XNET

THE FIRST BLOCKCHAIN-POWERED MOBILE CARRIER

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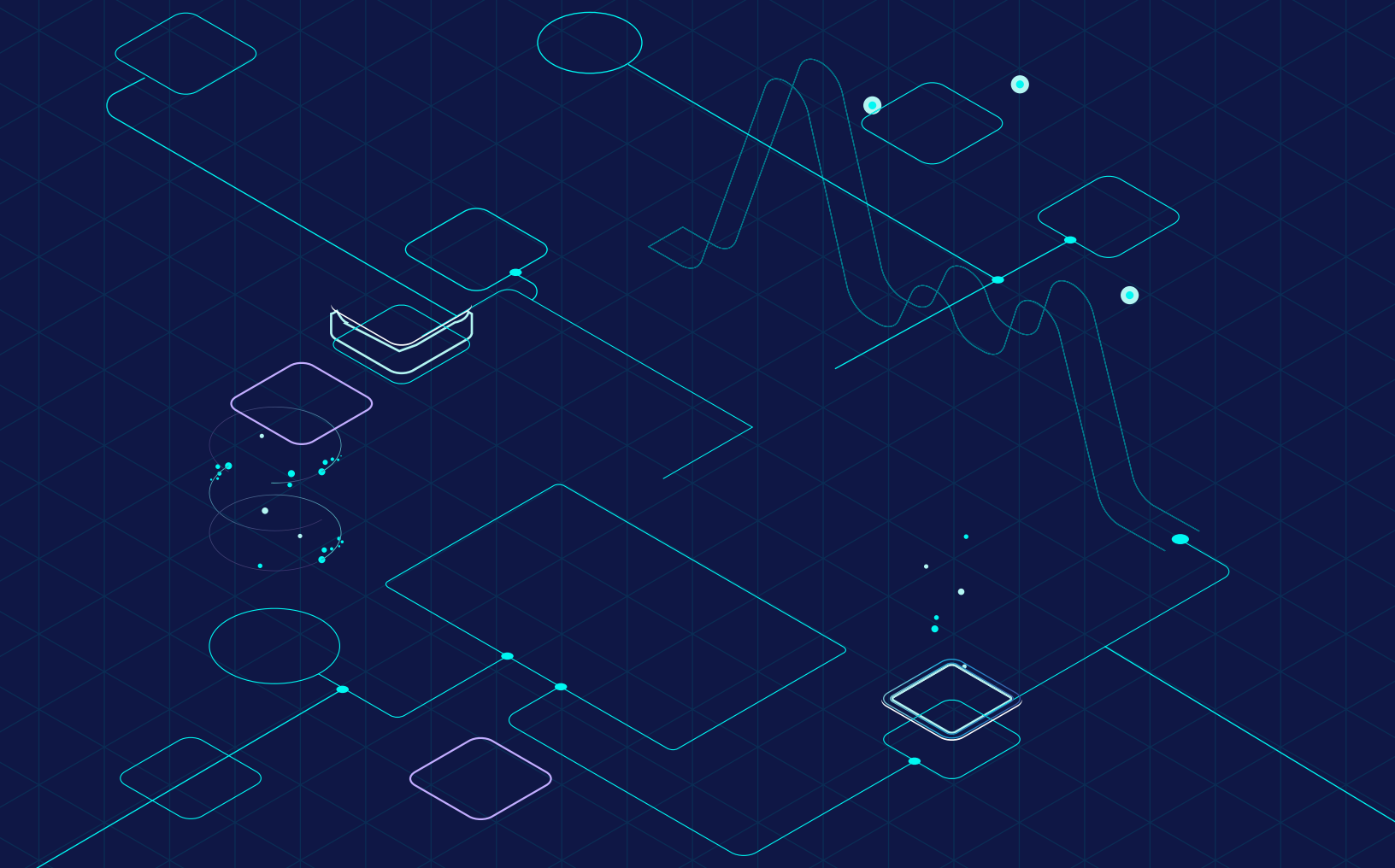

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OVERVIEW

The United Nations consider connectivity to be a human right, yet many parts of the US and the world lack cost-effective, reliable mobile wireless service. This, despite the high value ($300B in the US alone) and robust, recession-proof economics of the mobile market. Despite rapidly growing demand for data, little has changed in the mobile wireless network industry in decades. We believe this is a sector ripe for disruption and positive change.

XNET is a new approach to bringing true mobile wireless 5G connectivity to consumers and businesses using blockchain technology, Citizens Broadband Radio Service (CBRS) radio spectrum, and a community of network operators. Unlike traditional wireless networks that are dependent on wireless spectrum licenses and lots of expensive infrastructure, specifically various RAN (Radio Access Network/cell site) assets, XNET will own no spectrum and very little physical network infrastructure. And unlike Helium and other CBRS radio competitors, XNET will provide a full-service voice and data network, operating as a true MNO. XNET will enable a modern 4G and 5G wireless network using CBRS and any other available radio spectrum and will partner with a community of individuals and businesses who will own and operate XNET's wireless network infrastructure in return for crypto rewards.

XNET will be deployed first in the United States, and then in many other countries around the world as CBRS spectrum becomes available and rulemaking is harmonized.

A crypto-powered wireless network is not new. Helium has successfully demonstrated the viability of this type of network for low-data-rate, LoRaWAN applications, and is moving into 5G data services. However, operating a true mobile wireless network is a far more complex and technically demanding application. XNET combines lessons learned from its predecessors with a team deeply immersed in mobile wireless/cellular network technology and operations to create a new, radically more valuable enterprise.

MOBILE AND WIRELESS BROADBAND COMMUNICATIONS

We can't imagine modern life today without a mobile device being within our immediate reach. We expect our phones and tablets to be always connected and instantly available. We need this connection to be fast, secure and reliable, so how are we really connecting today? Although various technologies exist within the wireless ecosystem, it is largely dominated by mobile (4G/5G) and fixed wireless (Wi-Fi) broadband technologies. While Wi-

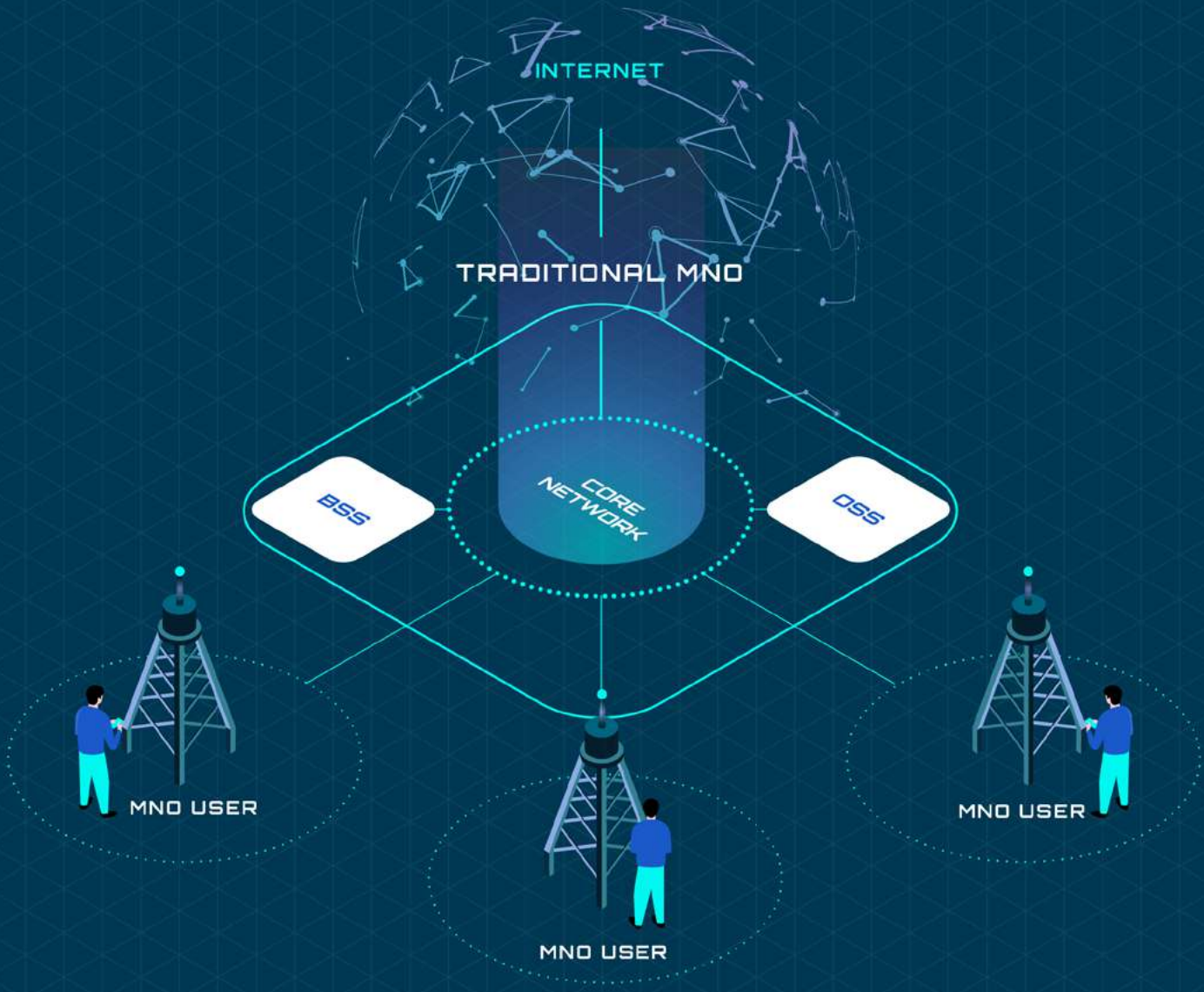
Fi carries most of the wireless internet traffic due to its affordability and wide availability indoors, 4G and especially 5G connectivity represents a much more valuable and ever growing market segment. This growth is driven by rapid development of video-rich applications, self-driving cars, industrial automation, remote monitoring and other advanced applications. The demand for secure, high speed / low latency mobile connectivity is accelerating and is now bigger than ever before.

MOBILE NETWORK OPERATORS (MNOS)

Over the last three decades, the mobile connectivity market In the United States has undergone a substantial consolidation and is now dominated by a small number of large Mobile Network Operators: AT&T, Verizon and T-Mobile. These large operators are mostly focused on large, high ARPU, metropolitan markets, while small regional operators provide coverage in-between. Globally, the likes of Vodafone, Orange, Telefonica, China Mobile, Docomo and Softbank control the majority of their respective local markets, but also participate in many smaller markets around the world. Up until very recently, the mobile connectivity market was an exclusive domain that was tightly controlled by a small number of these large telecom companies. The barriers to entry, especially in large markets like the U.S, were extremely high, due to very high spectrum licensing and infrastructure deployment costs. These barriers made it nearly impossible for new entrants to succeed, even as legacy Mobile Network Operators (MNOs) spend billions of dollars annually on supporting and upgrading their existing network infrastructure. As demand for fast and reliable 5G connectivity is rapidly accelerating, MNOs are struggling to keep up with the demand.

CENTRALIZED VS. DECENTRALIZED WIRELESS BROADBAND NETWORK

Traditional mobile wireless networks, such as those operated by AT&T, T-Mobile, etc., are highly centralized. These networks were designed and deployed at a time when such centralization was the only viable technical path. Centralization provides conceptual simplicity but also brittleness, and makes scaling such networks a costly challenge for providers. More importantly, centralized networks provide few mechanisms for users to improve the quality and coverage of their service, short of switching to another network provider or investing in costly signal boosting equipment. In fact, subscriber churn due to coverage issues is a big challenge for the mobile operators, with over one million people changing their mobile carriers every month for that exact reason.



The diagram above is a simplified logical representation of the network from a traditional cellular service provider, in which all of the network components and user information are managed by a single entity, including the radio layer, the core network as well as all of the business and operations support systems (BSS and OSS).

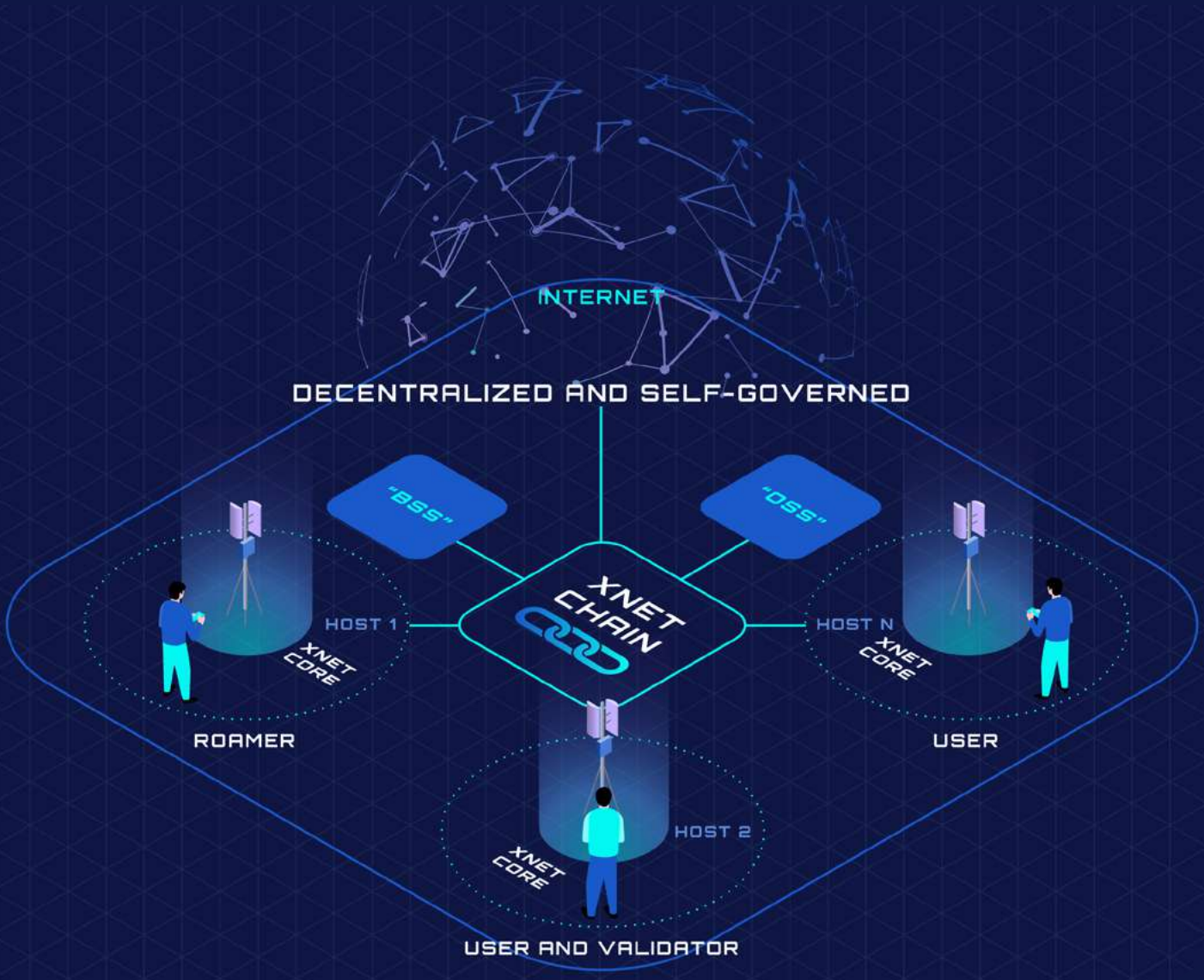
In contrast, the recent rise of blockchain technology has enabled a new class of decentralized applications, including decentralized communications networks and Web3 concepts. Decentralized networks can provide high levels of performance, ease of scalability, and robust security with few points of failure; possibilities enabled by inexpensive computation and the rise of the crypto economy that allows for new forms of incentives, value exchange, and social/technical organization.

Unlike traditional centralized networks, the users and all other participants of decentralized networks actively contribute in their operation and are rewarded for deploying connectivity where it is the most needed and valuable.

XNET DECENTRALIZED MOBILE WIRELESS NETWORK

We have developed an approach to building a decentralized mobile wireless network that leverages the robustness and scalability provided by a progressively decentralized implementation that also seamlessly integrates into legacy LTE/4G mobile networks and network back-ends, adopting the Web3 concepts wherever practical.

In the simplified diagram below, you see three different types of XNET network nodes and a heterogeneous collection of network clients, including clients that are acting as XNET network validators. The coordination of the individual nodes to act as a mobile network is done through the public blockchain and the BSS and OSS equivalent functionalities are implemented through smart-contracts and tokenomics models.



WHY THE XNET NETWORK IS TRULY DIFFERENT

XNET has the following advantages compared to other projects that are attempting to build decentralized mobile networks using blockchain and CBRS technologies:

Full Mobile Network Service Capability. Unlike Helium, Pollen and most Private LTE networks that are using CBRS and provide mobile data only, XNET will deliver a full spectrum of mobile network services including phone numbers, voice calls, SMS and e911 capability.

The value of these traditional mobile services today cannot be underestimated. Although our smartphones need mobile data to connect to the internet, we can't use any essential government or business services without providing a valid phone number, which is then often used to receive authentication codes and passwords by SMS. Needless to say, we also need a cellular voice connection to place a 911 emergency call or in fact any call to a landline.

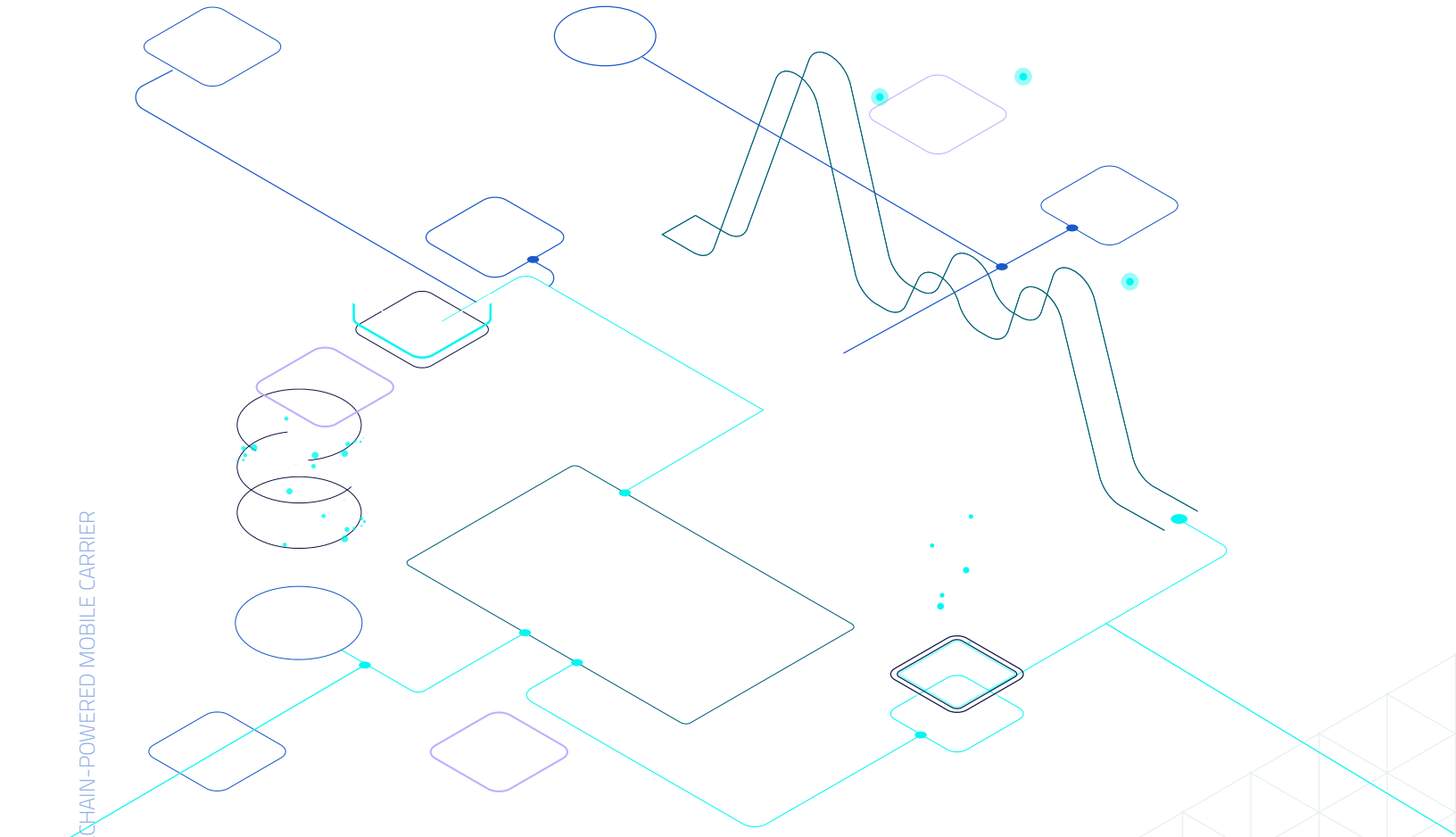
Understanding the continuing importance of these services in a modern mobile network offering, we are integrating these features and capabilities into our network and blockchain architecture from the very beginning.

- **Free Mobile Service.** We believe that all XNET node operators should be able to use 5G data on the XNET mobile network free of charge. A node operator should further be able to subscribe to a full mobile service package, including a phone number for a nominal monthly fee paid in $XNET.
  Moreover, in time, XNET intends to offer its community a seamless "roaming" on all partner networks, thus essentially significantly reducing or completely eliminating mobile service expenses for node operators and other XNET community members.

- **Neutral Host Operator.** XNET will be a "neutral host" mobile network built to seamlessly interconnect with other large and small mobile network operators, private LTE networks and roaming hubs. Given its focus on providing a full suite of mobile network services in areas where current operator coverage is insufficient or lacking completely, XNET's value proposition is superior to any randomly deployed "data only" network.

› **Strategic Network Rollout.** XNET fully controls its hardware supply and delivery logistics and does not intend to randomly deploy its network nodes in hopes of achieving higher network value through the total number of nodes in the field. Instead, nodes will be placed first in strategically important locations where demand for connectivity is high and current coverage is bad or non-existent.

Furthermore, the number of nodes per coverage area will be strictly limited and balanced, in order to ensure sustainable and attractive mining rewards for the node operators, while providing the highest quality of service possible to network users.



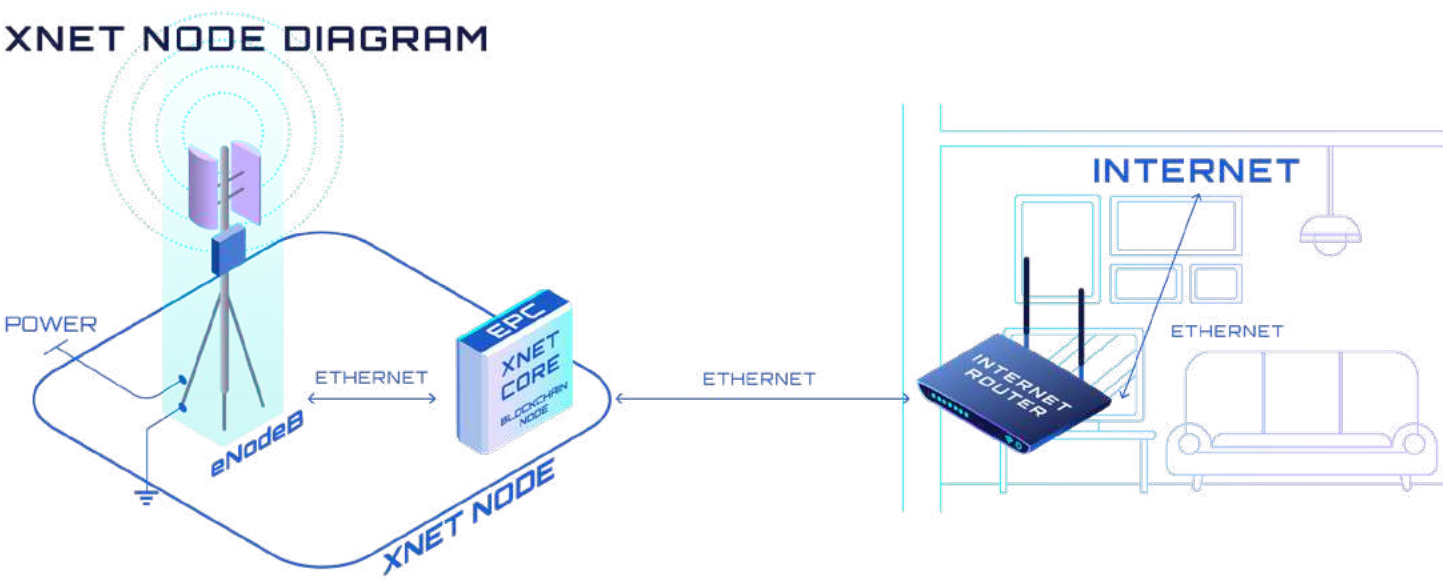
XNET NODES

Each XNET node acts as an autonomous network entity, with the ensemble of XNET nodes acting like a federation of networks coordinating through a common blockchain-based ledger.

XNET nodes perform a radio function, a network core function, and a blockchain function. In the most common configuration, the network function and blockchain function are combined in a device called the XNET core, which connects to a single local eNodeB radio device, as shown in the diagram below.

XNET Nodes coordinate with each other in a distributed way and collectively implement the XNET network. All XNET nodes coordinate with each other and the SAS (spectrum access system) to ensure responsible sharing of the CBRS spectrum.

XNET NODE DIAGRAM

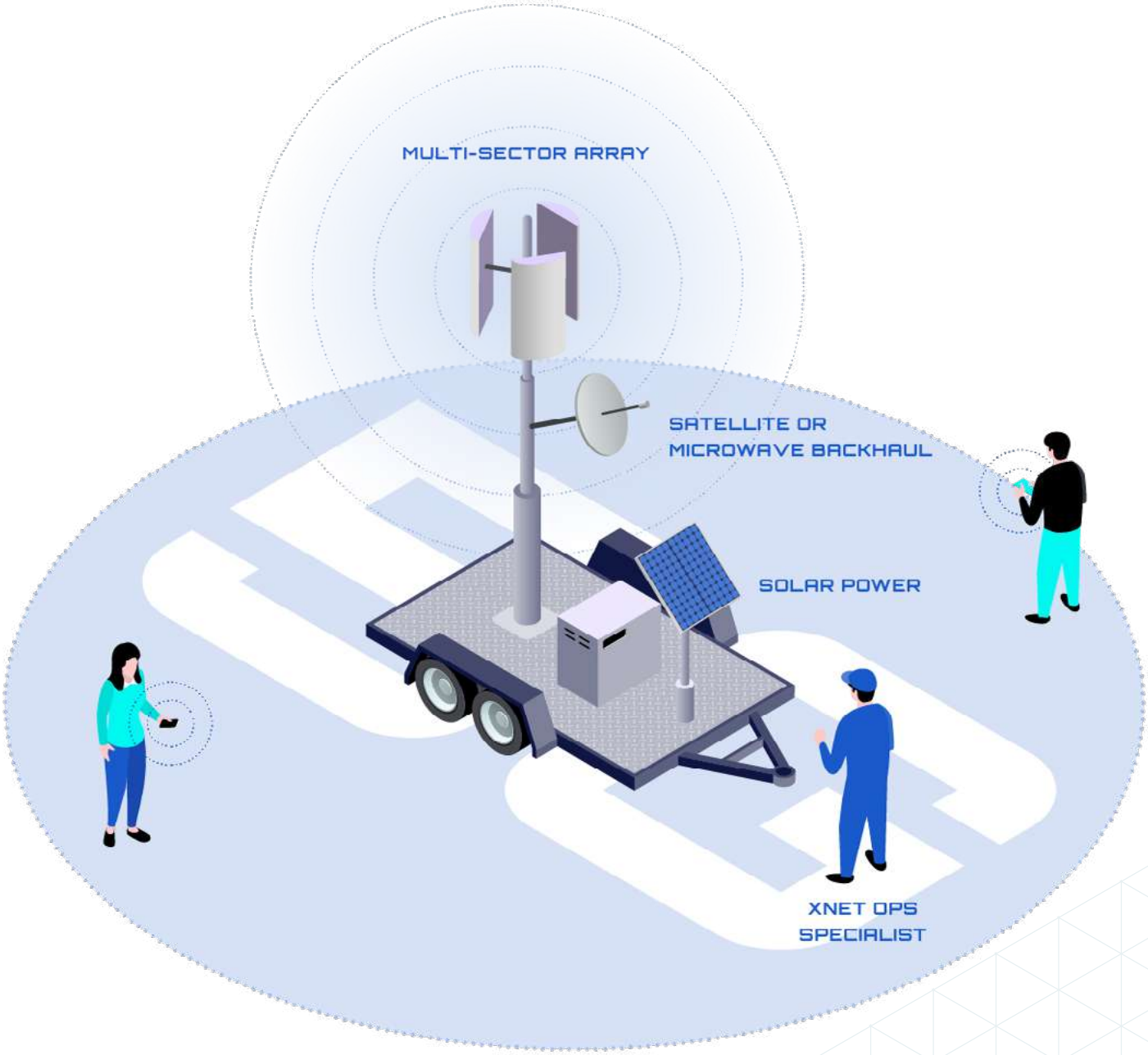


XNET LONG-RANGE NODES

XNET long-range nodes are installed on rooftops or in other elevated locations that facilitate a relatively large coverage area. XNET long-range nodes typically employ 3 to 8 antenna sectors and may use wired or a dedicated wireless backhaul, depending on the location. Long-range nodes may be owned and operated by anyone, but require installation or validation by a Certified Professional Installer.

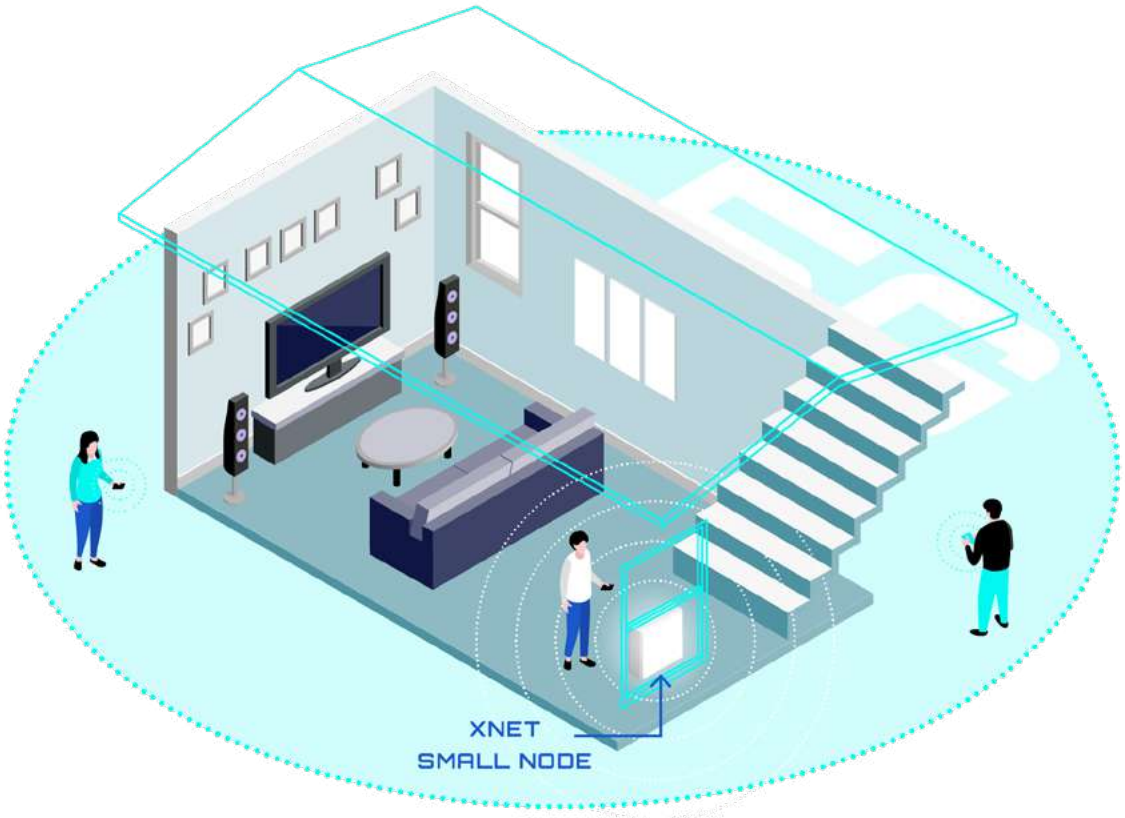
XNET ROVERS

The XNET Rover is a trailer-mounted, long-range node optimized for rapid deployment and self-contained operation. XNET Rovers are used to rapidly provide coverage in new service areas and to provide fill-in coverage in the wake of a natural disaster or other major disruption. XNET Rovers are owned, deployed, and operated by XNET.



XNET SHORT-RANGE NODES

XNET short-range nodes are typically installed inside a residence or facility, operate at relatively low power and use a single antenna sector. Short-range nodes use Ethernet or wireless meshing for backhaul. Like long-range nodes, short-range nodes can be owned and operated by anyone. Unlike long-range nodes, short-range nodes do not require professional installation. However, these nodes are otherwise functionally identical to long-range nodes.



XNET NETWORK VALIDATORS

XNET Network Validators are network clients that strengthen the XNET network by sending challenges to XNET nodes at unpredictable times and locations. XNET nodes also act as validators, challenging their neighbors, and there will also be an XNET mobile app that will, among other functions, provide network validation and reward the user through connectivity mining rewards (see below). When answered correctly, these challenges validate a node's coverage, and availability — see the discussion of Connectivity Mining, below.

CONNECTIVITY, DEMAND, AND CONNECTIVITY MINING

An essential feature of the XNET network is connectivity mining, which is the process by which the XNET network is organized and individual node operators and validators are rewarded. Just as some blockchains use a proof-of-work algorithm to maintain the integrity of the ledger and reward miners, XNET uses a proof-of-connectivity algorithm to do the same thing.

WHAT IS CONNECTIVITY?

We all intuitively understand connectivity to some degree and can relate to the experience of having or not having high-quality connectivity. However, "under the hood," connectivity is the product of a number of independent factors. For wireless networks providing a certain class of service, connectivity can be defined by coverage, capacity (bandwidth and number of simultaneous connections), latency, and uptime or reliability metrics. In wireless networking, the quality of connectivity isn't solely dictated by the wireless network, but also the wired or wireless backhaul network utilized to get traffic to and from the individual wireless nodes.

XNET operationalizes connectivity by metrics of coverage, capacity, and quality (a concept that combines reliability, latency, and some network topology metrics), which all play an important role in the end-user experience of connectivity. For the purpose of this discussion, you can imagine that XNET turns the multivariate, nuanced connectivity factors of a node into a convex, real-valued function, with higher scores representing better connectivity. The connectivity of a collection of nodes could then be represented by a convex function of the connectivity of the individual nodes, and the connectivity of any point on the map would be represented by a convex function of the connectivity of the individual nodes capable of providing service to that location.

XNET's mission is to provide high-quality connectivity for everyone, and to do that we need to incentivize the creation of high-quality connectivity that serves the needs of end-users. Connectivity that supports greater amounts of paid network traffic is more valuable than connectivity that supports lesser amounts. Hence, the value of connectivity increases with demand, and two locations with identical connectivity scores but different demand might end up with different values assigned to that connectivity product.

In the end, the objective is to have a fair connectivity ecosystem in which the reward is directly related to the value of the service offered and the quantity of the service used to promote higher user satisfaction and levels of service.

WHAT IS DEMAND?

Demand is not a connectivity property, though it can influence the quality of a given connection when capacity limits are approached. Rather, demand is an external factor that lets us assign a value to connectivity.

Intuitively, consider two nodes that offer the same connectivity (the same coverage, capacity, reliability, and quality) but see very different levels of demand, e.g., a node in a busy urban center vs. a node in a quiet rural setting. These nodes might be technically the same in terms of what they offer, yet provide very different levels of value to XNET network clients and the network as a whole.

XNET operationalizes demand as a measure of the total value of the data flowing through a node over a period of time combined with the total number of clients served. The accounting is done through a special semi-fungible data accounting token, or XNETD, that is discussed in more detail in the XNET Economics section later in this paper. This measure is an important factor in computing mining rewards for nodes, and in aggregate is used to adjust overall network mining difficulty.

XNET Regions and Demand Zones

Not all demand is created equal — because different markets place different value on connectivity, the rewards for providing service in a high-value market might be greater than the rewards for providing service in a lower value market. Likewise, the value of connectivity might vary by time of day, or even season of the year. And as the value varies, so does the cost. For more on how XNET figures out prices and rewards, see the XNET Economics section.

CONNECTIVITY MINING

A proof of work algorithm secures the Bitcoin network and provides the mining rewards that incentivises participation by miners who provide the Bitcoin network's computational infrastructure and power. So too does XNET's connectivity mining algorithm provide the foundation for the secure, robust, and scalable operation of the XNET network and incentivise the miners that provide the physical and computational infrastructure for the XNET network.

The XNET connectivity mining algorithm utilizes a combination of self-report, staking, and independent/distributed verification to ensure that XNET nodes and validators are fair actors.

Self Report

Nodes and validators periodically record metrics and compute hashes of network metadata which will be shared via IPFS and the blockchain. This data will be used in a staking challenge process (see below) to determine the eligibility of nodes/validators for rewards.

Value at Stake

WHY REQUIRE STAKING?

In order to ensure the fairness and smooth operation of the XNET network, it is necessary to impose costs for bad behavior. For example, a bad actor might attempt to steal value from the network by using a GPS spoofer to make an XNET node in one location (say, the bad actor's basement in rural Idaho) appear to be in another location (say, downtown Manhattan). Depending on the frequency of network validation activities, it might take some time for the XNET network to determine that the node is not where it claims to be. If the node could only harvest value without risking a value loss, the bad actor might successfully mine XNET for some period of time before being shut down, and the network might lose.

However, all nodes and validators are required to stake before they mine, and the mining rewards available in the expected interval before discovery is significantly smaller than the stake that will be lost if bad behavior is discovered. This makes cheating much riskier and more expensive.

HOW DOES STAKING WORK?

All participants in the XNET network must stake value to participate in connectivity mining. Nodes and validators will be ineligible to receive rewards above some fraction (say, 1/10th) of their stake during a given staking epoch, meaning that under-staked nodes and clients will be leaving money on the table. Staking epochs for the network will be automatically chosen so that nodes can expect a certain number of challenges[1] to be issued per period. If the success to failure ratio of passing challenges is too low, the stake is subject to forfeit, or being slashed, in blockchain terminology. If an XNET node or validator is slashed more than three times in a three-month period, the node/validator's wallet may become ineligible to participate in XNET rewards in the future.

[1] The number of challenges and required success ratio will be empirically set by XNET to support the smooth functioning of the network, and may be adjusted through a governance process as the network evolves.

During the early stages of the XNET network deployment there will be a review/appeals process by which failed staking tests may be addressed if there is a flaw or error, though this process will be one of manual review and refunding of stakes/reauthorizing participation. For a further discussion of this process, see the Governance section.

Independent/Distributed Verification

At the heart of connectivity mining is the concept of nodes and validators self-nominating to challenge and validate other network participants at unpredictable times and locations. These signed challenges will require signed responses from adjacent XNET nodes, the results of which are logged to the blockchain.

At a less frequent interval than issuing challenges, XNET blockchain nodes will from time to time self-nominate to verify blocks of previously logged challenges and responses. Verification may also include cross-referencing of data provided by traffic-accounting services with node-recorded metadata.

At a less frequent interval than verification, XNET blockchain nodes will self-nominate to issue preliminary rewards, identify misbehaving nodes, and adjust the verification "difficulty" interval. With enough such confirmations, rewards become final and misbehaving nodes/verifiers are stripped of their stake.

SELF NOMINATION EXPLAINED

Self nomination is key to the security of the XNET network. If it were possible to predict which node might self-nominate for a challenge, verification, or rewards issuance, it might be possible to issue bogus rewards or invalidate the stake of legitimate XNET participants. Thus, self-nomination must satisfy two important criteria: (1) it must be impossible to predict which node might self-nominate and when, and (2) when a node self-nominates, it must be easy to prove that the self-nomination was legitimate using information found only on the blockchain.

There is no central dispatcher for self-nomination. Instead, an unpredictable algorithm will cause a certain fraction of XNET nodes and validators to self-nominate every time a new block is issued on the blockchain. The entropy, or unpredictability, of self-nomination is derived from the unpredictability of the block hash and from the unique identifier of each node.

Each XNET node has an associated private/public key pair. Each time a new block is issued, an XNET node will compute the hash of a message consisting of its unique node identifier (its registered address), the block number, and the hash of the previous block. It then uses this message hash to decide if it has self-nominated, based on the number of leading zeros in the message hash and the current difficulty setting. If it has been self-nominated, the

node records the proof in the form of the message hash (which is easily independently verifiable) and its signature, which can be used to verify the sender address:

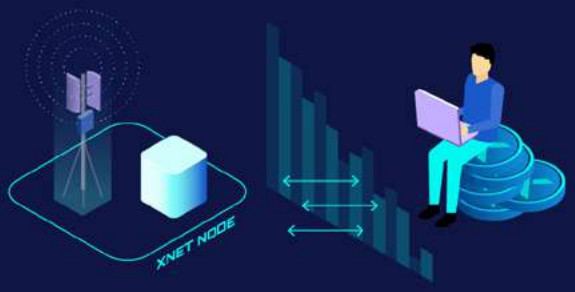
```
message = block.number+blockhash(block.number)+sender.address;
newhash = keccak256(message);
n = XNET.getDifficulty(); // a positive number
m = countLeadingZeros(newhash);
If (m >= n) { // we've won the self-nomination lottery
     newsig = sender.signMessage(newhash)
     // no need to record message, as that can be reconstructed
     recordSelfNominationProof(block.number,newhash,newsig);
     switch (m-n) { // what kind of action are we taking?
     case 0:
         XNET.doChallenge(); // challenge is most common
         break;
     case 1:                 // 1/10th frequency of challenge
         XNET.doVerification();
         break;
     case 2:
     default:
         XNET.doIssuance(); // 1/100th frequency of challenge
         XNET.adjustDifficulty();
         break;
     }
```

XNET ECONOMICS

In order for the XNET network to operate, the economics must work for all participants. This means that the value of the data being served must be higher than the costs to node operators and other members of the network ecosystem, and that the rewards to node operators and others consistently leaves XNET participants in the black.

XNET TOKEN BASICS

$XNET is a true utility token, converting to **network data credits**.



$XNET is issued to operators for running **XNET nodes**, in proportion to

- data served to wireless clients,
- value of the local market (urban, rural, international etc.) and
- network state / validation services.

$XNET will be using **proof of capacity** / **data served** mining algorithm.

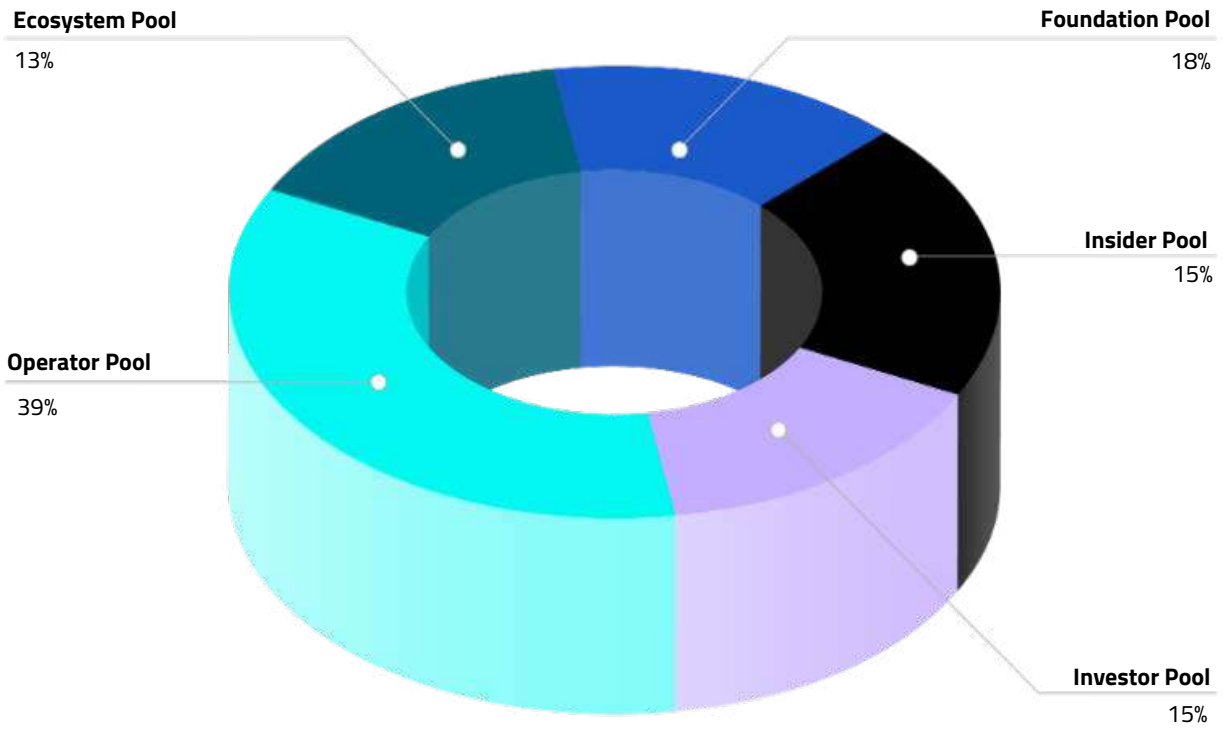
- **$XNET** can be converted directly to **data tickets** and all data consumed on the network will be accounted for in this way.
- **Converted tokens** will be **taken out** of circulation (burned).

Individuals and organizations will pay for network services in **$XNET**.

Mobile Network Operators will pay **XNET** in USD or other FIAT currency in arrears for data consumed by their subscribers and these FIAT payments will be used to burn proportional numbers of **$XNET**, thus supporting their value.

XNET TOKEN ISSUANCE AND ALLOCATION

There will be a total max supply of **24,000,000,000** (twenty-four billion) deflationary XNET tokens ($XNET). These tokens will be issued gradually over time and be allocated according to the breakdown below.



› Foundation Pool - 4,320,000,000 tokens (18%)

This pool of tokens is used to provide charitable works and support suitable projects and organizations. There will be a particular focus on connecting unconnected and under-connected groups and communities; facilitating access to education, healthcare and new economic opportunities in rural communities and remote tribal lands. These tokens will be released for such works gradually over several years.

- **Ecosystem Pool - 3,120,000,000 tokens (13%)**

  This pool is used to give rewards for key strategic suppliers and partners, ensuring quality of service and lowered supply costs. There will be a lockup period of 12-18 months on these tokens.

- **Operator Pool - 9,360,000,000 tokens (39%)**

  This is the pool of tokens used as mining rewards for operating XNET Mobile Network nodes and validating the XNET network. These will be issued to such participants over many years of network operation; there is a short lockup period on these tokens of approximately 10-15 days.

- **Investor Pool - 3,600,000,000 billion tokens (15%)**

  Used to gain access to investment in the network from Equity and (private) ICO investors. These tokens will be subject to a lockup period of 36-48 months.

- **Insider Pool - 3,600,000,000 tokens (15%)**

  Used to reward founders, employees and advisors over time. These will be subject to vesting schedules over 36-48 months. The sale of such tokens will also be subjected to a Scheduled Trade governance mechanism.

PARTICIPANTS

To understand the economics, it is important to understand the participants:

XNET Node Operators, or Enablers

XNET Enablers, along with Validators, form the backbone of the XNET network. Enablers operate XNET nodes, without which there would be no wireless network. Individuals, small businesses, or NGOs can all be enablers.

XNET Validators

Validators help validate and secure the XNET network by challenging nodes to prove coverage and network quality. Validators travel around regions with XNET coverage and issue random challenges to the network. Anyone with a supported smartphone can be a Validator.

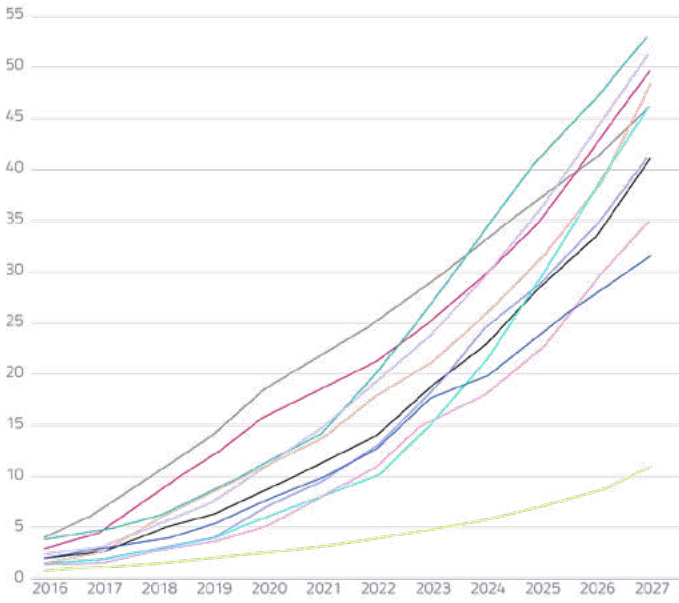
XNET Mobile Network Operator (XNETMNO)

XNETMNO, or XNET Inc, is the company that provides back-end services to the federated XNET network. The XNETMNO provides the critical role of bridging the XNET network to the legacy mobile networks and sells connectivity directly to other mobile operators. It is a centralized organization that may, over time, transition to decentralized community governance.

SIMPLIFIED ECONOMICS

Consider the network operation if there were no $XNET token. Imagine that each node operator was operating their own private mobile network, charging cash money for connectivity. The cost to the node operator is hardware depreciation, electricity, maintenance effort, and their own data backhaul costs, such as the cost of internet access. That node operator must consistently bring in enough cash to cover expenses, plus some profit.

Demand for fast and reliable mobile connectivity, globally and especially in the U.S., continues to grow at a rapid pace. The average monthly mobile data consumption in North America is forecasted to grow from 14 GB in 2021 to 52 GB in 2027, driven by video-rich applications which require high speed and low latency (e.g. interactive video content like video games, VR etc.)



Regions	2021	2027	CAGR 2021-2027
North America	14.6	52	24%
Western Europe	15.2	51	23%
India	18.4	50	18%
North East Asia	13.9	48	23%
South East Asia and Oceania	8.0	46	34%
GCC	22	46	13%
Middle East and North Africa	9.6	41	27%
Global average	11.4	41	24%
Latin America	7.9	35	28%
Central and Eastern Europe	9.9	32	22%
Sub-Saharan Africa	2.9	11	25%

Source: Ericsson Mobility Report

Traditional mobile network operators like Verizon, AT&T and T-Mobile are struggling to keep up with this demand, primarily due to high infrastructure deployment and maintenance costs. This applies to the majority of mobile operators globally. Most operators, especially in the U.S., are desperately looking for access to alternative coverage that could now be provided by private LTE networks. This is especially true in areas where existing operators currently have coverage gaps or low service quality due to capacity issues. By building a fully functional mobile network that includes phone numbers, data, voice, SMS and e911 services, XNET will be ideally positioned to provide instant access to its 5G network to all mobile operators. To become an attractive option for large operators, XNET intends to strategically target areas currently underserved by the operators as its first priority.

Simplified Node Economics

Imagine that the price of 4G/5G wireless data usage in a wholesale market is $1/GB, and the all-in costs to a node operator to serve that data is $0.10/GB. Thus, if the node operator were rewarded at $0.40/GB, they would make a handsome profit, with the remainder going to other ecosystem players.

Coverage Zones

XNET nodes will be distributed within three main coverage zones; high-density Urban, Suburban areas around big cities and Rural, remote areas currently lacking reliable cellular coverage. It is evident that networks like Helium, which deploy their network using multiple node vendors who ship nodes to random locations, suffer from inconsistent coverage, mediocre quality and widely varying mining rewards. In such networks, some areas are "over-served" by too many nodes operating in the same location, while showing lack of coverage in other areas. XNET intends to strategically place a limited number of its long-range and short-range nodes in a given area, thus balancing coverage size and quality of service with mining rewards. This strategic approach to network deployment, results in an overall higher network value for mobile operator partners, superior network end-user experience and consistently attractive rewards for the community of XNET enablers. XNET will also provide additional reward incentives for the initial deployment of nodes in valuable but currently "under-served" locations, where the demand for 5G connectivity is high.

Simplified Ecosystem Economics

The node operator isn't the only one with expenses — the XNET Network is supported by numerous agents who provide services and who must be rewarded. There are also back-end services that connect the XNET nodes to the other mobile network operators (AT&T, T-Mobile, etc.) operated by the XNET Mobile Operator (XNETMNO) company.

Simplified Economic Model

Imagine that an operator buys 1 GB of data from the XNET Mobile Network Operator for $1. This $1 is divided and used to cover several costs.

The first $0.40 gets used to buy $XNET from the market which are burned irrevocably to pay for the data traffic itself (see below for a more detailed explanation on Data Tickets). This is the primary way that tokens will get bought from the market early on. Importantly, XNET is not sensitive to the price of the $XNET token as it uses a fixed amount of fiat currency to buy these tokens at whatever prevailing price.

A further $0.30 is used to cover the costs of the back-end operation and running the network core. This is a fully-fledged mobile network so the infrastructure and components that have to be developed, integrated and deployed are extensive; much more than on a simple data network.

A further $0.30 is used to pay for various services and growth associated with the network itself. This includes professional network validation services, network planning, hardware R&D, software development, key site deployments, etc.

In parallel, newly issued $XNET tokens in the form of miner and validator rewards, are issued from the Operator Pool. The value of the $XNET issued in this way will generally be greater than the value of the data tickets burned, and will represent something like 40% to 50% of the fiat value of the data purchased by the operator.

MORE COMPLETE TOKEN ECONOMIC MODEL

The simplified model above doesn't cover the new issuance of $XNET, the change in value of $XNET with respect to data pricing, or different data pricing in different markets and coverage zones. To address this aspect, we will introduce a somewhat more complex economic model and a new token, the XNETD, short for XNET data ticket.

XNETD Data Tickets

The XNETD is a semi-fungible accounting token used to pay for data services on the XNET network. Unlike XNET, which is a universal fungible token that does not expire, XNETD tokens are coded to restrict their negotiability. If an XNETD token is not used before expiration, it is worthless.

XNET-D is the on-chain payment/accounting system for data on the XNET network; Appropriately coded XNETD is the only way to pay for XNET data/voice services at the XNET node level. When XNETD tokens are used to pay for data, that XNETD is burned.

CONNECTIVITY PRICING AND XNETD

One of the most important mechanisms for restricting the negotiability of XNETD is by region. Regions and coverage zones work together to set data prices in XNETD

XNET assigns nodes into regions, such as a state, territory, or large urban center. Within regions the XNET back-end assigns nodes to geographically contiguous zones based on demand — imagine a heat map showing average demand over a period of time, say a week, and isobars drawn to create zones of similar demand. In some high-value markets there may be significant fluctuation in demand by time of day or even season of the year, and in such markets one might imagine a set of maps tagged with time and representing average on-peak and off-peak demand.

To each region and demand zone, XNnet assigns a demand price, which can be thought of as a cost in USD or appropriately coded XNETD to put data on the network. This price in XNETD is proportional to the rewards paid for connectivity mining in that zone.

Each XNETD data token is tagged with a set of valid regions (e.g. any region in North America, North America minus major urban centers, etc.) and a time window in which it is usable (e.g. valid any time in the next week, valid next week at off-peak times only, etc.). XNETD tokens may be traded freely until they are burned to route traffic, and expired XNETD tokens are worthless. And while XNETD tokens are freely tradable once created, new XNETD tokens can only be created through a minting process that involves burning XNET tokens, which creates continuous market demand for XNET.

XNET and XNETD

The only source for new XNETD is by means of a one-way conversion from XNET via smart contract with price oracle[2]. The conversion ratio should be set to reflect the current market value of XNET as well as the current market value of the type and coding of XNETD as they trade against each other. Note that because XNETD is continuously burned to pay for network data, and the only source for new XNETD is burning XNET, this creates ongoing deflationary pressure on the XNET supply.

[2] In the initial phase of deployment, the cost of conversion may be set directly by the XNETMNO to ensure price stability and a smoothly functioning data market.

XNETD and Network Data

Data that flows through XNET nodes is billed against XNETD, which is then burned. Nodes will give preference to client data with the higher value/higher priority XNETD associated with it. Data without any XNETD associated may still be served by a node, but at the lowest level of priority, and such data will not count towards node rewards[3].

XNETD and Node Rewards

XNET nodes are rewarded with XNET in proportion to the quantity of XNETD they burn, adjusted by region and zone pricing, modified by factors such as coverage and reliability. XNET nodes are also rewarded for providing proven coverage and connectivity even in the absence of paid traffic, though these rewards are significantly less than the rewards for serving traffic demand.

XNET MNO Economics

The XNET MNO will purchase XNET on the market and burn it to XNETD, offering the resulting data credits to other MNOs or consumer subscribers in return for dollars. The XNETMNO may offer other products such as financing for XNET node operators and a range of other B2C and B2B offerings.

XNET Rewards Function

The XNET Rewards Function determines the reward in XNET granted to a nominally-functioning node or validator at the end of a staking epoch. This function applies both to full XNET nodes and validators, though validators do not receive a coverage score or data score.

```
Repoch = DeploymentBonus[4]  +
    min(stake/10, ZoneMultiplier * DemandMultiplier * QualityMultiplier *
                    (coverage_score + data_score + validation_score))
```

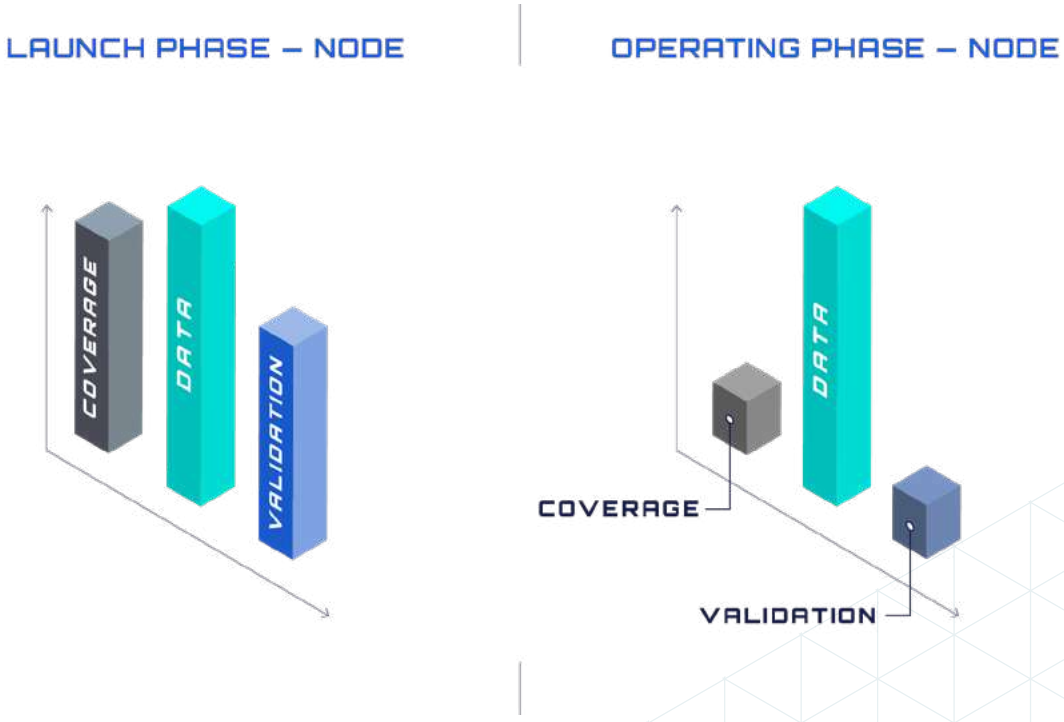
[3] We are examining the option of allowing node operators to reserve some bandwidth for private LTE applications, and mine connectivity on the remaining network bandwidth. This could create a win-win for organizations that want private LTE for non-bandwidth-saturating applications but would like to offset that expense with connectivity mining revenue.

[4] Deployment bonus available only during the first epoch of operation of a newly-deployed node.

Except for a one-time deployment bonus, the maximum reward available in an epoch is capped to 1/10th the amount staked, as assurance of good behavior and quality. As previously discussed, stakes are subject to slashing if quality is consistently low or cheating is detected. The node or validator operator may adjust the stake for the next epoch up or down at any time, but the stake used for this calculation is the stake at the beginning of an epoch, which is locked for the duration.

The zone multiplier is a function of location, the demand multiplier is a function of average local demand during the previous epoch, and the quality multiplier is a function of network quality metrics, both self-report and upstream calculated. The coverage score is a function of estimated coverage area, the data score is a function of the total value of XNETD burned during the epoch, and validation score is a function of validation activity, namely initiating and responding to validation challenges.

In order to compute the coverage, validation, and data scores, underlying metrics are multiplied by linear weights. In the launch phase (approximately the first year of operations) the weights will be adjusted to incentivise XNET node deployment, which is to say coverage and validation. In later phases of operation the weights will be adjusted to incentivise serving data (burning XNETD). You can see a sketch of how the weights might be adjusted in the figure below.



XNET Node Economics

As we have said before, XNET will not be successful if the economics do not work for our node operators. That means that an operator must be able to mine connectivity profitably, with a reasonable expectation of covering all costs, including depreciation, power, and backhaul costs.

The XNET connectivity mining rewards algorithm will ensure that an adequately staked, non-redundant node will generate net profits for operators under a sell-to-cover-costs model, given reasonable assumptions about the $XNET exchange rate, and the cost of power, depreciation, backhaul bandwidth, back-end services, etc.

We envision that during the launch phase of XNET (approximately the first twelve months of operation) a node that consistently provides coverage and passes its challenges will pay for itself within six to twelve months, depending on traffic served. After the launch phase, rewards for providing coverage will decline, but increased network traffic rewards will more than make up for the difference in most coverage locations.

XNET Validator Economics

Both XNET nodes and dedicated-purpose mobile clients will act as network validators. Validation requires significantly less overhead than node operation, but plays a critical role in the connectivity mining algorithm. Adequately staked XNET validators will be rewarded at a sufficiently high level to more than cover any additional costs that might be associated with validation. However, validation requirements are relatively inelastic with network usage and as such the upside opportunities of providing validation services are more limited.

Note that connectivity mining results in the issuance of new XNET, and provides the primary inflationary pressure on XNET supply. The overall mining difficulty, which is to say the amount of XNET issued as a reward for node operation or validation, will adjust in response to market forces to keep rewards in a beneficial range for connectivity miners and the overall network.

XNET GOVERNANCE

The XNET project began as XNET, Inc — a private, closely held US corporation, governed by a board and led by a group of telecom experts, engineers, and innovation professionals. XNET, Inc will control all governance aspects of the XNET project during the initial phases of operation.

As the XNET project develops, we envision creating a separate XNET foundation, structured as a US 501(c)(3) nonprofit or a similarly legally constituted entity. This foundation will hold the XNET tokens allocated to it, as well as other assets that may come from donations or the sale of XNET tokens. This foundation will be governed by an independent board of directors, and may over time transition partly or wholly to community governance by means of a separate governance token.

We envision that aspects of the XNET project, including the provision of XNETMNO services, will continue to be operated in a centralized fashion by XNET, Inc. The ownership of XNET, Inc may change over time, either as the result of an acquisition, a public listing, or as a merger with a future XNET DAO entity.

Other aspects of the XNET project that relate to on-chain operations, including: connectivity mining rewards parameters, the coding of geographic areas into zones, and the exchange rate for conversion of $XNET to $XNETD data tokens, etc., will start out being centrally governed by XNET, Inc, but may transition over time to a community governance structure (XNET DAO) employing a governance token. This future XNET DAO governance token will either be $XNET or a yet-to-be-created governance token issued to $XNET holders and other stakeholders.

XNET NETWORK PROJECT PHASING

PHASE 0: BOOTSTRAP AND PROOF OF CONCEPT

This phase of operations started in early 2022 and included the various tasks below. It is expected to be completed in September 2022.

- Build and configure the mobile network core software system used at the heart of the XNET mobile network.
- Build the blockchain software system used to track operator and validator provision, and reward tokens.
- Deploy an initial collection of nodes to validate the mobile network and the blockchain capabilities.

PHASE 1: DEPLOYMENT OF THE NETWORK IN KEY US LOCATIONS

This phase will start in June 2022 with the launch of the XNET website and hardware provisioning. The rollout of XNET nodes will be targeted to key US cities and locations initially.

This phase will continue throughout 2022 and into early 2023 with the incremental deployment of nodes to these locations ensuring quality of service.

PHASE 2: EXTENSION OF THE NETWORK TO WIDER NORTH AMERICAN LOCATIONS

This phase will start in 2023 and focus on extending the network to a much wider set of locations within North America.

PHASE 3: GLOBAL DEPLOYMENT OF THE NETWORK

This phase will start in late 2023 and focus on extending the network to global locations. As CBRS spectrum becomes available and rulemaking is harmonized, various countries will become targets for the XNET mobile network deployment model.

LEGAL DISCLAIMER

Not An Offer. This XNET Whitepaper is designed for general information purposes only and does not constitute a prospectus or financial service offering document and is not an offer to sell or solicitation of an offer to buy any security, investment products, regulated products or financial instruments in any jurisdiction.

Not A Contract. The information shared in this Whitepaper is not all-encompassing or comprehensive and does not in any way intend to create or put into implicit effect any elements of a contractual relationship. The primary purpose of this Whitepaper is to provide potential XNET enablers and token holders with pertinent information in order for them to thoroughly analyze the project and make an informed decision.

Utility Tokens. $XNET (XNET tokens) are pure utility tokens, meant to be exchanged for mobile connectivity credits and used within the XNET ecosystem only. XNET Inc. does not intend to offer $XNET for public sale. $XNET is not a corporate security and is not structured as such. Owners of $XNET are not entitled to any rights in XNET Inc. or any of its affiliates, including any equity, shares, units, royalties to capital, profit, returns or income in XNET Inc. or any other company or intellectual property associated with XNET Inc.

No Representations Or Warranties. No representations or warranties have been made to the recipients of this Whitepaper or its advisers as to the accuracy or completeness of the information, statements, opinions or matters (express or implied) arising out of, contained in or derived from this Whitepaper or any omission from this document or of any other written or oral information or opinions provided now or in the future to any interested party or their advisers.

Note On Forward-looking Statements. This Whitepaper contains certain forward-looking statements regarding the business we operate that are based on the belief of XNET Inc. as well as certain assumptions made by and information available to XNET Inc. Forward-looking statements, by their nature, are subject to significant risks and uncertainties. Forward-looking statements may involve estimates and assumptions and are subject to risks, uncertainties and other factors beyond our control and prediction. Accordingly, these factors could cause actual results or outcomes that differ materially from those expressed in the forward-looking statements. Any forward-looking statement speaks only as of the date of which such statement is made, we undertake no obligation to update any forward-looking statements to reflect events or circumstances after the date on which such statement is made or to reflect the occurrence of unanticipated events.

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