Lastic: The Marketplace for Blockspace

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Introduction

Abstract

Blockspace, the fundamental product of blockchain technology, holds considerable significance today. It represents the capacity within a blockchain to store and process data, and accessing this blockspace yields several advantages, including trust, security, transparency, and traceability. The demand for blockspace is evidenced by the willingness of users to pay fees to confirm transactions, as seen in blockchains such as Bitcoin.

The type and quality of blockspace available for use is contingent upon the specific blockchain providing it. If the desired type of blockspace is not readily accessible, an alternative approach is to construct a new blockchain tailored to provide the required blockspace, as we've seen with the advent of appchains. Nevertheless, at its core, the primary driver of activity in the blockchain ecosystem remains the need for blockspace.

Lastic facilitates the on-demand, periodic, or continuous utilization of blockspace for various purposes. However, this level of flexibility and accessibility is only achievable through the utilization of a novel

concept known as "Coretime" on the Polkadot network. Unlike traditional approaches involving shards or slots, Polkadot is paving the way for the use of "cores," which can host not only blockchains but also a wide range of functions and calculations, both asynchronous and synchronous. These cores can be procured in monthly allotments, or intriguingly, they can be subdivided into Non-Fungible Tokens (NFTs), allowing for trading and sharing among users with differing requirements.

Coretime on Polkadot

Polkadot’s Parachain model

Polkadot, a prominent player in the blockchain ecosystem, has evolved significantly since its inception. This chapter explores Polkadot's underlying resource utilization, introducing several models that showcase the platform's potential beyond merely verifying blockchains, and delves into the core concepts as well as a guiding vision for the future.

Polkadot's mission is outlined in its white paper, defining it as a "scalable heterogeneous multi-chain blockchain of blockchains." This description remains true to its original vision, and it provides the foundation for the network's current structure.

The structure of Polkadot comprises two key components:

- Relay Chain: The core of Polkadot's structure that provides consensus, interoperability, and shared security.
- Parachains: The blockchains that connect to the relay chain, inheriting the aggregate economic security of the relay chain while functioning as independent, specialized state machines that are optimized for a given purpose.

Polkadot efficiently utilizes resources to ensure the security of the Parachains.

What’s Next for Polkadot: Polkadot’s Coretime Model

Polkadot's architectural model allows for the extension beyond blockchain verification, inadvertently creating a resilient multi-core compute system. This allows for flexible and diverse utilization of resources, making it a versatile tool for various use cases.

Characteristics of the Polkadot Multi-Core Compute System:

- Parallelism: Multiple cores can operate in parallel, 52 cores at the time of this publication.
- I/O Capacity: Each core has approximately 1 megabyte per second of I/O bandwidth.
- Computational Power: Each core exhibits computational capabilities, with a Geekbench 5 SC score of about 380. This performance can improve with advances in hardware.

While initially designed for blockchain verification, Polkadot's multi-core compute system can support other functions as well.

Polkadot introduces the concept of "Agile Coretime," aiming to optimize resource **procurement** and **utilization** for greater efficiency and flexibility.

Procurement:

- Monthly Bulk Sales: Blocks of coretime sold on a monthly basis.
- Instantaneous Sales: Shorter-term coretime available for immediate use.
- NFT-Based Bulk Coretime: These NFTs represent coretime and can be customized according to usage patterns.

Utilization:

Where the current Polkadot Model utilizes coretime to verify Parachains.

- Service Model: The concept of CorePlay introduces synchronous and reconfigurable utilization. CoreJam furthers this by creating a VM solution for anything that compiles to WebAssembly.
- Potential Sophisticated Models: Exploring advanced resource utilization models.

Future Directions The future of Polkadot holds significant promise as the platform opens up opportunities for more varied and efficient resource utilization. These advancements are driven by two key motives:

- Economic Efficiency: Maximizing the value of resources by making them available for a broader range of applications, reducing economic inefficiencies.
- Technological Flexibility: Encouraging experimentation and allowing diverse applications to use the platform's underlying resource for innovative purposes.

Polkadot's evolution from a blockchain verification platform to a versatile and flexible multi-core compute system demonstrates its commitment to adapting to the needs of the blockchain and broader technology communities. The introduction of Agile Coretime, combined with the potential for various resource utilization models, reflects Polkadot's ambition to be a central player in the evolving landscape of decentralized technology.

Blockspace markets today and how Lastic expands the idea

When people talk about blockspace marketplaces today, they often refer to tools that MEV actors use to reorder transactions within a block, for a particular virtual machine or state-transition-function (STF), but such marketplaces are specific to reordering of blockspace, not the blockspace itself. A true blockspace marketplace should be a place where buyers may do whatever they wish with the blockspace they have purchased. Where, once they’ve purchased the blockspace, they can manipulate it however they choose, such as simply reordering transactions, extending their EVM execution, offloading tasks in Wasm execution, scaling up their processing by doubling-up the blockspace to reduce fees, performing exotic cryptography calculations, deploying smart contracts, combining multiple workloads for synchronous processing, and anything else they can imagine.

Lastic revolutionizes the way blockspace can be exchanged with the flexibility required for a vast array of applications across all web3 ecosystems. Using Polkadot's coretime model as a foundation, applications large or small can access the blockspace they need according to their use at a given time. At the same time, blockspace providers can tailor the packaging of blockspace to match the current market demands.

Lastic serves as the pivotal secondary marketplace, essential for the exchange of coretime, pioneering a new era in blockchain functionality. Within this evolving ecosystem, Lastic introduces features designed to enhance user experiences and provide innovative solutions. These features include user-created automations, automated governance-controlled parameters, elastic scaling, and a streamlined linear onboarding model, ensuring efficient and hassle-free access to high-quality blockspace on the Polkadot network.

In its essence, Lastic stands as a dynamic marketplace that empowers individuals, extending its reach to those who may lack the technical expertise required to construct their blockchains. The platform ushers in an era of fully customizable and adaptable blockspace, enabling virtually anyone to participate. Blockspace, the lifeblood of the blockchain ecosystem, is thus transformed into a more accessible and flexible resource, thanks to the pioneering efforts of Lastic and Polkadot's Coretime model. This evolution ensures that blockspace is no longer a limiting factor but a catalyst for innovation and growth within the blockchain community.

Problem Statement: Coretime's Current Limitations

The existing framework of Coretime presents several challenges that hinder its effectiveness in meeting the dynamic demands of users within the Polkadot ecosystem. These issues can be summarized as follows:

1. Inflexibility in Procurement Options:
    - Coretime procurement currently offers two primary options: bulk coretime for a fixed period of 4 weeks or instantaneous coretime, which operates on a pay-as-you-go basis per block. This binary choice does not cater to the diverse range of use cases and resource requirements.
    - Lack of intermediate timeframes: Users often require coretime resources at intervals other than four weeks or the granularity of every single block. The absence of a secondary marketplace precludes options for securing coretime resources for scenarios such as every other block or every 10th block.
    - Insufficient flexibility for multi-party structures: In certain collaborative or multi-user settings, the need arises to distribute coretime resources evenly. The current Coretime setup does not facilitate such resource sharing.
    - Limited predictability for short-term usage: While the current system is predictable for users procuring Coretime for one or two months, it does not adequately address the needs of those seeking shorter coretime periods.
2. Complex User Experience:

    - The existing Coretime framework exhibits a user experience that is far from user-friendly. Without a proper interface, users will be forced to use the Polkadot-JS developer console or manually create extrinsics (transactions) that broadcast desired outcomes to the network. It can be considered unwieldy, leading to potential errors and confusion, and in many cases, it has.
    - A reliance on companion documentation: Users are compelled to consult supplementary documentation to navigate the Coretime procurement process, resulting in a less-than-seamless experience.
    - Requirement for technical expertise: Successful utilization of the current Coretime model largely depends on the proficiency of experts and developers, making it less accessible for a broader user base.
    - Limited automation support: The current Coretime system lacks automation features, which are becoming increasingly crucial in the modern blockchain landscape.
3. Regulated Market with Constrained Price Discovery:
    - The price discovery mechanism within the Coretime system operates in a manner similar to rent control in a highly regulated market. For example, monthly price adjustments are limited to increments of 5%, leading to slow adaptations in pricing.
    - Governance-controlled initial pricing: The initial prices for Coretime are set through governance, which, while offering stability, may not fully align with market dynamics and competitive pricing structures. This rigidity can potentially limit the optimization of resource allocation.

The existing Coretime framework, while a notable step in offering Polkadot's resource procurement, demonstrates significant shortcomings that hinder its adaptability to a diverse range of user requirements. Addressing these limitations is essential to make Coretime a more versatile and user-friendly resource within the Polkadot ecosystem. The solution lies in the development of a more flexible and accessible Coretime framework, enabling a seamless and automated experience while allowing users to access coretime resources with greater precision and efficiency.

Solution: A Marketplace for Blockspace

The current core allocation model on Polkadot lacks a dedicated marketplace or exchange for buying and selling coretime in flexible chunks. Teams face challenges in obtaining cores on-demand without explicit ad-hoc requests, purchasing fine-grained spans of coretime, and often struggle to find cost-effective ways to utilize cores efficiently. Moreover, the existing architecture does not fully address the ability for parachains to sell excess blockspace, create partnerships or coalitions per core, and acquire fine-grained coretime.

The existing core allocation model on Polkadot faces several key limitations that have been identified as hurdles to the efficiency and flexibility of coretime allocation. These challenges include:

- Absence of a Dedicated Coretime Marketplace: The Polkadot ecosystem currently lacks a dedicated marketplace or exchange designed for the flexible trading of coretime. This gap results

in teams encountering difficulties when seeking on-demand coretime, purchasing specific spans of coretime, and optimizing core utilization cost-effectively.

- Lack of Flexibility for Coretime Allocation: The core allocation framework falls short of enabling precise ad-hoc requests for coretime. It also lacks provisions for acquiring fine-grained coretime, hindering the ability to maximize the utilization of cores.
- Inadequate Solutions for Excess Blockspace: The existing architecture does not provide a comprehensive solution for parachains to monetize excess blockspace, form partnerships or coalitions per core, and secure fine-grained coretime allocation.

Introducing Lastic: Your Blockspace Marketplace

Lastic stands at the forefront of the digital marketplace, revolutionizing the way blockspace is traded and managed. Our platform is meticulously designed to cater to the diverse needs of the blockspace ecosystem, offering streamlined services for buying, selling, and splitting blockspace.

Buying: Navigating the Blockspace Market with Ease

At Lastic, we understand the importance of simplicity and accessibility in the complex world of blockspace trading. Our platform features an intuitive interface that allows users to effortlessly navigate and purchase blockspace. Buyers have the flexibility to explore listings on both the primary system-level market and Lastic's vibrant secondary market, ensuring a comprehensive overview of available options. This seamless approach demystifies the process, enabling informed and strategic purchasing decisions.

Selling: Unlocking the Value of Unused Blockspace

For blockchain entities grappling with surplus blockspace, Lastic offers a lucrative avenue to monetize these underutilized assets. By selling excess blockspace through our platform, blockchains can effectively mitigate losses and optimize their resources. Additionally, Lastic serves as a gateway for wholesalers and speculators to engage with the market, fostering a dynamic environment for diverse market participants. Our platform's design facilitates the activation of new players, broadening the scope and reach of the blockspace market.

Splitting: Enhancing Flexibility and Liquidity

Lastic introduces an innovative feature that allows for the splitting of blockspace cores into smaller, more manageable units. This groundbreaking functionality empowers fractional ownership, significantly increasing market liquidity and accessibility. Users can tailor their investments and holdings to their specific needs and capacities, promoting a more inclusive and versatile trading environment.

Advanced Features: Streamlining the User Experience

Beyond the core functionalities of buying, selling, and splitting blockspace, Lastic is committed to providing an enriched user experience. Our platform is equipped with a highly simplified user interface, complemented by real-time market data to keep users informed about current trends and potential market trajectories. Additionally, Lastic incorporates advanced features such as automation, timely alerts, and an array of extended trading instruments, including futures and options. These sophisticated tools are

designed to enhance the user experience, providing a comprehensive and efficient platform for all blockspace-related transactions.

For Buyers:

1. **Streamlined Blockspace Acquisition:** Lastic revolutionizes the blockspace acquisition process with its user-friendly interface, offering a seamless and intuitive buying experience. Our platform empowers buyers to effortlessly navigate and secure blockspace from a diverse array of listings, encompassing both primary system-level markets and Lastic's robust secondary market.
2. **Diverse Marketplace Beyond Parachains:** Our marketplace extends its reach beyond the conventional parachains, creating a vibrant ecosystem that brings together Dapp Developers, ZK Provers, and Speculators. This expansion fosters a unified marketplace, catering to a wide spectrum of needs and preferences.
3. **Enhanced Security and Risk Mitigation:** Security is paramount at Lastic. We provide a purchasing environment that is not only secure but also minimizes risks and uncertainties. Our platform is designed to prevent common purchasing mistakes, offering buyers a confident and worry-free transaction experience.

For Sellers:

1. **Optimized Monetization of Unused Blockspace:** Lastic presents a sophisticated solution for blockchains burdened with surplus blockspace. Our platform enables these entities to recuperate their losses effectively by putting excess coretime on the market.
2. **Empowering a New Class of Market Participants - Wholesalers:** The introduction of wholesalers as market participants marks a significant expansion in our marketplace dynamics. Lastic empowers these entities to purchase blockspace in bulk and subsequently engage in transactions on the secondary market. This strategy opens the door for non-developers, who can participate purely from a buy-and-sell standpoint, capitalizing on the fluidity and opportunities within the blockspace market without necessarily utilizing the blockspace themselves.

The Lastic Business Model

Lastic offers more than just a platform for trading blockspace; it presents an innovative and empowering ecosystem that opens up exciting opportunities for traders. Our business model is designed to benefit users and the entire Lastic community through the following components:

- **Fee Model**: Lastic operates a fee model within its blockspace marketplace, ensuring that revenue generated contributes to the prosperity of the platform and its users.

Features

Market-based Scaling

- Elastic Scaling for Parachains: Lastic will facilitate elastic scaling for parachains, providing multiple cores to parachains when needed without the need for explicit requests. This feature enhances the scalability and responsiveness of parachains, ensuring optimal performance.

Flexibility beyond what Polkadot offers

- Customizable Coretime Chunks: Lastic allows developers and parachains to purchase coretime in custom chunks of throughput that match their specific requirements. For instance, a parachain working on a computationally intensive task may choose to buy larger coretime chunks during peak processing times and smaller chunks during off-peak periods. Chunks should not be confused with time or length of blocks, but rather the weight or size of them.

- Variable Timeslices: Lastic enables the allocation of variable time slices to different tasks or applications. Projects can efficiently manage their coretime usage by adjusting time slices based on workload fluctuations, ensuring optimal resource utilization and cost-effectiveness.

Energy Markets as an inspiration

Blockspace is a commodity that has unique properties in the blockchain space compared to tokens, derivatives, and NFTs. The main difference is that blockspace is coupled with the time for which it is created. This negates the possibility of long-term hoarding, simple trading mechanisms such as bid/ask settlement, and unified liquidity pools. Due to the nature of blockchain being coupled with time, it is most similar to an energy market, where defining the timespan for which it is purchased is necessary. The challenge of creating a blockspace marketplace can be assisted by learnings from energy markets. Currently, there are a multitude of ways to trade energy, including, but not limited to: real-time spot markets, day-ahead markets, forward contracts, and capacity markets.

- **Real-time Spot Market:** This is where electricity is bought and sold for immediate delivery. Prices in this market can change rapidly, reflecting the real-time balance between supply and demand. To ensure supply matches demand, grid operators use signals and market prices to dispatch power plants and balance the grid.
    - This market is most similar to the Instantaneous Coretime functionality already provided by the system via the Coretime chain and Relay chain and Lastic's role in this area will likely primarily just be a user interface with data overview and analysis.
- **Day-Ahead Market:** Participants in this market commit to buying or selling electricity for delivery the next day. It allows utilities and market participants to plan ahead, but it doesn't completely eliminate the need for real-time adjustments.
    - We foresee Lastic to provide, among other things, functionality similar to Day-Ahead Markets, where buyers of Instantaneous Coretime may need some reliable way to ensure

they get blockspace in the very near future. One could imagine a scenario where a user of instantaneous coretime needs to start scaling up either for regular operations that require more blockspace or launches of certain features, applications or functionality that is likely to cause an increase in computation/activity.

- **Forward Contracts:** Participants can enter into contracts for future delivery of electricity, which can span days, weeks, months, or even years. These contracts help manage price risk and provide price stability for both buyers and sellers.
    - Currently, we envision Lastic to play a major role in something similar to Forward Contracts in an energy market. We see through preliminary research and surveys that there is most demand for blockspace between the ad-hoc instantaneous coretime market and the Bulk Coretime market. There is much more flexibility available to buyers and sellers within this domain, and where we foresee most blockspace market activity to occur. Buyers of blockspace can start with Instantaneous Coretime, but will need to elastically scale up their infrastructure and production in a flexible, bi-directional, and responsive way. For example, one could imagine a case where an application starts seeing some activity and needs to ramp up production, and they start buying blockspace agreements that are more reliable and deterministic, so they buy blocks at regular intervals such as one block every 10 minutes.
- **Capacity Markets:** These markets pay power generators not just for the electricity they produce but also for maintaining available capacity to meet future demand. This encourages the construction and maintenance of power plants.
    - Due to the near future of blockspace, specifically on Polkadot, being oversupplied by the amount of cores and processing power of Polkadot, we have intensively researched how markets deal with oversupply. Capacity Markets in the energy sector offer insights into how oversupply is dealt with. We can learn from this buy encouraging providers to reach agreements with regular blockspace buyers, giving buyers the option to utilize credits they have received by paying for blockspace ahead of time. This also allows the possibility of creating long-term agreements beyond the one-month scope of Bulk Coretime.

Technical Architecture

The technical architecture of Lastic is pivotal to the realization of our vision for a dynamic and efficient blockspace marketplace built on Polkadot's Coretime model. We understand that the architecture should not be a constraint but rather an enabler for the user-centric, secure, and transparent experience we aim to provide. In this chapter, we will delve into the architectural choices and features that will empower Lastic to deliver a seamless and robust marketplace.

Foundations of the Architecture:

At Lastic, we are committed to an architecture that aligns with our overarching vision. This architecture is designed to enable several key elements that will define the Lastic platform:

1. **Intuitive User Interface:** The user interface is the face of Lastic, and it must be user-friendly, allowing users to navigate the platform effortlessly.
2. **Speed and Efficiency:** Lastic aims to offer a fast and responsive experience. Users should be able to perform transactions swiftly and efficiently.
3. **User Protections and Clarity:** Mitigating errors is essential. The architecture should incorporate safeguards to prevent mistakes and provide clarity to users.
4. **No Front-Running:** Lastic intends to create a fair marketplace where front-running is eliminated, ensuring equitable access to resources.
5. **Transparency:** Transparency is a core principle of Lastic. The architecture should facilitate clear visibility of coretime allocation, pricing, and all relevant data for users.
6. **Scalability and Flexibility:** We are building an architecture that is not only robust for our planned features but also flexible enough to accommodate future innovations.
7. **Multi-Token Support:** Lastic's architecture will be capable of handling multiple tokens for buying and selling. The initial implementation will work with DOT, with plans to expand to USDC and potentially other tokens.

The Initial Implementation:

To kickstart the development, we will begin with a user interface that integrates seamlessly with the Coretime model on Polkadot. This UI will interact with smart contracts based on ink! WebAssembly. The use of cross-chain communication (XCM) ensures that the UI can perform essential functions such as re-assigning cores and splitting cores.

The key components of this initial implementation are as follows:

1. **Ink! Smart Contracts:** We will utilize ink! WebAssembly smart contracts for critical operations within Lastic. These contracts will be deployed on a Parachain that supports ink! These smart contracts will act as the backbone of our system.
2. **Cross-Chain Interaction:** For complete functionality, our UI and ink! smart contracts will interact seamlessly with both the upcoming Coretime chain and the Polkadot relay chain. This connectivity is crucial for coretime reassignments, split operations, and more.

Evolving to Meet Demands:

As we progress with the development of Lastic, we acknowledge that challenges and limitations may arise. To overcome any potential roadblocks and offer the best experience, we are prepared to make significant transitions. If the ink! smart contracts face constraints, we will consider migrating them to a separate chain. This transition will grant us enhanced flexibility and the capability to explore new possibilities.

Funds and Fee Collection:

It is essential to clarify that Lastic will not hold users' tokens. Instead, we will manage a centralized pool of funds that will be used for fee collection. This approach ensures that user assets remain secure while facilitating a robust fee collection process.

The technical architecture underpinning Lastic is carefully designed to fulfill our vision of a user-centric, efficient, and secure blockspace marketplace. It is adaptable and flexible, prepared to accommodate future innovations and challenges, while always keeping the user experience at the forefront. With an architecture focused on transparency and innovation, Lastic is poised to transform the landscape of blockspace trading.

Conclusion

In this comprehensive exploration of Lastic: The Marketplace for Blockspace, we have covered blockchain technology, blockspace markets, and the innovative Coretime model on the Polkadot network. Lastic aims to create a new way blockspace is traded, managed, and harnessed for various applications within the blockchain landscape.

At its core, Lastic seeks to empower individuals and builders alike, offering a flexible and accessible marketplace for the exchange of blockspace resources. Users' demands for specific blockspace types and the agile provisioning of such resources are brought together through the groundbreaking concept of "Coretime" on Polkadot. Through Coretime, users can procure cores in monthly allotments, individual blocks, or anything in between as Non-Fungible Tokens (NFTs), allowing for unprecedented flexibility and granularity in blockspace utilization.

Polkadot's multi-core compute system, driven by parallelism, I/O capacity, and computational power, further enhances the capabilities of the ecosystem, offering scalability and responsiveness beyond traditional blockchain verification. The introduction of "Agile Coretime" paves the way for efficient resource procurement and utilization, opening doors to innovative utilization models such as CorePlay, CoreJam, and more.

Lastic extends its reach beyond the conventional parachains, creating a vibrant ecosystem catering to Dapp Developers, ZK Provers, Speculators, and more. It simplifies blockspace acquisition for buyers and optimizes the monetization of unused blockspace for sellers. The platform's features, including user-created automations, governance-controlled parameters, and elastic scaling, ensure that high-quality blockspace on the Polkadot network remains accessible and adaptable.

The challenges presented by the existing Coretime model on Polkadot have not gone unnoticed. Lastic acknowledges the need for improved flexibility, accessibility, and predictability. Through a comprehensive marketplace structure, Lastic addresses these limitations, providing options for various procurement timeframes, sharing resources in multi-party settings, enhancing user experience, and promoting automation.

In conclusion, Lastic represents a paradigm shift in the world of blockspace markets. It empowers individuals and organizations to harness the full potential of blockspace resources, fostering innovation and growth within the blockchain community. We invite you to join us on this transformative journey, as we shape the future of blockspace trading together.