**SPOT EXPOSURE HEDGING BOT**

**Overview**

The Spot Exposure Hedging Bot is a sophisticated, modular risk management system that monitors and automatically hedges the directional risk of spot positions using perpetual futures and options across multiple exchanges (Bybit, OKX, Deribit).  
It features a powerful Telegram bot interface for interactive risk analytics, automated and manual hedging, and portfolio management.

**Features**

* **Multi-exchange integration:** Bybit, OKX, Deribit (orderbook, simulated/demo trading)
* **Real-time risk analytics:** Delta, gamma, theta, vega, VaR, drawdown, correlation, beta
* **Automated and manual hedging:** Delta-neutral, options-based, dynamic rebalancing
* **Smart order routing:** Finds best price across venues, estimates slippage and transaction cost
* **Interactive Telegram bot:** Commands, buttons, and charts for risk monitoring and control
* **Portfolio analytics:** Aggregated Greeks, P&L, stress testing, correlation matrix
* **Persistent storage:** User positions, trade logs, and settings saved securely
* **Extensible:** Ready for advanced options strategies, ML-based analytics, and backtesting

**Architecture**

graph TD

User--> | Telegram | Bot

Bot-->| API | Bybit

Bot-->| API | OKX

Bot-->| API | Deribit

Bot-->| Risk Engine | Risk Engine

Bot-->| Order Execution | Smart Router

Bot-->| Storage | Positions/Logs

Risk Engine -->| Analytics | Portfolio

Smart Router-->| API | Exchanges

**api\_clients/** : Exchange API wrappers (Bybit, OKX, Deribit)

**risk\_engine/**: Risk calculations, Greeks, analytics

**order\_execution/**: Smart routing, slippage, transaction cost

**hedging\_strategies/**: Advanced options strategies

**utils/**: Logging, persistent storage

**bot.py**: Main Telegram bot logic and command handlers

**Setup & Installation**

**Requirements**

* Python 3.9+
* [pip](https://pip.pypa.io/en/stable/)
* Telegram account and bot token ( [Bot Father](https://core.telegram.org/bots#botfather) )
* (Optional) API keys for Bybit, OKX, Deribit

**Install Dependencies**

bash

pip install -r requirements.txt

**Environment Variables**

Create a .env file with your API keys:

BYBIT\_API\_KEY= your BYBIT API key

BYBIT\_API\_SECRET= your BYBIT API secret

OKX\_API\_KEY=your OKX API key

OKX\_SECRET=your OKX API secret

TELEGRAM\_TOKEN=your telegram bot token

**Run the Bot**

bash

python bot.py

**Telegram Commands**

| **Command** | **Description** |
| --- | --- |
| /start | Welcome message |
| /connect | Link your exchange account (if using CCXT/Binance) |
| /monitor\_risk <symbol> <size> <thresh> | Start risk monitoring for a position |
| /set\_threshold <thresh> <symbol> | Set risk threshold for a position |
| /set\_hedge\_fraction <fraction> | Set fraction for partial hedging |
| /set\_rebalance\_interval <seconds> | Set interval for dynamic rebalancing |
| /auto\_hedge <strategy> <threshold> | Enable automated hedging |
| /hedge\_now <symbol> <size> [steps] | Manually trigger (gradual) hedge |
| /hedge\_status <symbol> | Show current hedge status |
| /hedge\_history <symbol> <timeframe> | Show hedge history for an asset |
| /portfolio | Show portfolio analytics and Greeks |
| /risk\_chart | Show a chart of position deltas |
| /correlation\_chart | Show correlation matrix of portfolio assets |
| /simulate\_strategy <type> <params> | Simulate advanced options strategy (collar, straddle, etc.) |
| /pnl | Show P&L attribution over time |

**Risk Models & Formulas**

* **Delta:** Sensitivity of position value to underlying price changes
* **Gamma:** Sensitivity of delta to underlying price changes
* **Theta:** Time decay of option value
* **Vega:** Sensitivity to volatility changes
* **VaR (Value at Risk):** Statistical measure of potential loss
* **Drawdown:** Maximum observed loss from a peak to a trough
* **Correlation/Beta:** Measures co-movement between assets and hedge instruments

**Example: Delta Calculation**

For spot:

Delta = position size

For options (Black-Scholes):

Delta = N(d1) for calls, N(d1)-1 for puts

**Example Usage**

**Start monitoring BTC spot risk:**

/monitor\_risk BTCUSDT 2 0.5

**Manually hedge 1 BTC in 4 steps:**

/hedge\_now BTCUSDT 1 4

**Simulate a straddle strategy:**

/simulate\_strategy straddle 1 30000 200 210

**Show portfolio analytics:**

/portfolio

**Show correlation matrix:**

/correlation\_chart