ASSET REVIEW SUMMARY: LAYERZERO PROTOCOL

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Asset Review Summary
LayerZero Protocol

Executive Summary

Several years back, the crypto ecosystem's narrative was that a single all-encompassing chain would dominate the blockchain space. However, we have witnessed metrics like Bitcoin dominance gradually dropping over time. Nowadays there are dozens of blockchains offering users different value propositions, which has, in turn, brought significant market fragmentation.

As the industry has evolved, the consensus now is that the blockchain space will, when fully developed, be multi-chain and interoperable. And interoperability calls for a solid infrastructure to flourish. The demand for interoperability has paved the way for many projects to offer solutions, but trade-offs to the users are inevitable.

LayerZero, an omnichain interoperability protocol, attempts to connect blockchains seamlessly. At its core, it is a messaging protocol between blockchains. Essentially, LayerZero offers on-chain assurances (Ultra Light Node) facilitated by off-chain entities (Oracles and Relayers). This specific architecture delivers two key benefits: i) secure and cost-effective communications and ii) attaining a favorable threat model. The protocol is already launched on a private Testnet and is expected to release on Mainnet soon.

The three co-founders of LayerZero have worked on several projects together. The team's focus has mainly been on product development (building in stealth), and hence the team needs to strengthen itself to include other resources like community, content, and business development.

The project is backed by a series of Venture Capital firms (VCs) and angel investors.

Our researchers gave LayerZero a final rating of 58.10%. *(Note: Due to the very early nature of the project, the Tokenomics and Legal & Compliance sections have not been rated by D-CORE).* The breakdown of this rating is available at the end of this report.

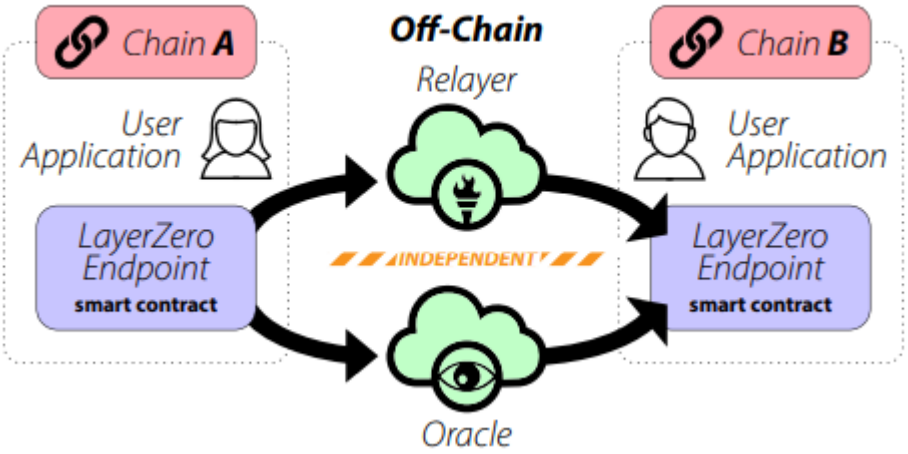
Product & Company Description

Introduction to LayerZero

LayerZero is a trustless interoperability protocol to connect various blockchain networks. At its core, LayerZero is a communication protocol that provides trustless Valid Delivery of messages between supported chains. Developers can build diverse cross-chain applications atop this low-level communication primitive. Possible use cases for the LayerZero protocol are:

- Inter-chain DEXs,
- Cross-chain lending,
- Cross-chain state sharing,
- Unified liquidity bridging,
- Cross-chain governance, and
- Multi-chain yield aggregators.

LayerZero ultimately aims to connect every contract on every chain in the long term.



LayerZero Architecture. Source: LayerZero Whitepaper

LayerZero consists of several critical components.

Endpoints: The LayerZero user-facing interface is a lightweight on-chain client (the Endpoint) implemented as a series of on-chain smart contracts. Every supported chain will have a LayerZero Endpoint residing on it.

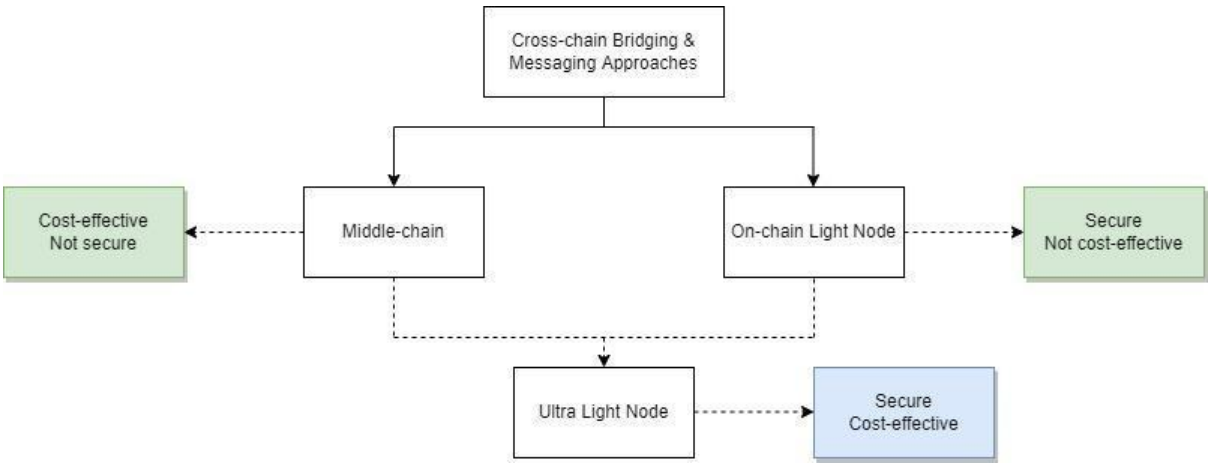
Oracles: Oracles are independent third-party service providers in LayerZero that read block headers from one chain and send it to another chain. Theoretically, any Oracle service provider could become part of this mechanism; however, the LayerZero team has now selected to use Chainlink and Band Protocol.

Relayers: Relayers fetch proofs for specified transactions in off-chain functions. Since LayerZero does not specify any Relayer implementation, users could implement their own versions theoretically (thereby enabling collusion-resistant trustless validated delivery).

However, in practice, LayerZero provides the relayer service. Many of the existing inter-chain transactions solutions suffer from several drawbacks: For instance, such solutions involve multiple transactions (a cumbersome user experience with costs incurred at each hop). There could also likely be trusted elements (intermediaries) in the process.

LayerZero solves this by using a single transaction swap and achieving a trustless Valid Delivery for messages. It enables the Valid Delivery of tokens and arbitrary data. Essentially, the protocol allows for direct transactions across chains rather than intermediating interchain activity.

LayerZero states that cross-chain bridging and messaging fall into two broader categories: The middle-chain category and the on-chain Light Node category. Both approaches offer significant trade-offs in terms of cost and security. However, LayerZero improves this situation by providing a hybrid solution aiming to combine the best of both worlds. **LayerZero introduces the novel idea of Ultra Light Nodes.**



Broader categories of cross-chain bridging & messaging. Adopted from: Ryan Zarick's Medium post

The LayerZero protocol was presented in a Whitepaper written by Ryan Zarick, Bryan Pellegrino, and Caleb Banister. The whitepaper "LayerZero: Trustless Omnichain Interoperability Protocol" introduced the design and implementation of LayerZero. The project's management has also indicated upcoming papers, e.g., an economic paper, the Delta Algorithm Whitepaper.

As demonstrated,[1] LayerZero has already developed a Minimum Viable Product (MVP). The product is live on Testnet (not public). Furthermore, the project leads suggest active development by several projects on top of LayerZero. **The first application on LayerZero, Stargate,[2] is a fully**

[1] "Layer Zero Demo | The Future of Omnichain dApps | 3 contracts. 2 ...." 1 Dec. 2021, https://www.youtube.com/watch?v=JFnF1dgbF00. Accessed 30 Jan. 2022.
[2] "The Bridging Trilemma. We introduce a fully composable native…." 29 Oct. 2021, https://medium.com/stargate-official/the-bridging-trilemma-d80788cce4ef. Accessed 30 Jan. 2022.

composable native asset bridge (a project by LayerZero). The management plans to launch the protocol on Mainnet shortly.

Market: The blockchain ecosystem is heterogeneous, with many chains and protocols. As a result, the whole ecosystem inevitably became fragmented where liquidity was concentrated, and users could not deploy capital efficiently. In this backdrop, interoperability could unlock tremendous opportunities via the broader adoption of blockchains and its subsectors like DeFi. As an example, consider the use cases that quickly emerged thanks to Wrapped Bitcoin.

Team: LayerZero consists of an experienced and skilled team of professionals.

Product: LayerZero has not yet been released on Mainnet. It has only been released on Testnet, and as shown in this Demo (YouTube Link). The product (including StarGate, the first application built on top of LayerZero) is functioning as expected. Moreover, the team has hinted that projects are already getting familiarized with the product. **We could identify that this signifies that the product is in demand within the existing market—an early sign of Product-Market-Fit (PMF) for LayerZero.**

Success Factors

Based on our understanding, there are several success factors for the project. These factors are listed below:

- Interoperability is a great market need.
- The LayerZero omnichain protocol could be implemented by existing and new projects.
- LayerZero offers better trade-offs to users over other products in the market.
- A well-funded project, backed by leading blockchain Venture Capital firms (VCs).
- Experienced executive team.

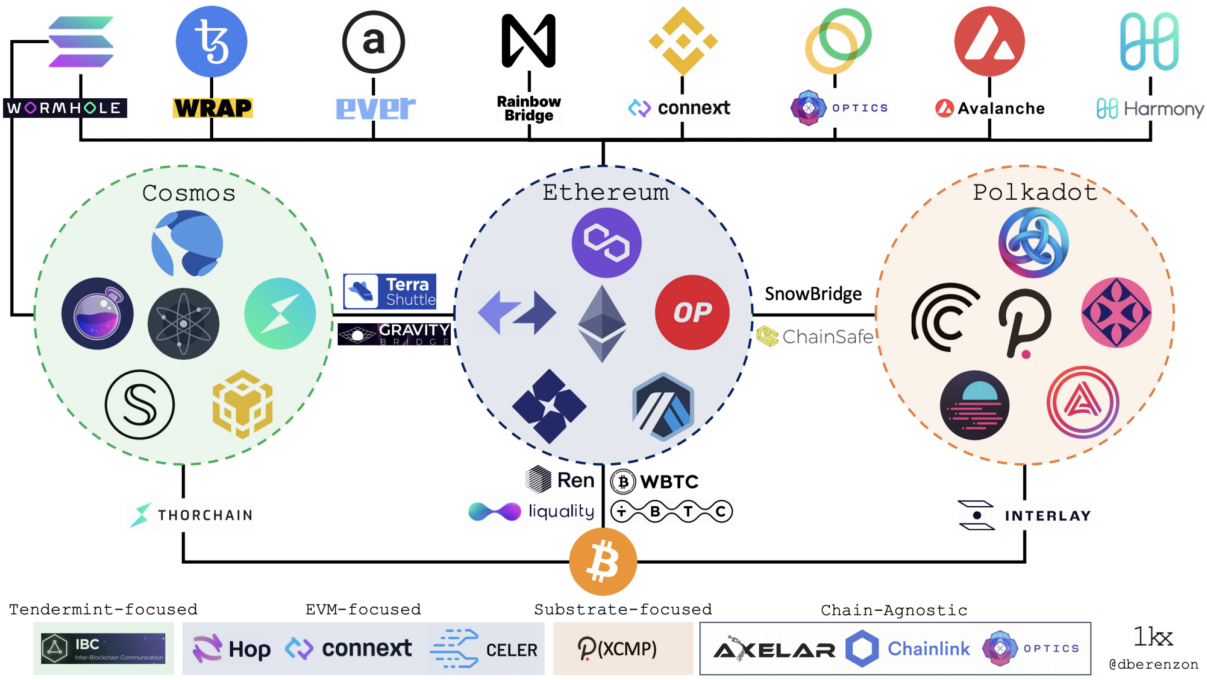
Market Conditions and Competition

Market Conditions

The blockchain ecosystem consists of many distinct Layer-1 blockchains. Due to the inherent characteristics of these chains, the ecosystem became increasingly fragmented, creating silos. This situation introduces several limitations. Namely,

- Slower adoption (e.g., due to friction, inability to allocate capital efficiently),
- Limited and restricted use cases (hinder innovation),
- Issues of scalability.

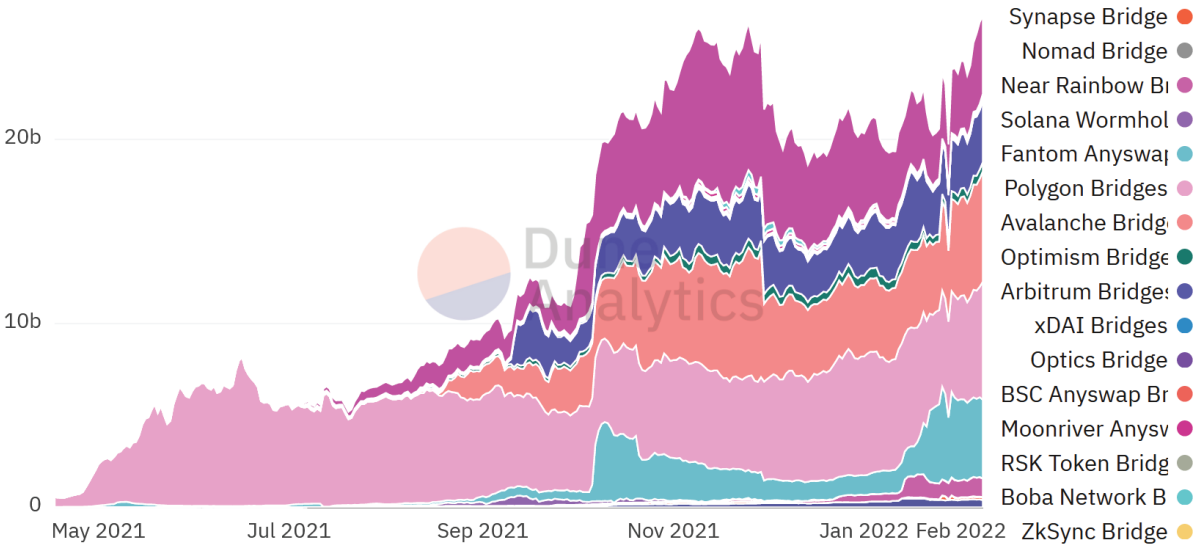
It is possible to surmount these limitations with interoperability solutions. This need prompted several projects to emerge recently:



An illustration of the blockchain bridging ecosystem. Source: 1kx Medium, Dmitriy Berenzon.

The market has witnessed a surge in Total Value Locked (TVL) in Ethereum bridges. At present, there's $19.88 billion TVL in Ethereum bridges. The ThorChain currently has $159.79 million in TVL ($315.75 million, including the staking classified as TVL).[3]

[3] "Thorchain Protocol: TVL and stats - DefiLlama." https://defillama.com/protocol/thorchain. Accessed 30 Jan. 2022.



Ethereum bridges TVL over time. Source:@eliasimos via Dune Analytics

Competition

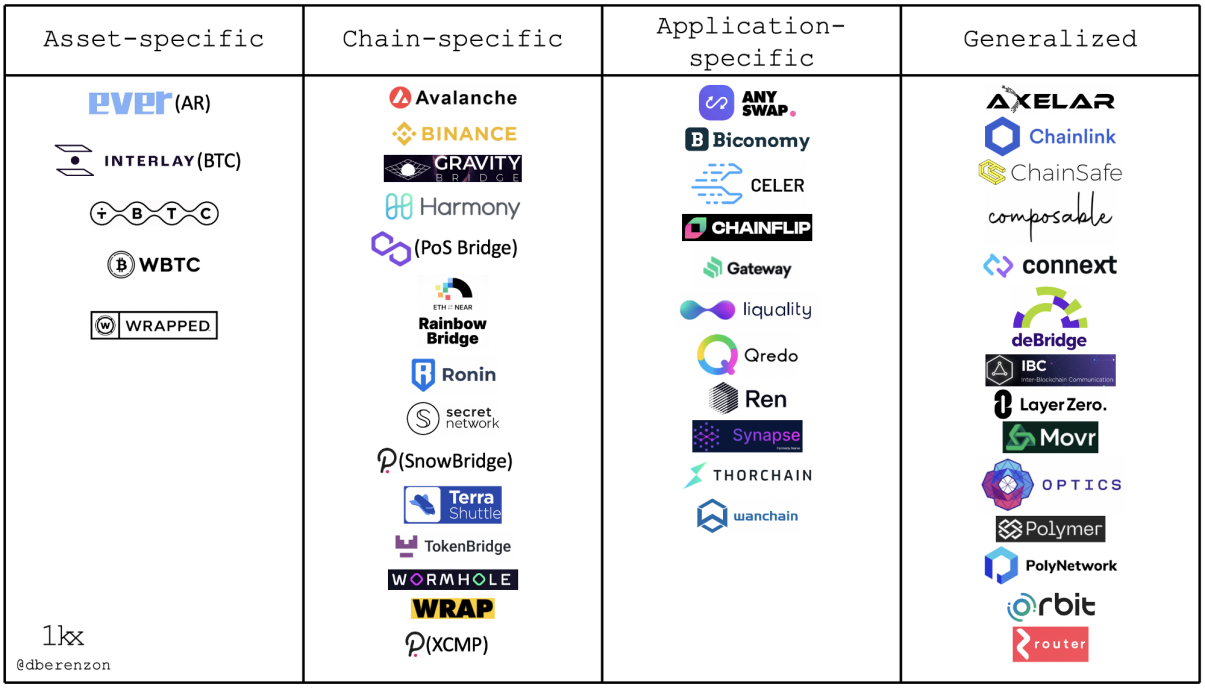
If the blockchain world were to be headed towards becoming a single-chain environment, there would be no role for interoperability. However, there is a need for a network fabric to connect these multiple chains in a multi-chain environment. This demand for cross-chain functions has resulted in many interoperability solutions. **There are currently around 65 bridges in the market as per bridges aggregator DeBridges.**[4] It is viewed that LayerZero is facing competition from most of these players. That said, it is likely that LayerZero does not compete with most of the bridges due to it being a messaging protocol. Therefore, it may be possible that LayerZero becomes complementary to some of the market players.

Apart from the projects listed in the graph below, several solutions offer different cross-chain use cases:

Comit Network:[5] An open protocol facilitating trustless cross-blockchain applications.
Chainlink's Cross-Chain Interoperability Protocol (CCIP):[6] Providing a cross-chain messaging layer for developers.
Across Protocol:[7] A bridging method that combines an optimistic oracle, bonded relayers and single-sided liquidity pools.
t3rn:[8] a smart contract hosting platform that offers an innovative solution to interoperable smart contact execution through its unique Gateway and Circuit solutions.

[4] "All blockchain bridges aggregator." https://debridges.com/. Accessed 30 Jan. 2022.
[5] "COMIT Network." https://comit.network/. Accessed 1 Feb. 2022.
[6] "Cross-Chain Interoperability Protocol (CCIP) | Chainlink." https://chain.link/cross-chain. Accessed 1 Feb. 2022.
[7] "Across - Bridge Layer 1 and Layer 2 assets." https://across.to/. Accessed 1 Feb. 2022.
[8] "t3rn – Smart contract interoperability protocol." https://www.t3rn.io/. Accessed 1 Feb. 2022.

Nomad:[9] Offers cross-chain communication without header verification. Nomad is an implementation and extension of the Optics protocol.



Types of bridges and competitive solutions in the market. Source: 1kx Medium, Dmitriy Berenzon.

How is the project different from its competitors?

Once fully developed, LayerZero offers several differentiating features.

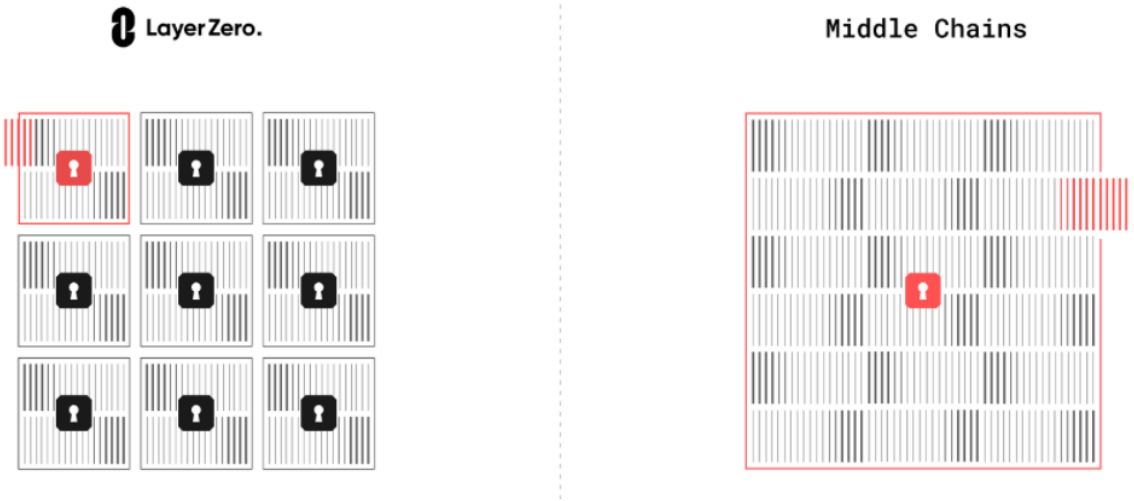
- Layer Zero could be **run on any chain**, including the fast-finality and probabilistic-finality chains. The protocol also offers the possibility to execute cross-chain swaps in a single transaction only **incurring source chain gas** (user experience looks like a native swap).

- For developers, LayerZero is a mechanism to achieve cross-chain functions in a trustless way with **a simple protocol** (does not involve complex intermediate chains/smart contracts).

- **The modular design of Endpoints** allows LayerZero to add support for new chains without modifying the three core modules (i.e., Communicator, Validator, and Network) but by only adding an additional Library. Libraries are auxiliary smart contracts that define the way communication should be handled on a particular chain.

- **The threat model of LayerZero** is that a compromised/colluding Oracle and Relayer combination could only affect the user applications using the compromised/colluding Oracle and Relayer. Other user applications using different Oracle and Relayer combinations would not be affected.[10]

[9] "What is the Nomad Protocol? | Nomad." https://docs.nomad.xyz/. Accessed 1 Feb. 2022.
[10] "LayerZero- An Omnichain Interoperability Protocol - Medium." 16 Sep. 2021, https://medium.com/layerzero-official/layerzero-an-omnichain-interoperability-protocol-b43d2ae975b6. Accessed 30 Jan. 2022.



LayerZero security properties vs other solutions. Source: LayerZero Medium channel

- Liquidity pools will be single-sided and hence represent **no Impermanent Loss to providers**.

Technology Review

Product

LayerZero is a messaging protocol that optimizes superior features of the Light Node and Middlechain implementations to achieve cross-chain interoperability. Its novel concept is called Ultra Light Nodes, which try to achieve both secure and cost-effective messaging across disparate chains.

LayerZero implements Endpoints (a series of on-chain smart contracts) on each support chain. An Endpoint consists of three functionality modules: Communicator, Validator, and Network. The Library defines how the protocol should handle communication for a specific chain. Therefore, each LayerZero chain has a Library implemented, and every Endpoint has a copy of every Library.

The Endpoint handles the construction and forwarding of the block header and the transaction proof (performed by the Communicator) on the source chain. The Communicator forwards it to the Validator, which sends the block header to the Network and the transaction proof to the Relayer. The Network delivers the block header to the Oracle. **The Oracle and the Relayer handle the Valid Delivery of the message to the destination chain.** These are off-chain entities and do not involve on-chain replication and storing of block headers.

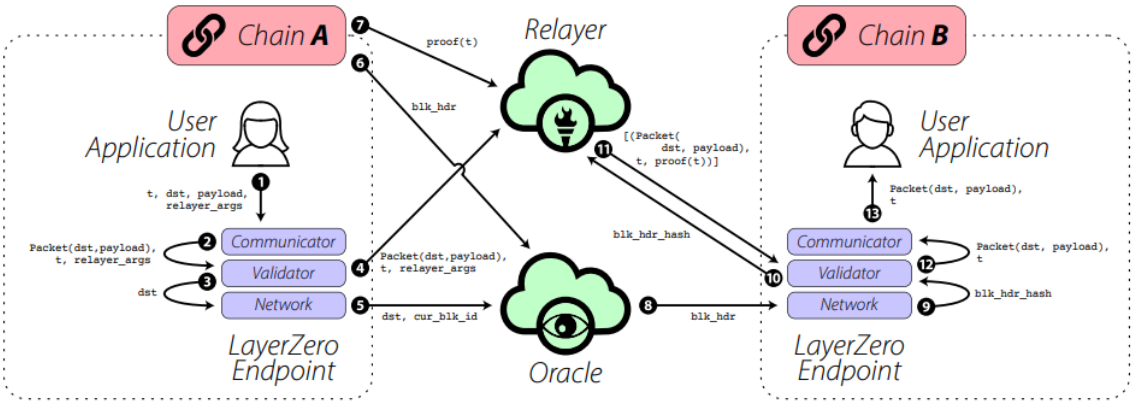


Figure 4: The communication flow in a single LayerZero cross-chain transaction.

Communication flow in a single Layer Zero cross-chain transaction. Source: Layer Zero Whitepaper.

Valid Delivery
Valid Delivery is a communication primitive that allows valid cross-chain token transfers. Two critical properties of Valid Delivery are:

- Every message contains a Transaction on the source (sender) chain.
- The receiver only gets the message when the source chain transaction is valid and committed.

Valid Devildery could be achieved either in a trusted and trustless manner. LayerZero does it in a trustless way.

There are three possible validation outcomes in LayerZero.

Possible Outcome	**Protocol functionality**
The block header and the transaction proof are valid.	Functioning normal and the message accepted
The block header and the transaction proof are invalid.	Functioning normal and message discarded
The block header and the transaction proof are invalid but match.	Not functioning as expected, possible collusion scenario

Validation outcomes in LayerZero

LayerZero has not open-sourced its codebase yet (planned to be fully open-source in the future). **The project is only live on Testnet (not public Testnet).** As per the CEO, the LayerZero code is already completed and has been audited thrice. The mainnet launch is likely to occur after the ongoing StarGate protocol audits are completed. However, the project welcomes developers to build on top of its protocol and provides developers access to documentation and GitHub upon directly reaching the project team as per Discord conversations.

Security Audit

There are no publicly available details about LayerZero protocol audits yet. However, the team has disclosed that the protocol has undergone three audits.

Roadmap

The project has not published a detailed time-bound roadmap.

Team

The three co-founders of LayerZero have founded other ventures and held senior management roles in several different organizations. The team possesses experience in software development/programming, application development, AI/ML, and smart contracts (writing, auditing, testing, and advising). The three co-founders co-authored the initial LayerZero Protocol paper.

Bryan Pellegrino[11] (co-Founder & CEO) was formerly a professional poker player. Bryan co-founded several ventures like Coder Den and Open Token. Bryan also worked as an advisor to several cryptocurrency projects, namely RewardMob, FogCoin, Shipchain, Science, Inc. Bryan studied Computer Science at the University of New Hampshire (which, according to a podcast interview, he dropped out of).

Ryan Zarick, co-Founder & CTO,[12] founded three other ventures (Minimal AI, Coder Den, and 80Trill, which is dysfunctional now) before co-founding LayerZero. Ryan obtained his BS and MS degrees in Computer Science from the University of New Hampshire. Interestingly, early in his career, he worked for the University of New Hampshire's InterOperability Lab as a Graduate Research Assistant.

Caleb Banister,[13] a co-Founder at LayerZero, started his career as a Software Developer at the University of New Hampshire's InterOperability Lab. Later, he co-founded Coder Den, 80Trill, and Minimal AI. Caleb is an alumnus of the University of New Hampshire (BS in Computer Science).

Advisors

The LayerZero team has not appointed any Advisors yet.

General Comments on the Team & Advisors

The LayerZero team consists of around 13 members as per the CEO. He also mentioned, although not advertised, that LayerZero is hiring for Community, Content, Business Development, and Engineering staff.

During our review period, we did not find evidence that the team members have taken part in any previous or current illegal projects or projects that were controversial.

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[11] "Bryan Pellegrino - Co-Founder & CEO - LayerZero Labs | LinkedIn." https://ca.linkedin.com/in/bryanpellegrino. Accessed 31 Jan. 2022.
[12] "Ryan Zarick - Co-Founder and CTO - LayerZero Labs | LinkedIn." https://ca.linkedin.com/in/ryanzarick. Accessed 31 Jan. 2022.
[13] "Caleb Banister - Co-Founder - LayerZero Labs | LinkedIn." https://www.linkedin.com/in/caleb-banister-240b1142. Accessed 31 Jan. 2022.

However, our researchers found public records that Bryan Pellegrino was an advisor to several cryptocurrency projects (now non-operational). Among them, Shipchain, where Bryan was reported to be an Advisor, settled cease-and-desist proceedings by the Securities & Exchange Commission for conducting an unregistered securities offering.[14] Similarly, Ryan Zarick (the CTO) was listed as a Smart Contract Developer with TravelBlock, a now-defunct project.[15] However, due to the fact Bryan Pellegrino was an advisor to these projects and not in a position to make legal and financial decisions, our researchers did not rate the team section a lower score due to this being an advisory role held.

[14] "ShipChain, Inc. - SEC.gov." 22 Nov. 2021, https://www.sec.gov/divisions/enforce/claims/shipchain.htm. Accessed 31 Jan. 2022.
[15] https://icobench.com/ico/travelblock

Legal and Compliance Specifics

Jurisdiction

LayerZero Labs Canada Inc. (Corporation No. 1355847-9) is registered in Canada under the Canada Business Corporations Act on 2021-11-30. Caleb Banister, Ryan Zarick, and Bryan Pellegrino are listed as the company's directors. Link to Federal Corporation Information.

Interestingly, the Series A fundraiser of Layer Zero was announced before the incorporation date.

Partnerships

LayerZero protocol has established partnerships with a group of venture funds and a well-known list of angel investors.[16]

Series A investors in LayerZero. Source: LayerZero

Legal Advisors

The project has not appointed legal advisors or any team member responsible for legal matters.

[16] "Binance Labs and Multicoin Capital Co-Led $6 M Series." 16 Sep. 2021, https://www.binance.com/en/blog/ecosystem/binance-labs-and-multicoin-capital-coled-$6m-series-a-for-layerzero-4214998246849027 66. Accessed 30 Jan. 2022.

Social Media and Virality

LayerZero has achieved a notable Twitter footprint for an early-stage project without dedicated marketing efforts. LayerZero's Twitter account has 47.2k followers at present.[17] The Twitter account, however, does not indicate much activity.

Discord and Telegram happen to be the most active channels to communicate with the management of LayerZero. The CEO actively participates in Discord community discussions on varying topics about the project. The Discord channel has about 12.1k followers. The project's Telegram channel currently records around 13.5k members.[18] Discord link here.

The project has not posted anything on its LinkedIn profile, with only 155 followers,[19] possibly showcasing a lack of content and business development resources.

LayerZero recently launched its YouTube channel. So far, it has not been very active and hosts only a few videos. Several other third-party channels discussed LayerZero. Some of which are:

Justin Bram - 4.8k views
The Defiant - 4.7k views
Crypto Seeds - 2.1k views
The Delphi Podcast - 1.2k views (Delphi is an investor in the project)
The Blockcrunch Podcast with Jason Choi - 256 views (the host Jason Choi is a General Partner at Spartan Capital, which invested in LayerZero)

[17] "LayerZero Labs (@LayerZero_Labs) / Twitter." https://mobile.twitter.com/layerzero_labs. Accessed 31 Jan. 2022.
[18] "Telegram: Join Group Chat." https://t.me/joinchat/VcqxYkStIDsyN2Rh. Accessed 31 Jan. 2022.
[19] "LayerZero Labs | LinkedIn." https://www.linkedin.com/company/layerzerolabs. Accessed 31 Jan. 2022.

Risks to the Project

Below we list several risks that LayerZero faces. (This is not an exhaustive list of known risks). Some of these risks may be minor/not materialize at all.

- **Technological risks:** The LayerZero protocol involves smart contract deployments. Any smart contract-related bugs or vulnerabilities could become a risk to the protocol.

- **Collusion and service provider failures:** One of the risks to the LayerZero protocol is the potential collusion between Oracles and the Relayers. On the other hand, an oracle failure could also result in a risk to the protocol. LayerZero's threat model helps mitigate this risk by sharding user applications into multiple oracle and relayer combinations compartments.

Ratings

Everything you see in this report is the aggregate result of an extensive research process carried out by a distributed team of researchers and crypto enthusiasts around the world. The process consists of 60 questions divided into three phases. Researchers are called to answer these questions about a project, while providing links or screenshots as evidence to support their answers. For every answer, they also provide a rating from zero to ten. The average of their ratings is detailed below.

Our researchers gave LayerZero Protocol a final rating of 58.10%.

CATEGORY	SCORE
Market & Project Specifics	60.00%
Team Specifics	63.30%
Technology Specifics	53.30%
Legal & Compliance Specifics	N/A
Tokenomics Specifics	N/A
Social Media / Virality Specifics	62.20%
Total	58.10%

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