Ithaca finance

December 2022

Opportunity; TAM

Spot Market

Cefi	DeFI
~$10 trln	~$1.5 trln

3-10x bigger

Derivatives Market

(Equities, FX, Interest Rates)

Exhibit 1: Crypto Market Current State

	CeFi	DeFI
Futures	~$25 trln	~$1 trln
Forwards	?	?
Funding/Basis	?	?
Options	$500 bln	Option Protocol DOV — TVL ~$1bln
Structured Products	$5 bln	

Equities: Option volumes 3.0x spot
FX: Option volumes 0.5x spot

☆ Crypto options and structured product TAM
→ $500bln x 10-60

~$15trln market x 15% DeFi market share

~$2-2.5trln opportunity on a steady state

2x Crypto market growth + 2x Defi Market share growth → ~$10trln opportunity

DOV Market Landscape; Limitations

TVL of Decentralized Options Vaults (DOVs) has grown considerably in 2022, outpacing the growth of broader DeFi.

DOV selling proposition revolves around simplicity. Investors commit their assets into vaults for a pre-specified time period; vaults deploy these assets into basic option strategies.

Overwhelming majority of 38 DOVs deployed on various Mainnets can be categorized along a limited set of similar attributes.

Exhibit 2: Key DOV

DOV Key Attributes	Existing DOV
Auctions	Infrequent (Weekly or Bi-weekly)
Payoffs	Vanilla options (fully funded put & call selling)
Flexibility	No building block or strategy flexibility
Unwinds	No position unwind or net-off
Collateralization	Full collateralization
Dependencies	Protocol-external, trading, matching & settlement infrastructure

Ithaca Matching Engine

Ithaca fundamental risk sharing building blocks (RSBBs):

- 'Spot Cash'; Per-auction settled collateralized forward ('MEV resistant' spot)
- 'Forward Cash'; Defined maturity collateralized forward
- European Call Option (by put/call parity, Put Options)
- Binary Call Option (→ digitals and barriers)

→ IME can accommodate all payoffs statically replicable by RSBBs

Discrete-time (periodic), uniform-price, double auctions (HFT | MEV resistance) allow for pooling of orders for different underlying instruments (as matching happens at the RSBB level) and thus utilization of different sources of liquidity for markets that normally clear in isolation from each other.

Example – CeFi & DeFi + DOVs

A buyer of a call + a seller of a put + a forward seller

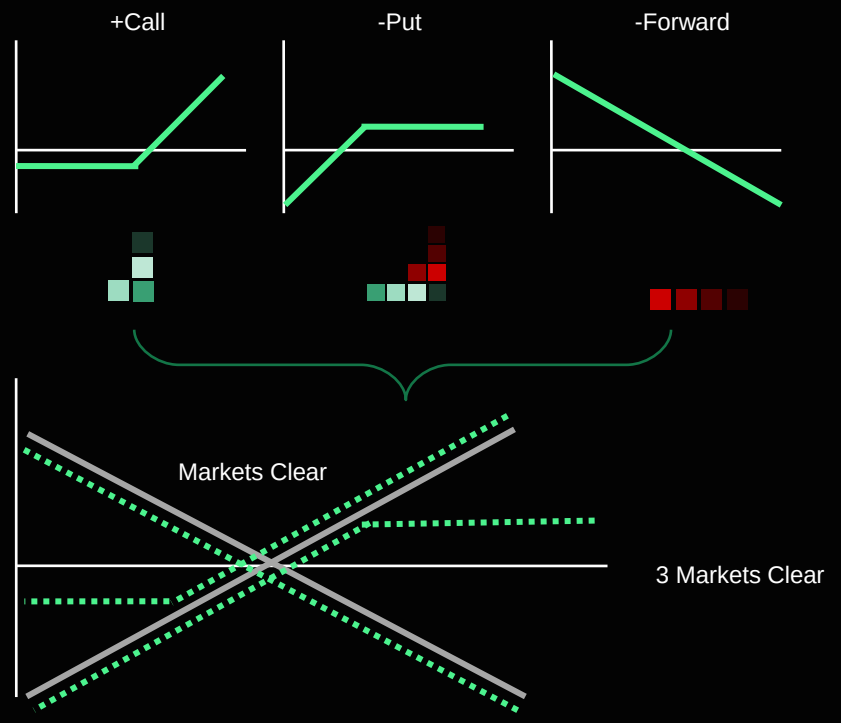
3 markets: 3 x 2-sided liquidity required

Ithaca ME → 1 auction: 3 direct matches

Standard put / call parity and funding / option equivalence relationships utilized to reconstitute / decompose instruments from / into constituent parts with matching taking place at the RSBB level.

Volume maximization and 'best execution' achieved by utilizing MILP which searches for sets of clearing prices corresponding to the submitted orders.

Ithaca ME accommodates conditional orders, where execution is dependent upon simultaneous fills on all legs.



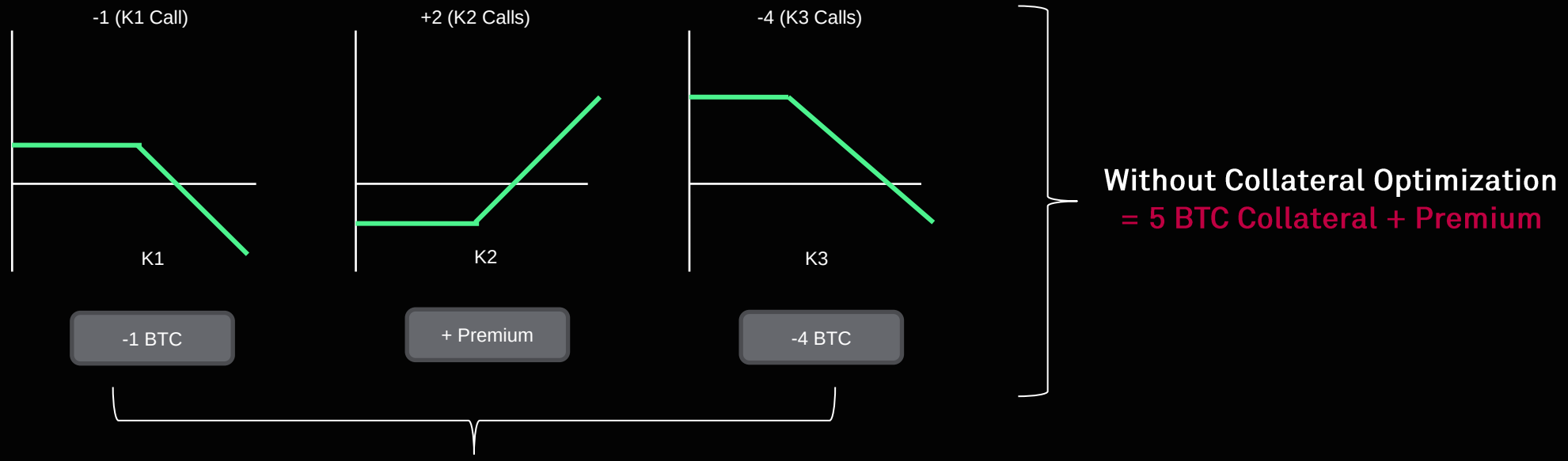
Ithaca Collateral Optimization

Option Buyers fund potential premium.

Option Sellers fund maximum liability.

Collateral Optimization allows collateral requirements to be determined by the users' Ithaca trade portfolio maximum potential loss.

Upon order execution, subject to full collateral having been locked, engine computes the collateral corresponding to maximum potential portfolio loss and returns any excess back to the user.



Collateral Optimization = 3 BTC Collateral

Systematic Volatility Market Making

Continuous trading operation **to complete liquidity**
(24/7 minus maintenance)

OPERATIONAL SETUP

- Conservative risk-taking approach with strict and tight risk limits with soft and hard stops and independently controlled with defined mitigation procedures
- In-house built core components with parameterized vol surface modelling and automated market making engine

RISK MANAGEMENT

- Centralised approach to positions and trading activity
- Synchronized and unified risk & PnL calculations
- Strict pre-defined and frequently reviewed risk limits
- Independent ongoing control and mitigation

MODULAR MODEL – independently operating components

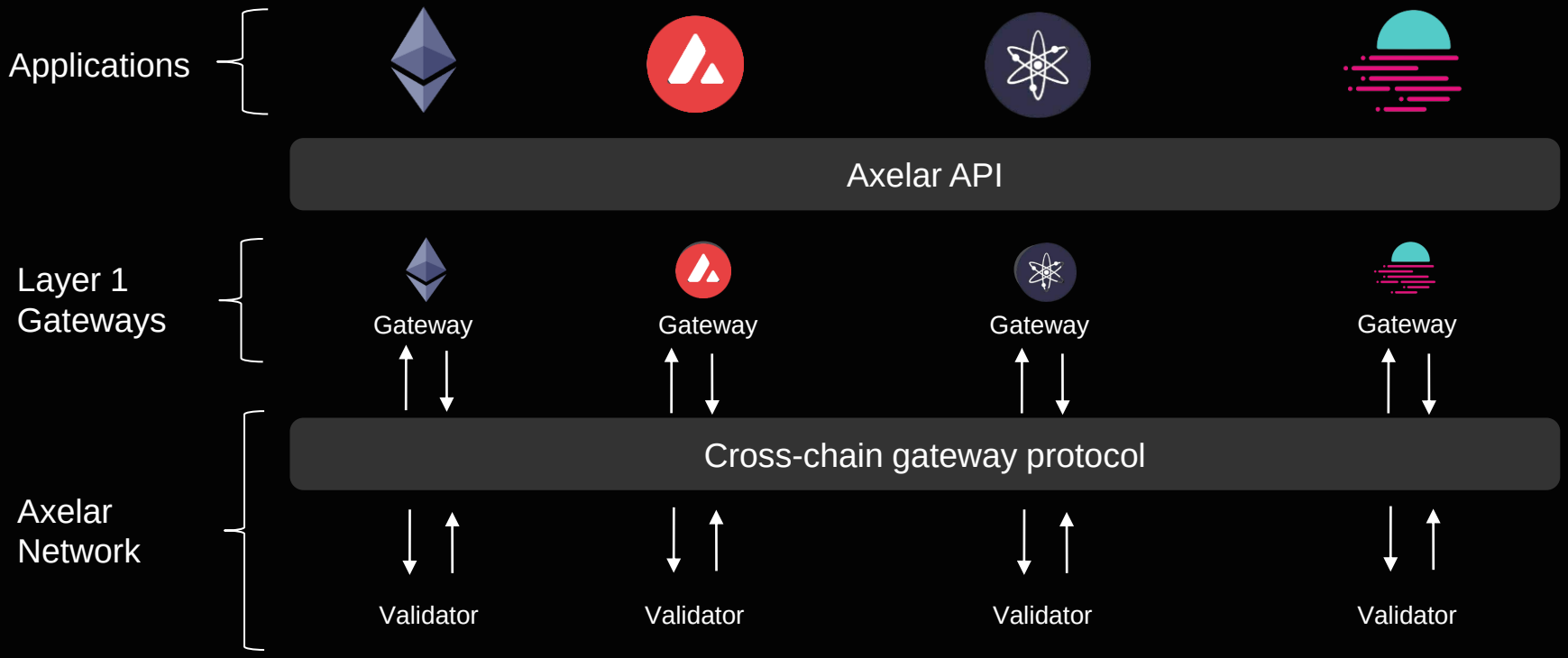
- Core market making components
  - Process to consume market data from other platforms/exchanges
  - Vol marking/modelling from observed market data to implied 'fair' surface
  - Market making engine, from 'fair' price to MM quotes based on Current position & trade flow and Market view, research and bias
  - Quote dissemination – Order Manager
- Risk and trading (non-MM) components
  - Position aggregator
  - Risk calculation and mgmt engine
  - Back testing environment
  - Automated Delta hedging
  - Risk and PnL Reports
  - Flow analysis and MM analytics tool

Multichain Liquidity

Ithaca will be deployed on Polygon.

Utilizing Axelar's interoperability infrastructure, assets from a wide range of supported chains (such as Ethereum, Avalanche, Polygon, Fantom, Moonbeam) shall be deployable on Ithaca.

→ Users become agnostic to the particular chain where Ithaca Smart Contracts are deployed, considerably expanding the addressable market and liquidity.



Tokenomics

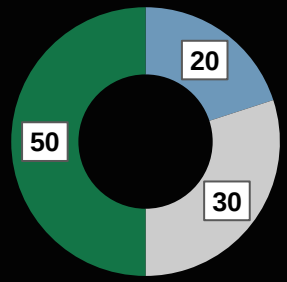
Protocol Revenues
Trading Fees
Position Builder
Collateral Optimization
On/off-chain Prepackaged Strategies

Token Utility
Liquidity Incentives
Matching Engine Instance Validation | Repurposing
- New Market Launch
Protocol Governance

Target Liquidity
10x option market | 20% market share
2x futures/forwards market | 1% market share
Funding market | $100bn
$1.4trln Target Liquidity; 1 ITC = $20k liquidity

25 mln Ithaca Coin (ITC) (fixed supply)

- 10% Investors (Angel, Strategic, Series A)
- 10% Further rounds
- 30% Ithaca Endowment
- 50% ITC Liquidity
  - Direct Liquidity (controlled by Ithaca)
  - Instance Deployment Ready
  - Stapled Liquidity



Case Study:

New Protocol aspires to develop a liquid full scope derivatives market for its native token. New Protocol purchases 1M ITC + 1M stapled liquidity award → Launches Ithaca Instance & Tokenomics.

Revenues across Instances → ITC burning (proportional reduction in ITC instance size).

Liquidity Incentives – (i) Product Category (Options | Forwards), (ii) Transaction Category, (iii) 1 way Order | 2 way Order Match.

Reward Factor = f(y) = LP (1 - rij / Rij) wherein, rij (accumulated rewards), Rij (total rewards to be paid out).

Liquidity Adjustment – (i) Fixed Parameters, (ii) State Parameters, all parameters subject to governance.

Why Ithaca; Go-To-Market

Go-To-Market:

- Organic Liquidity Network Effects
- Prepackaged strategies, building block combinations and outright RSBB orders contribute synergistically to organic in-protocol liquidity creation.
- Ithaca Matching Engine is a mechanism for systematically harnessing market making tools.

Ithaca finance

- Incentivising 2-sided Volatility Flow
- Market Expansion Innovative Tokenomics
- Institutional Defi Gateway
- Axelar Integration

Stage 1: Active Defi users; inviting UI

Stage 2: Institutions; infrastructure built in parallel (API integration, TradFi access rails)

Ithaca 1.0 (MVP at Launch)
- Vanilla calls and puts
- Binary / digital calls puts
- Structured products
- Per auction settled cash (MEV resistant spot)
- Riskless lending
- All statically replicable derivatives
- Various prepackaged Strategies

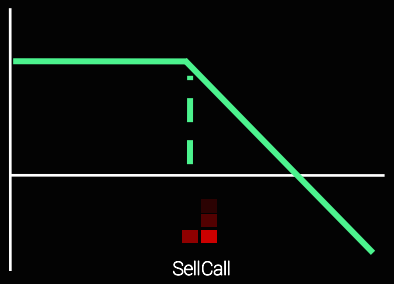
Ithaca 1.1
- Governance token
- Liquidity incentive structure
- TradFi access rails integration

Ithaca 1.2
- API for external protocol integration
- Margin borrowing / lending + liquidation engine
- “Riskless” and “risky” lending

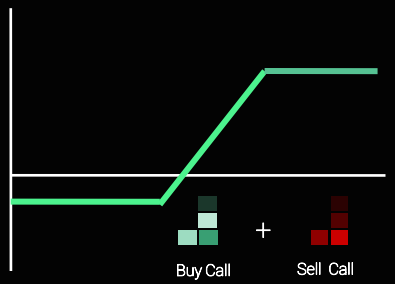
Ithaca 1.3
- Path dependent derivatives
- Accommodate exponential growth inherent in order book combinatorics, by enforcing linear ‘ring wise‘ relationships by pairwise replication at RSBB level

Full Payoff Flexibility

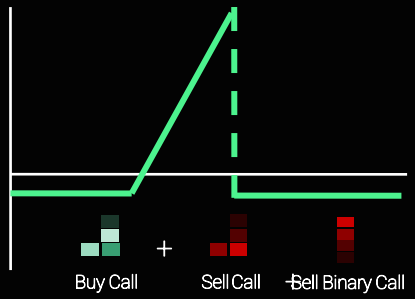
Covered Call



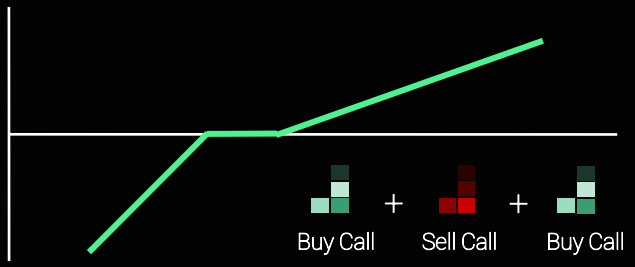
Call Spread



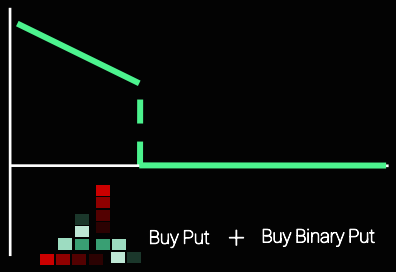
Up and Out Call



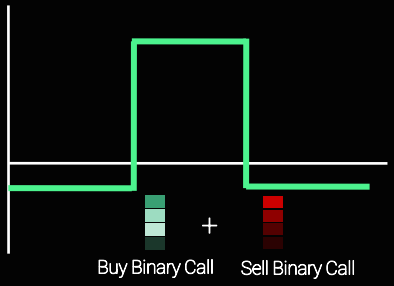
Airbag Certificate



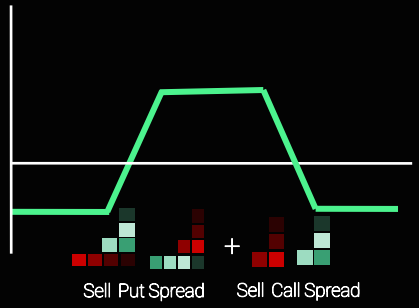
Down and In Put



In Line Warrant

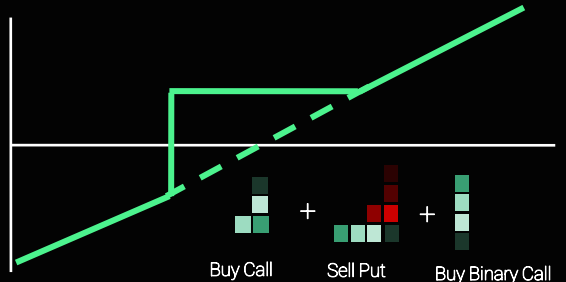


Iron Condor

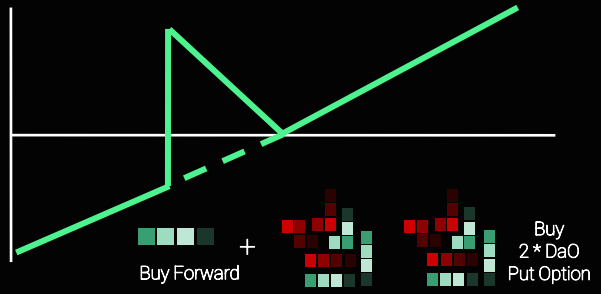


Buy Now Pay Later On

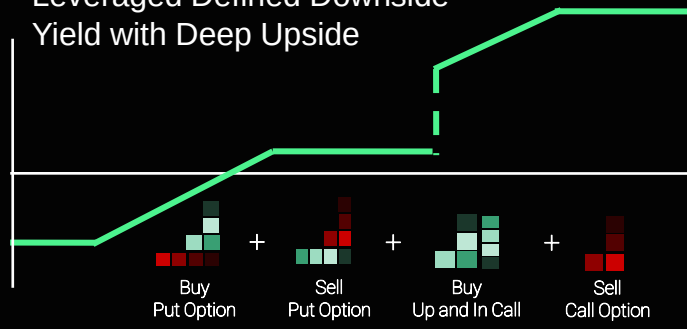
Bonus Certificate



Twin-Win Certificate

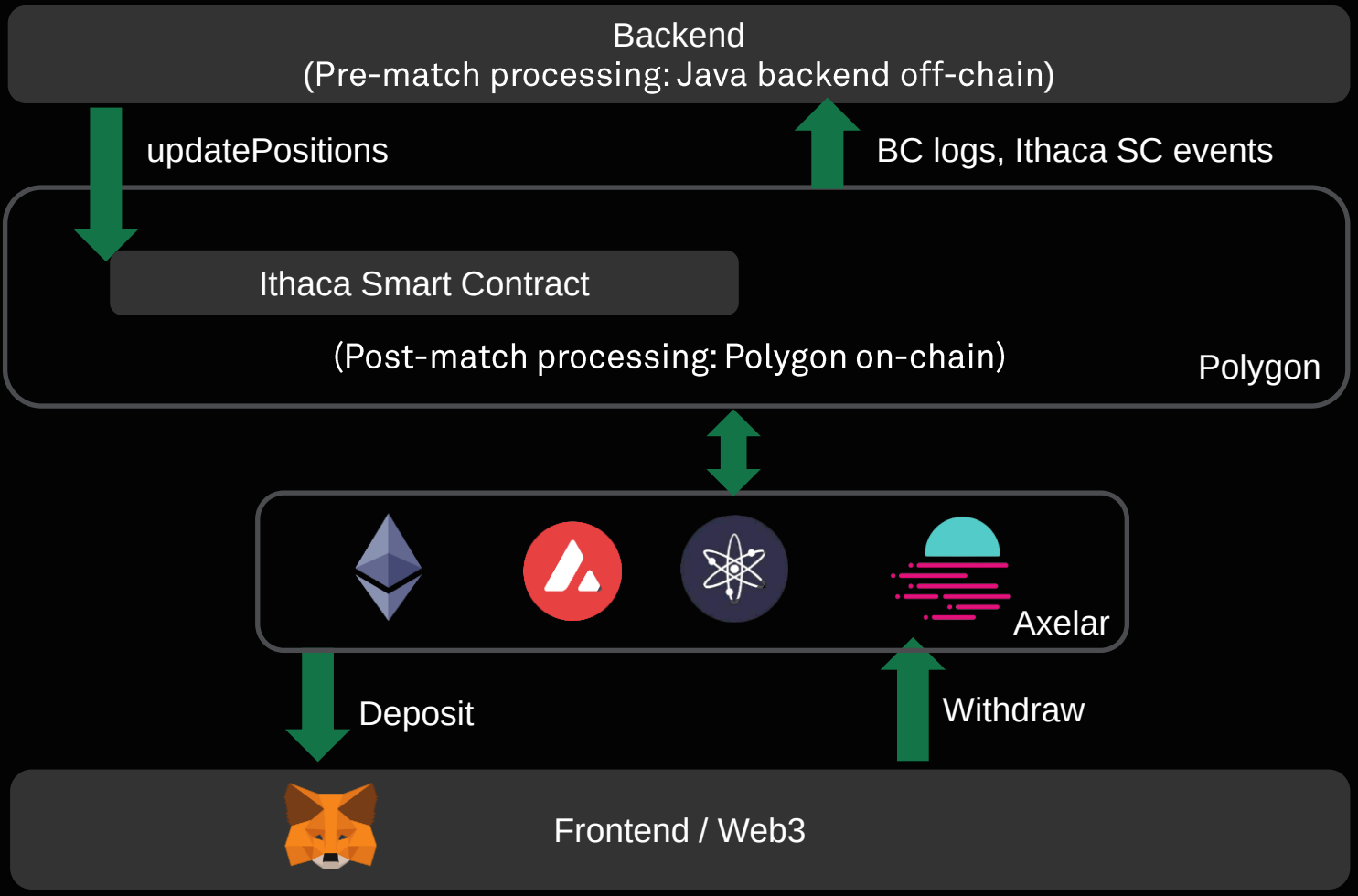


Leveraged Defined Downside Yield with Deep Upside



Architecture

Legacy CeFi trading infrastructure robustness + permissionless blockchain enforced trustlessness



Decentralization alternatives:

Setting up parallel deployments of the matching engine for validators, with subsequent optimization of frequency of validations.

External attestation

Cosmos based on-chain resolution process (?)

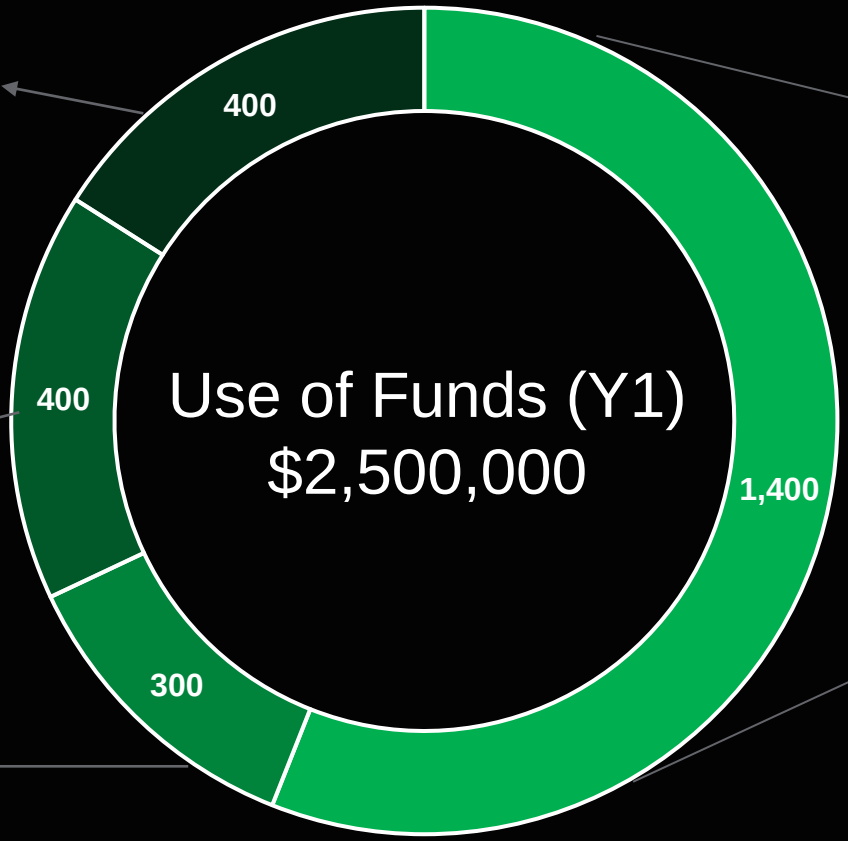
Funds

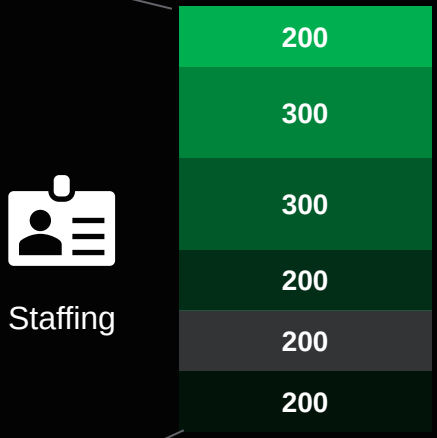
Launch MVP | | Product-Market Fit Achievement | | Tokenomics Launch | | Path to Trustlessness

Buffer funds to provide additional 3-4ms runway

Inclusive of incorporation docs, institutional issuance vehicles and asset management licenses as required

Community building and user engagement





The Team

Chief Executive Officer

(CEO/CFO, Head of Product, Community and Engagement)

20 years experience in fixed income trading and structuring. Prior to joining a major crypto company as country lead, he served as the head of trading at the Portuguese Debt Management Office and as a senior derivatives trader and head of capital markets at Banco PN and Millennium BCP.

Continues teaching Computational Finance and Financial Derivatives as visiting professor at Nova IMS.

Chairman

(Business Development, Sales & Trading, Quant and Structuring)

As Chief Strategy Officer of a major crypto firm, he was responsible for formulating and driving the Group's global strategy with particular emphasis on institutional client business, licensing footprint, regulatory engagement as well as geographical expansion.

He was the founder and CEO of Nomisma, a regulated digital asset derivatives venue, the CIO of Harmony Advisors, an SFC regulated asset management multi-family office business, managing up to 1.5bln$ liquid assets on a discretionary basis in global markets.

He spent 2 years in commodity trading and 12 years at Goldman Sachs. After being elected as Partner in 2008 based in London, he served up to 2013 as co-head of Asia Pacific Securities Division Distribution based in Hong Kong, as a member of the board of Goldman, Sachs Asia LLC and on various committees including the Securities Division Business Standards Committee, Firmwide New Activities Committee and the Firmwide Asset & Liability Committee. He earned his Ph.D. in Economics at the University of Chicago.

Head of Trading

20+ years of FX options trading experience at BNP Paribas, Stanchart, ANZ, BlueCrest. Active on Crypto options market making since Jan21. Extensive experience in both buy and sell side volatility trading as Market Maker on vanilla, exotic options and structure products, and as Portfolio Manager. Actuary graduated from ISUP, Sorbonne University, Paris.

User Experience | **DevOps** | **SC Dev** | **Backend Dev** | **SC Dev** | **Backend Dev**

Sales — **Structuring** — **Quant Advisory**

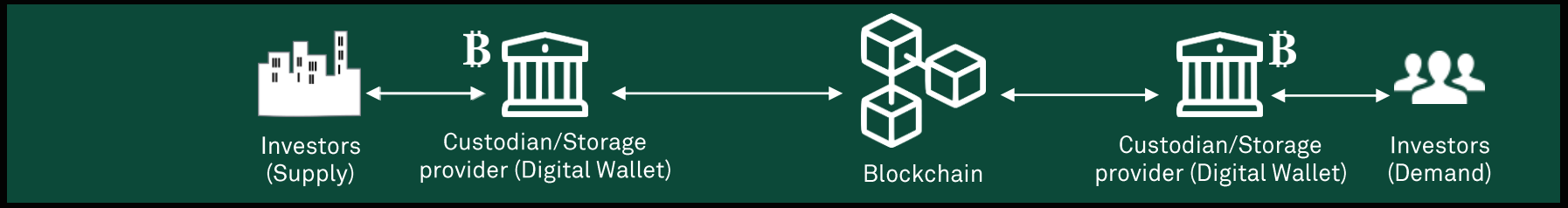
Appendix

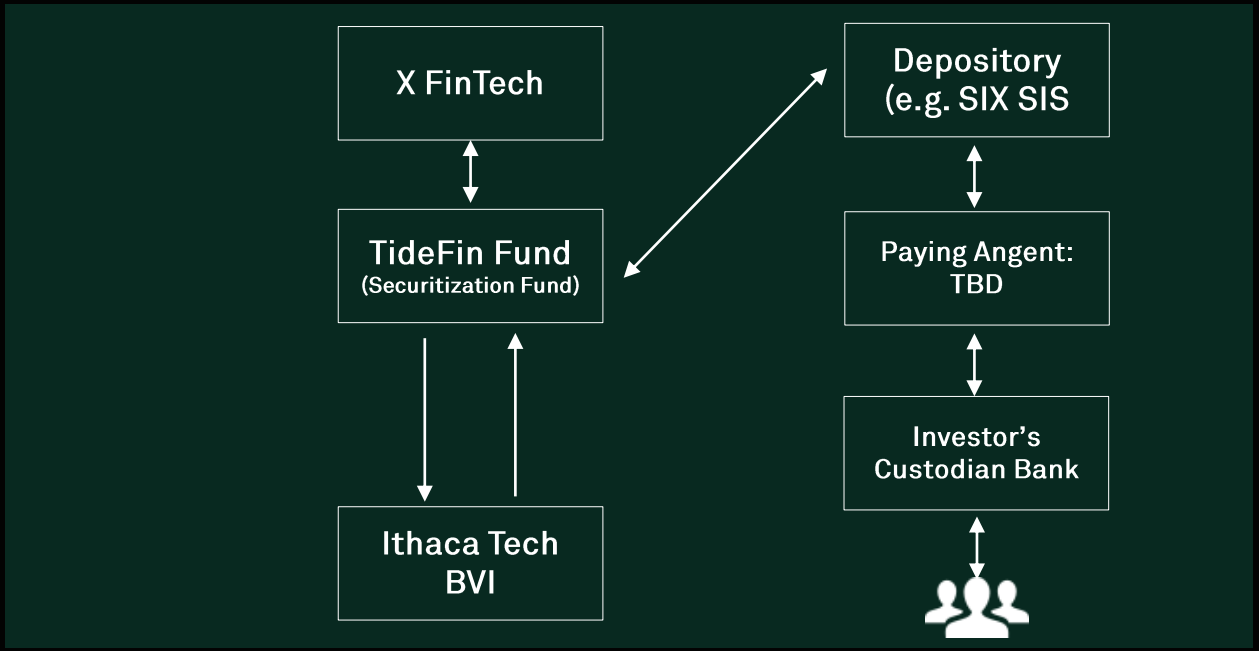
Institutional Go-To-Market

Ithaca finance

Traditional rail

Crypto rail



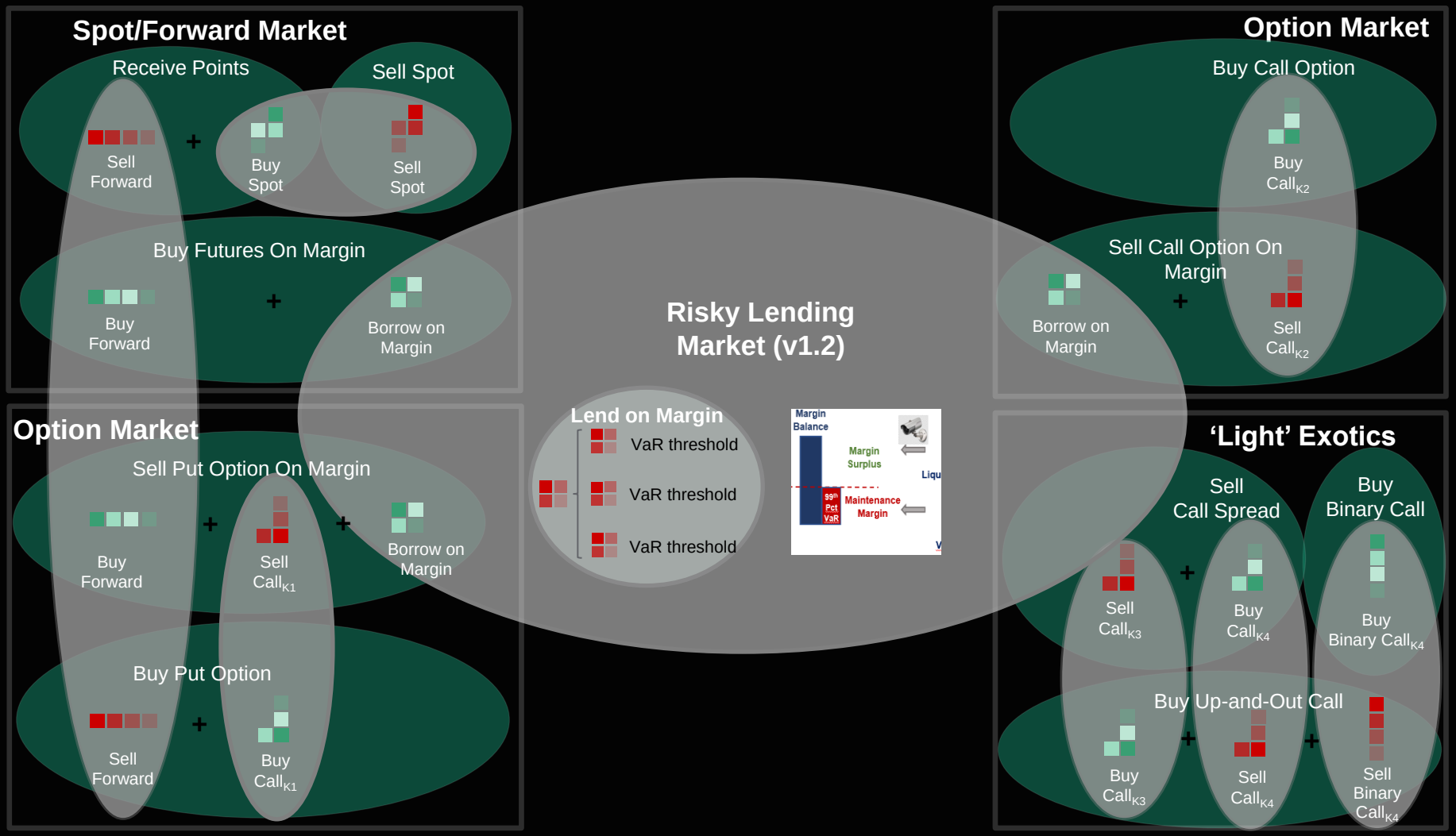


Clearable security, (if required) listed at Alternative markets (e.g. Vienna Stock Exchange)

Product Scope
- Trackers
- Earn Notes
- Yield Boost
- Structures Products

Distribution Scope
- Professional Investors
- Private Placements (EMEA, ASIA, Latam)

Ithaca Matching Engine (Replication)



Incentivizing 2-sided Volatility Flow

Riskless lend with upside

1x long Spot @ 100
1x long Put @ 101
1x short Call @ 101
1x long Call @ 180

Short Put Spread + Unl Call

1x short Put @ 101
1x long Put @ 90
1x long Call @ 120
20x long Binary Call @ 120
1x short Call @ 180

Covered Call

1x short Call @ 120

Cash Protected Put

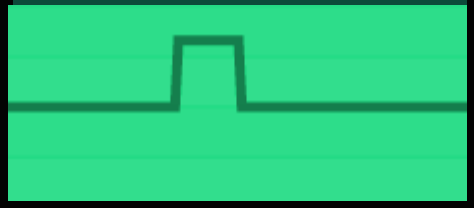
1x short Put @ 90

Buy Now Pay later

1x long Call @ 101
20x short Binary Call @ 101

Long ATM Bet

40x long Binary Call @ 101
40x short Binary Call @ 120

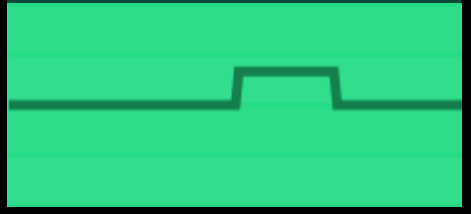


Short Bet

20x short Binary Call @ 101
20x long Binary Call @ 150

Long OTM Bet

20x long Binary Call @ 120
20x short Binary Call @ 150



2-way Order Match

	Put @ 90	Put @ 101	Call @ 101	Bin Call @ 101	Call @ 120	Bin Call @ 120	Bin Call @ 150	Call @ 180
Riskless lend w/ upside		🟢	🔴					🟢
Short Put Spread + Unl Call	🟢	🔴			🟢	20x 🟢		🔴
Covered Call					🔴			
Cash Protected Put	🔴							
Buy Now Pay later Put			🟢	20x 🔴				
Long ATM Bet				40x 🟢		40x 🔴		
Short Bet				20x 🔴			20x 🟢	
Long OTM Bet						20x 🟢	20x 🔴	
NET POSITIONS								

Option Strategies

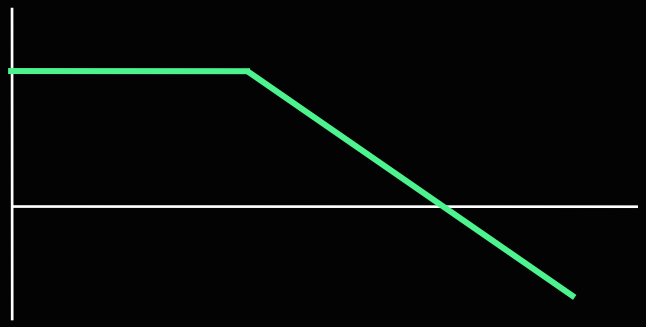
Target Buying | Target Selling

This strategy allows users who hold stablecoins to buy crypto at a lower target price, and holders of crypto to sell at a higher target price, while earning risky yield.

Example:

- This strategy is suitable for users who want to generate a higher return while executing a buy or a sell at specific target prices.

Payoff Structure:



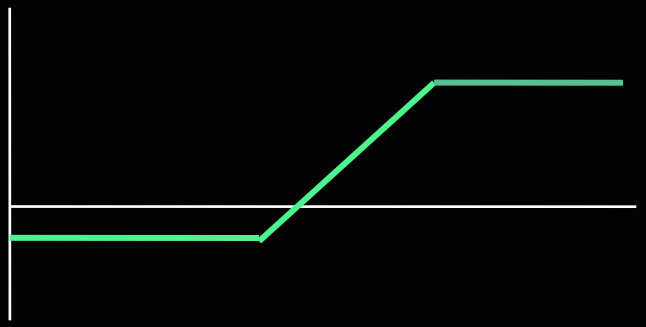
Option Spreads (Calls or Puts)

This strategy involves buying and selling options of the same type (calls or puts) with different strikes or maturities on the same underlying and is suitable for users who are bullish yet are willing to give up some of the potential upside to reduce the premium paid.

Example:

- User buys a 105% call and also sells a 115% call on ETH for a specified maturity.

Payoff Structure (Call Spread):



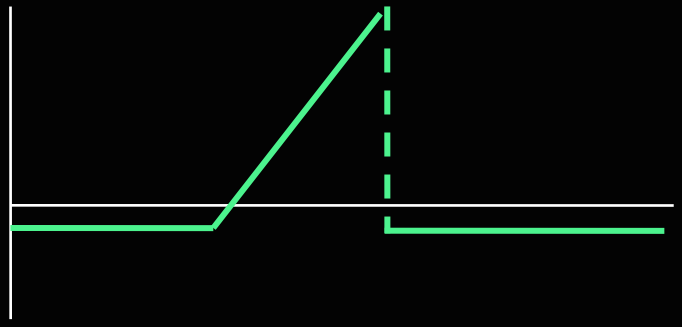
Up and Out Call

This instrument provides the buyer with the right to buy the underlying at the strike price so long as the reference prices does not exceed a specified barrier price and is suitable for users who are only mildly bullish and want to cheapen the premium spent.

Example:

- User buys an ETH 100% ATM call with a 115% barrier

Payoff Structure:



Option Strategies

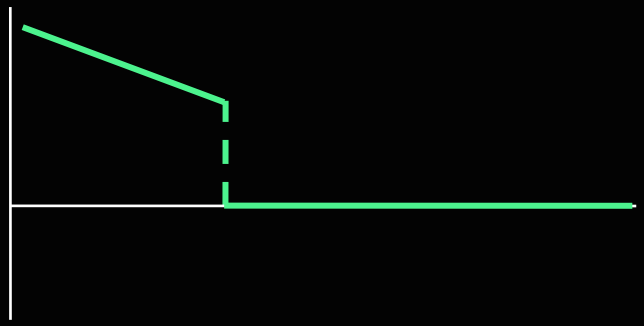
Down and In Put

This instrument provides the buyer with the right to sell the underlying at the strike price so long as the reference price is equal or below the barrier price. It is suitable for users who are bearish, want to reduce premium outlay and accept the trade-off of no payout in case of a mild sell-off.

Example:

- User buys an ETH 100% ATM put with an 85% barrier.

Payoff Structure:



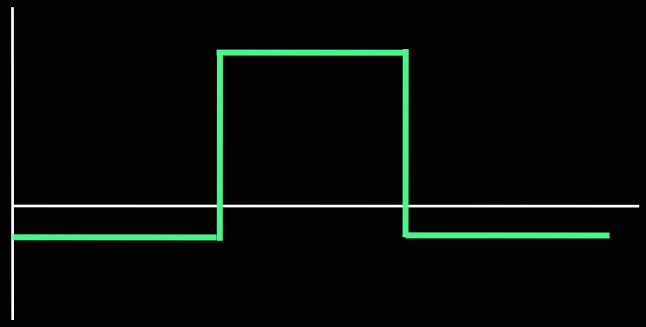
In line Warrant (Binary Call Spread)

This instrument involves buying and selling binary call options with different strikes on a specified maturity to express a price range view for the underlying at expiry.

Example:

- User buys a 120% binary call and also sells a 150% binary call on ETH for a specified maturity.

Payoff Structure:



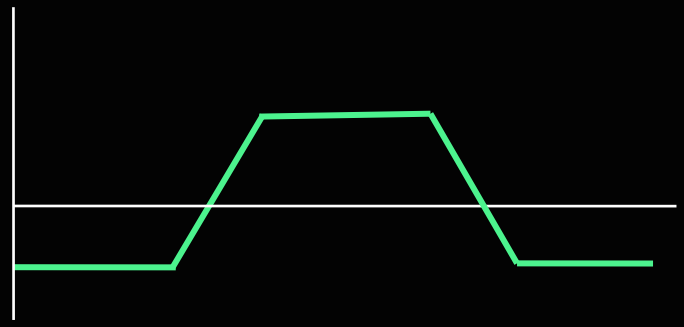
Iron Condor

This strategy involves 2 puts (one long and one short) and 2 calls (one long and one short), with different strike prices, all with the same maturity and is suitable for users who want to express a range trade view at expiry with known upside and initial outlay.

Example:

- User buys an ETH 80% put, sells an ATM put, sells an ATM call and buys a 120% call.

Payoff Structure:



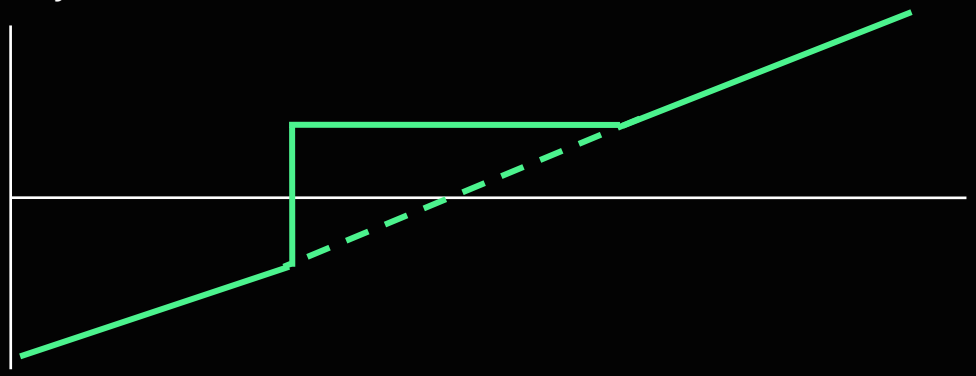
Bonus

Bonus involves buying a forward, a binary call option and a Down and Out put option and is suitable for users who expect to want to get rewarded for sideways or rising markets while being offered partial downside protection.

Example:

- The User buys an ETH zero-strike call and a D&O put option with a 50% knock-out barrier. Product features full upside participation and a conditional capital protection as long as ETH does not go below 50%.

Payoff Structure:



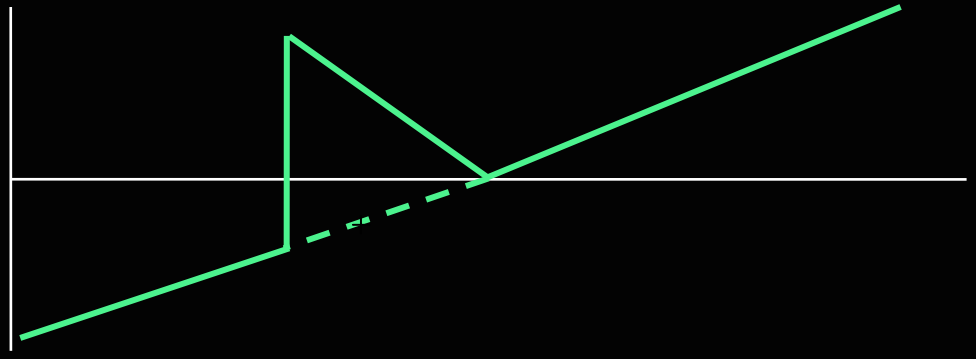
Twin-win

Twin Win strategy involves buying a forward and a binary call option with a 2x Down and Out put options and is suitable for users who expect sideways market moves and want to benefit, up to an extent, from both upside and downside at expiry.

Example:

- The User buys an ETH zero-strike call and a 2x D&O put option with a 70% knock-out barrier. Product features full upside participation, partial returns on the downside and a conditional capital protection as long as ETH does not go below 70%.

Payoff Structure:



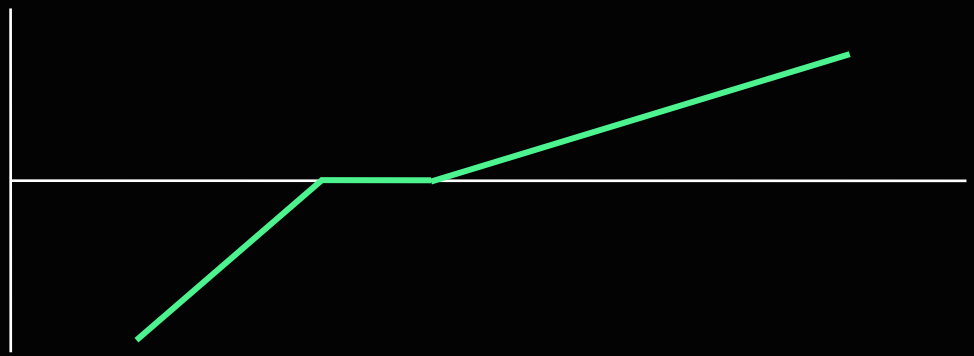
Airbag

This product offers full capital protection should the Underlying remain above a predefined Airbag level. The level of the Airbag protection typically ranges between 90% and 70% of the spot price and are therefore ideal for users who expect to see sideways or rising markets within the specified timeframe and further desire some protection on a downturn.

Example:

- It consists of a long ATM call which provides the upside, a long zero-strike call and a short call with a strike set at the upper end of the airbag. The last two components form a ratio call spread which provides the downside.

Payoff Structure:



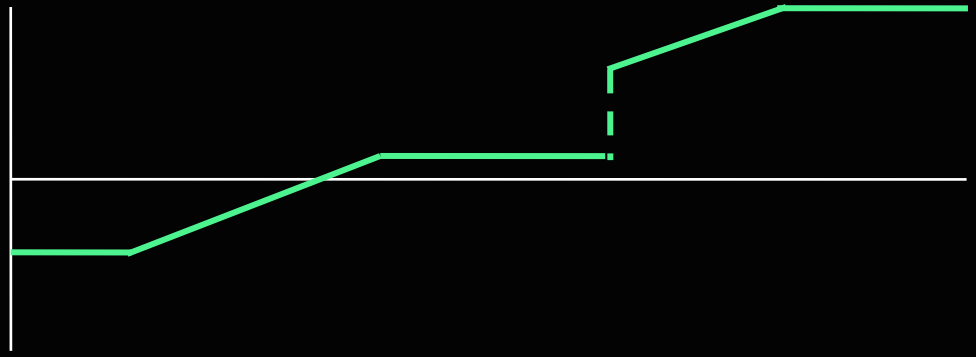
Leveraged Defined Downside Yield with Deep Upside

This product offers defined downside leveraged yield position while providing capped upside optionality.
It involves selling an ITM put spread and buying a knock-in call spread and is ideal for users who desire leveraged yield with defined downside and upside participation.

Example:

- The User sells 102% put, buys a 90% put and 120% Up and in call (buy 120 call, buy 20x 120 bin call) and sells a 180% call.

Payoff Structure:



Prepackaged Strategies

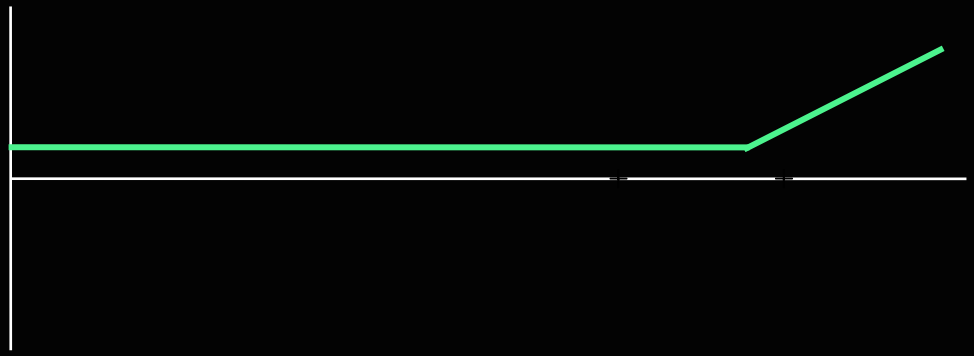
Principal Protected Moonshot

This product offers full capital protection alongside riskless yield while providing the user the opportunity to bet on a ‘moonshot’; ie. deep upside. The user earns return while enjoying partial participation in case of significant underlying upside and is therefore ideal for users who want to participate in significant rallies without capital at risk.

Example:

- The User buys spot ETH, sells a 102% call and buys a 102% put (riskless deposit), and also buys a 180% call.

Payoff Structure:



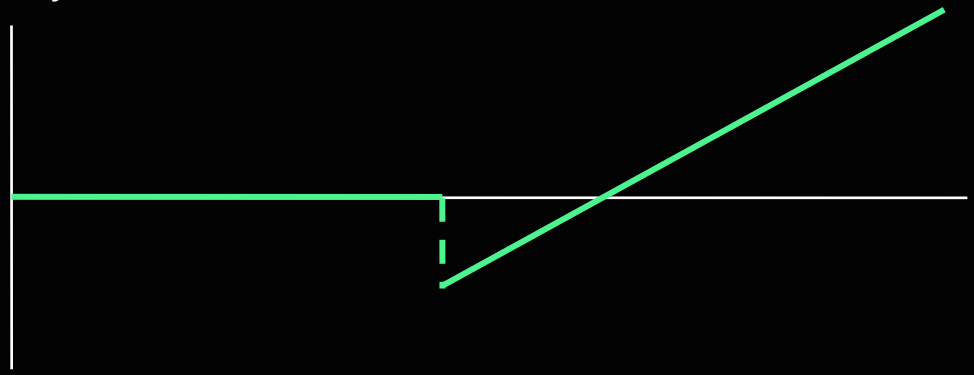
Buy Now Pay Later On Success Only Call Option

The BNPL strategy allows a user with a strong upside view to bet on this view without any capital outlay, considering one will be out of pocket only in case there is a mild only rally and is therefore ideal for users with strong views who would prefer not to pay out anything at trade inception.

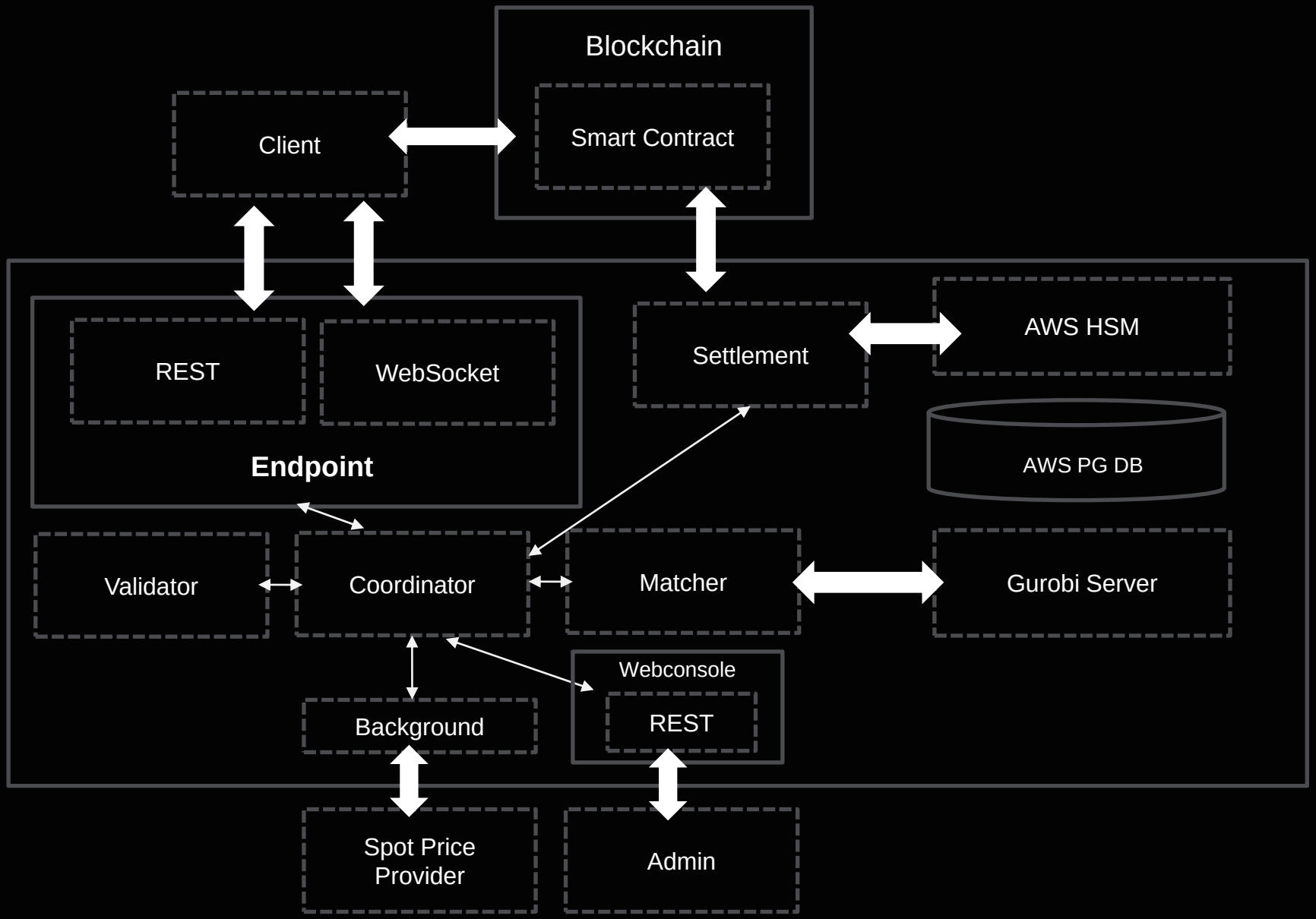
Example:

- The User buys an ETH 102% call and sells a premium adjusted (~1/3rd size) 102% binary call. This is a contingent premium call, wherein the User will pay the premium, only when the call is ITM.

Payoff Structure:



Common Architecture



Smart Contract Architecture