

mobile communication device, by 200 points issued by the payment service provider, and the account of credits merchant A1 by the same value.

[0203] 232—The payment service provider settlement system debits the account of merchant A1 by 200 points of the e-money issued by payment service provider, and credits the account of the payment service provider by the same value.

[0204] 233—The payment service provider settlement system triggers a process to purchase the equivalent value of e-money issued by biz chain A. In this example, a ratio of 1:1 is used, as shown by the same 300 point figure on the credit side of the account of payment service provider 238 and the debit side of the purchase account of payment service provider 239.

[0205] 234—The payment service provider settlement system debits the 200 points of e-money of Biz Chain A from the purchase account of payment service provider, and credits the account of merchant A1 by the same value.

[0206] 235—The payment service provider settlement system pays the 200 points of e-money of biz chain A in the account of merchant A1, back to the purchase account of payment service provider, to complete the transaction.

[0207] FIG. 24 illustrates condensed accounts of credits and debits associated with the money flow of FIG. 23. The account of mobile communication device user C1 241 has a 1000 point credit and a 200 point debit, and has a final credit balance of 800 points. The account of merchant A1 242 has two 200 point credits and two 200 point debits, and has a final balance of 0 points. The account of the payment service provider 243 has both a 200 point credit and a 1000 point debit, and has a final debit balance of 800 points. The purchase account of payment service provider 244 has both a 200 point credit and a 200 point debit, and has a final balance of 0 points. Although not shown, earlier, mobile communication device user C1 had purchased 1000 points of e-money issued by the payment service provider.

[0208] FIG. 25 illustrates an alternative money flow among condensed accounts of credits and debits associated with the transaction of FIG. 22, among the account of mobile communication device user C1 2506, the account of merchant A1 2507, the account of payment service provider 2508, and the purchase account of payment service provider 2509. Each step is explained as follows.

[0209] 2501—The payment service provider settlement system debits the account of mobile communication device user C1, assuming C1 has 1000 points of stored value on the mobile communication device, by 200 points issued by biz chain A, and credits the account of merchant A1 by the same value.

[0210] 2502—The payment service provider settlement system debits 200 points of the e-money issued by biz chain A from the account of merchant A1, and credits the purchase account of payment service provider.

[0211] 2503—The payment service provider settlement system triggers a process to purchase the equivalent value of e-money issued by the payment service provider. In this example, a ratio of 1:1 is used, as shown by the same 200 point figure on the credit side of the purchase account of payment service provider 2509 and the debit side of the purchase account of payment service provider 2509.

[0212] 2504—The payment service provider settlement system pays the 200 points of e-money of the payment service provider back to the account of payment service provider to complete the transaction.

[0213] FIG. 26 illustrates condensed accounts of credits and debits associated with the money flow of FIG. 25. The account of mobile communication device user C1 261 has a 1000 point credit and a 200 point debit, and has a final credit balance of 800 points. The account of merchant A1 262 has a 200 point credit and a 200 point debit, and has a final balance of 0 points. The account of the payment service provider 263 has both a 200 point credit and a 1000 point debit, and has a final debit balance of 800 points. The purchase account of payment service provider 264 has both a 200 point credit and a 200 point debit, and has a final balance of 0 points. Although not shown, earlier, mobile communication device user C1 had purchased 1000 points of e-money issued by the payment service provider.

[0214] Mobile communication devices as described herein are capable of issuing and redeeming check-like transfers of value by a process involving transferring electronic tokens bearing data sufficient to track the transfers among devices such as device signatures and endorsements, and maintaining data structures supporting the issuing and redeeming steps pending verification by and operation server.

[0215] In general, the architecture described herein provides an operation server 14 central to the payment service provider system. The operation server 14 manages an account system handling the assets of the participants, including electronic gift certificates, electronic checks, electronic coupons, electronic tickets and so on, in an account management program having high security policies. The system operates in both an on-line mode and an off-line mode. In the off-line mode, the account system in the operation server 14 simulates the Central Bank structure, such as the structure of the Federal Reserve System and United States, and acts as the final settlement institute for stored values such as electronic gifts, electronic checks, or electronic coupons. Thus, in an off-line scenario, the transaction terminal at a merchant site takes the role of a bank, recording each transaction in a book of accounts, and transfers a batch of transactions to the operation server 14 periodically for daily clearing. The operation server 14 also keeps accounts for holders of each mobile communication device. In this way, system settlement insures the completion of proper movement of value among the accounts, including the accounts of merchants and individuals, and keeps balance in the credit and debit positions on a periodic basis. Periodically, such as daily during the account clearing, the system moves funds among the purchased accounts to settle the specific transactions. The operation server 14 can operate the process that maintains a stored value ledger for example, and balances the ledger for final settlement of all the transactions being processed in a batch.

[0216] In on-line transactions, transactions are managed using an on-line protocol that can clear both accounts of the merchants and the individual, trigger account movement, and finish the settlement process. This way, the balance status of the accounts of both the merchant and the individual can be balanced with the stored value on the old device at the time of the transactions.

[0217] According to embodiments of the architecture described herein, the operation server uses a second factor to increase the trust of the settlement process. Thus, the architecture used herein supports the use of security factors produced and delivered to the operation server by the transaction terminal, and security factors produced and delivered via the telecommunication provider network to the operation server, to verify individual transactions. In this manner, the operation