

# Terminal Velocity RateX [VRX]- Altcoin Difficulty Retarget System

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### 1. Introduction

VRX or Terminal Velocity RateX is an altcoin difficulty retarget system that, utilizing a several block depth scan, quickly adapts the implemented blockchain/altcoin's mining or minting difficulty levels to ensure a narrow window around the desired block time. This of course allowing for some inconsistencies in block spacing time due to significant increases or decreases in hashrate or staking depending on whether the blockchain is Proof-Of-Work based or Proof-Of-Stake.

### 2. Technical Aspects

Simply put VRX indexes a previous set amount of blocks (typical reference implementations are set to the previous six blocks) and then compares each of them against each other in relation to block their times thus determining a set spacing between those blocks. The system then takes the determined block spacing and compares it against desired block spacing in what is called "Check Round" similar to the other retarget systems available but adjusts on a different curve which adapts quickly to large changes in the hashrate of the blockchain however also making sure to not adjust too much so as not to "stall" the blockchain. There is one Check Round per pair of blocks indexed so in most cases as stated previously using a six block count index depth VRX will have five Check Rounds. After VRX runs through its checks it then determines whether it should change the difficulty either up or down depending whether the desired block time was overshoot or rushed, the severity of which is limited to a maximum of doubling the previous block difficulty or halving it. Finally an average is calculated between the different pair calculated difficulty changes so that the most logical change in difficulty occurs that best suites the blockchain and submitted for the mining/minting network.

### 3. Future Intentions

While already being currently a nice alternative to the typical difficulty adjustment systems future changes and updates are planned for later releases such as:

- Proof-Of-Work difficulty skew for hybrid PoW/PoS blockchain systems
- Code cleanup and general revisions
- Create separated PoW and PoS reference implementations

... among other updates not currently thought of or mentioned.

### 4. Conclusion

Overall this document's intention is provide a general understanding of what VRX is and what it does. The use of the VRX system is still not widely tested or used and currently can only be found in Espers [ESP] and INSaNE [INSANE] blockchain projects as of the writing of the documentation. This VRX system will continue to evolve to become more robust and overall a effective solution to the blockchain difficulty retarget problem.