Strategic Intelligence Essay 2

A NATO-COLLECTION APPROACH TO IDENTIFYING LARGE-SCALE CRYPTO-MINING OPERATIONS

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1 On Cryptocurrency

Satoshi Nakamoto's 2009 white paper on Bitcoin, to some, signaled the beginning of an era filled with trust-less transaction systems. The two-key nature of Bitcoin and most other contemporary cryptocurrencies instill security as an inherent part of the money (Houben and Snyers 2018) . This is critical, as the same two-key system provides anonymity to all transactors of a cryptocurrency. While the blockchain maintains a publicly available record of all the public keys used for transactions on its system, connecting this public key to the private key of a specific individual or organization is meant to be impossible (Houben and Snyers 2018).

Collecting intelligence regarding the use of cryptocurrency by certain actors is important, as the aforementioned anonymity of cryptocurrency makes it the ideal transaction vehicle for terrorist organizations and rogue states alike (Armin 2020). Indeed, cryptocurrency is used largely in the status quo for illegal transactions, and is suspected to be used by countries like Iran and North Korea to evade American sanctions (Das 2018). These operations often go hand-in-hand with large scale cryptocurrency mining operations, as such operations are often difficult to detect, retain the anonymity that makes cryptocurrency transactions so appealing, and is a trust-less process. This makes the currency important to collect further intelligence on, as doing so would provide more actionable insights into regulating cryptocurrencies domestically and preventing circumvention of sanctions internationally. This paper will focus specifically on analyzing best practices for collecting cryptocurrency usage information from other states, with a focus on tracking large-scale mining operations.

2 Primary Collection Methods

Given cryptocurrency's completely digital nature, it stands to reason that the most effective collection methods would focus on utilizing this feature. To this end, this paper argues that signals intelligence (SIGINT) and financial intelligence (FININT) would be the most effective data collection methods.

Specifically, electronic signals intelligence (ELINT) is a part of SIGINT which may reveal important information regarding internet bandwidth and electricity usage of specific locations that may be used as cryptocurrency mining centers. Because cryptocurrency mining is inherently a computationally intensive task, hardware infrastructure requirements are high for large-scale mining operations. Chief among these requirements are high-end processing units, significant amounts of electricity, proper cooling solutions, and a strong internet connection. Importantly, two of these four criterion seem measurable through SIGINT. Inter-

net connection can be derived by monitoring signal strength of computer networks over different geographic areas. Electricity usage can also be monitored in order to understand potential hot-spots of electricity usage.

While certainly an effective step in collecting intelligence on cryptocurrency-mining operations, SIGINT alone is not the most effective method to carry out this data collection. This is because it is difficult to determine whether or not a specific area with a strong internet signature and high electricity usage is being used for cryptocurrency specifically. Data centers also share these characteristics, as do many offices. For this reason, it is important to consider FININT as a supplementary step to SIGINT.

Because cryptocurrency is completely digital, there exists no hard money that one might need to keep track of when monitoring cryptocurrency mining operations. Instead, cryptocurrency mining operations (generally) provide its miners with coins as a reward for completing the cryptography problems critical to writing information to the blockchain. This should prove to be useful for FININT collection. Furthermore, there must exist either some transaction of cryptocurrency or some conversion from cryptocurrency into a fiat currency for the mining operations to be useful. This is a process that, once again, must occur digitally. Through both SIGINT and FININT, gaining insight into whether or not this process is occurring provides critical information regarding the existence of a mining operation.

These methods of intelligence collection, while useful, are not without their drawbacks. Because of the anonymous nature of cryptocurrency, FININT collection would certainly be a difficult task. Furthermore, it is unclear whether the blockchain records reward transactions provided to miners, meaning that FININT data would be even more difficult to conduct.

3 Alternate Collection Methods

An alternate collection method may include using elements of Measurements and Signals Intelligence (MASINT). Specifically, infrared intelligence (IRINT) would be beneficial in the detection of crypto-mining facilities. Such facilities are notorious for their difficulty to properly cool, given the electricity they require and the high intensity at which the machines constantly work. For this reason, some commercial large-scale cryptocurrency-mining operations are based in the Arctic Circle, where cooling can be done passively through the environment (Fedorinova 2021). Because there are unlikely to be many areas other than cryptocurrency mining that emit high amounts of heat constantly through all hours of the day, using IRINT may be beneficial in narrowing down possible locations of mining operations.

Human Intelligence (HUMINT) may also be beneficial to mining operations. Because cryptocurrency mining, especially at a large scale, is no trivial task, it is likely that there is a large team dedicated to building, maintaining, and improving the mining operation. This group of people would likely need significant technical experience to understand how to coordinate mining centers at such a large scale effectively. Because of this, target-specific human intelligence may yield fruit when more technical means cannot.

These approaches, too, have their drawbacks. Infrared, while useful, has the same drawback as ELINT where it is difficult to tell whether a specific area that emits high levels of heat is definitively a mining center. Human intelligence, while useful, would need to be extremely target-specific, as it is unlikely that a very large amount of people would be working with this center intimately, given the technical expertise required.

4 Support Resource Management

Given the high amount of technologically focused intelligence collection that this project entails, it seems as if the processing done with this information will also be highly technical. Considering this, it may be beneficial to analyze FININT data separately, as the rest of the data collected through ELINT, IRINT, and HUMINT is largely focused on finding specific locations that could be used for mining operations. To this end, resources may best be managed through the creation of two analysis teams, one team focused on FININT while the other team is focused on combining the results of ELINT, IRINT, and HUMINT. The former team would be critical to determine how cryptocurrency may be transacted by a state, while the latter team would be useful in possible determining crypto-mining locations.

5 Effectiveness

To be deemed a success, these collection efforts should reveal not only whether or not a state is actively mining cryptocurrency, but also where such mining operations may be located. This is because knowing only the former piece of information would indicate a failure of ELINT, HUMINT, and IRINT in either the collection or analysis process. Such information would potentially also yield lots of additional information regarding state attitudes towards cryptocurrencies in general, as well as their technological capabilities.

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