

# Launching Implied Volatility Price Feeds with Chainlink

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# Intro

Implied Volatility (IV) is a key metric that captures the market's view of the likelihood of changes in a given security's price. It is often employed to determine the premium of the options contracts. (Investopedia) As Decentralized Finance (Defi) continues to grow, more and more Defi projects ([Hegic](#), [FinNexus](#), [OptionRoom](#) etc) look into the derivatives market, which is often estimated at over \$1 quadrillion on the high end according to investopedia (Investopedia). So it is essential and critical for Chainlink to provide reliable and accurate IV price feeds as part of the broad Defi Oracle offering and align with Chainlink 2.0 vision.

While IV price feeds oracle are essential and critical for the Defi ecosystem, it's not trivial to launch the service. In this report, I will analyze and provide steps to launch IV price feeds oracle with Chainlink, as well as discussing the rationale behind each step.

## Steps to launch IV feeds with Chainlink

Overall, following the chainlink existing price feeds oracle architecture design, it should include 3 layers of data aggregations plus some other network security design in mind, and involve doing four steps analysis.

- 1) Raw BTC/ETH Options Exchange Data
- 2) High Quality Data Aggregators
- 3) Chainlink Node Operator Aggregation
- 4) Oracle Network Aggregation



## 1.Raw BTC/ETH Options Exchange Data

First of all, Chainlink will start to look into the existing exchanges which offer options contracts.

Options contracts are more complex than a direct purchase of an asset as they include several key variables including spot price, strike price, maturity, option type (Call or Put), option style (European / American) etc. As a result, not all exchanges provide options contracts exchange services.

The following is a table of all big exchanges offering options contracts services.

Name	Coins	Period	Options Style	Liquidity (Daily avg)	Comments
Deribit	BTC / ETH	Daily, Monthly	European	High	The biggest Option contracts exchange
Binance	BTC / ETH	Daily, Monthly	European	Medium	
FTX	BTC	Any	European	Low	
LedgerX	BTC	Daily, Monthly	European	High	
Okex	BTC / ETH	Daily, Monthly	American	Low	
Huobi	BTC / ETH	Daily, Monthly	European	Low	

It's possible to gather IV data directly from the exchanges, however setting up an IV price feed oracle mechanism from a collection of raw data is extremely difficult and it opens the oracle up to numerous attack surfaces, such as rapid volume shifts, data outliers, flash crash and exchanges downtime, all of which are not uncommon in cryptocurrency markets.

## Volume Shifts

Cryptocurrency markets differ from traditional financial markets because no exchange owns the exclusive issuance of assets and therefore cannot lock-in users and cover the entire trading market of an asset. Blockchain technology is permissionless and thus anyone can list cryptocurrency coins/tokens on their exchange for traders to access at any time. Because of this dynamic, the volume of cryptocurrencies is spread across many different exchanges and can shift rather quickly between different exchanges. This needs to be accounted for by an oracle mechanism if it is to avoid market manipulation attacks where the majority of the volume is shifted to an exchange not included in the data aggregation process.

## Flash Crashes

Cryptocurrency exchanges, which commonly lack sufficient circuit breakers, are susceptible to flash crashes where the market price deviates far outside the rest of the market across all other exchanges. Even the largest exchanges are subject to this risk and have already experienced these issues multiple times over the years. On March 6th 2021, Binance, one of the world's biggest cryptocurrency exchanges, experienced a severe flash crash on polkadot's perpetual-futures contracts. The contracts were trading around \$33.25 right around 8:45 p.m. EST, when suddenly they tumbled 99.2%. The contracts fell as low as \$0.25 in less than a minute, before quickly bouncing back to around \$33. (Coindesk)

## Centralized Cryptocurrency Exchanges Downtime

Centralized Cryptocurrency exchanges, which still lack proper infrastructure to serve sudden spiked large volume during market turbulence. On May 19th 2021, Several large

cryptocurrency exchanges had trouble staying open during the market crash, which saw Bitcoin and Ethereum lose 50% and 60% of their value, respectively, in 24 hours. It was reported that during the time, Coinbase, Bitfinex, Binance, Kraken and some others all had some intermittent downtime. (decrypt)

Coinbase went offline  
Bitfinex went offline  
Binance went offline  
Kraken went offline  
Gemini went offline  
CMC went offline  
Bittrex went offline  
KuCoin went offline  
Huobi went offline  
CoinDesk went offline

Probably just a coincidence.

[#Bitcoin](#) [#BTC](#) [#Crypto](#)

1:46 AM · May 20, 2021



With all these concerns in mind, Chainlink should configure data sources in an aggregation fashion to eliminate all the potential risks and provide a reliable and accurate IV price feed oracle.

## 2.High Quality Data Aggregators

High quality data aggregators can provide the most robust market coverage, a feature that is especially important for providing accurate data to markets that are still relatively low in volume when compared to traditional financial markets. When sourcing from data aggregators, the role of maintaining market coverage shifts from the creator of the oracle network, who may not have the experience or resources to continually track exchange volume, to professional data aggregators.

These data aggregators have full-time globally distributed teams that are highly experienced in maintaining accurate price data with complete market coverage across all trading environments. They take into account important metrics such as liquidity, volume, time and how these metrics vary across exchanges; they also smooth out any outliers. These features can make Chainlink IV data feed highly resistant to volume shifts, flash crashes and quality dilution. Some better data aggregators also take into account fake volume, exchange downtime and time differences.

The following is a table to show all the data aggregators which provide IV metrics.

Name	Coins	Exchanges	IV Data support?	On Chainlink Market ?	Comments
CoinGecko	BTC/ETH	Binance FTX Huobi OKEx Deribit Bybit	No	Yes	Crypto only
CoinMarketCap	BTC/ETH	Binance FTX Huobi OKEx Bybit	No	Yes	Crypto only
BraveNewCoin	BTC/ETH	Binance Deribit OKEx	No	Yes	Crypto only
Shrimpy	BTC/ETH	Binance Coinbase Bittrex Bitfinex Poloniex	No	No	Traditional
Kaiko	BTC/ETH	Deribit OKEx FTX Binance	Yes	Yes	Traditional
Skew	BTC/ETH	Deribit CME OKEx LedgerX Huobi	Yes	No	Crypto Only
CryptoCompare	BTC/ETH	Binance FTX Huobi OKEx	No	Yes	Crypto Only
dxfeed	BTC/ETH	20+ crypto exchanges	YES	Yes	Traditional

As the above data aggregators table suggests, still not every mainstream data provider supports options contracts IV data. It will be important to demonstrate Chainlink's value proposition to data aggregators, that it is in their financial best interests to build APIs and

sell their data in a format that supports Chainlink's Oracle Networks or even have their own Chainlink oracle node.

### **The number of data providers to consider:**

It is important to address the number of data aggregators chainlink would like to incorporate. For IV price feeds, Chainlink should target at least five data providers. While more data providers are better, the quality should not suffer from quantity. To ensure a high degree of tamper-resistance and reliability, Chainlink IV Price Feeds should exclusively pull data from premium data aggregators in a decentralized fashion.

### **Choose the right data providers with following principles:**

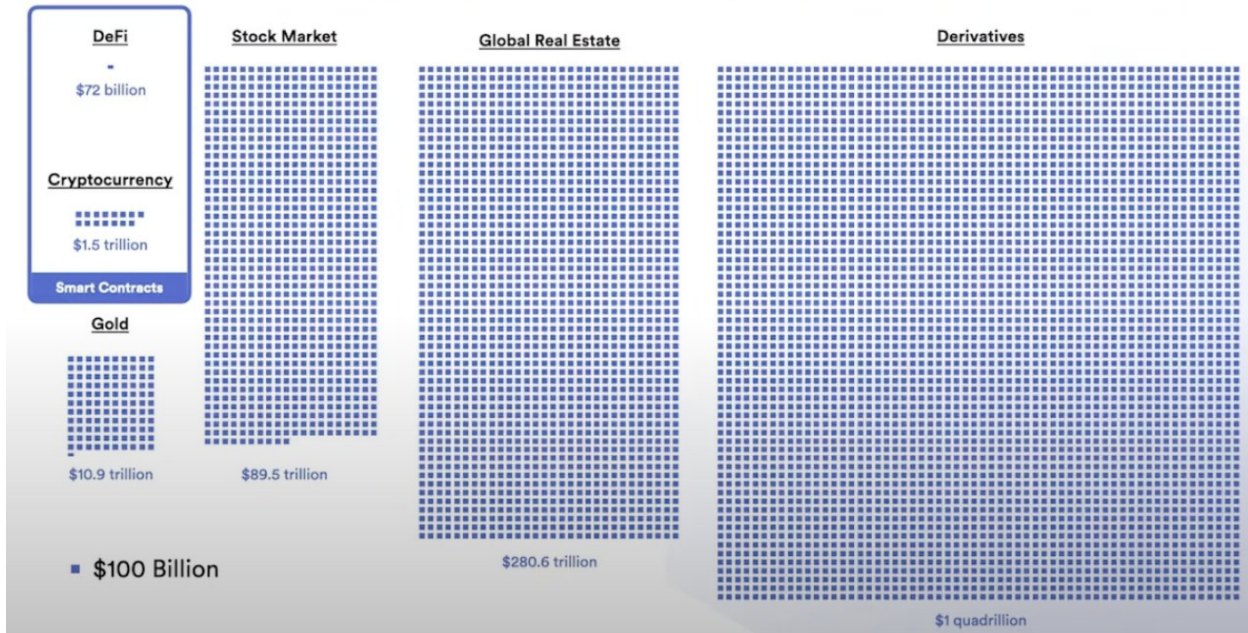
- Only consider data sources that provide premium data feeds.
- Data Providers who report on exchanges with the largest volume of option data would be best to start with.
- Convince some data aggregators who are already providing spots price data to Chainlink Price feed oracle. This is because those data providers are more likely familiar with Chainlink ecosystem already.

Choosing the right data providers means that each data source represents a refined, volume-adjusted price point aggregated from all centralized and decentralized exchanges, making it inherently resistant to numerous attack vectors.

### **Building APIs to enable multi-trillion Defi market**

There are strong arguments and beliefs that Chainlink is on a mission to pave the foundations for the future Defi market. Here is a landscape image showcasing how early the Defi industry is by comparing the current Defi market cap to traditional finance.

## The Remaining Market For Smart Contracts is Trillions



With the right partnership with Chainlink, it will be possible to enable the multi trillion market together in the future.

- 1) **Chainlink has proven itself as Oracle industry leader.** Chainlink's pricing data feeds empower the largest Defi projects including [Compound](#), [Aave](#), [Synthetix](#), [Curve](#) and [Liquity](#), securing billions of dollars. This should give potential data aggregators tremendous confidence that the newly-built API will be used in other projects and generate rich income since the Chainlink's reputation, track records and technical capabilities in the industry.
- 2) **Chainlink is a blockchain agnostic Oracle Provider** to provide blockchain infrastructures to enable cryptographic truth enabled society and decentralized finance. Currently Chainlink is offering oracle services on [Ethereum](#), [Binance Smart Chain \(BSC\)](#), [Polygon](#), [xDai](#), [Huobi Eco Chain](#), [Avalanche](#) and [Arbitrum](#). In the near future, Chainlink will expand the Oracle offerings to other popular blockchains such as [Solana](#), [Polkadot](#) and [Cosmos](#) etc. Potential data providers can reach out to more blockchain ecosystems with Chainlink than by creating multiple relationships with other protocols.



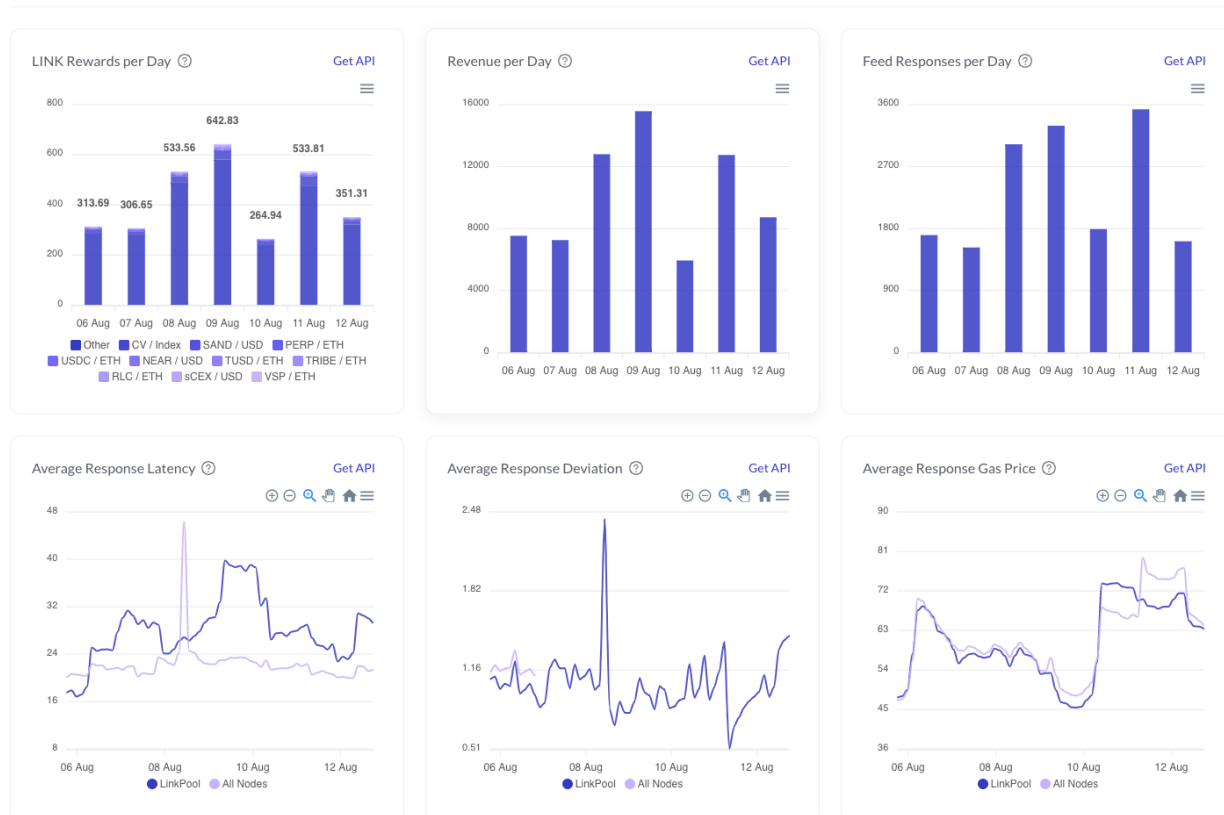
- 3) **Chainlink other services including any API offering, [Anti-Fraud Network](#), [Chainlink Keepers](#) and [CCIP](#)** will boost the need for more and more Data APIs in general. It's a great moment for data aggregators to be on board now. Even though the report mainly addresses IV price feeds, the potential opportunities are huge inside Chainlink ecosystem.

### **Data providers running chainlink nodes and allow redistribution On-Chain**

It's the best outcome for data providers not only to provide premium APIs to offer IV price feeds to the network, but also it's a no-brainer to have their own chainlink nodes.

In this way, data providers can have two streams of income. One is from the premium API subscription models offered in fiat currencies. Chainlink nodes can subscribe to these APIs and relay their data on-chain by leveraging Chainlink's external adapters in their node setups. This can be applied to any current existing data provider and is already being used in production by Chainlink's Price Reference Data networks. The other model is for data providers to operate Chainlink nodes and sell their data directly to smart contracts. This provides them with a new method of monetizing their data and is already being utilized by several leading data aggregators.

Chainlink open-source visualizations and monitoring system gives total transparency for the data providers to learn and research the existing node operators through [market.link](#). They can find oracle services, external data connections, certifications of nodes, different adapters, jobs and node metrics. All the valuable information can help the new data providers to gain significant insights and decide what's best for them to do.



Chainlink understands that data providers can't be expected to understand every blockchain environment and independently set up secure operations on each one, especially considering the novelty of the blockchain market and the lack of documentation and developers who understand each environment.

A team of professional DevOps who have experience operating mission-critical blockchain infrastructure that already secures billions of dollars in on-chain value will also be able to help data providers to set up their nodes if needed.

## Other Considerations

According to wikipedia, there are several models to calculate Implied Volatility based on underlying instruments, parameters and different options contracts styles. The [Black-Scholes Model](#), a widely used and well-known options pricing model, factors in current stock price, options strike price, time until expiration (denoted as a percent of a

year), and risk-free interest rates. It cannot accurately calculate American options, since it only considers the price at an option's expiration date. (Investopedia)

The [Binomial Model](#), on the other hand, uses a tree diagram with volatility factored in at each level to show all possible paths an option's price can take, then works backward to determine one price. ("Binomial Option Pricing Model")

In the case of Implied Volatility for Ether and Bitcoin, it is important to confirm that the data aggregators are employing the same formula to calculate implied volatility across exchanges. Factors including strike price, time of expiry and options style (American vs European) should be aligned between data aggregators to ensure data consistency and quality.

### 3. Chainlink Node Operator Aggregation

After Chainlink successfully chose over minimum 5 high premium data aggregators, now it's time to have a decentralization of high-quality and secured node operators in place.

#### **Security precautions / anchoring mechanism for Chainlink nodes**

**Professional services:** Nodes should be supported by leading blockchain DevOps and security teams distributed around the world, who have a good understanding of the blockchain infrastructures and are familiar with Chainlink Oracle nodes setup. They are responsible for running the Chainlink core software that's used to source and broadcast external market data on the blockchain.

**Global Distribution:** Chainlink's Decentralized Oracle Networks should be highly available and fault tolerant. A key to achieving this is ensuring nodes are distributed geographically.

**Public Cloud and Onsite data warehouse:** To further ensure decentralization of the oracle network, nodes should be distributed both off-site in the cloud and on-site bare-metal servers, to avoid any single point of failure in the oracle mechanism.

**Credential Management:** In order to connect to premium data providers and ensure users receive the highest quality data, node operators need the ability to store API keys and manage account logins to interact with these premium data providers.

**Service Agreements:** Chainlink oracle networks will incorporate binding Service Agreements signed by both the node operator and the requesting smart contract, which pre-defines the parameters with which a node needs to be compliant during the entire length of the agreement. These parameters set the terms of data delivery (latency of response), data quality (accuracy of response), amount of staked LINK (crypto-economic guarantees), slashing conditions (penalties), and any other predefined terms and conditions defined by the requester.

## 4. Oracle Network Aggregation

After premium data source aggregators and node operator aggregation, the oracle network aggregation should be in place. An oracle network defines how the collection of nodes work together to create a single reference data point on-chain, which generally involves aggregating the responses of all the individual nodes. The most common form of aggregation is taking the median of the reported values once a predefined number of nodes have responded. Ultimately, aggregation can take on many forms and can be performed either on-chain or off-chain depending on the throughput and cost of the underlying blockchain network.

### On-Chain vs Off-Chain Aggregation

Recently Chainlink released a more scalable and effective version of the network aggregation protocol based upon off-chain reporting ([OCR](#)). Previously, In the [FluxAggregator](#) model, every node must submit their price value individually, and once all responses are received on-chain, the contract aggregates them to confirm the price. Since every single node must submit a transaction per round, each pays gas to do so, with aggregation occurring on-chain once all nodes have submitted.

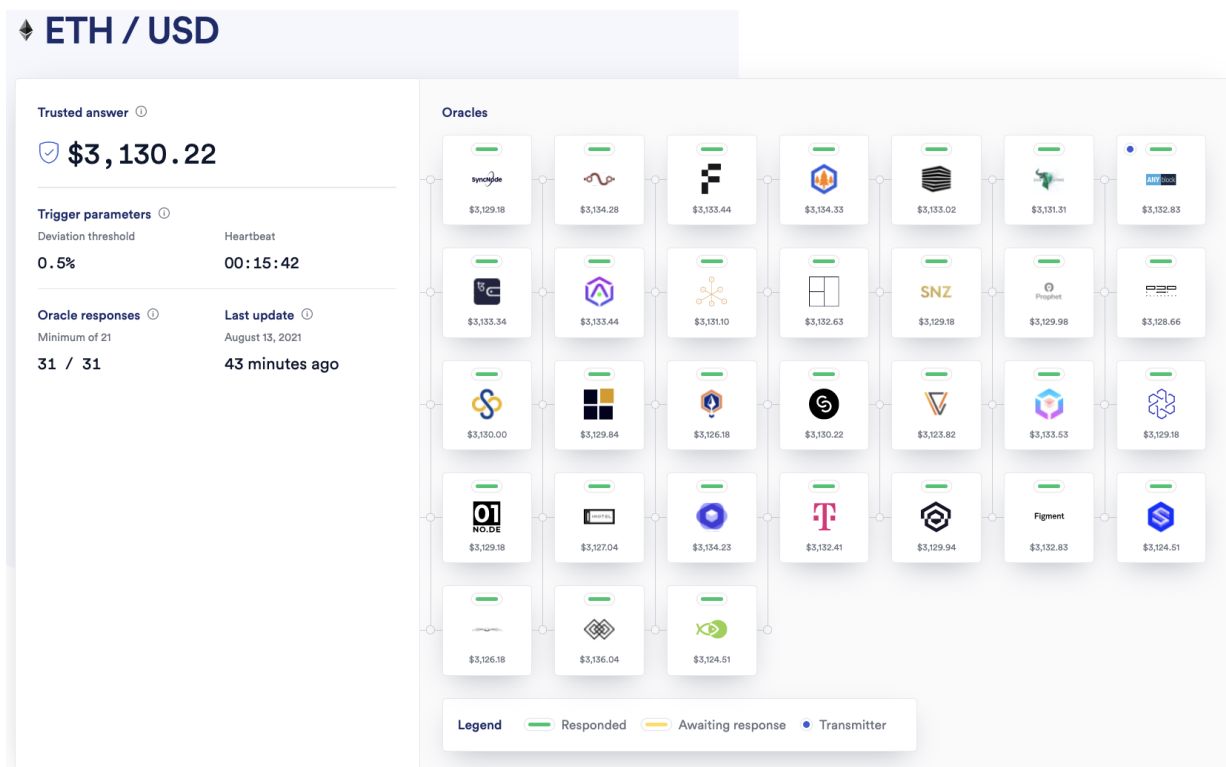
With the Off-Chain Reporting aggregators, all nodes communicate using a peer to peer network. During the communication process, a lightweight consensus algorithm is run, in which every single node reports its price observation and signs it. A single, aggregate transaction is then transmitted, saving a significant amount of gas. The report contained in the aggregate transaction is signed by a quorum of oracles and contains all oracles' observations. By validating the report on-chain and checking the quorum's signatures on-chain, it can preserve the truthfulness properties from Chainlink oracle networks.

See the [OCR protocol paper](#) for a technical deep dive.

## Aggregation Parameters

Chainlink also provides the ability to customize the aggregation, by using an average, median, or even more complex models of weighted sourcing and removal of outliers. This includes flexibility in the update frequency, whether using a time-based update, price deviation updates (e.g. every 0.5% change in price), or some type of hybrid approach with multiple parameters. Each aggregation round is triggered based on one or more aggregation parameters. Whichever condition is met first will trigger a price update.

For example, the existing Chainlink price feeds aggregate the responses of numerous security-reviewed node operators and take a median, requiring a predefined threshold to respond in order to trigger an on-chain price update. Below is a screenshot taken from [data.chain.link](https://data.chain.link) for ETH/USD pair.



# Summary

The report carefully studied all the documents from [docs.chain.link](https://docs.chain.link), [blog.chain.link](https://blog.chain.link) and numerous other online resources and summarized a four-step approach to launch a reliable, accurate, efficient, secured and decentralized Implied Volatility Price Feed Oracle on Chainlink.

With all these in mind, the oracle should achieve:

**High Quality Data** - Chainlink sources IV data from numerous premium data providers, who maintain robust market coverage, weight data by volume/liquidity, and remove outliers/fake volume. This mitigates vulnerabilities around API downtime, exchange inaccuracies, and data manipulation.

**Reliable Nodes** - Chainlink IV Data Feeds are secured by a large collection of independent, security-reviewed, and Sybil-resistant oracle nodes run by leading blockchain DevOps teams. Chainlink nodes have a strong history of performance even during extreme market volatility and periods of high network congestion.

**Decentralized Infrastructure** - Chainlink IV Data Feeds are decentralized at the data source and oracle node level, eliminating central points of failure in the sourcing and delivery of external data to another Defi platform.

**Transparent Performance** - Chainlink IV Data Feeds can be monitored by anyone in real-time, allowing users to verify the accuracy of the IV calculation that they received.

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