The Ecosystem

The ecosystem: a bird's-eye view

The Uplink Ecosystem, more than a product, is an architecture. It addresses the complexities of contemporary network connectivity not by replacing existing solutions but by creating a self-sustained and infinitely scalable system that decentralizes both operational responsibilities and financial incentives across a broad spectrum of participants. It follows the principles of decentralized Wireless, or DeWi.

Anyone, from individual users to specialized infrastructure Providers, from the small-est business to the largest corporation, can and will find their place among the Uplink community, along with rewards and top-of-the-line connectivity if and when they need it.

How this is achieved is detailed in this document, both in terms of the technology and the economy that sustains it, but one of the pivotal aspects is the integration of third-party connectivity Providers in a diverse and inclusive gamut of roles that will incentivize a broad spectrum of participants. Verifiers, network intelligence operators, telcos, OEMs, and more will all be incentivised and provided with the tools and resources to build this ecosystem and take ownership of it. Providers will operate on a range of business frame-works, such as revenue-sharing agreements or Software-as-a-Service (SaaS) models:

- Entities that specialize in the **planning and deployment** of network infrastructure;
- Firms that are experts in the **management and optimization** of reward systems;
- Providers dedicated to **backhaul connectivity services**.

Uplink will not only leverage localized expertise and existing user bases, but it will also amplify profitability and extend the ecosystem's reach with a minimal allocation of resources. This benefits everyone, Providers, users, and Uplink as well.

Self-sustaining, self-replicating, autonomous

The ecosystem's capacity for self-sustainability and its ability to adapt to new environ-ments are its greatest strengths. They are underpinned by a meticulously designed incentive system, which will nurture relationships with these third-party Providers.

Moreso, it will also facilitate the spontaneous emergence of the Uplink network in new geographical locations. The system has been designed so this can occur with no direct intervention from Uplink, making the ecosystem not just self-sustaining but also highly adaptable to a variety of market conditions and user requirements.

Central to Uplink's ethos is the aspiration to construct a network that is reliable and responsive to user needs. This document serves as an introduction to the Uplink Ecosystem, delineating the roles, responsibilities, and interrelationships that constitute its foundational architecture. These are the principles that make DeWi a superior guiding principle for connectivity and the Internet going forward. The objective is to provide a nuanced understanding of the complex interplay between key stakeholders and the mechanisms that sustain the platform. In achieving this, users will be better positioned to appreciate the tangible benefits and practical applications that the Uplink Ecosystem can offer.
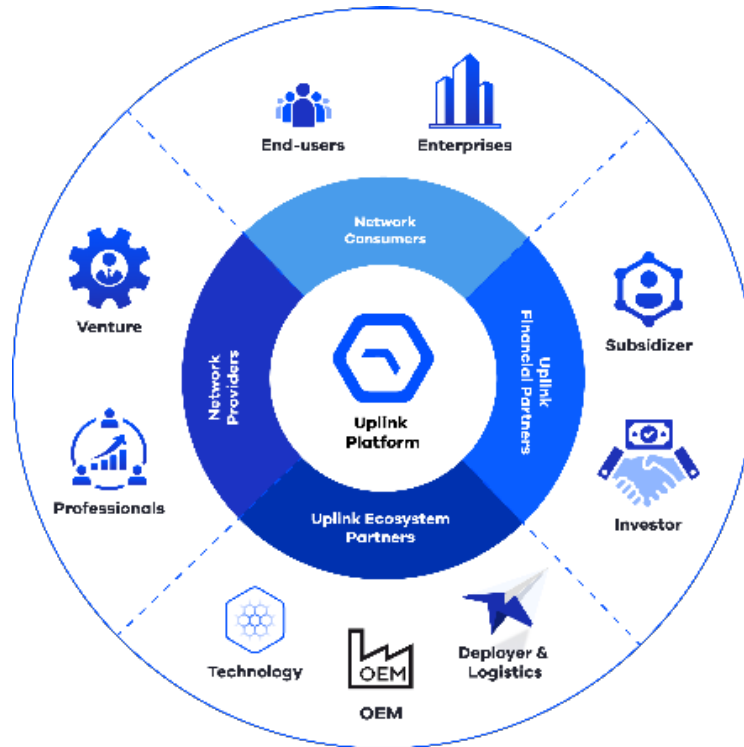
Key Roles and Their Interactions

The Uplink ecosystem has a number of main actors, or roles, that have different responsibilities in the establishment and maintenance of the entire network. These roles can be played both by people or businesses (mainly Consumer and Provider) or by the machines running specific software that the same people and businesses own and operate. For the purpose of this document, roles will be capitalised and should be understood to mean either, depending on context.

1. Consumer

The Consumer is the end-user within the Uplink network. They are pivotal for generating essential proofs by consuming data. These users receive services on the network, make necessary payments, and provide proof in return.

There are two types of Consumers:

• **End-users:** These individuals utilize the Uplink wallet app to access connectivity services on their devices, such as smartphones, tablets, and laptops. The Uplink wallet app provides a user-friendly interface, enabling end-users to connect to the network without technical complexities.

• **Enterprises:** These are businesses or larger entities that require consistent, high-quality connectivity for a multitude of devices. They opt for the 'Plug and Play connectivity service' provided by Uplink, which offers a streamlined approach to networking. This service allows enterprise customers to bypass traditional networking challenges, ensuring efficient connectivity for their operations.
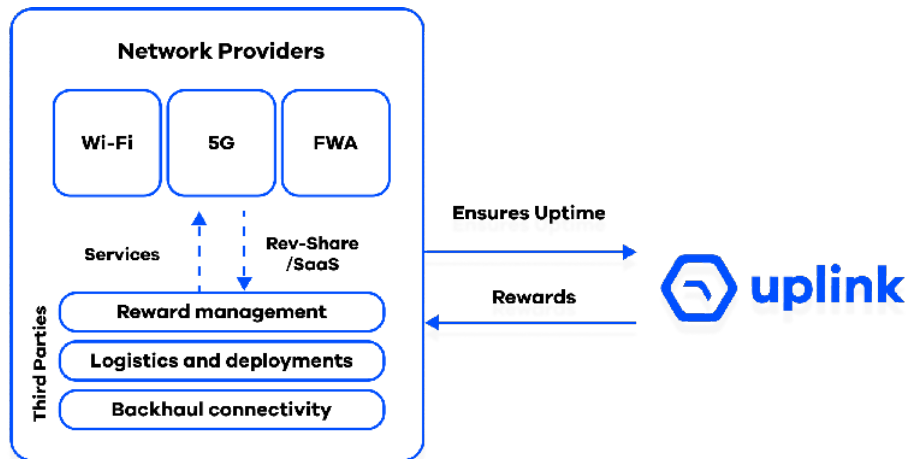
2. Provider

Providers are crucial entities in the Uplink ecosystem. They offer data through connectivity devices, such as routers. For their services, they receive rewards and payments. Providers can play dual roles: they can solely provide devices and connectivity or, to maximize rewards, they can also serve as Verifiers or Validators (see the Governance and Stability chapter). Uplink's ecosystem is enriched by two primary categories of network Providers:

1. Venture Providers: These are individuals (or groups of individuals) who might have minimal knowledge about network planning and deployment processes, but can either deploy hardware or share their existing network with Uplink. They play a crucial role in expanding Uplink's reach, especially in areas where professional network services might not be prevalent.

2. Enterprise Providers: These are entities with a profound understanding of network planning and deployment. They often collaborate with real estate managers to deploy hardware and have the capability to integrate gateways into the Uplink ecosystem using Uplink software.

The Uplink ecosystem also welcomes third-party service Providers. These Providers can operate on a revenue-sharing or SaaS-based model. They include:

- Reward Management.
- Logistics and deployments.
- Backhaul connectivity Providers.

By collaborating with these third-party Providers, Uplink can leverage local expertise and user bases, maximizing profitability and expanding its reach with minimal effort.

Last but not least, Uplink's ecosystem is designed to support various networking applications that operate on an existing Uplink network. Examples include:

1. Virtual Private Networks (VPNs)
2. Content Distribution Networks (CDNs)

3. Core-As-A-Service

4. Other Xapps

This approach is reminiscent of platforms like AWS, which allows businesses and ventures to run their own operations on the same foundational network.

Interactions and Relationships

For the ecosystem to reach its stability and balance, a number of relationships need to be established between the actors described above. The nurturing of these relationships through a carefully designed incentive system is what makes the Uplink ecosystem both self-sustainable and even capable of sprouting in entirely new locations with little or no direct intervention from Uplink.

- **Consumer and Provider:** The primary interaction here is transactional. Consumers receive services from Providers and, in return, provide proofs and make payments. This relationship is foundational to the Uplink ecosystem, ensuring that there's a demand for the connectivity services that Providers offer.

- **Provider and Verifier:** Providers can choose to verify their own proofs, but they can also rely on external Verifiers. This relationship ensures the accuracy and integrity of the data. When Providers act as their own Verifiers, they streamline the process, but external Verifiers offer an added layer of objectivity.

- **Verifier and Validator:** Verifiers assure gateways are up and provide proof. Validators process and store this proof on a ledger. This sequential relationship ensures the integrity of the data on the network. Validators rely on the accuracy of Verifiers to maintain the trustworthiness of the Uplink ecosystem.

- **Validator and Maintainer:** While both roles involve Fullnodes, their responsibilities differ. Validators participate in the consensus process, while Maintainers focus on replication and stability. This division of labor ensures the smooth operation of the Uplink network.

- **Maintainer and Consumer:** Indirectly, Maintainers support Consumers by ensuring the network remains stable. While they might not interact directly, the service quality that Consumers experience is, in part, due to Maintainers.

In summary, each role in the Uplink ecosystem has distinct responsibilities, but their interactions create a cohesive, efficient, and secure network. The symbiotic relationships between these roles ensure that Uplink remains a reliable and trusted platform for all its users.

Governance and Network Stability

Uplink's governance model is designed with precision and transparency, ensuring the ecosystem operates efficiently and in the best interests of all its participants. By prioritizing decentralization, Uplink ensures that decision-making processes are rooted in the collective input of the community, fostering a platform that is adaptable and resilient.

The decision-making process in Uplink is a collaborative endeavor. It emphasizes the importance of feedback and needs from its users, ensuring that the platform's evolution is not dictated by a centralized authority but is a reflection of its community's aspirations. DeWi is about creating networks of interactions and making every stakeholder responsible for whether the ecosystem thrives.

Fullnodes

Fullnodes play a pivotal role in maintaining the network's health and participating in its governance. Their primary responsibility is to validate transactions and ensure network security. By actively participating in consensus mechanisms, they contribute to the robustness and security of the network.

The governance model also has provisions for electing Validators for limited periods. These Validators are involved in the consensus process, bringing in fresh perspectives and ensuring that decision-making remains dynamic and in line with the community's evolving needs.

Maintainers, as Fullnode owners, are dedicated to ensuring the network's continuous operation. Their commitment to keeping their nodes consistently online and updated provides a stable foundation for the Uplink network.

Uplink's consensus mechanism emphasizes transparency and security. Each transaction is subjected to thorough verification by a majority of participants, ensuring a consistent and accurate ledger across the network.

The governance model's iterative nature allows for continuous improvements based on feedback from the community. This feedback-driven approach ensures that Uplink remains responsive to the needs of its users.

For this system to work fully, specific actors are necessary to run the fullnodes, performing essential roles for the self-sustainability of the system:

Verifiers

Role and Functionality

Verifiers are responsible for confirming the operational status of gateways within the Uplink network. While Providers have the option to act as their own Verifiers, this is not a requirement. Verifiers must have either direct or indirect network access to perform their duties. They conduct cryptographic challenges to gateways and use the responses to create proofs of functionality, which are then submitted to the blockchain.

Incentivization and User Acquisition

Uplink incentivizes the role of Verifiers to ensure sufficient network coverage and data verification. These incentives serve dual purposes: they encourage active participation in verification activities and can act as a user acquisition strategy. For example, a company with a large user base could become a Verifier, thereby extending Uplink's reach and data collection capabilities.

Validators

Consensus and Network Integrity

Validators are selected Fullnodes that participate in the network's consensus process. They validate and store proofs on the blockchain, ensuring all transactions are verified. Validators are essential for maintaining the network's integrity and service quality. They can be elected from the pool of Verifiers for specific durations.

Decentralized Growth

Uplink encourages third-party businesses or individuals to become Validators, fostering a self-sustaining network that expands with increasing data flow. This minimizes the need for centralized investment, allowing Uplink to focus on its core competencies while sharing benefits across the community.

Maintainers

Network Stability

Maintainers are Fullnode owners who are not Validators. They have direct network access and engage in data replication but do not participate in the consensus process. Their primary role is to ensure the network remains stable and consistent.

This expands the network and benefits everyone, minimizing the need for centralized investment of both capital and manpower, freeing Uplink to do what it does best and sharing the benefits among the entire community.

Activities and Interactions of Financing Partners

The role of financing partners in the Uplink Ecosystem extends beyond mere capital injection. These partners actively engage in a variety of activities and interactions that contribute to the platform's growth, scalability, and reach. This chapter will describe these activities and interactions, as well as the mutual benefits that arise from such engagements.

The key thing to keep in mind is that financing partners contribute to Uplink's ecosystem in ways that go beyond financial support. Their involvement is often hands-on, and must be understood in the context of a live and expanding ecosystem that doesn't have a centralized authority.

Their contributions can be categorized as follows:

1. Network Enhancement: Financing partners often subsidize hardware and operational costs, thereby directly contributing to the expansion and improvement of Uplink's network coverage. This contribution ensures that they will then partake in the system's ROI.

2. Revenue Generation: Partners are actively involved in revenue-sharing models, where they partake in the profits generated from the regions where the hardware they subsidized is deployed. This includes sharing in Uptime Rewards and data revenue.

3. Strategic Input: Financing partners have the opportunity to influence Uplink's strategic direction, particularly in regions that align with their own interests or objectives.

Types of Activities by Financing Partners

The types of activities that financing partners engage in are as diverse as the partners themselves. These activities are tailored to the unique value each partner brings to the ecosystem. As the system evolves and becomes more complex, surely some of these activities will also develop and change. It is both expected and desirable that this list will need expansion in the mid and long-term:

1. Government Entities:
 • Public-Private Partnerships: Engage in collaborative efforts to improve network coverage in underserved areas.

 • Policy Advocacy: Work closely with Uplink to advocate for policies that facilitate network expansion and reliability.

2. Corporate Partners:
 • Custom Solutions: Collaborate with Uplink to develop customized connectivity solutions that meet specific operational needs.

 • Joint Ventures: Enter into joint ventures to leverage Uplink's existing infrastructure for mutual benefit.

3. Investors:

• Risk Assessment: Actively participate in evaluating the risks and rewards associated with expanding into new regions or technologies.

• Portfolio Diversification: Utilize Uplink as a means to diversify investment portfolios, given its unique market position and growth potential.

4. Other Providers:

• Infrastructure Leverage: Utilize Uplink's existing infrastructure to expand their own network coverage.

• User Base Expansion: Leverage Uplink's extensive user base to introduce new services or enhance existing ones.

Uplink financial partners not only provide the financial muscle for growth but also engage in a range of activities that contribute to the platform's strategic direction, operational efficiency, and overall success. Their involvement is a testament to the symbiotic relationships that fuel Uplink's mission to democratize access to reliable and scalable network connectivity.
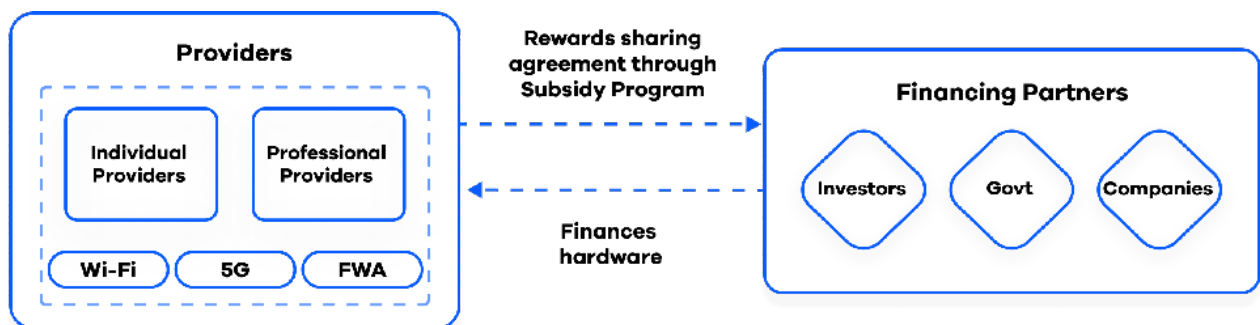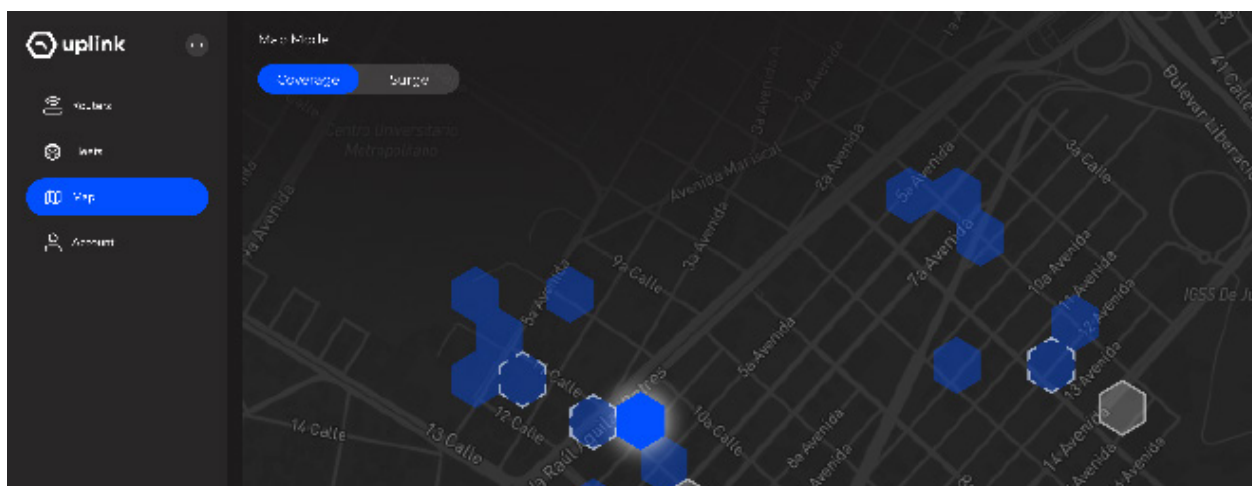
The Surge Map

The Surge Map is a pivotal tool within the Uplink ecosystem, designed to provide a clear representation of geographic areas that require enhanced connectivity. By employing a hexagonal grid system, it offers a consistent and precise approach to mapping, ensuring that both enterprises and Providers have a reliable source of information to base their decisions on. The Surge Map can be found on the Portal, the one-stop-shop for every actor interacting with the Uplink ecosystem to perform operations related to the network.

The identification of Surge areas is pivotal for several reasons:

1. Matching Efficiency: By recognizing surge areas, Uplink can optimize its network deployments, ensuring that resources are allocated where they are most needed. This results in increased matching efficiency, ensuring users in these areas receive optimal connectivity.

2. Strategic Deployment: The surge map guides Uplink's hardware deployment, allowing for a targeted approach. This ensures that network resources are not wasted and are directed towards areas that will benefit the most.

3. Consumer-driven Insights: An interesting aspect of the surge mechanism is that areas can be chosen by either Uplink or by the Consumers themselves. When Consumers, namely enterprise customers, identify a surge area, they lock ULX tokens, which serves two purposes. These locked tokens will fund rewards and ensure the system's growth, as well as signaling to Uplink that the existing network in that region might be underperforming, allowing Uplink to prioritize its efforts accordingly.

Surge, Flagging, and Data

The primary function of the Surge Map is to allow enterprises to indicate regions where they need improved connectivity. This is achieved through a flagging system. When an area is flagged, it serves as a clear indicator to Providers about where their infrastructure and services are in demand. This collaborative approach is designed to ensure that

resources are deployed where they are most needed, reducing wastage and ensuring efficient use of infrastructure.

The Surge Map is equipped to update its data in real-time, ensuring that any changes in connectivity needs are immediately reflected. This feature is crucial for Providers, as it allows them to adapt their strategies and resources in response to emerging demands without delay.

Beyond the basic flagging system, the Surge Map offers a wealth of data insights. For each flagged area, Providers can access detailed information, from the specific type of connectivity required to potential user density and other relevant metrics. This ensures that decisions are not just based on demand but are also informed by a comprehensive understanding of the specific needs of each area.
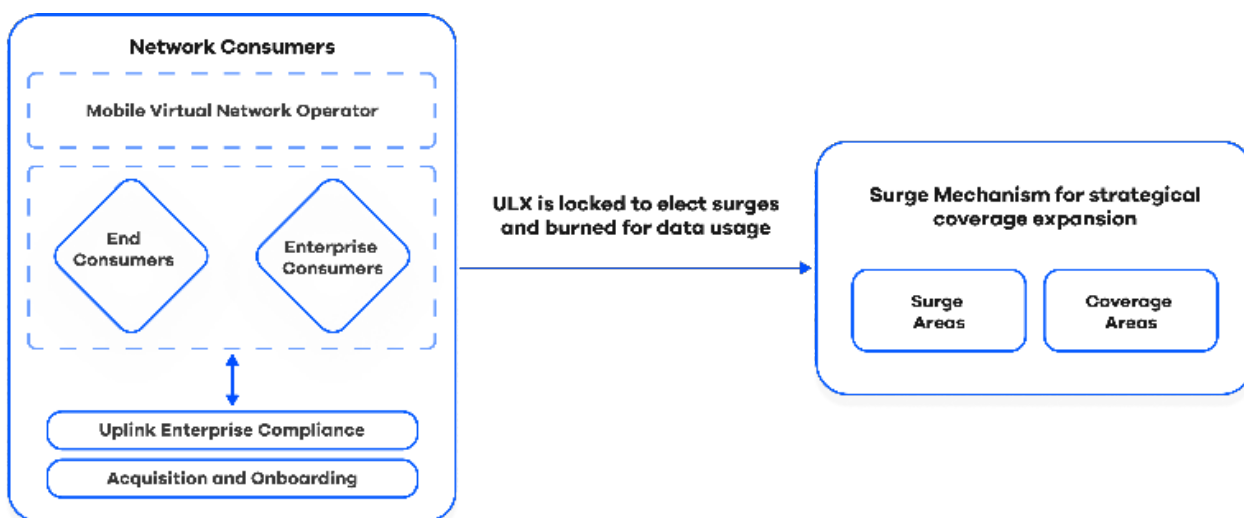
For Consumers and Providers

For Consumers, the Surge Map is where they can flag areas with insufficient or faulty connectivity, signaling their need for improvement. By doing so, they're not just passively waiting for a solution; they're actively participating in bringing about change.

Providers, on the other hand, use the Surge Map as a strategic tool. It guides them to areas where their services are not just wanted but desperately needed. When a region on the Surge Map darkens, indicating high demand, Providers can respond swiftly, deploying their resources to meet this demand, incentivized by the ROI that might generate. This interaction ensures that the connectivity solutions are directed precisely where they're most required.

Furthermore, as Providers deploy their services in high-demand areas, they're rewarded for their efforts, ensuring a win-win situation for all parties involved. The Surge system, thus, fosters a harmonious relationship between Consumers and Providers, with both sides working together to achieve a common goal: seamless, efficient, and widespread connectivity.

You can find a Portal user manual that covers how to interact with the Surge Map on this document.

For Subsidizers

The Surge Map also allows for the creation of **Subsidies**, a tool that allows anyone, whether they are already an actor in the ecosystem or not, to incentivise its growth and expansion to suit their needs. Highlighted areas in the Surge Map will indicate where connectivity is weak or missing, allowing Subsidizers to then pinpoint areas where they would like to fund a deployment.

Subsidy Categories

• **Data Subsidies:** These are set up for data usage in the subsidized region. There's no revenue sharing for this model, so it's usually driven by Consumers who want better connectivity. Providers will be rewarded with the value of this subsidy, thus encouraging action to improve connectivity in an underserved region.

• **Infrastructure Subsidies:** These help Providers set up and expand their operations in targeted areas by covering some of the infrastructure costs. These can be set up by anyone, whether they are already active in the ecosystem or not, and provide ROI through a revenue sharing model, where Subsidizers get a percentage of all connectivity sold via the equipment they helped fund.

The Surge Map and the subsidy system work together. Consumers show where they need better connectivity, Providers offer solutions, and Subsidizers fund these solutions. This keeps the Uplink network growing independently and ensures that more areas get the connectivity they need.

ULX → → **Network Credits**
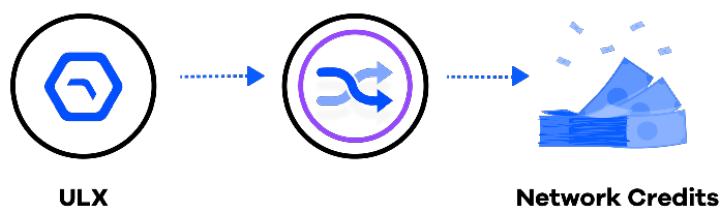
The Dual-Token Ecosystem: ULX and NC

The Uplink network operates on a dual-token system, which forms the bedrock of its economic model. ULX, as the market token, serves as the gateway into the network's economy, with its value subject to market dynamics. On the other hand, NC offers stable value, ensuring consistent service costs for users, irrespective of ULX's market value.

The relationship between ULX and NC is cyclical and symbiotic. As users purchase NCs with ULX to access the network's services, these ULX tokens are recycled back into the system as rewards for gateways, the Providers of connectivity services. This economic model ensures a continuous flow of value within the network, encouraging network activity and promoting active participation.

The Tokens and their Relationship

ULX is more than just a digital asset; it symbolizes an integral system of incentives and motivations. It serves as a reward mechanism for Providers, acknowledging their efforts in preserving the network's efficiency and reach. Furthermore, ULX facilitates transactions within the network, ensuring its relevance as long as connectivity services are sought. However, it's essential to understand that ULX is not a governance token. Despite its significance, it doesn't grant holders any voting rights in the network's decision-making, ensuring equitable operations.

NC plays a pivotal role in the Uplink network, ensuring stability and facilitating its operations. Its primary purpose is to facilitate payments for services, with users exchanging ULX for NCs to access these services. Unlike ULX, NC's value remains stable, offering predictability in service costs. Moreover, NCs are non-transferable, ensuring they're used solely for accessing services.

NCs also play a part in the network's incentive system. They're used for Proof of Delivery (PoD), ensuring the network's optimal performance. Providers, in turn, receive ULX as payment, aligning the network's incentives.

The Broader Cyclical Flow

The process of exchanging ULX for NCs is part of a broader cyclical flow that nourishes the network's economy. As ULX enters the system, NCs are minted and used to purchase connectivity. This results in NCs being burnt, and further ULX tokens being introduced into the ecosystem. This cycle not only incentivizes Providers but also ensures a continuous flow of value within the network.

Uplink's Core Responsibilities

Uplink's ecosystem is designed to provide a seamless connectivity experience for both end-users and enterprise customers. Central to this mission are Uplink's core responsibilities, which ensure the efficient and secure functioning of the entire network. Here's a detailed breakdown:

The Fostering of a Community

Uplink isn't, and isn't meant to be, a traditional telco. While the company will always be open to doing the jobs associated with one, such as traveling to specific locations to install infrastructure, this will be reserved for custom jobs and specific customers that require it. The true purpose of Uplink is to follow the ethos of Web3 by decentralizing and democratizing access to the building blocks of the Internet.

Uplink has taken it upon itself to develop a community of service providers (third-parties and ecosystem partners) that will contribute to technical solutions that will serve enterprise customers. We are building the tools and resources that will allow us to move on from developing technical solutions around connectivity to catering to a community that does.

This is the core difference that separates Web2 from Web3, and Uplink is building the foothold to fully become the latter.

As time goes by, this document will also evolve to encompass a number of sections regarding grants, collaboration templates, value propositions, etc. that will be in place for every actor in this ecosystem to be able to thrive, grow, and make their own mark in an ecosystem that will also belong to them.

Authorization, Authentication, and Accounting (AAA)

Uplink is responsible for the AAA across multiple wireless protocols. This involves:

1. Authentication: Verifying the user's identity, ensuring that the person or entity is who they claim to be.

2. Authorization: Determining what resources the user can access within the network.

3. Accounting: Keeping track of the user's activity on the network, which can be used for billing, auditing, and other purposes.

Proofs

Decentralized ecosystems like Uplink have to be designed for trustlessness. But how do we ensure that every transaction, every byte of data consumed, and every service provided is genuine? Enter Uplink's proof mechanisms. These mechanisms are designed to validate and verify every action within the ecosystem, ensuring transparency, integrity, and trustworthiness.

Quick Overview of Proof Mechanisms

- **Proof of Delivery (PoDL):**
  - This proof confirms that data was successfully delivered to the Consumer.
  - It ensures that Providers are genuinely delivering the services they claim to, and Consumers are receiving the data they're billed for.

- **Proof of Density (PoDS):**
  - This proof is generated based on device location, and "density" should be understood as the ratio of devices underserved of connectivity versus the offerings of connectivity on any given area.
  - It helps in identifying high-demand areas, guiding Providers on where their services are most needed.

- **Proof of Liveness (PoL):**
  - This proof validates that connectivity infrastructure is available even when it's not being used.
  - It ensures that Providers offer consistent and reliable services, rewarding those who maintain high uptime.

Ecosystem Implications

The interplay of these proof mechanisms within the Uplink ecosystem is what ensures its reliability:

- **Consumer's Role in Proof Generation:** Every time a Consumer accesses data, they play a part in generating PoDL and PoDS. Their consumption patterns directly influence these proofs, ensuring that they're an active participant in maintaining the ecosystem's integrity.

- **Provider's Role in Proof Validation:** Providers, especially those who also act as Verifiers, play a crucial role in validating these proofs. By doing so, they ensure that the rewards they receive are genuine and based on actual services provided.

- **Verifier's Role in Proof Verification:** Verifiers, whether they are also Providers or independent entities, cross-check the proofs, ensuring that every claim made within the ecosystem is genuine.

- **Validator's Role in Proof Storage:** Once proofs are verified, Validators store them on the ledger, ensuring a permanent, tamper-proof record of all transactions and actions within the Uplink ecosystem.

In conclusion, Uplink's proof mechanisms are the foundation upon which the trust and reliability of the entire ecosystem are built. Through these mechanisms, Uplink ensures that every participant, from Consumers to Providers, can operate in a trustless and transparent environment.

Direct Acquisition and Service to Enterprise Customers

Uplink directly acquires and serves enterprise customers, catering to those that require on-demand connectivity and network-level flexibility. This direct approach eliminates intermediaries, ensuring faster response times and tailored services for enterprise-level needs.
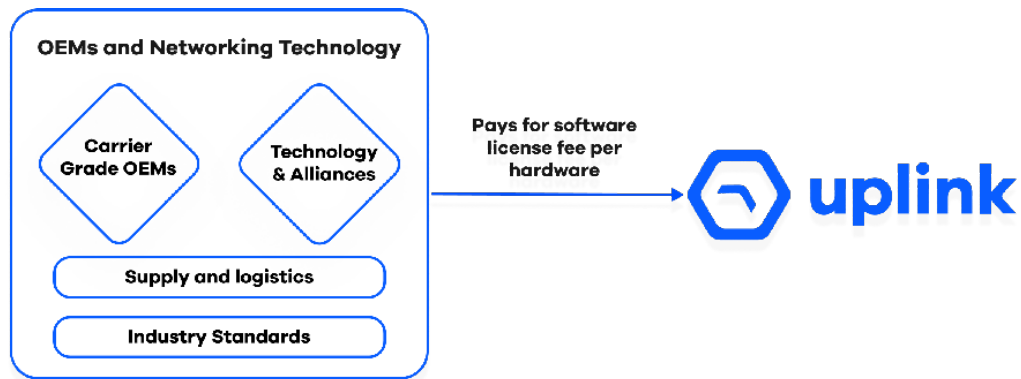
Infrastructure and OEM Partnerships

Uplink's commitment to providing carrier-grade connectivity is evident in its robust infrastructure and collaboration with Original Equipment Manufacturers (OEMs). By aligning with industry standards and future market trends, Uplink ensures a seamless integration of hardware and networking software. This chapter provides a comprehensive insight into the infrastructure design, OEM collaborations, and the benefits derived from such associations.

Infrastructure Design and the "Open" Revolution

Infrastructure design plays a pivotal role in determining network performance and optimizing costs. Uplink recognizes the importance of leveraging existing advancements, especially in the era of the "Open" revolution in connectivity. Instead of reinventing the wheel, Uplink collaborates with existing hardware OEMs and networking technology partners.

Benefits of Collaborating with OEMs

1. Carrier-grade Infrastructure: Uplink's collaborations ensure that the infrastructure meets Mobile Network Operator (MNO) offloading requirements.

2. Multi-protocol Expertise: The infrastructure supports various protocols, including:
    a. 5G,
    b. LoRA
    c. LTE
    d. Wi-Fi

3. Logistics and Inventory Management: Collaborations help mitigate overheads from overseas logistics and inventory management, thanks to regional distributors.

4. Integration and Customization: Uplink technology can be easily integrated and customized with the infrastructure.

5. Adoption Across Networking Stacks: The infrastructure is adopted by various players across the networking domain, including OEMs, Internet Service Providers (ISP), and Internet Data Providers (IDP), reducing friction in onboarding and maintenance.

6. Post-sale Support: Uplink ensures post-sale hardware support to network deployers and Providers.

7. Industry Standards: The infrastructure aligns with standards developed by market leaders in the networking technology sector.

8. Exponential Growth: Collaborations lead to exponential growth in hardware sales and offer opportunities for revenue-sharing agreements for OEMs within the Uplink economy.

Conclusion

Uplink's ecosystem is designed to address the challenges of global decentralized connectivity. By integrating a diverse range of network Providers, establishing a solid infrastructure, and securing strategic financing partnerships, Uplink aims to provide reliable and efficient connectivity solutions for an ecosystem that should be able to operate, on many levels, independently. As the demand for consistent internet access grows, Uplink's approach to meeting these needs becomes increasingly relevant. The platform's focus on technical efficiency, collaboration, and strategic growth positions it as a key player in the future of connectivity and DeWi.