet Nine will use this Nineum to fund creating cool experiences for Planet Nine users as well as initiatives that are working to save Planet Earth.

Developer Resources

In addition to the app, Planet Nine has created developer resources to help with setting up Power Gateways. Links can be found at www.planetninekit.com. At launch there will be a javascript gateway for web implementations, and an iOS cocoapod written in Swift. There will also be instructions on how to create Gateway libraries in other languages and on other platforms. The code for these implementations will all be open sourced so that others can use them and learn from them for creating other Gateways.

Reference Game

In addition to the developer resources above, a reference game which uses the iOS cocoapod called The Ballad of Lorbert has been developed. It is [open source and available here](). Apple does not allow unfinished apps in the app store, so The Ballad of Lorbert is only available in code form, but developers should be able to use that code as a jumping off point for building other game experiences.

How It Comes Together

These three pieces: the mobile app, Power Gateway libraries, and games are the three pillars of the Planet Nine Platform. Users engage with the platform through the Planet Nine app. Content creators create Power Gateways on the platform of their choice using the Power Gateway libraries. And game developers make games that utilize Nineum. The games give value to Nineum which gives value to Power which can then be spent at Power Gateways in order to find Nineum for users and content creators.

For an example let's say a user has 1,200 Power. They spend 400 Power in the app to find Nineum, which also lets Planet Nine find a Nineum. They then go to a friend's blog that is set up to accept Power transactions at a Power Gateway that costs 500 Power. The user spends 500 Power so they get one Nineum and their friend gets one Nineum and a 50/50 chance at another Nineum. The user then goes to a trading card game where pieces of Nineum are cards. There they find that they've received two new cards, the two new pieces of Nineum received from their transactions.

Taking a popular card game like Hearthstone as an example, we can try and predict how valuable a trading card game could make Nineum. In Hearthstone packs of five cards are sold for $1.99 meaning that the approximate price per card is $0.40/card. In Hearthstone some cards are rarer than others so while $0.40/card is what a single pack averages out to, in reality some cards are worth much more than $0.40 and most cards are worth much less. Still if a card game was developed that was selling packs of five Nineum cards for $1.99 the $0.40/piece of Nineum this represents would be some premium over the effective price per Nineum, but since such a premium is possible the price per Nineum would have to be more than $0.00 giving value to Nineum. This in turn would give value to Power.

Let's say that the effective price of Nineum is $0.05/Nineum then the Power transactions above would be worth $0.05 and $0.075 respectively. So long as $0.075/user is greater than the ad revenue from a similar engagement for the user's friend then the user's friend is incentivized to use the Planet Nine Platform to monetize their site. And this is another example of the virtuous cycle where users, content creators, and game developers all create value for each other by engaging in the dual-resource protocol through the Planet Nine Platform.

Universe and Address

The dual-resource protocol sets aside an 8-bit universe and a 32-bit address these are for future opportunities for the dual-resource protocol. First let's look at address. As the popularity of the protocol grows, the user base will grow large enough to start supporting more than one token type. Just as in physical mining, some can mine for gold while others mine for gems, in the digital world once enough users are engaged with the protocol some can discover Nineum while others can discover some heretofore unknown digital asset. These new digital assets will be added to the platform with a different address. They will be added by Planet Nine in coordination with an interested third party for a yet to be determined fee structure.

If an organization wants to create their own dual-resource protocol they can license the technology from Planet Nine. In this instance the organization will be creating a new "universe" and will mark their tokens as such. Just as with address the fee structure for this is to be determined.

Planet Nine Team

Zach Babb - CEO: Zach has 10+ years of leadership experience and seven years of development experience. He's spent the past year leading the charge for Planet Nine to come to life. In his spare time Zach enjoys hiking, beer, and trying out new gadgets that come out.

Alex Peter - CDO: Alex is passionate about creating technology solutions that empower connected, accessible, and sustainable communities. Alex has spent the past year designing all aspects of the Planet Nine product suite as well as the brand's identity. She enjoys her house plants, dog sitting, going to local shows, and biking around town.

John Klein - Developer: John loves working with technology, solving problems, and building things. It's great being able to do all those things at Planet Nine. Outside of work, he loves to read, travel, and eat and he'll do just about anything to get outside on a sunny day or up to the mountain when there's snow.

Roadmap

TBD - We want the users of Planet Nine to have a voice in the Roadmap. With our link aggregator feature, users can post ideas and vote on them.

Addendum 1

Half-fungible Tokens

First, what is fungibility? Fungibility is the property of a good whereby a unit of that good can be exchanged for another of the same unit of that good. For example gold is fungible because one ounce of gold is the same as any other ounce of gold. Money needs to be fungible by definition, one dollar is the same as every other dollar. A good becomes non-fungible when its units cannot be interchanged. For example houses are non-fungible because one house is different from all other houses, even if they have the same floor plan, their locations will differ making them unique.

When you read about fungibility, it's usually presented as a binary--either something is fungible or it isn't. But the real world is never so simple. There are a whole range of goods that are fungible in one respect and non-fungible in another. Take beer as an example. Beer manufacturers go to great lengths to ensure that each of their beers taste the same, that they would be fungible with each other. At the same time Beer manufacturers go to great lengths to ensure that their beer does not taste like any competitor's, making their beer non-fungible with other brands. Virtually everything we consume that's branded falls into this category of fungible within/non-fungible without. For lack of a better term let's call these types of goods half-fungible.

Current non-fungible token specifications are not capable of gracefully handling the half-fungible case. This is because current specifications give non-fungible tokens unique addresses which do not contain additional information about the token itself. This is not that big of a deal in context of a single digital experience for the non-fungible tokens. A database mapping addresses to values is sufficient for providing the half-fungible feel of the asset. For non-fungible tokens to be used in multiple digital experiences, however, half-fungibility must be taken into account.

Addendum 2

blockchain

Some may be wondering why this platform doesn't use a blockchain. The short answer is cost. The long answer is below:

There is something called the blockchain trilemma, which states that you can only have two of the following: security, decentralization, and scalability. Security and decentralization are the hallmarks of blockchains, and thus most have foregone scalability. When developing an interplanetary trade system, you don't want to build on something that won't scale to the opportunity.

But what do we even mean by scalability? In the case of blockchains that usually manifests as the chain's ability to process transactions. Each block has a finite number of transactions, which means transactions aren't guaranteed. Often times you can pay extra fees to prioritize transactions, but you don't want to be in the business of paying more for your foundational transaction the more successful your platform becomes.

Then there's Power. Current blockchains have no concept of a rechargeable resource. You would have to encode it in a smart contract, and since power is constantly regenerating you'd want to recalculate it for all users with every block. Even with cheap fees that would be expensive. The alternative would be calculating it off chain, but if you do that why use the chain?

Even worse is Nineum. Current chains have no concept of half-fungible tokens so again you're doing custom contracts. Storing that data on chain is expensive even on chains with cheap transactions. And in order to do the ordinal of the nineum you need to look up how many of a flavor have been minted. That would require traversing the whole chain with every Nineum minted, or keeping that off chain. A single NFT costs in the $0.10-$2 range. Nineum would be even more expensive. Prohibitively expensive.