

# Virtual Money Systems: a Phenomenal Analysis

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## Abstract

*In the development of virtual communities, a new phenomenon of virtual money is observed and presented high importance to both e-commerce and e-society fields. This paper, as a pioneer research, has attempted to make a phenomenal analysis on the existing virtual money systems. By the analysis, this paper has defined what virtual money is, what its general models are, and how its existing systems work. By the analysis, the features of existing virtual money systems are abstracted and their problems are summarized. Driven by the motivation of utilizing and improving the existing virtual money systems, this paper has outlined a novel generic virtual money system model called Common Money (CONEY) to resolve the problems that bother the existing virtual money systems. Finally, further interesting issues for future research are given.*

## 1. Introduction

With the development of ICT technologies, people have found lots of funs on Internet. For example, they play online games (e.g. ztgame.com), read books in digital libraries (e.g. ssreader.com), publish personal writings in blogs (e.g. blog.readnovel.com), share information in forums (e.g. spaces.live.com), or join in online clubs for any purposes (e.g. mjclub.com). The online places that support these fun activities can be generalized as many types of virtual communities based on their interest, relationship, entertainment and commerce [3]. In general, a *virtual community*, as defined by Lee et al [10], is a technology-supported cyberspace, centered upon communication and interaction of participants, resulting in a relationship being built up for certain purpose. Many interrelated virtual communities constitute a *virtual world*, which evolves dramatically in recent years and tends to more and more connect to the real world life.

During participating virtual community activities, a new economic phenomenon is observed: a type of special money, called virtual money (e.g. QBCoin [13], WoW Gold [2], Linden Dollars [11], Acebucks [1]), was born during the interactions between virtual community members under the drives of pursuing, measuring, storing and transferring the values of self-interests of virtual community members derived from the virtual communities.

*Virtual money* (v-money) is a type of money virtually created for or from virtual activities by virtual community

members in virtual communities. It has some properties of traditional money, i.e. measure of value, store of value, and medium of exchange [6]. However, v-money is different from traditional and electronic money, especially in terms of the location of spending and the way of creation.

*Traditional money* (t-money) in general is created in three forms: *commodity money* based on real commodity such as gold and silver, where money takes two forms of either real gold/silver with its intrinsic value (typically used before 19<sup>th</sup> century, e.g. gold coin) or banknotes without intrinsic values but guaranteed with the equivalent and freely convertible amount of gold or silver (e.g. U.S. dollar before Great Depression in 1930s and Liberty Dollar [libertydollar.org]); *fiat money* as legal tender based on the laws and rules of an economic territory, which is floated, managed or fixed in value according to monetary policies, e.g. US\$, HK\$ or RMB; and *credit money* based on issuer's credit, where money is any claim by a physical or legal person that the money issued can be used for the purchase of goods and services in a declared scope, for example, bank accounts, non-government checks or firms' coupons. T-money is created from and used in *real world* with its debt discharging power based on the trust in its issuer.

*Electronic money* (e-money) inherits the three forms of t-money to derive *e-commodity money* (e.g. e-gold [e-gold.com] and eLiberty [elibertydollar.com], which are backed by precious metals and used in supported scope), *e-fiat money* (e.g. RFID euro dollar plan (www.eetimes.com/story/OEG20011219S0016), which is not really adopted yet), and *e-credit money* that is often *fiat money denominated* (e.g. e-credit/debit/prepaid card, e-checks [e.g. echeck.org], e-accounts [e.g. eaccount.bm and paypal.com], mobile payment [e.g. paybox.net] and eScrip [e.g. escrip.com]). Like t-money, its discharging power for debt varies with the trusts in issuers and the supported scopes, and its spending area is *real world*. A definition much matching the above is: an "*electronic money* shall mean monetary value as represented by a claim on the issuer which is: (i) stored on an electronic device; (ii) issued on receipt of funds of an amount not less in value than the monetary value issued; (iii) accepted as means of payment by undertakings other than the issuer [9]".

Comparing with t-money and e-money, v-money has differences in the following:

- *Purpose*. It is primarily created for spending in *virtual world* but could be later extended to spend in real world.
- *Denomination*. It is often not fiat money denominated but in a *fictional* way, e.g. the denomination as Leidian and Yuanbao in xunlei.com.
- *Money base*. Similar to t-money/e-money, v-money could be *commodity-based* (currently not observed), *rule-based* (rules made by virtual communities), and *credit-based* (virtual world credit, e.g. from a virtual bank). Uniquely, a fourth *labor-base* is observed, where v-money is automatically created by servers based on the amount of virtual work being done, e.g. staying online hours or playing games.

These differences characterize that v-money is a type of money oriented to virtual world purposes, no matter whether it is initially purchased from t-money/e-money, created from virtual work, or extended later as a medium of exchange in real world.

Understanding v-money is very important. First, it helps us understand the economic relations between virtual community members. Second, it enables us to build economic and social orders of virtual world to bind the behaviors of virtual community members towards legal virtual activities. Third, it enables us to create a bridge between the virtual world and real world for establishing their healthy e-commerce interactions.

This paper aims to provide a useful understanding of existing virtual money systems so that they can be utilized and improved. To achieve it, a phenomenal analysis on existing v-money systems is given to reveal their problems. Based on this, a new virtual money system, called Common Money (CONEY) is proposed to utilize and improve the existing virtual money systems such that it can bridge both virtual and real money.

The rest of this paper arranges as follows: Section 2 makes a phenomenal analysis. Section 3 analyzes the existing v-money systems to derive the problems we need to investigate. Section 4 proposes a new Common Money (CONEY) system to bridge both virtual and electronic money. Finally, the paper makes a summary and lists the contributions together with the required future work.

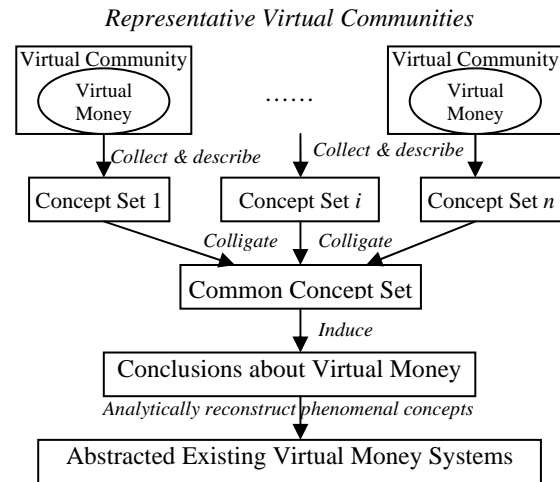
## 2. Existing Virtual Money Systems

A new phenomenon in current virtual communities is the emergent virtual money systems. For example, WoW Gold [2] in WorldOfWarcraft.com game community, QBCoin [13] in QQ.com amusement community, Linden Dollars [11] in Internet SecondLife.com community, and AceBucks [1] in Facebook.com social networking community. This phenomenon signifies a new trend of Internet use: economic rewards can be gained through virtual world of Internet in terms of virtual communities but not in the real-world payroll places such as corporate offices and manufacturing plants.

In order to provide a better understanding of, utilize and improve the existing v-money systems, this section introduces a phenomenal analysis on existing virtual money systems.

### 2.1. A Phenomenal Analysis on V-Money

A phenomenal analysis, adopted in this paper, follows phenomenology in philosophy. It is a way of seeking a description, analysis, and understanding of experienced concepts, and a way to concluded features of research topic from observed phenomena by describing, analyzing and inducing. Specific to existing v-money systems, the phenomenal concepts are diversely distributed in many virtual communities. Particularly in this paper, the process of the phenomenal analysis from the v-money phenomena to the concluded existing v-money systems model can be described in the following and illustrated in Figure 1:



**Figure 1: A phenomenal analysis method**

- (1) Collecting the diverse phenomenal concepts about v-money from representative virtual communities;
- (2) Colligating the collected phenomenal concepts about v-money in reference to e-money concepts;
- (3) Inducing the colligated concepts about v-money to conclusions;
- (4) Generalizing models of existing v-money systems using induced conclusions through facts reconstruction.

### 2.2. Existing V-Money System Model by Analysis

Guided by the above-mentioned phenomenal analysis method, phenomenal concepts about v-money are reliably collected from four representative virtual communities:

- WoW Gold [2] of World of Warcraft, a world largest massively multiplayer online role-playing game site in terms of its subscriber number.
- QBCoins [13] of Tencent QQ, one of the largest China amusement sites where virtual money is best developed.
- Linden Dollars [11] of Second Life, one of the most famous internet-based 3-D virtual worlds, which grows explosively in these years.

- AceBucks [1] of Facebook, World-popular social networking site with more than 59 million of active users.

The phenomenal concepts from four communities are diverse but they have a collection of common concepts by colligation. The colligated result implies the general features of v-money systems and can be further induced. By induction, conclusions on the existing v-money systems can be made as follows:

- (1) Virtual communities may issue v-money to their “netizens” to perform virtual economic activities.
- (2) V-money is created both on demand and amount of virtual work at virtual community servers.
- (3) The sovereignty of a *virtual currency* (i.e. v-money of a virtual community) is a particular virtual community.
- (4) V-money is created and used by linking to virtual community accounts whose anonymity is not emphasized.
- (5) Certain currency exchange systems between v-money and t-money and/or e-money exist.
- (6) Legal governance is missing for v-money.
- (7) There is no v-money exchange system for exchanging v-monies between virtual communities.

The above conclusions are used to reconstruct phenomenal concepts into a generalized model of existing v-money systems, shown in Figure 2.

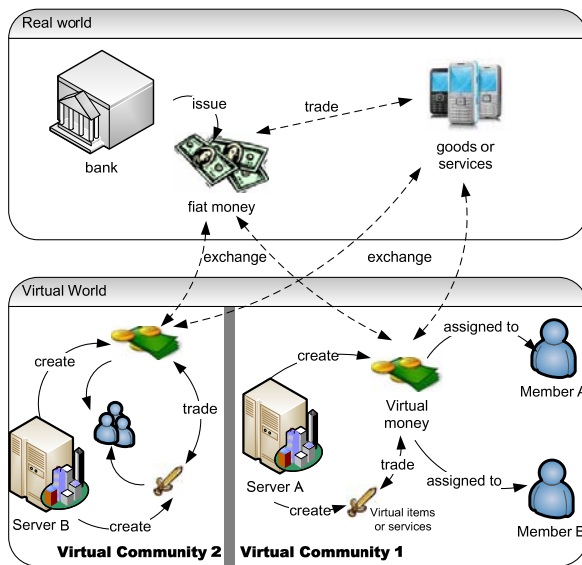


Figure 2: A Generic Model of Existing V-Money Systems

The captured model on the existing v-money systems reveals the following features:

- (1) *Independent of real world.* V-money systems are special currency systems dealing with virtual world economic activities.
- (2) *Isolated from other v-money systems.* V-money systems are created in different particular virtual communities that are isolated from each other. Virtual economic activities of one virtual community are difficult to interoperate with virtual economic activities of another.

- (3) *Interface-able to real world.* V-money systems are able to interface to the real world systems for economic interactions, though whole v-money systems are relatively independent of real world.
- (4) *Medium of exchange for virtual products and services and extensible to real world.* V-money is primarily developed as an exchange medium to pay for virtual products and services created by virtual community servers, but gradually extensible to be the real-world medium of exchange.

Besides the above directly derivable features from the generic model shown in Figure 2, v-money systems have additional features that can be observed from the operations of the existing virtual money systems.

- (5) *High fluctuation of v-money value.* The stored value of virtual money, in terms of the perceived value to the customer, is fluctuated as time goes by, since the stored value of a particular virtual currency is purely based on the attractiveness of its situated virtual community. This is different from t-money and e-money where their monetary values are denominated by the value of fiat money. Its depreciation and appreciation follow fiat money.
- (6) *Potential impact factor of real-world money systems.* The demand and supply of virtual money may spread to real-world economic systems through virtual money interfaces to the real-world monetary systems (i.e. the feature 3).

### 2.3. A Classification of Virtual Money Systems

Given the above generic features, existing v-money systems can be classified into four key categories based on their different feature combinations, shown in Figure 3:

*Type 1:* v-money spendable for virtual goods and services only. This type of v-money systems issues v-money to virtual community members based on their virtual performance and the issued v-money can be spent by consuming goods and services provided by the same virtual community. Examples of such are v-money in weiqi.cn.

*Type 2:* v-money spendable for both virtual and real goods and services. This type of v-money systems is the extension of Type 1, which allows real-world goods and services to be paid by v-money. For this type, an interface to real-world shopping systems for purchasing real-world goods and services is necessary, which also signifies the real-world involvement of v-money. Examples of this type are AceBucks [1].

*Type 3:* v-money purchasable by real-world money. This type of v-money systems is the extension of Type 2. It allows to pay for virtual and real goods/services but also to buy v-money using t/e-money such as prepaid card, telephone card or e-payment systems such as PayPal. Type 3 v-money systems signify the possibility that v-money has certain links to the real-world monetary systems. To enable v-money purchase, an interface to real-world monetary systems must be provided in addition to

supplying an exchange rate system between v-money and t/e-money. Examples of this type are QBCoins [13] and WoW Gold [2].

*Type 4:* v-money sellable for t/e-money. This type of v-money systems is the extension of Type 3. It allows not only to buy v-money by t/e-money but also to sell v-money back to t/e-money. Type 4 systems indicate the maturity of v-money systems with regard to the business interoperability with real world systems. To implement Type 4 systems, interface systems to real-world shopping and money exchange must be reliably designed and implemented. Examples of Type 4 are Linden Dollars [11].

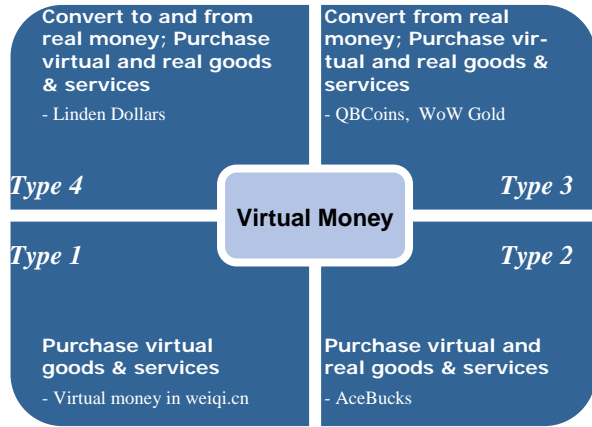


Figure 3: Existing Virtual Money Systems Categories

These types of existing virtual money systems clearly depict the evolutionary path of the v-money system development. The categorization helps us find out the problems that exist in current v-money systems and the possible solutions to them.

### 3. Existing Virtual Money Systems Problems

An analysis to the existing virtual money systems presented in Section 2 finds the following problems.

*Security Threat.* V-money is created on both demand and virtual work amount at the virtual community servers based on certain v-money creation rules (e.g. if posting a blog message then creating a virtual dollar for the poster). Whenever hackers break into a v-money system, they can create as much v-money as they wish as long as they follow the money creation rules or directly rewrite the amount in certain accounts.

*Danger of V-Money System Collapse.* The total amount of v-money circulated within a certain virtual community is theoretically unlimited without any high-level control constraints followed by the supply and demand analysis. This is different from real-world monetary systems, where each monetary authority will control the money issue amount based on the GDP analysis and demand and supply. This creates a possibility for a v-money system to issue an unlimited amount of v-money without any control. The outcome will be the endless v-money depreciation (if the virtual GDP increase is less than the amount

increase of v-money), which may finally lead to the collapse of the v-money system and endanger the survival of the whole virtual community.

*Impacts on Real-World Monetary Systems.* In Type 2, 3 and 4 virtual money systems, the impacts of v-money are not limited to virtual communities. V-money can be used to pay for real-world goods and services. The consequence is that the demand of real-world money may reduce. Differently, if v-money is converted to real-world money, the demand for real-world money increases. All these add difficulties for forecasting how much real-world money should be issued, and may require real-world monetary systems to be adjusted by adding v-money impact factors. The Chinese government recognized the problem and planning to limit the use of v-money in the virtual world only [7]. However, whether this limitation is a wise choice remains unknown.

*Money Laundering, Tax Evasion and Online Criminal.* Potential problems such as money laundering, tax evasion and online criminal arise if t/e-money and v-money can be mutually converted [14]. As a fact, v-money lacks legal governance and may become a hotbed of crime. For example, by making payment in v-money, t/e-money can be laundered, tax can be evaded, and online gambling can be proceeded no matter whether there are stringent legal rules. People start to realize these potential problems and urge relevant financial institutions, or the governments, to take actions on regulating v-monies [12].

*Value Fluctuation of V-Money.* V-monies are often used for gaming, shopping or receiving services. It is observed that when the popularity of a virtual community drops, its v-money devalues in the form of reducing the perceived value to the users of that v-money. In a close virtual community, the *reduced perceived value* can be reflected in fewer services/goods that are available and can be paid by that v-money. For example, in a close devalued virtual community, one will find that his/her 1 million of v-money, which can originally select from 1000 items, now only 10 kinds of goods left. It is clear that a devaluing virtual community is experiencing the process of the v-money depreciation and the collapse of virtual community.

Since existing virtual communities are close societies, foreign exchange systems have not yet been established among different virtual currencies (v-currencies). It is expected that when different virtual communities are interoperable with each other, the impact of the v-currency depreciation of one virtual community could be reflected in its v-currency exchange rates with other virtual communities. It is inferential that like the real-world the determination of v-currency exchange rates will be complex and will at least be impacted by the following important factors.

- Utility (psychological factor) – how useful of a v-currency to all its holders;

- Demand and supply (market factor) – what total circulation amount is needed for a v-currency;
- Convertibility (legal factor) - to what extent a v-currency can be converted to another virtual or real currency under a given legal environment.

By investigating these factors, we may quantify the perceived value of a v-currency to determine v-currency exchange rates.

#### 4. A Virtual Common Money System Model

To utilize and improve the existing v-money systems, we propose a new v-money system model, *Common Money (CONEY) System Model*, shown in Figure 4.

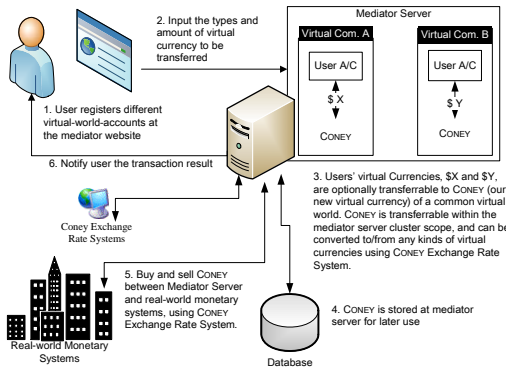


Figure 4: Common Money (CONEY) System Model

This novel CONEY System Model aims to provide a generic model for utilizing and improving the existing v-money systems, shown in Figure 2. Specifically, it supports linking different v-monies of virtual communities, and is interface-able to real-world monetary systems by means of a common money CONEY following the existing legal monetary environments.

The generic CONEY System Model, shown in Figure 4, includes four important subsystems, which are Mediation Server subsystem, Exchange Rate subsystem, database management subsystem, and Client subsystem that presents user interfaces to any virtual currency users.

The modeling motivation behind is to minimize the impacts of the existing v-money problems during utilizing and improving them. This motivation implies that, in designing and implementing CONEY System Model, several important conceptual and technical issues have to be resolved when CONEY is introduced as a type of common v-money for all virtual communities and is convertible to and from any real-world currencies. These issues include but not limited to the following:

- Virtual user identification and authentication.
- Virtual currency representation.
- Common medium of exchange between multiple virtual currencies.

The ways of solving these issues constitute theoretical foundations of CONEY System Model below described.

#### 4.1. Identification and Authentication

*Virtual user identification and authentication* ensures users' identities and avoids misuses of v-money accounts. To enable the freedom and democracy of the virtual world but combat with the illegal and criminal uses of v-money from the real world, CONEY System Model promotes the use of pseudonyms as the unique identifiers of CONEY Netizens (in CONEY server cluster scope). However, when a pseudonym wants to buy and sell v-money from and to the real-world monetary systems beyond CONEY scope, the pseudonyms must be associated with the true names that can be proved true. If the real-world true names cannot be proved, their associated pseudonyms shall not be able to be issued digital certificates for real-world money conversion. *Pseudonyms and their true name associations are the secure and legal foundation of CONEY System Model.*

#### 4.2. Common Virtual Currency Representation

*V-currency representation* defines how a v-currency can be digitally represented and modeled in a virtual community. Particular to CONEY System Model, we represent CONEY as a common v-currency that could be mapped onto other heterogeneous v-currencies. Following PRODUCT MAP [8], the representation of CONEY structure and CONEY meaning are separated to achieve heterogeneous v-currency interoperability. Basically, any carried v-money of a pseudonym is simply represented as a v-money account associated with a mandatory unique pseudonym and an optional real name by inheriting the merit of the existing account-based v-money systems. The representation structure of any v-money is:

```
CONEY Structure = (
    currencyName,
    accountNumber,
    uniquePseudonym,
    realName,
    amount,
    digitalCertificateForVirtualWorld,
    digitalCertificateForRealWorld)
```

where `digitalCertificateForVirtualWorld` certifies truly given pseudonym while `digitalCertificateForRealWorld` certifies that `realName` truly exists in real world and is traceable. The `realName` and its digital certificate are optional and used for association of pseudonym and real name if and only if real-world money transactions occur.

With above structure, heterogeneous v-currencies of various virtual communities can interoperate with each other by mapping their v-currency structures onto this common CONEY structure, such that (any virtual currency structure)  $\leftrightarrow$  (CONEY Structure).

Representing v-currency following PRODUCT MAP enables various v-currencies of virtual communities to be technically exchangeable. *CONEY structure is integration and interoperability foundation of CONEY System Model.*



### 4.3. Common Medium of Exchange

*Common medium of exchange* specifies the common ground of different v-currencies in their exchange. So far, this is a difficult theoretical issue that is still open. In CONEY System Model, the common ground of v-currency exchange rate between all types of v-currencies is determined by many factors such as the following:

- Fixed and dynamic exchange rates between v-currencies and real-world currencies, which are set by different virtual community operators. For example, the exchange rate between QBCoins and Chinese RMB is set by QQ operator as 1:1.
- Purchasing power parity against a standard basket of real-world products and services. CONEY will develop a standard basket of real-world goods and services that are often purchased using CONEY and different other v-currencies. The average price of this basket will be an impact factor.
- Purchasing power parity against a standard basket of virtual goods and services. CONEY will develop a standard basket of virtual-world goods and services to observe the price base of different v-currencies.

The factors like the above are *CONEY Impact Factors*, which will reflect the demand and supply of all v-currencies against CONEY and real-world currencies. *CONEY Impact Factors are v-currency exchangeability foundation of CONEY System Model.*

### 5. Conclusion

This paper has made a phenomenal analysis on several representative v-money systems. By the analysis, a generic model about existing v-money systems is summarized, and relating problems have been discussed. To utilize and improve the existing v-money system model, a novel model called CONEY System Model has been proposed. The discussed solution finds out the theoretical foundations of CONEY System Model with regard to the issues of virtual user identification and authentication, v-currency representation, and common exchange medium between multiple v-currencies.

Not like e-money with much discussion found in literature (e.g. [4][5]), v-money is a new phenomenon that is rarely discussed, though real practices have been occurred and the term is confusedly long used. This paper acts as a pioneer research on attempting to clarify and understand what v-money is, how the existing v-money systems work, and how they can be utilized and improved.

The key contributions of this paper can be dedicated to the following points:

- Defined and distinguished virtual money from electronic money and traditional money.
- Suggested a phenomenal analysis method to understand existing v-money systems: their working, categorization, features, and existing problems.

- Proposed an improved CONEY System Model for resolving the existing v-money problems.

Some urgent research issues need solutions. They include: (1) how to accurately determine the common medium of exchange; and (2) how semantic conflicts can be resolved between heterogeneous v-currencies. These issues constitute the important future work.

### Acknowledgement

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