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(54) VOTING SYSTEMS AND VOTING METHODS BASED ON SMART MOBILE COMMUNICATION DEVICES

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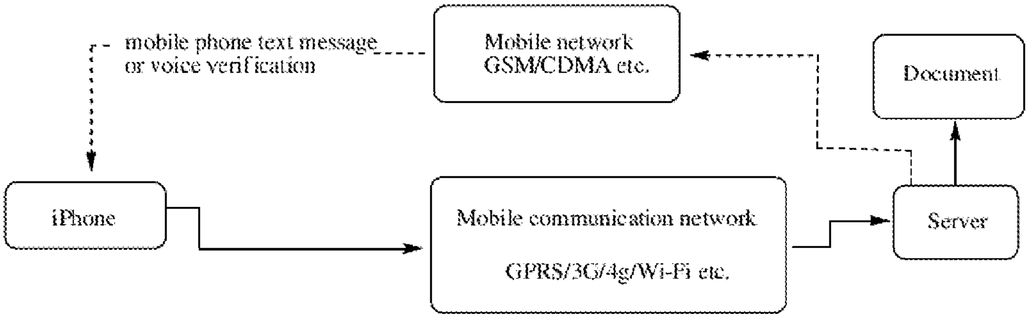
(57) ABSTRACT

The invention provides a voting system based on smart mobile communication devices. It comprises at least one smart mobile communication device, at least one server device, a client module, and a server module. The client module is installed on the smart mobile communication device and it is used for temporarily saving the voter's information, submitting identity verification request, showing voting inquiries, and submitting votes. The server module is installed on the server device and it is used for storing the voter's information, verifying the voter's registration and identity, issuing and verifying the voting certificate, creating and publishing the voting affair, and calculating and publishing the voting contents statistics. The client module and the server module perform digital communications through a mobile communication network. The invention also provides a voting method based on smart mobile communication device. According to this invention, voting can be safe, convenient and fast.



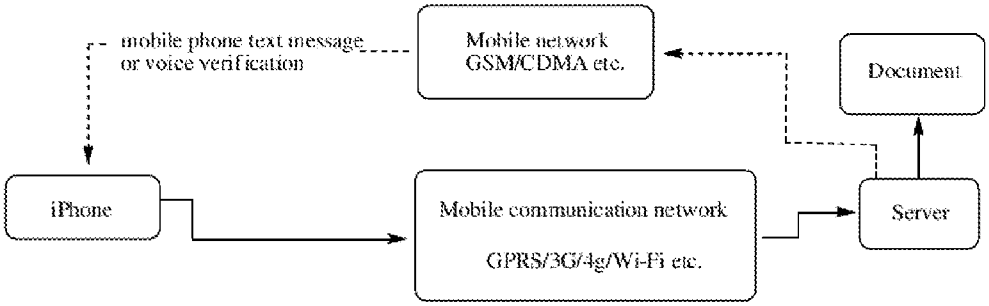

mobile phone text message or voice verification
Mobile network GSM/CDMA etc.
Document
iPhone
Mobile communication network
GPRS/3G/4g/Wi-Fi etc.
Server

FIG. 1

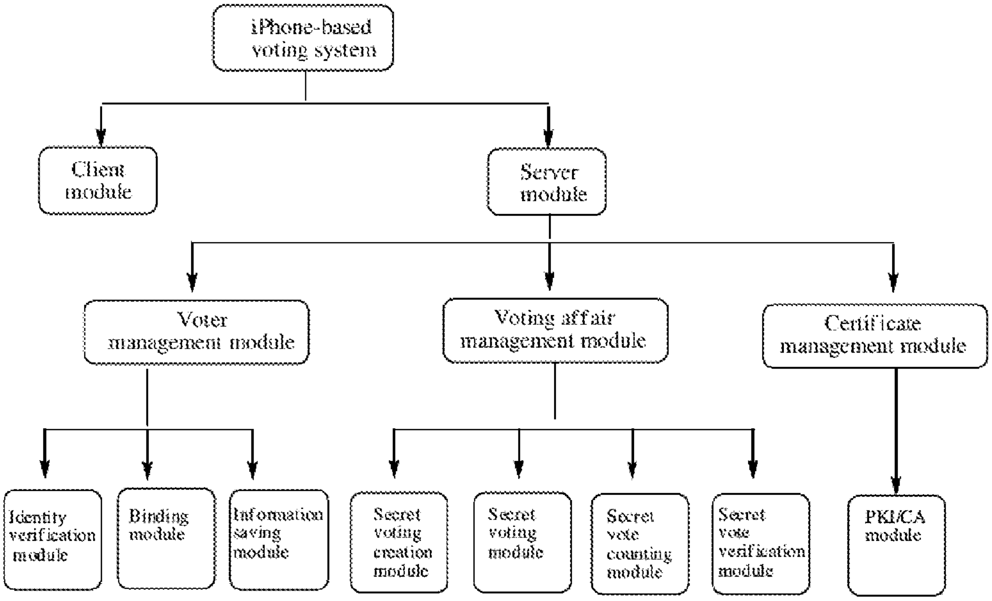

iPhone-based voting system
Client module
Server module
Voter management module
Voting affair management module
Certificate management module
Identity verification module
Binding module
Information saving module
Secret voting creation module
Secret voting module
Secret vote counting module
Secret vote verification module
PKI/CA module

FIG. 2

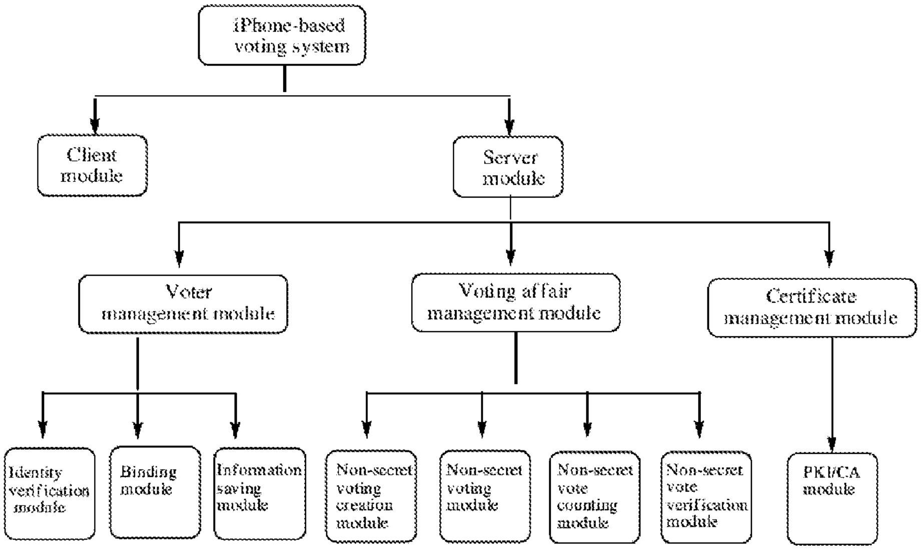

iPhone-based voting system
Client module
Server module
Voter management module
Voting affair management module
Certificate management module
Identity verification module
Binding module
Information saving module
Non-secret voting creation module
Non-secret voting module
Non-secret vote counting module
Non-secret vote verification module
PKI/CA module

FIG. 3

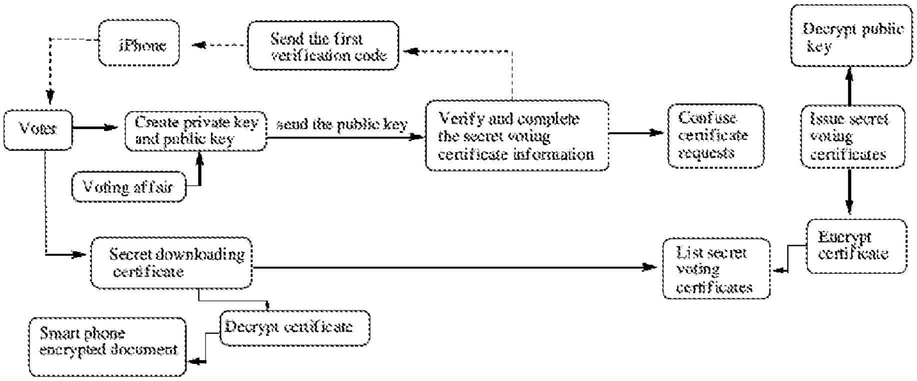

iPhone
Send the first verification code
Decrypt public key
Votes
Create private key and public key
send the public key
Verify and complete the secret voting certificate information
Confuse certificate requests
Issue secret voting certificates
Voting affair
Secret downloading certificate
List secret voting certificates
Encrypt certificate
Smart phone encrypted document
Decrypt certificate

FIG. 4

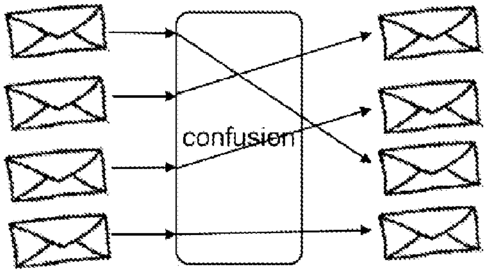

confusion

FIG. 5

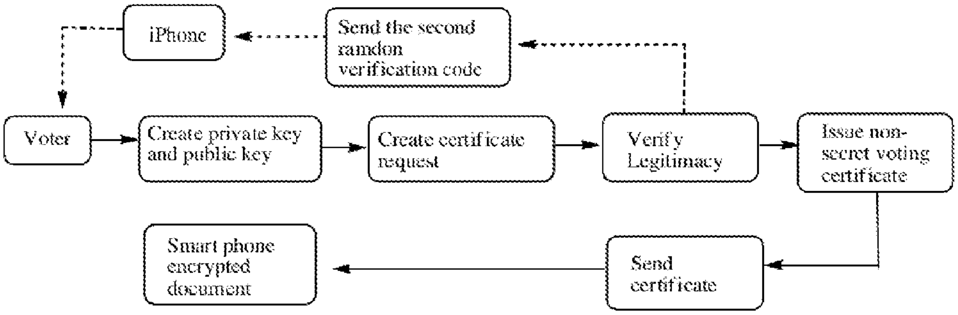

iPhone
Send the second ramdon verification code
Voter
Create private key and public key
Create certificate request
Verify Legitimacy
Issue non-secret voting certificate
Smart phone encrypted document
Send certificate

FIG. 6

VOTING SYSTEMS AND VOTING METHODS BASED ON SMART MOBILE COMMUNICATION DEVICES

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority from Chinese Patent Application No. 201210209301.6 filed in the State Intellectual Property Office of China on Jun. 21, 2012, the entire content of which is hereby incorporated by reference herein.

FIELD OF THE INVENTION

[0002] The invention relates to a voting system. More particularly, the invention relates to a voting system which is based on a smart mobile communication device. The invention also provides a voting method which is based on a smart mobile communication device.

TECHNICAL BACKGROUND OF THE INVENTION

[0003] The smart mobile communication devices which can be used in this invention include the following three types: smart phones, a combination of a mobile phone having calling and text messaging capabilities and a tablet PC with the internet capabilities, a tablet PC with internet and phone capabilities. The mobile communications network used in the invention comprises a mobile internet. The mobile internet combines mobile communication with internet. The mobile internet has been through four generations, 1G, 2G, 3G, and 4G, while 4G is the current generation. The mobile internet standard includes GSM, CDMA, GPRS, CDMA2000, WCDMA, TD-SCDMA, TD-LTE, LTE, and Wi-Fi technology. The Wi-Fi, commonly known as wireless broadband, is a short range wireless transmission technology which helps users to access emails, websites, and the streaming media.

[0004] "Voting" means to collect information from the targeted crowd. In general, a formal, secured and creditable voting method has the following important features: secretiveness, completeness, truthfulness, uniqueness, legitimacy and verifiability. Secretiveness means that the voting contents are not made known to anyone except to the voter and assigned personnel (such as persons who count the votes). Completeness means that all valid votes are correctly counted. Truthfulness means that the vote truly reflects the voter's intent and cannot be altered by others. Uniqueness means that each vote is counted only once and no voter is allowed to cast more than one vote for the same voting matter. Legitimacy means that only a legitimate voter can participate in the voting. Verifiability means that the voter is able to verify whether the voter's vote is counted.

[0005] No matter whether the voting is a non-secret voting or secret voting, usually the voting takes place one site by paper, a voting device provided by the voting organization, or a special voting device or similar equipment. Although the on-site voting site may meet the uniqueness, legitimacy and other requirements, it is limited by the voting location and time; the voter has to go to the specific site assigned by the voting affair management organization at a given time to case the vote. Furthermore, the voting affair management organization has to assign employees to manage the voting. This is inconvenient and inefficient for voting and vote counting. It is impossible for the voters to cast votes or the voting employee to operate the voting remotely.

[0006] To solve the above problem, an electronic voting method based on internet has been used. This method overcomes the geographical limitation of the paper voting. However, the method cannot ensure voting uniqueness, secretiveness, and truthfulness and thus it is difficult to be implemented. For example, in order to meet the security requirement of the secret electronic voting, the information technology providers developed blind signature and ring signature strategies, homo-morphic encryption, hybrid network, zero-knowledge proof protocol, secured multiparty calculation, secret sharing and threshold cryptography, FOO protocol, and the its improved protocol. The FOO protocol is relatively commonly used. It is an electronic voting protocol suitable for large scale voting and is an electronic voting system based on an anonymous channel. It uses the Bit Commitment, blind signature and similar technologies and it relatively well resolved the issue of the anonymity requirement. However, the FOO protocol does not allow voters to abstain from voting. Furthermore, when two votes collide, i.e., the votes by two legitimate voters are identical, they may be mistakenly considered as a double voting. The FOO protocol strictly requires the voter to submit an encrypted key on time; otherwise, the voting contents will be released early or cannot be decrypted during the counting of the votes. None of the above protocol can ensure the security of the electronic secret voting. For electronic secret voting, its main focus is on the completeness and truthfulness of the voting contents, i.e., the voting contents by the voter reflect the voter's true intent and are not altered by anyone else. Currently, there is no electronic voting method which ensures this security. For the non-secret voting, the general requirements for the uniqueness, truthfulness, and security are greater because the voter's information is shown on the voting ticket. The method of internet electronic voting does not meet all these requirements. The use of internet for electronic voting method often cannot satisfy the above general requirements. Security is one of the most important features of a voting system; it ensures the fairness and justice. For the governmental or internal enterprise voting or voting for an important candidate, the requirement for security of the voting process and voting contents is even more important. The current voting methods cannot meet the security requirement. Furthermore, no matter whether the voting is a secret voting or non-secret voting, the internet-based electronic voting methods use desktop and laptop computers in order for the voting affair management organization to log into. They are not suitable for the voters who have no fixed working sites and cannot meet the need of the modern society for fast and convenient voting systems.

DESCRIPTION OF THE INVENTION

[0007] An objective of the invention is to provide a smart mobile communication device based voting system which meets the requirements for the important voting features and is quick and convenient for electronic voting.

[0008] To achieve the above objective, the smart mobile communication device based voting system of the invention comprises at least one smart mobile communication device, at least one server device **4**, a client module (**51**,**52**), and a server module (**61**,**62**). The client module (**51**,**52**) is installed on the smart mobile communication device and is used for temporarily saving the voter's information, submitting request for voter's identity verification, showing voting inquiries, and submitting votes. The server module (**61**,**62**) is installed on the server device **4** and it comprises a voter management module (**71**,**72**), a certificate management module (**91**,**92**), and a voting affair management module (**81**,**82**). The server module (**61**,**62**) is used for saving the voter's information, verifying the voter's registration and identity, creating voting certificate, verifying voting certificate, creating and publishing the voting affair, and calculating the statistics of the voting contents and publishing the results. The client module (**51**,**52**) and server module **6** perform digital communications through a mobile communication network **3**.

[0009] It can be seen from the above scheme that the invention uses the client module (**51**,**52**) to achieve the voter's identity verification request, to show voting inquiries, and to temporarily save voter's information such as the voting certificate, etc. The server module (**61**,**62**) is used to permanently save the voter's information, the voting affair and voting contents, verify the voter's registration and identity, create and publish the voting affair, and to calculate the statistics of the voting contents and publish the results. The server module (**61**,**62**) can also according to the voter's information create a voting certificate for the voter who passes the registration verification and identity verification and send the voting certificate to the client module (**51**,**52**). The voter can use the voting certificate to execute the digital signature for the voting affair and complete the voting procedure. Therefore, the voter may use a smart mobile communication device, i.e., a smart phone or a tablet PC with communication function, to vote from anywhere at any time. As the mobile communication network technology and related device which this invention involves become popular and readily available, such as iPhones and iPads, all kinds of android cellular phones or tablet devices, and the 3G mobile communication services become popular with many domestic telecommunication service providers, this invention breaks through the geographic limitation of the paper voting or internet voting of the existing technology. More importantly, in this invention, the voter is required to register the voter's information before voting to verify the voter's truthfulness and legitimacy. A voting certificate is created according to the voter's information, i.e., one person can only have one voting certificate. This guarantees the uniqueness of the vote, the truthfulness of the voting contents, and the secretiveness of the voting process, and truly secures the voting process. This invention fully utilizes various mobile network **2** technologies and existing and successful encryption technologies and digital signature technologies. According to this invention, voting can be carried out safely, quickly, and conveniently.

[0010] Another objective of the invention is to provide a voting method based on mobile communication devices. The voting method is installing a client module (**51**,**52**) on a smart mobile communication device and installing a server module (**61**,**62**) on the server device **4**; the server module (**61**,**62**) comprises a voter management module (**71**,**72**), a certificate management module (**91**,**92**) and a voting affair management module (**81**,**82**); the client module (**51**,**52**) and the server module (**61**,**62**) perform digital communications through a mobile communication network **3**. An example of the voting method is as follows. Step 1: the server module (**61**,**62**) creates and publishes the voting affair. Step 2: the voter provides the voting information through the client module (**51**,**52**) to the server module (**61**,**62**). The server module (**61**,**62**) according to the voter's information through the voter management module (**71**,**72**) saves the voter's information, verifies the registration and identity. Step 3: the server module (**61**,**62**) create a voting certificate according to the voter's information after the registration verification and identity verification and sends it to the client module (**51**,**52**). Step 4: after the voter executes the digital signature using the voting certificate through the client module (**51**,**52**), the voting contents of the voting affair is submitted to the server module (**61**,**62**); the server module (**61**,**62**) calculates the statistics of the valid voting contents and publishes the results.

[0011] It can be seen from the above scheme that the invention uses the smart mobile communication device on the voting side and the voter through the voter management module (**71**,**72**) installed on the server device **4** verifies the registration and identity, and thus verifies the truthfulness and legitimacy of the voter's identity; the voter who passes the verifications submits through the client module (**51**,**52**) the voting certificate creation request to the server device **4**, and uses the voting certificate to execute the digital signature for a given voting affair to accomplish the voting operation. Therefore, in the voting process, there are multiple security checks: when the voter is registered, the voter's registration and identity are verified to ensure that one person has only one voting certificate. The legitimacy of the voting certificate is again verified during the voting process. Thereby, the security, secretiveness, and uniqueness of the voting contents are guaranteed in the voting process. The voter can use a smart mobile communication device, such as a smart phone, a mobile phone having a calling and text messaging functions and a tablet PC having an internet function, and a tablet PC having internet and phone functions to quickly and conveniently perform the voting at any time and in any place. Compared with the current voting methods which use paper, voting device, or internet, the method of the invention is more convenient and faster in addition to the more secured for the voting contents and voting process. Therefore, the method of the invention combines the features of security, convenience and speed and it greatly enhances the voting efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. **1** is an illustrative diagram of the network connection of Voting System Example 1 of the invention.

[0013] FIG. **2** is an illustrative functional structure of Voting System Example 1 of the invention.

[0014] FIG. **3** is an illustrative functional structure of Voting System Example 2 of the invention.

[0015] FIG. **4** is a flowchart of the secret voting certificate creation of Voting Method Example 1 of the invention.

[0016] FIG. **5** an illustrative diagram for the certificate shuffling results of Voting Method Example 1 of the invention.

[0017] FIG. **6** is a flowchart of the non-secret voting certificate creation of Voting Method Example 2 of the invention.

DESCRIPTION OF THE CURRENT TECHNOLOGY USED IN THE INVENTION

[0018] Digital signature: it is also called public key, electronic stamp or electronic signature. It often exists in one of the following forms: existing within the digital information, as an appendix of the digital information, a digital form logically associated with the digital information, etc. It is used to tell the signatory's identity and indicate the signatory's acknowledgement of the information contained in the digital information. It is equivalent to a person's handwritten signature on paper; the only difference is that the public key encryption is used as a technology tool, especially, as a method for authenticating the digital information.

[0019] GUID is an abbreviation of Global Unique Identifier; it is also known as UUID, which is an abbreviation for Universally Unique Identifier. GUID is a digital identifying symbol having a binary length of 128 and is obtained through a particular computing method. It is used to identify the uniqueness of a product. GUID is primarily used in multiple nodes and multiple computers networks or systems in which the distribution must have a unique identifier. It must be assigned a unique identity. In the Windows platform, GUID is widely used in Microsoft's products; it is used to identify registry entries, class and interface ID, database, system directories, and other objects.

[0020] MD5 is the abbreviation for Message Digest Algorithm 5. MD5 is an algorithm that ensures that the information transmits with integrity. It is widely used as a collision algorithm and is also known as a digest algorithm or hash algorithm.

[0021] SHA is the abbreviation for Secure Hash Algorithm. It is a digital encryption algorithm. The algorithm has become increasingly sophisticated after many years of development and improvement. SHA is now recognized as the most secure hash algorithm and is widely used. The algorithm is based on the idea of receiving a plaintext, and then converting the plaintext to ciphertext irreversibly. It can be understood simply as a process of taking a string of input codes (referred to as pre-mapping or information) and transforming them into a shorter length, digit-fixed output sequence hash value (also known as message digest, or message authentication code). Hash values can be referred as "fingerprints" or "digests" of a plaintext; thus the digital signature of the hash value can be regarded as the digital signature of a plaintext.

[0022] The invention is further illustrated by the following diagrams and the examples.

EXAMPLES OF OPERATION

Voting System Example 1

[0023] See FIG. **1** and FIG. **2**. This Example is a voting system based on iPhone **1**(Apple smart phone). It includes several iPhones, a server device **4**, a client module **51**, and a server module **6**. A client module **51** is installed on each of the iPhones and is used for temporarily storing the voter's information, submitting request for verifying voter's identity, showing voting inquiries, and submitting votes. The server module **61** is installed on the server device **4**. It comprises a voter management module **71**, a certificate management module **91**, and a voting affair management module **81**; and it is used for storing the voter's information, verifying the voter's registration and identity, issuing and verifying the voting certificates, creating and publishing the voting affair, and calculating the statistics of the voting contents and publishing the results. The client module **51** and the server module **61** perform digital communications through a mobile communication network **3** or a mobile network **2**, such as 4G, 3G, GPRS, Wi-Fi, GSM or CDMA. To simplify, the following is an example using only one iPhone **1**.

[0024] The voter management module **71** comprises an identity verification module **101**, a binding module **111** and an information saving module **121**. The identity verification module **101** is used to verify the voter's registration, i.e., it verifies whether the voter's information is correct, sends the results to the binding module **111**, and verifies the voter identity. The binding module **111** is used to bind the verified voter one-to-one with the voter's iPhone number. The information saving module **121** is used to save the voter's information. The structured data of the voter's information includes: the User ID, log-in name and password, the voter's name, document type, identification number, and the binding phone number. The user ID is the only identification for the voter in the voting system and is automatically created by the voting system. The log-in name is the voter's name which is used to log-in the voting system, it does not allow repetition, and is inputted by the voter. The log-in password is the user's password which is used to log-in the voting system. The voter's name is the voter's Chinese or English name. The document type is the voter's identification document such as ID card, passport, and military officer certificate, etc. The document number is the number of the voter's identification document, such as the document number of the voter's ID card. The binding cell phone number is the voter's cell phone number used to recognize the iPhone **1**. The above structured data is the voter's information which the voter must provide when the voter logs on the voting system, i.e., the required information for the voter's registration. Other information, such as how to contact the voter, the voter's date of birth, place of birth, identity of the reviewers and reviewing procedure, etc., may be optional for the voter to fill out. For a formal voting or relatively important voting, the voter's information should be carefully verified. The verification procedure can be set up in the voting system. One or more verifiers can be successively used to review the voter's information.

[0025] The identity verification module **101** is used to verify whether the voter is eligible to vote and whether the voter's information submitted is correct; it then sends the verified results to the binding module **111**. The binding module **111** binds the verified voter's information one-to-one with the voter's iPhone number. The identity verification module **101** continues to verify the voter's identity, i.e., it verifies whether the voter's information is legitimate and valid. It can go through a third party such as the public security office's query entry, and it can also go through preset legitimacy conditions. The method to verify a voter's identity may vary depending on the actual needs, such as on-site verification, i.e., when the voter who has a valid identification document goes to a voting center, and the voter can be registered by a relevant manager. It can also be done by remote network identity verification. In this example, the remote network identity verification is used.

[0026] The voting affair management module **81** comprises a secret voting affair creation module **131**, a secret voting module **141**, a secret vote counting module **151**, and a secret vote verification module **161**. The secret voting affair creation module **131** is used to create a secret voting affair, to publish the voting affair via digital signature, and to verify voter's eligibility to vote. The secret voting module **141** is used to execute the digital signature for the voter's voting contents by using voting certificate and to encrypt and submit the voting contents. The secret vote counting module **151** is used to decrypt the voting contents, to verify whether the decrypted voting contents and the voting process are legitimate, to calculate the statistics of the voting contents from a legitimate voting process and publish the results by the digital signature. The secret vote verification module **161** is used to verify the validity of the voting contents in accordance with the secret voting affair and the secret voting certificate. The structured data associated with the secret voting affair include the voting affair ID, title, voting time, voting condition, counting method, voting algorithm, electronic vote counting certificate, summary of the voting contents, detailed description of the voting contents, and voting matter table. The voting affair ID is a unique identifier for the voting affair in the voting system and is automatically generated by the voting system. The title is a brief description of the voting contents that is no more than 100 Chinese characters, e.g., “Photographic Association 2012, the first by-election standing committee.” The voting time is the date and time for valid voting, e.g., “Feb. 1, 2012 to Feb. 3, 2012, 8:00-18:00.” The voting condition is the voter’s qualification condition. In this case, it is expressed by regular expression as “Voter: Member of the Photographic Association=yes.” The counting method is the method to activate the counting function, including a real-time vote counting and a non-real-time vote counting. Real-time vote counting means counting the votes immediately after the voters cast the votes. Non-real-time vote counting means counting the votes after the valid voting period is over. Voting algorithm refers to the voting results and the vote calculation. In this Example, it is expressed by regular expression as “Most selected matters=2, passing voting rate>=50% and the first two having the highest number of votes.” Electronic counting certificate refers to the secret voting certificate of the counting process; the counting process uses the public key of the secret voting certificate to encrypt the voting contents. Summary of the voting contents refers to a clear and brief writing in a limited number of words to summarize the voting affair. It is used to in a multi-line display of the voting affair; it may include graphics. Detailed description of the voting contents is a detailed explanation for the basis of the voting, the objectives, and the voting procedure etc. with no limit for the number of words and is used in the single-screen display of the voting affair; it may include graphics. Voting matter table refers to one or more voting matters, i.e., the voting contents by the voters, such as the names of the candidates etc. The key matters of the secret voting affair are discussed above. Additional selections can be added based on actual needs, e.g., whether a teller is needed and whether a notary is needed. A secret voting affair includes a voting matter table consisting of one or more voting matters lists. The voting matters are the selections which the voters are going to make. The core structured data of the voting matters include the voting matter ID, title, summary and detailed information. Voting matter ID is a unique identifier used in the voting system and automatically generated by the voting system. Title is a brief description of the voting matters with no more than 100 Chinese characters, e.g., the names of the candidates can be used as the title. Summary is an overview of the voting matter in a combination of language and graphics, e.g., a photo of the candidate and an introduction to the candidate’s key accomplishments etc. Detailed information describes the voting matters in detail and in a combination of language and graphics. The above data are provided by the voting affair management organization and are filled out through the voting affair management module **81**. After the data are filled out, the secret voting affair creation module **131** according to the structured data of the voting affair creates the binary document; after an electronic signature the voting affair management organization publishes the binary document. Then the voter may check the voting matters with an iPhone **1** and select one or more voting matters to vote. The voting affair management organization, tellers, verifiers, and other staff involved in the voting process have been verified by a relevant verification organization for their eligibility and the legitimacy. Therefore, it has already had its own digital certificate for the digital signature. The secret voting affair creation module **131** is also used to verify whether the voter is qualified to vote for the secret voting affair.

[0027] The certificate management module **91** comprises a PKI/CA module **171**; it is used to create the secret voting certificate by the secure framework of the PKI/CA module **171** and to verify the legitimacy of the secret voting certificate. The PKI/CA module **171** is a verification system which has been approved by the governments and supplied by legally certified service providers. PKI is the abbreviation for Public Key Infrastructure and refers to the basic infrastructure of the public key. CA is the abbreviation for Certificate Authority and refers to the certificate center. The working principle of PKI/CA is to establish a trusted network through issuing and maintaining the digital certificates. Users in the same trusted network use the digital certificate received to process identity verification and security check. Before the secret voting, the voter automatically creates a pair of asymmetric encryption keys on iPhone **1**, i.e., a public key and a private key. Through the client module **51**, the voter sends the public key as a certificate request to the server device **4** by 3G network. The certificate management module **91** of the server device **4** receives the certificate request and then to the voter by either a voice or a text message according to the binding iPhone number in the voter management module **71** sends a valid first random verification code. After the certificate management module **91** verifies that the first random verification code is correct, it issues a secret voting certificate only to the voter for the voter to vote during the valid voting period. The voter uses the first random verification code as an anonymous way to download the secret voting certificate which the voter applied for. During the above process, when the secret voting certificate is issued to a voter, the voting affair management organization and the PKI/CA module **171** both use the blind signature policy. The secret voting certificate is also anonymously downloaded. Therefore, only the voter knows the relationship between the voter and the secret voting certificate.

[0028] The detailed voting process is as follows.

[0029] During the valid voting period, the voter selects a secret voting affair on iPhone **1**. The iPhone screen shows the current valid secret voting affair table for the voter to select. After the voter selects a secret voting affair, the iPhone screen shows the voting matters of the secret voting affair. After the voter selects a relevant voting matter, the client module **51** checks according to the conditions provided by the voting algorithm of the secret voting affair whether the current selection meets the requirements. If the current selection does not meet the requirements, the voter is asked to reselect. If a voter is only allowed to select one voting matter but selected two or more voting matters, the voter is asked to reselect. After the voter selects a voting matter by iPhone keyboard or screen, the voting operation is finished when the voter enters the corresponding private key. Due to secret voting, the voter does not need to log into the voting system with the voter’s real name. The voter verifies the vote on iPhone **1**. After the valid voting period is over, the secret vote counting module **151** is automatically activated to proceed to the vote counting stage; the secret vote counting module **151** can also be manually activated to proceed to the vote counting stage. At this point, first the voter's voting contents is decrypted, and then the legitimacy of the secret voting certificate of the voting contents, the completeness of the voting contents, and the legitimacy of the voting process are verified. Finally, the statistics of the voting results is calculated and published. No matter what type of counting method is used, before the statistics of the secret voting contents is calculated, the secret vote counting module **151** in the voting affair management module **81** must perform the following operation: clearing the entire statistic results of the voting contents under the voting affair so that the initial counting operation can proceed.

[0030] The voter may use the secret voting certificate saved in the voter's iPhone **1** to verify whether the voter's vote is included in the voting results and to check whether the voting contents are tampered with by any illegitimate person. The voter may manually delete the secret voting certificate on the voter's iPhone **1** after the vote counting is completed and is verified correct. The above-mentioned vote verification function is a preferred way in this Example. If this Example omits the vote verification function, it can still achieve the objective of the invention.

Voting System Example 2

[0031] As shown in FIG. **3**, Example 2 is similar to the network connection map of Voting System Example 1. It differs from Voting System Example 1 in that it is specifically used in a non-secret voting. The voting system based on iPhones comprises multiple iPhones, a server device **4**, a client module **52**, and a server module **62**. Each iPhone **1** is installed with a client module **52** which is used to temporarily save the voter's information, submit requests for verifying voter's identity, show the voting inquiries, and submit votes. The server module is installed on the server device **4**. It comprises a voter management module **72**, a certificate management module **92**, and a vote affair management module; it is used to save the voter's information, verify the voter's registration and identity, issue and verify the voting certificate, create and publish the voting affair, and to calculate and publish the voting contents statistics. The client module **52** and the server module **62** perform digital communications through a mobile communication network **3** or a mobile network **2**, such as 4G, 3G, GPRS, Wi-Fi, GSM or CDMA. For simplicity of illustration, the following Example uses only one iPhone **1**.

[0032] The voter management module **72** comprises an identity verification module **102**, a binding module **112** and an information saving module **122**. The identity verification module **102** is used to verify the voter's registration, i.e., verify whether the voter's information is correct and to send the results to the binding module **112**. It is also used to verify the voter's identity. The binding module **112** is used to bind the verified voter one-to-one with the voter's iPhone number. The information saving module **122** is used to save the voters' information. The actual data structure in the voter management module **72** is the same as in Voting System Example 1 and it is not repeated here.

[0033] The voting affair management module **82** comprises a non-secret voting affair creation module **132**, a non-secret voting module **142**, a non-secret vote counting module **152**, and a non-secret vote verification module **162**. The non-secret voting affair creation module **132** is used to create a non-secret voting affair and publish it after the digital signature and to verify the voter's eligibility to vote. The non-secret voting module **142** is used for the digital signature and submission of the voting contents via a non-secret voting certificate. The non-secret vote counting module **152** is used to verify the completeness of the voting contents and the legitimacy of the voting certificate and to calculate and publish the statistics of the legitimate and complete voting contents of qualified voters. The non-secret vote verification module **162** is used to verify the validity of the voting contents according to the non-secret voting affair, the non-secret voting certificate, and the voter's information, wherein the structured data of the voting affair and the structured data of the voting matters are similar to those in Voting System Example 1. Example 2 differs from Example 1 only in that in Example 2, the voting affair is a non-secret voting affair.

[0034] The certificate management module **92** comprises a PKI/CA module **172**. The certificate management module **92** is used to through the secure framework of the PKI/CA module **172** create a non-secret voting certificate which corresponds one-to-one with the voter's information and to verify the legitimacy of the non-secret voting certificate. The voter uses an iPhone **1** to log into the voting system of this Example, clicks on the iPhone **1** to create the non-secret voting certificate. The voter's iPhone **1** automatically creates a certificate request and sends it by a 3G network or a Wi-Fi network to the server device **4**.

[0035] According to the voter's binding iPhone number, the certificate management module **92** sends a valid second random verification code to the voter by a voice or text message. The voter submits the second random verification code to the server device **4**. After the server device **4** checks the current voter's identity, the contents of the certificate request and the second random verification code, it submits the voter's information to the PKI/CA module **172**. The PKI/CA module **172** creates a standard non-secret voting certificate. Thereafter, the client module **52** on the iPhone **1** automatically downloads the non-secret voting certificate and binds the non-secret voting certificate with the voter's information. In this voting system, the voter's information can be bound to only one valid non-secret voting certificate. If the current voter's information has already been bound to a valid non-secret voting certificate, the repeated binding is prohibited.

[0036] The voting process is as follows.

[0037] After using the iPhone **1** to log into the voting system and manually select the voting affair and relevant voting matters, the voter executes the digital signature for the voting contents (i.e., the vote) with the standard digital signature technology using the non-secret voting certificate on the iPhone **1** and submits the voting contents to the server device **4** by a 3G network or a Wi-Fi network. Before submitting the vote, the voter clicks a "get verification code" button on the iPhone **1**, and the non-secret voting module **142** according to the voter's binding iPhone number sends a third random verification code to the voter by a voice or text message. The voter submits this third random verification code to the non-secret voting module **142**. After the non-secret voting module **142** automatically verifies the voting contents, the voter's identity, the correctness of third random verification code, and voter's eligibility, the vote is saved in the non-secret voting table in order to proceed to the subsequent counting operation. In the non-secret electronic voting, the counting operation has two types, a real-time vote counting and a non-real-time vote counting. The real-time vote counting means that immediately after the voter casts the vote, the current voting statistics of the voting affair is calculated and the results are published. The non-real-time vote counting means that after the valid voting time period expires, the voting statistics of the current voting affair is then calculated and published. Before counting, the non-secret vote counting module **152** needs to verify the completeness of the voting contents, the legitimacy of the voting certificate, and the voter's voting eligibility. Only if these three conditions are met, i.e., complete voting contents, legitimate voting certificate, and eligible voter, the statistics of the non-secret voting contents is then calculated and the results are then published. No matter what counting method is used to count the votes, the non-secret vote counting module **152** in the voting affair management module **82** must perform the following operation: clearing the entire statistic results of the voting contents under the voting affair so that the initial counting operation can proceed.

[0038] The voter may use the non-secret voting certificate saved in the voter's iPhone **1** to verify whether the voter's vote is included in the voting results and to check whether the voting contents are tampered with by any illegitimate person. The above-mentioned vote verification function is a preferred way for this Example. If this Example omits the vote verification function, it can still achieve the objective of the invention.

Voting Method Example 1

[0039] This is an iPhone **1** based secret voting method. The voting method is installing a client module **51** on all iPhones and a server module **61** in a server module **61**. The server module **61** comprises a voter management module **71**, a certificate management module **91**, and a voting affair management module **81**. The client module **51** and the server module **61** perform digital communications through 4G, 3G, Wi-Fi, CSM or CDMA networks. A specified voting method is as follows: Step 1a: the server module **61** creates and publishes the voting affair; Step 2a: the voter via the client module **51** provides the voter's information to the server module **61** and according to the voter's information the server module **61** through the voter management module **71** saves the voter's information and verifies the voter's registration and identity; Step 3a: according to the voter's information and after the registration verification and identity verification, the server module **61** creates a secret voting certificate and sends the certificate to the client module **51**; Step 4a: after executing the digital signature for the secret voting certificate via the client module **51**, the voter submits the secret voting contents for the voting affair to the server module **61**, and the server module **61** calculates the statistics of the voting contents and publishes the voting results.

[0040] In step 1a, the creation and publication of the voting affair are achieved by the secret voting affair creation module **131** in the voting affair management module **81**. The secret voting affair creation module **131** in the voting affair management module **81** is used to create and publish the voting affair, and to verify the voter's eligibility.

[0041] In step 2a, the voter's information saving, registration verification and identity verification are achieved via the voter management module **71**. The voter management module comprises an identity verification module **101**, a binding module **111**, and an information saving module **121**. The actual voter's information saving process is that the voter's information is saved by the information saving module **121**; the actual registration verification process is that after the voter submits the voter's information to the server module **61**, the identity verification module **101** verifies whether the voter's information is correct and sends the verified results to the binding module **111**; when the voter's information passes the verification, the binding module **111** binds the verified voter's information one-to-one with the voter's iPhone number; otherwise no binding takes place. The actual identity verification process is that when the voter's information passes the verification and is bound with the iPhone number, the identity verification module **101** verifies the validity and legitimacy of voter's identity; otherwise no verification takes place. Further, for a very formal and relatively important voting, the voter's information needs to be seriously verified, and thus in the voting process, one or more verifiers may be pre-assigned to successively verify the voter's information according to the verification procedure set up in the voting system.

[0042] In this Example, the voting affair is a secret voting affair. The voting certificate is a secret voting certificate, wherein the secret voting certificate created in step 3a is created by the certificate management module **91**. The certificate management module **91** comprises a PKI/CA module **171**. The process for creating the secret voting certificate can be seen in FIG. **4**. A specific process is as follows.

[0043] Certificate requesting step: the voter performs the following operations for one or more voting affairs from the current voting affairs table via the client module **51**. This Example is to select a secret voting affair to create a pair of asymmetrically encrypted keys and save them. This pair of encrypted keys includes a private key and a public key. Then the public key is encrypted and sent to the certificate management module **91** as a request for a secret voting certificate. The method of creating the encrypted key pair can be any method commonly used in this technology field for creating encrypted keys such as RSA random key encryption method. The above encrypted key pair is saved in the voting secret key file, and the voting secret key file is the voting secret key file which is saved in the iPhone flash memory card and encrypted via a special encryption method. The voting secret key file can be encrypted via a strong symmetric encryption method such as AES and 3DES etc. The name of the voting secret key file can be a combination of a fixed string prefix plus the voting affair ID. The client module **51** creates the keywords for the certificate identity and save them in the voting secret key file, e.g., the keywords can be a string of random codes created by the GUID algorithm.

[0044] This string of random codes is used as the "certificate identity keywords" of the current certificate request and saved in the voting secret key file; then the MD 5/SHA algorithm is used to create the "certificate identity keywords digital abstract." The combination of the "certificate identity keywords digital abstract" and the public key is serialized to the "binary contents." A "certificate request secret file" is created by using the public key of the public certificate published by the PKI/CA module **171** and by the encryption of the "binary contents." The MD5 or SHA algorithm is used to obtain the digital abstract of the above "binary contents" and to use it as the "certificate request digital abstract." The above "certificate request secret file" and the "certificate request digital abstract" are combined, serialized into binary contents and encoded via BASE64/16 into ASSII character; and the "certificate request package" is formed.

[0045] The verification obtaining procedure is as follows. The certificate management module **91** receives the secret voting certificate request, creates a first random verification code, and then sends the first random verification code to the voter via the binding iPhone number obtained from the voter management module **71**. The voter then sends the first random verification code which the voter received to the certificate management module **91**. The first random verification code is a string of random codes which is randomly formed via the server module **61**, has a specific length, and consists of numbers and letters. The voter is informed of the first random verification code via a voice or short text message. By "a voice message," it means dialing a telephone call and sending the above prompt to the voter via a voice message. By "a short text message," it means sending the prompt to the voter's iPhone **1** via a short text message. The procedure is that the prompt message is formed according to the specific contents of the secret voting affair selected by the voter and the first random verification code and it is sent to the voter's iPhone **1** via an interface provided by a third party telecommunication service provider. The contents of the prompt message can be formed via a given module, e.g., Dear Zhang-San, Hello! Your verification code of the certificate request for the 'Photographer Association first meeting of 2012 for the Standing Committee election' is "AB134LD."

[0046] Verification requesting step: the certificate management module **91** verifies whether the first random verification code which the voter sent is the same as the saved first random verification code. The secret voting affair creation module **131** in the voting affair management module **81** verifies whether the voter has the voting eligibility and whether the voter previously requested a secret voting certificate. When all of the conditions are met, i.e., the first random verification codes are consistent, the voter is eligible to vote, and the voter did not previously request the secret voting certificate, the certificate module allows the secret voting certificate request, send a command to the PKI/CA module **171**, and proceed to the creation request step. Otherwise, the secret voting certificate request is denied and the secret voting certificate creation process terminates.

[0047] For particularly important or critical voting affairs, manual validation can be added. Voter's identity can be double-checked by personal telephone calls. The addition of manual verification to the above voting method can further the objective of this invention for achieving secure, fast, and convenient voting.

[0048] The request creation step is as follows. The name, purpose and valid voting period of the certificate, request for signature and request for a secret voting certificate are serialized to create a voting certificate request package which is then saved. The voting certificate request package is then sent via mobile internet such as 3G network or Wi-Fi network to the PKI/CA module **171**. In the above certificate request step, the voter's certificate request only contains the public key information of the voter. This is why it needs to create the important contents such as the name, purpose, and valid voting period etc. Because the voting certificate created in this Example is a secret voting certificate, the important information such as the purpose and valid voting period must be strictly controlled. In this step, the voter's secret voting certificate request time for the voting affair, the voter's user ID, the voting affair ID, the mobile phone number and the mobile phone verification number, i.e., the iPhone number and iPhone verification number, must be recorded in order to prevent the voter from applying for more than one secret voting certificate for the same voting affair. This record is also used for auditing review in the certificate request procedure. The rules for creating the request elements are as follows. The name of the certificate is a fixed string, such as "secret voting certificate." The purpose of the certificate is generated by the voting affair ID and the voting affair subject, such as "10001_Photographic Association, the first Standing Committee by-election of 2012_Voting Special Use". If the certificate is used for more than one voting affairs, the affairs can be listed by a table. The valid voting period of the certificate corresponds to the voting period of the voting affair. If the certificate is used for multiple voting affairs, the valid voting period of the certificate can be from the starting time of the earliest voting to the ending time of the latest voting, e.g., "2012.2.1 8:00 to 2012.2.3 8:00." The signature of the certificate request is formed as follows. The above name, purpose, and valid voting period of the certificate, and the digital abstract of the certificate request submitted by the voter are serialized and the digital signature is executed for the digital certificate via the certificate management module **91**, and the certificate request signature is thus formed. The above name, purpose, and valid voting period of the certificate, and the certificate request secret file data submitted by the voter are serialized to create a complete secret voting certificate request data package.

[0049] Preferably, in order to prevent others from deriving the relationship between the secret voting certificate and the voter based on the time of the submission of the certificate request and the time of issuance of the final secret voting certificate, the secret voting certificate request data package created in the above creation request step is not immediately sent to the PKI/CA module **171** but temporarily saved in a disk file waiting for reaching a certain threshold parameter. The threshold parameter can be set according to the actual situation, being a positive integer greater than 1. For example, when the number of the secret voting certificate request data packages reaches one 100, these data packages are in a random order sent to the PKI/CA module **171** so that the correspondent relationship between the order of the certificate requests and the order of the certificate insurance is eliminated. In general, the order of the certificate requests and the order of the certificate insurance are consistent, i.e., the "First In, First Out." The process described above is called confusion step and its effectiveness of the implementation can be seen also in FIG. **5**. FIG. **5** illustrates the results of the certificate confusing step, at the left the 4 certificate request data packages are output in a different random order after the confusion step. In special situations where the number of the secret voting certificate request data packages cannot reach the threshold parameter, special strategies can be used, such as a strategy of waiting for time-out, waiting for a few minutes and then submitting the data packages to the PKI/CA module **171**. The waiting time period can be set according to the actual situation, which can be a positive integer greater than 1. The certificate confusion step can better protect the secrecy of the voting. However, the objective of the invention can be achieved no matter whether or not the certificate confusion step is used.

[0050] Certificate issuing step: The PKI/CA module **171** uses the private key to decrypt the secret voting certificate request data package and then verifies the completeness and legitimacy of the decrypted secret voting certificate request data package. If the data package is complete and legitimate, the PKI/CA module **171** creates and saves the secret voting certificate. If not, the PKI/CA module **171** does not create the secret voting certificate. After the PKI/CA module **171** receives the secret voting certificate request data package, it uses the private key to decrypt the cipher text of the secret voting certificate request data package and get the certificate identity keywords digital abstract submitted by the voter and the voter's public key. According to the above decrypted data, the digital abstract of the certificate request is obtained using the standard digital digest algorithm. The PKI/CA module **171** uses the standard electronic signature verification algorithm to verify, according to the certificate request signature provided by the voting affair management organization, the completeness of the secret voting certificate request data package, i.e., to verify the name, purpose, and valid voting period of the certificate and the completeness of the digital abstract of the certificate request, and to verify whether the relevant contents have been illegally tampered. Verifying the legitimacy of the secret voting certificate request data package is to verify whether the secret voting certificate is issued by the specified voting affair management organization, to verify whether the secret voting certificate is issued by the PKI/CA module **171** of this voting system, and to verify whether the secret voting certificate is within the valid voting period. After the above verification step, a secret voting certificate is created via a standard secret voting certificate issuing method, a digital abstract of this secret voting certificate is simultaneously computed as the only identity of this secret voting certificate, and it is checked from the existing certificates table whether or not this identity already exists. If this identity already exists, it means that different voters create the same public key (i.e., the same secret voting certificate exists; the probability for this is low). In this case, a string of random characters is created and added to the name of the certificate, and a new secret voting certificate is created. The above procedure is repeated until a secret voting certificate that has never used is created. The secret voting certificate is saved in the established certificates table which contains the secret voting certificate identity, the secret voting certificate contents, the secret voting certificate request contents and the certificate issuing time. In order to allow the voter to download the voter's own secret voting certificate, the secret voting certificate is encrypted via a public key encryption into a secret file and is saved in the secret certificate downloading table which contains the certificate identity keywords digital abstract, the certificate secret file, and an indication whether downloading has taken place.

[0051] Certificate downloading step: the voter may check at a given time via the client module **51** whether the certificate issuing step is complete. If it is complete, the client module **51** automatically downloads the secret voting certificate. If it is not complete, there is no downloading. The certificate downloading step uses the secret downloading and thus the voter does not have to use the voter's real name to log into the downloading system. The detailed downloading steps are as follows. The first step is to check at a given time; the client module **51** on the voter's iPhone **1** automatically starts the service of the service desk, sends the certificate identity keywords to the server device **4** at a given. The server module **61** uses MD5 or SHA algorithm to obtain the certificate keyword digital abstract, check whether there is a secret voting certificate in the secret certificate downloading table. If it exists, the voter will be made aware of the certificate identity keywords by iPhone screen, iPhone voice, iPhone vibration, or combinations thereof; the certificate identity keywords will not be made to known to others. The certificate is downloaded and installed after the above timed check step. The client module automatically downloads the secret voting certificate and after the voter manually enters an encrypted password, it obtains the private key from the corresponding voting secret key file and uses it to decrypt the secret voting certificate. If the decryption succeeds, the decrypted secret voting certificate is saved in the above voting secret key file and the server module **61** will be called and the secret voting certificate downloading table will show "yes" on the indicator of whether the secret voting certificate has been downloaded. If more than one secret voting certificate is found, more than one voter is provided with the same password. The probability of duplication is about 1 over 2^{128}. In this case, the voters may each use their own private key to decrypt and the successfully decrypted secret voting certificate is the corresponding voter's secret voting certificate. Otherwise, if the above decryption operation fails, the voting certification is not the voter's certificate. Further checks can be done by the iPhone service desk.

[0052] In this Example, the voting contents of the secret voting affair are secret. The statistics of the voting contents is the statistics of the secret voting contents. In step 4a, after the voter via the client module **51** uses the secret voting certificate to execute the digital signature, the voting contents of the secret voting affair are submitted to the server module **61**. The server module **61** calculates the statistics of the valid secret voting contents and publishes the results via the voting affair management module **81**. The voting affair management module **81** comprises the voting affair creation module, the secret voting module, the secret vote counting module **151**, and the secret vote verification module **161**. A detailed procedure follows.

[0053] Submitting step: the secret voting affair creation module creates the secret voting affair. The voter uses the secret voting certificate to execute the digital signature and sends the secret voting contents after encrypted to the secret voting module. After the voter confirms the voting on iPhone **1**, the client module **51** serializes the selected voting affair file, i.e., the voting affair file issued by the voting affair management organization and executed for the digital signature, and the selected voting matter into a voting contents binary document. The client module **51** according to the voting affair ID finds the corresponding voting private key file. The voter manually enters an encrypted password, uses the secret voting certificate in the voting private key file to execute the digital signature for the above voting contents binary document, creates the signature document of the voting contents, and then uses the public key of the counting certificate of the voting affair to encrypt the voting contents signature file and to create the cipher text of the voting contents signature file, and then use the voter's secret voting certificate to execute a second digital signature for the serialized contents of the voting contents signature secret file and the voting affair to create the voting contents secret file signature document and send it to the secret voting module.

[0054] Verification step: the secret voting module receives the voting contents, verifies whether or not the secret voting affair is within the valid voting period, through the PKI/CA module **171** verifies whether or not the secret voting certificate is legitimate, verifies whether the secret voting certificate and the secret voting affair are corresponding, and verifies whether or not the data is complete. When all of these conditions are met, valid voting time period, legitimate voting certificate, and correspondence between secret voting certificate and the secret voting affair, and complete data, the secret voting module saves the secret voting contents and then goes to the counting step. Otherwise, the secret voting module does not save the secret voting contents and the procedure does not proceed to the step for the statistics calculating and publishing of the secret voting contents. In the verification step, the secret voting module automatically verifies whether the current secret voting affair is within the valid voting period, whether the current voting certificate is issued by the PKI/CA module **171** (whether legitimate), whether the signature data is tempered by any illegitimate person (whether the data is intact), according to the certificate name verifies whether the current secret voting certificate can be used for the current secret voting affair (whether the secret voting certificate matches with the secret voting affair). After the voting contents pass the legitimacy test, the secret voting module saves the secret voting contents in a voting contents table. The voting contents table contains the voting affair ID, the secret voting certificate digital abstract, the secret document of the voting contents and the public document of the voting contents. The secret document of the voting contents is the signature document of the voting contents secret file, and the public document of the voting contents is the signature document of the voting contents obtained after decryption during the counting step. When the voting contents are being saved, if the same voting certificate digital abstract exists in the voting contents table, it means that the voter has already voted, and this record will be deleted. The current voting contents are added to the following two voting information items: the secret voting certificate digital abstract and the secret document of the voting contents.

[0055] Counting step: the secret vote counting module **151** uses the private key to decrypt the secret voting contents and via the PKI/CA module **171** verifies whether the secret voting certificate is legitimate and whether it matches with the secret voting affair, it verifies whether the voting contents are complete and whether the voting process is legitimate. If all the conditions are met at the same time, legitimate and consistent secret voting certificate, complete voting contents, and legitimate voting process, the statistics of the voting contents is calculated and published. Otherwise, the statistics is not calculated and published. In order to ensure the secrecy of the voting, the secret voting uses a non-real-time counting method, which means that the counting operation implement after the valid voting period has passed. The counting operation is traversing the voting contents table and uses the following method to verify the legitimacy of the voting contents. First, the private key of the electronic counting certificate is used to decrypt the secret document of the voting contents, obtain the data of the public document, and save it to the public document of the voting contents on the voting contents table. Then the standard algorithm is used to respectively verify the legitimacy of secret voting certificates in the secret document of the secret voting contents and the public document of the secret voting contents, verify the completeness of the signature contents, verify the legitimacy of the certificate to the voting affair document, verify whether the secret voting certificates in the secret document of the secret voting contents and in the public document of the secret voting contents are consistent with the voting affair document, and verify whether the MD5/SHA digital abstract of the secret voting certificate and the secret voting certificate digital abstract are consistent. According to the voting algorithm of the voting affair, it is verified whether the selection items of the current voting affair are correct, e.g., verifying the number of the voting matters of each vote is within the specified number. The method for verifying the legitimacy of the voting procedure is to verify whether the number in the voting contents table is less than or equal to the number of the "yes" answers to the question "whether downloaded" in the secret voting certificate downloading table; verify whether the number of the secret voting certificate downloading table is equal to the established secret voting certificate table; verify the number of the established certificate table is equal to the certificate request table; verify whether the user ID in the certificate request table exists in the voter's ID table; verify whether the iPhone number in the certificate request table is the same as the iPhone number in the voter's ID table; according to the voter conditions of the voting affair verify whether the voter is eligible to vote for the current voting affair; verify whether the iPhone number of the voting affair in the certificate request table is unique, i.e., one iPhone number corresponds to only one voter; via the standard signature algorithm verify the completeness of the signature contents in the secret voting certificate request contents of the traverse certificate request table; verify whether the signature certificate is legitimate and whether it is used by the voting center; and verify whether the public key digital abstract in the secret voting certificate request is consistent with the public key digital abstract in the secret voting certificate contents. After the above verification procedure has been performed and the verification of legitimacy of the voting process has been completed, the secret vote counting module **151** then calculates the statistics of the valid votes and according to the vote determination method of the voting affair, calculate the statistics of the number of the voters, the total number of votes, the number of valid votes, the number of each voting matter, and the voted matters, and execute digital signature for the above statistics and the vote counter's digital certificate used in the voting affair document and the publish the results. Otherwise, there will be no calculation or publication of the statistics. Optionally, if there is need for a public notary to notarize, the public notary must use the public notary's own digital certificate to execute signature for the above statistic results.

[0056] The vote verification is achieved by the secret vote verification module **161**; a detailed procedure is as follows.

[0057] Requesting step: the voter submits a vote verification request for a secret voting affair to the secret voting affair office; the voter selects on iPhone **1** a voting affair, the client module **51** sends the voting affair ID of the secret voting affair to the secret vote verification module **161** of the voting system.

[0058] Searching step: the secret voting verification module searches for the existence of the corresponding secret voting contents according to the secret voting affair and the secret voting certificate; if they are found, it proceeds to the verification step; otherwise, a prompt indicates that they were not found, and it exits the above vote verification procedure. The server module **61** receives the above information and according to the secret voting affair ID and the current user ID searches for the corresponding valid voting contents in the voting contents table. If they are not found, it means that the vote counting results do not include this voter's voting information; if the relevant voting record is found, it proceeds to the verification step.

[0059] Verification step: this step verifies whether the secret voting contents are complete and whether the voter's public key is the same as the public key of the secret voting certificate. When the secret voting contents are complete and the public keys are the same, prompt shows that the vote verification is successful; otherwise, prompt shows the inconsistent verification results. It verifies whether the voting contents public document is complete and whether the public key of the secret voting certificate is the same as the public key which is to be verified. If the voting contents are complete and the public keys are the same, the verification passes, indicating that the voter's voting contents were included in the counting results and not illegitimately tampered. Preferably, after the voting contents and the counting results are confirmed, the voter can manually delete the voting private key file saved on the iPhone **1** to prevent it from careless leaking and causing negative effect. After the private key file is deleted, the voter will no longer be able to use the verification function.

Voting Method Example 2

[0060] This is an iPhone **1** based non-secret voting method. The non-secret voting method is installing a client module **52** on each and all of the iPhones and a server module **62** on the server device **4**. The server module **62** comprises a voter management module **72**, a certificate management module **92**, and a voting affair management module **82**. The client module **52** and the server module **62** perform digital communications through 4G, 3G, Wi-Fi, GSM, or CDMA networks. The voting method is as follows: step 1b: the server module **62** creates and publishes the voting affair; step 2b: the voter via the client module **52** provides the voter's information to the server module **62** and the server module **62** according to the voter's information via the voter management module **72** saves the voter's information and verifies the voter's registration and identity; step 3b: the server module **62** according to the voter's information and after the registration verification and identity verification creates a voting certificate which corresponds one-to-one with the voter's information and sends the certificate to the client module **52**; step 4b: after executing the digital signature for the voting certificate via the client module **52**, the voter submits the voting contents for the voting affair to the server module **62**, and the server module **62** calculates the statistics of the voting contents and publishes the voting results.

[0061] In step 1b, the creation and publication of the voting affair are achieved by the voting affair creation module. The voting affair creation module is used to create the voting affair and publish the voting affair after passing the digital signature, and it is also used to verify the voter's eligibility.

[0062] In step 2b, the voter's information saving, registration verification and identity verification are achieved via the voter management module **72**. The voter management module comprises an identity verification module **102**, a binding module **112** and an information saving module **122**. The actual voter's information saving process is involves that the voter's information is saved by the information saving module **122**; the actual registration verification process is that after the voter submits the voter's information to server module **62**, the verification module verifies whether the voter's information is correct and sends the verified results to the binding module **112**; when the voter's information passes the verification, the binding module **112** binds the verified voter's information one-to-one with the voter's iPhone number; otherwise no binding takes place. The method for the voter's information saving, registration verification and identity verification is the same as that in Voting Method Example 1, and it is thus not repeated here.

[0063] In this Example, the voting affair is a non-secret voting affair. The voting certificate is a non-secret voting certificate which corresponds only to the voter's information. In this Example, the execution order of step 1b and step 2b are in the reversed order. Of course, step 1b and step 2b can be also executed sequentially or simultaneously. For the non-secret voting method, step 1b and step 2b can be presented in no particular order. In above step 3b, the creation of the non-secret voting certificate is achieved via the certificate management module **92**. The certificate management module **92** comprises a PKI/CA module **172**. The process for creating the non-secret voting certificate can be seen in FIG. **4**. A specific process is as follows.

[0064] Binding checking step: this step checks whether or not the voter is bound with the use of a valid non-secret voting certificate. If the voter has been bound, the non-secret voting certificate creation step ends. If the voter has not been bound, it proceeds to the creation request step; this step is to check whether the current voter is bound with a valid non-secret voting certificate. If bound, re-creation is prohibited.

[0065] In the voting method of this Example, a voter can only be bound with one valid non-secret voting certificate at a given time period. If the current voter lost the non-secret voting certificate or suspects that the second random verification code is leaked, the voter needs to request that the PKI/CA module **172** cancels the current non-secret voting certificate and recreate a new one.

[0066] Certificate creation request step: a non-secret voting certificate package is created based on the voter's information and is sent to the certificate module after encryption. The voter via the client module **52** on iPhone **1** uses the standard algorithms to create a standard non-secret voting certificate request package, wherein the name of the certificate is composed of the current voter's name and the user ID information etc., e.g., "OU=Zhang–san, OU=10001". The above voting certificate request package and corresponding private key are saved in the voting private key file. The encryption code of the voting private key file is manually entered by the voter, wherein the voting private key file is saved in the voter's iPhone flash card using specific encryption algorithm.

[0067] Verification obtaining step: the certificate management module **92** receives the encrypted non-secret voting certificate request package, creates a second random verification code, and then sends the second random verification code to the voter by the binding iPhone number obtained from the voter management module **72**. The voter then sends the received second random verification code back to the certificate management module **92**. To achieve this step, the voter can click "get certificate number" button on the iPhone **1**. The server module **62** through the current voter's binding iPhone number sends the second random verification code created by the certificate management module **92** to the voter by voice or text message. The second random verification code is a string of random codes of specific length and composed of numbers and letters. After receiving the second random verification code, the voter manually fill it in the information item specified in the certificate creation request window.

[0068] Verification request step: the certificate management module **92** verifies whether the second random verification code which the voter sent is the same as the saved second random verification code, verifies whether the voter previously requested a non-secret voting certificate, verifies whether the information in the non-secret voting certificate request package is consistent with the information in the voter's registration, and verifies whether the non-secret voting certificate request package is complete. When all of the conditions are met, i.e., the second random verification codes are consistent, the voter did not previously request the non-secret voting certificate, the voter's information is consistent and the non-secret voting certificate request package is complete, the certificate module allows the non-secret voting certificate request, sends a issuing command to the PKI/CA module **172**, and proceeds to the certificate issuing step. Otherwise, if any of the conditions in the above verification procedure is not met, the non-secret voting certificate request is rejected.

[0069] Certificate issuing step: the PKI/CA module **172** according to the contents of the non-secret voting certificate request package creates a voting certificate and saves it. The certificate management module **92** uses the API of the PKI/CA module **172** to create a standard non-secret voting certificate according to the contents of the non-secret voting certificate request package and saves it to the voter's personal certificate table.

[0070] Certificate downloading step: the voter may check at any given time via the client module **52** whether the certificate issuing step is complete. If it is complete, the client module **52** automatically downloads the non-secret voting certificate. If it is not complete, there will be no downloading. The voter through the client module **52** on iPhone **1** automatically starts the services of the service desk and uses the server module **62** to check at any given time whether the corresponding non-secret voting certificate has been created. If the voter's personal certificate table has existed, it will be automatically downloaded onto the iPhone **1** and the voter will receive a prompt to enter the encryption code and save this non-secret voting certificate to the voting secret key file.

[0071] In this Example, the voting contents of the non-secret voting affair are non-secret voting contents. Therefore, the statistics of the voting contents is the statistics of the non-secret voting contents. For the non-secret voting method, two different activation strategies for vote counting can be used. One strategy is real-time vote counting, i.e., after the voter submits the vote, the non-secret vote counting module **152** automatically calculates according to the voting affair ID of the voting contents signature file the statistics of the vote of the voting affair. This strategy does not require encryption treatment of the non-secret voting contents. Another strategy is non-real-time vote counting method, i.e., after the valid voting period has ended, the non-secret vote counting module **152** according to the voting affair ID of the voting contents signature file automatically calculates the votes for the voting affair. This strategy requires encryption of the non-secret voting contents. No matter whether it is real-time vote counting or non-real-time vote counting, before the vote counting, it must be verified whether the voting contents signature file is complete, whether the voting certificate is legitimate, and whether the voter has voted repeatedly. In step 4b, after the voter through the client module **52** and using the non-secret voting contents executes the digital signature, the non-secret voting contents of the non-secret voting affair are submitted to the server module **62** and the server module **62** calculates the statistics of the non-secret voting contents and publishes the results. The above process is achieved through the voting affair management module **82**. The voting affair management module **82** comprises a non-secret voting affair creation module, a non-secret voting module, a non-secret vote counting module **152**, and a non-secret vote verification module **162**. A specific process is as follows:

[0072] Voting verification step: the voter submits a request for a certificate verification code to the non-secret voting module, the non-secret voting module creates a third random verification code and send it to the voter's binding iPhone number. The third random verification code is a string of random code which is randomly formed by the server module **62**; it has a specific length and consists of numbers and letters.

[0073] Vote submitting step: the voter submits the third random verification code and the non-secret voting contents to the non-secret voting module.

[0074] Content verification step: the non-secret voting module verifies whether the non-secret voting affair is within the valid voting period, it verifies whether the third random verification code that the voter sent is the same as the third random verification code that is saved, through the PKI/CA module **172** verifies whether the non-secret voting certificate is legitimate, verifies whether the non-secret voting certificate corresponds with the voter's information, and verifies whether the voter is eligible to vote; when all of the conditions are met, i.e., the non-secret voting is within the valid voting period, the third random verification codes correspond, the non-secret voting contents are complete, the non-secret voting certificate is legitimate, the voter's information is consistent, and the voter is eligible to vote, then the non-secret voting contents are saved and proceed to the non-secret contents statistics calculating step; otherwise, the non-secret voting contents are not saved and it exit the non-secret contents statistics calculating and publication step. When the non-secret voting contents are being saved, if it is found that the voting contents table has had the same user ID, indicating this voter has voted before, this record is then deleted and the current voting contents are added to the voting contents table.

[0075] Voting contents statistics calculating step: the non-secret vote counting module **152** via the PKI/CA module **172** verifies whether the non-secret voting certificate is legitimate, verifies whether the non-secret voting contents are complete, verifies whether the voting process is legitimate, and verifies whether the voter is eligible to vote; when all of the conditions are met, i.e., the non-secret certificate is legitimate, the non-secret voting contents are complete, the voting process is legitimate, and the voter is eligible to vote, then the non-secret voting contents statistics is calculated and published; otherwise, the statistics is not calculated or published.

[0076] Preferably, the voter may verify the non-secret voting contents which are submitted by the voter. The voting verification procedure is achieved through the non-secret vote verification module **162**; the detailed procedure is as follows:

[0077] Request submitting step: the voter submits the voting verification request for the non-secret voting to the non-secret vote verification module **162**. The voter selects a voting affair on iPhone **1**. The client module **52** reads the non-secret voting certificate from the voting secret key file.

[0078] After the voter manually enters a decryption code, the voter reads the public key in the voting secret key file. The client module **52** sends the voting affair ID and the public key to non-secret vote verification module **162** of the voting system.

[0079] Information searching step: the non-secret vote verification module **162** performs search according to the non-secret voting affair, the voter's information and the non-secret voting certificate for the existence of corresponding non-secret voting contents; if they are found, proceed to the information verification step; otherwise, a prompt appears indicating they are not found and exit the voting verification procedure. After the non-secret vote verification module **162** receives the information from the client module **52**, it uses the digital digest algorithm to obtain a public-key digest and according to the voting affair ID and the voting certificate digital digest looks for the voting contents table corresponding to the valid voting contents. If not found, it indicates that the vote counting results do not include the voter's voting information. If the relevance voting record is found, then proceed to the information verification step.

[0080] Information verification step: this step verifies whether the non-secret voting contents are complete and whether the non-secret voting certificate corresponds with the voter's information; when the non-secret voting contents are complete and the non-secret voting certificate corresponds with the voter's information, a prompt appears indicating that the information verification succeed; otherwise, a prompt appears indicating the voting verification failed. This step is to verify whether the voting contents public file is complete and whether the non-secret voting certificate used for the digital signature is the voter's own certificate. If both verifications succeed, it indicates that the current voter's non-secret voting contents are included in the vote counting results and the voting contents are not tampered illegitimately.

[0081] In the secret electronic voting methods disclosed in the voting system examples and voting method examples, the secret electronic voting uses a blind signature, an innovation based on the Hybrid Theory and FOO agreement. Compared to the traditional electronic voting methods, such as the voting method of the FOO agreement, a remarkable feature of the voting method of the invention is that it uses a blind signature for the voting certificate, focuses on blinding the voting certificate information, and by blinding and securitizing the voting certificate achieves the "anonymity" technical target. In the traditional electronic voting agreement, the voter's voting contents are the blinding focus. When voting, the voter only uses the secret voting certificate to execute the digital signature and does not need to enter any voter's information. This invention uses the vote counting certificate public key to encrypt the voting contents. Therefore, the whole voting process is anonymous. Even if someone illegitimately monitors the wireless mobile internet, this person cannot obtain the voter's personal information and the voting contents.

[0082] In the secret electronic voting methods disclosed in the voting system examples and voting method examples, one voter can only be bound with one valid certificate at any given time. If the voter has been bound with a valid certificate, repeated binding is prohibited. In summary, this invention has a higher level of security; it can be widely used in all types of formal electronic voting in which stringent data security is required, such as the voting of urban communities for neighborhood committee management related issues, the voting of a variety of related matters within civil society, the voting of business shareholders, and the voting of corporate board of directors.

[0083] In the actual process, when there are a relatively large number of voters for a specific voting affair, the present voting system can be deployed in a dispersive manner. Each electoral constituency can have a server module **62**. When voters vote, the client module **52** automatically submits the votes according to the electoral constituency of the voters to the corresponding server module **62**. The server module **62** of each electoral constituency will automatically report the vote counting results to a central server device **4**, and then the central server device **4** will calculate the statistics for the final voting results.

[0084] The above voting system examples and voting method examples are implemented based on the iPhone **1**. As alternatives to the above examples of the invention, the client module **5** of the invention can be installed on the iPad or various android smart phones or other smart mobile communication devices. When this invention is used in a cell phone having at least the functions of calling and text messaging plus a PC having internet capability, the client module **5** is installed in the PC having internet capability. Obtaining the random verification code and the binding number corresponding to the voter's information is achieved by the above cell phone having at least the functions of calling and text messaging. Other functions are similar to the above examples.

[0085] PC that has the function of calling and internet capabilities, such as SAMSUNG P1000, is a tablet PC having a calling function. It has a standard SIM card slot. As long as a SIM card is inserted into the SIM card slot, it will implement the functions of both the internet and phone at the same time. The application of this invention in this type of smart mobile communication device is the same as the above examples. It only needs to install the client module (**51**,**52**) in the PC and to install the server module (**61**,**62**) on the server device **4**.

[0086] Another alternative to the above voting system examples is a voting system which combines the above secret voting function and non-secret voting function, i.e., a combination of the voting system in above Voting System Example and Voting System Example 2. Its structure, connection method, and major functions are the same as those in the above examples. Similarly, the client module (**51**,**52**) is installed on the smart mobile communication device and the server module (**61**,**62**) is installed on the server device **4**. The client module (**51**,**52**) and the server module (**61**,**62**) communicate digital data via the mobile communication network **3**. The server module (**61**,**62**) comprises a voter management module (**71**,**72**), a vote affair management module, and a certificate management module (**91**,**92**). The difference is that the vote affair management module comprises a voting affair creation module, a voting module, a vote counting module, and a vote verification module. The voting affair creation module is used to create the secret voting affair, to execute digital signature and publish the voting affair, and to verify the voter's voting eligibility in the secret voting affair. The voting module is used to execute the digital signature by the secret voting certificate for the voter's secret voting contents, encrypt, and submit them. The voting module is also used to execute the digital signature by the non-secret voting certificate for the non-secret voting certificate for the non-secret voting contents and submit them. The vote counting module is used to decrypt the secret voting contents, to verify the legitimacy of the secret voting contents and the voting process after the secret voting contents are decrypted, to calculate the statistics of the legitimate secret voting contents of the above voting process publish the results via the digital signature. The vote counting module is also used to verify the completeness of the non-secret voting contents and legitimacy of the non-secret voting certificate, to verify the voter's eligibility during the vote counting process, and to calculate the statistics of the complete and legitimate non-secret voting contents and non-secret voting certificate of eligible voters and publish the results. The vote verification module is used to verify the validity of the voting contents according to the secret voting affair and the secret voting certificate. The vote verification module is also used to verify the validity of the non-secret voting contents according to the non-secret voting affair, the voter's information, and the non-secret voting certificate. The certificate management module (**91**,**92**) comprises a PKI/CA module (**171**,**172**). The certificate management module (**91**, **92**) is used to create the secret voting certificate and to verify the legitimacy of the secret voting certificate. The certificate management module (**91**,**92**) is also used to create the non-secret voting certificate that corresponds one-to-one with the voter's information and to verify the legitimacy of the non-secret voting certificate. That means to set forth the features of the voting affair and the voting contents for "non-secret" or "secret" and perform relevant operations according to these features. Clearly, the above alternatives may be applied to the voting method examples. Detailed implementation steps can be seen in the above voting method examples, which are not repeated here.

What is claimed is:

1. A smart mobile communication device-based voting system, comprising

at least one smart mobile communication device and at least one server device;

a client module which is installed on the smart mobile communication device and is used for temporarily storing the voter's information, submitting a request for verifying voter's identity, showing voting inquiry, and submitting the vote;

a server module which is installed on the server device, comprising a voter management module;

a certificate management module; and

a voting affair management module which is used for storing voter's information, verifying voter's registration and identity, creating voting certificate, verifying voting certificate, creating and publishing voting affair, calculating statistics of the voting contents and publishing the results; wherein the client module and the server module perform digital communications through a mobile communication network.

2. The voting system of claim **1**, wherein the voter management module comprises an identity verification module, a binding module, and an information saving module; wherein the identity verification module is used to verify the correctness of the voter's information, send the results to the binding module, and verify the voter's identity; the binding module is used to bind the verified voter information one-to-one with the voter's smart mobile communication device number; and the information saving module is used to save the voter's information.

3. The voting system of claim **2**, wherein the voting affair management module comprises a secret voting affair creating module, a secret voting module, and a secret vote counting module; wherein the secret voting affair creating module is used to create the secret voting affair, publish the secret voting affair via digital signature, and verify the voter's eligibility; the secret voting module is used to employ voting certificate to execute digital signature for the voter's voting contents, and to submit the voting contents with encryption; the secret vote counting module is used to decrypt the voting contents, verify the legitimacy of the voting contents and the voting procedure after decryption, and to calculate the statistics of the voting contents in the voting procedure and publish the statistics through digital signature.

4. The voting system of claim **3**, wherein the voting affair management module further comprises a secret vote verification module; and wherein the secret vote verification module is used to verify the validity of the voting contents according to the secret voting affair and the secret voting certificate.

5. The voting system of claim **4**, wherein the certificate management module comprises a PKI/CA module; and wherein the certificate management module is used to create the secret voting certificate and to verify the legitimacy of the secret voting certificate.

6. The voting system of claim **2**, wherein the voting affair management module comprises a non-secret voting affair creating module, a non-secret voting module and a non-secret vote counting module; the non-secret voting affair creating module is used to create the non-secret voting affair, publish the non-secret voting affair through digital signature, and verify the voter's voting eligibility; the non-secret voting module is used to employ the non-secret voting certificate to execute digital signature for the voting contents and submit the voting contents; the non-secret vote counting module is used to verify the completeness of the voting contents and the legitimacy of the voting certificate and calculate the statistics of the complete and legitimate voting contents of the qualified voters and publish the results

7. The voting system of claim **6**, wherein the voting affair management module further comprises a non-secret vote verification module; and wherein the non-secret vote verification module is used to verify the validity of the voting contents according to the non-secret voting affair, the non-secret voting certificate, and the voter's information.

8. The voting system of claim **7**, wherein the certificate management module comprises a PKI/CA module; and wherein the certificate management module is used to create the non-secret voting certificate which is one-to-one corresponding to the voter's information, and to verify the legitimacy of the non-secret voting certificate.

9. A voting method based on a smart mobile communication device, said voting method comprising installing a client module on the smart mobile communication device and installing a server module on a server device; wherein the server module comprises a voter management module, a certificate management module, and a voting affair management module; wherein the client module and the server module perform digital communications through a mobile communication network; wherein the procedure of the voting method comprises:

Step 1: the server module forms and publishes the voting affair;

Step 2: the voter provides voter's information to the server module through the client module; and the server module according to the voter's information through the voter management module saves the voter's information, and verifies the registration and identity.

Step 3: the server module creates a voting certificate according to the voter's information after the registration verification and identity verification and sends the voting certificate to the client module; and

Step 4: the voter, after using the voting certificate to execute the digital signature through the client module, submits the voting contents of the voting affair to the server module; and the server module calculates the statistics of the valid voting contents and publish the results.

10. The voting method of claim **9**, wherein the voter information saving, registration verification, and identity verification processes are achieved through the voter management module; and wherein the voter management module comprises an identity verification module, a binding module, and an information saving module; wherein the voter information saving process is as follows: the information saving module saves the voter's information; the registration verification process is as follows: after the voter submits the voter's information to the server module, the identity verification module verifies the correctness of the voter's information and sends the verified results to the binding module; when the correctness verification is passed, the binding module binds the voter information one-to-one with the smart mobile communication device number; otherwise, no binding takes place; the identity verification process is as follows: when the voter passes the correctness verification and is bound to the smart mobile communication device number, the identity verification module verifies the validity of the voter's identity; otherwise, no identity verification takes place.

11. The voting method of claim **10**, wherein the voting is a secret voting; wherein the secret voting affair creation and publication via the digital signature in step 1 are achieved through the secret voting affair creation module of the voting affair management module; wherein the secret voting creating module is also used to verify the voter's voting eligibility; wherein the voting certificate is a secret voting certificate; wherein in step 3, the secret voting certificate creation is achieved through the certificate management module; the certificate management module comprises a PKI/CA module; and the creation process of the secret voting certificate is as follows:

certificate requesting step: the voter through the client module and following the secret voting affair creates an asymmetrically encrypted private key and a public key, and encrypts and saves them; the voter then sends a request for the secret voting certificate which is encrypted by the public key to the certificate management module;

certificate obtaining step: the certificate management module receives the request, creates a first random verification code, and then sends the first random verification code through the binding smart mobile communication device number obtained from the voter management module to the voter; the voter then sends the first random verification code which the voter received back to the certificate management module;

verification requesting step: the certificate management module verifies whether the first random verification code that the voter sends is the same as the first random verification code that is saved, verifies through the voting affair management module whether the voter meets the voting eligibility of the secret voting, and verifies whether the voter has previously requested a secret voting certificate; when all of the following conditions are satisfied: consistent first random verification code, eligible to vote, and no previous request for secret voting certificate, then the certificate management module allows the request, sends an issuing instruction to the PKI/CA module, and proceeds to the request forming step; otherwise, the request is rejected and the secret voting certificate creation process is terminated;

request forming step: the certificate name, purpose, valid period, request for signature and the request for the secret voting certificate are serialized to create a secret voting certificate request data package which is then saved and sent to the PKI/CA module;

certificate issuing step: the PKI/CA module uses the private key to decrypt the secret voting certificate request data package, and then verifies the completeness and legitimacy of the decrypted secret voting certificate request data package; if it is complete and legitimate, the PKI/CA module creates the secret voting certificate and saves it; otherwise, the non-secret voting certificate will not be created; and

certificate downloading step: the voter through the client module checks at a given time whether the certificate issuing step is complete; if it is complete, the client module automatically downloads the secret voting certificate; otherwise, downloading does not take place.

12. The voting method of claim **11**, wherein in step 4, after the voter uses the secret voting certificate to execute the digital signature through the client module, the voter submits the secret voting contents of the secret voting affair to the server module; the server module calculates the statistics of the valid secret voting contents and publishes the results; the above process is achieved through the voting affair management module; and wherein the voting affair management module comprises a secret voting creation module, a secret voting module, and a secret vote counting module; wherein the procedure is as follows:

submitting step: the voter uses the secret voting certificate to execute a digital signature for the secret voting affair created in the secret voting creation module, encrypts the secret voting contents and then sends them to the secret voting module;

verification step: the secret voting module receives the secret voting contents, verifies whether the secret voting is within the valid voting period, through the PKI/CA verifies whether the secret voting certificate is legitimate, verifies whether the secret voting certificate and the secret voting affair correspond with each other, and verifies whether the verification data is complete; when all conditions, validity, legitimacy, correspondence, and completeness of the data, are met, the secret voting module saves the secret voting contents and proceed to the vote counting step; otherwise, the secret voting contents are not saved and the calculation and publication of the statistics of the secret voting contents will not continue;

vote counting step: the secret vote counting module uses the private key to decrypt the secret voting contents, through the PKI/CA module verifies whether the secret voting certificate is legitimate, verifies whether the secret voting certificate corresponds with the secret voting affair, verifies whether the secret voting contents are complete, and verifies whether the voting process is legitimate; when all of the conditions are met, i.e., the secret voting certificate is legitimate and corresponds with the secret voting affair, the secret voting contents are complete, and the voting process is legitimate, then the secret voting contents go through the statistics calculation and publication; otherwise, the statistics calculation and publication do not take place.

13. The voting method of claim **12**, wherein the voting method further comprises a vote verification procedure by which the voter verifies the secret voting contents the voter submitted; wherein the voting management module further comprises a secret vote verification module; the verification procedure is achieved through the secret vote verification module, the procedure of which is as follows:

requesting step: the voter submits a verification request to the secret vote verification module of the secret voting affair;

searching step: the secret vote verification module performs the search according to the secret voting affair and the voter's information for the corresponding secret voting contents; if found, the procedure proceeds to the verification step; otherwise, a prompt appears indicating that the corresponding secret voting contents are not found and the procedure does not proceed to the verification step;

verification step: verifies whether the secret voting contents are complete and whether the voter's public key corresponds with the public key of the secret voting certificate; when the secret voting contents are complete and the public keys correspond with each other, a prompt appears indicating that the vote verification succeeds appears; otherwise, the prompt indicates that the verification fails.

14. The voting method of claim **10**, wherein step 1 and step 2 are performed in the order of from step 1 to step 2, or step 2 to step 1, or performed simultaneously;

wherein the voting affair is a non-secret voting affair; the non-secret voting is achieved through the non-secret voting creation module of the voting affair management module; the non-secret voting creation module is also used to verify the voter's voting eligibility;

wherein the voting certificate is a non-secret voting certificate corresponding one-to-one with the voter's information;

wherein in step 3, the non-secret voting certificate creation is achieved through the certificate management module; the certificate management module comprises a PKI/CA module; the procedure of the non-secret voting certificate creation is as follows:

binding check step: this step checks whether the voter's information is bound with a valid non-secret voting certificate; if so, the non-secret voting certificate creation step is terminated; if the voter's information is not bound, the procedure proceeds to the creation requesting step;

creation requesting step: according to the voter's information, a non-secret voting certificate request package is formed, encrypted, and sent to the certificate management module;

verification obtaining step: the certificate management module receives the encrypted non-secret voting certificate request package, forms a second random verification code, and then sends the second random verification code to the voter through the binding smart mobile communication device number obtained from the voting affair management module; the voter sends the second random verification code which the voter received back to the server module;

verification requesting step: the certificate management module verifies whether the second random verification code that the voter sent is the same as the second random verification code that is saved, verifies whether the voter has previously requested a non-secret voting certificate, verifies whether the information of the non-secret voting certificate request package is the same as the information in the voter's registration, and verifies whether the non-secret voting certificate requesting package is complete; when all of the conditions are met, the second random verification code consistency, no previous request for non-secret voting certificate, consistent voter information, and complete non-secret voting certificate package, the certificate management module allows the non-secret voting certificate request, and the PKI/CA module sends the issuing instruction and proceeds to a certificate issuing step; otherwise, the non-secret voting certificate request is rejected;

certificate issuing step: the PKI/CA module forms and saves the non-secret voting certificate according to the contents of the non-secret voting certificate requesting package; and

certificate downloading step: the voter, through the client module, checks at given times whether the certificate issuing step is complete; if it is complete, the client module automatically downloads the non-secret voting certificate; otherwise, downloading does not take place.

15. The voting method of claim **14**, wherein in step 4, after the voter executes the digital signature through the client module for the non-secret voting certificate, the voter submits the non-secret voting contents of the non-secret voting affair to the server module, and the server module then calculates the statistics of the non-secret voting contents and publish the results; wherein the above procedure is achieved through the voting affair management module; the voting affair management module comprises a non-secret voting affair creation module, a non-secret voting module, and a non-secret vote counting module; a detailed procedure is as follows:

voting verification step: the voter submits a request for certificate verification code to the non-secret voting module, the non-secret voting module creates a third random verification code and sends it to the voter's binding smart mobile communication device number;

vote submitting step: the voter submits the third random verification code and the non-secret voting contents to the non-secret voting module;

contents verification step: the non-secret voting module verifies whether the non-secret voting affair is within the valid voting period, verifies whether the third random verification code that the voter sent is the same as the third random verification code that is saved, through the PKI/CA module verifies whether the non-secret voting certificate is legitimate, verifies whether the non-secret voting certificate corresponds one-to-one with the voter's information, and verifies whether the voter is eligible to vote; when all of the conditions are met, i.e., the non-secret voting is within the valid voting period, the third random verification codes correspond, the non-secret voting contents are complete, the non-secret voting certificate is legitimate, the voter's information is consistent, and the voter is eligible to vote, then the non-secret voting contents are saved and proceed to the non-secret contents statistics calculation step; otherwise, the non-secret voting contents are not saved and it exits the non-secret contents statistics calculation and publication step;

contents statistics calculation step: the non-secret vote counting module through the PKI/CA module verifies whether the non-secret voting certificate is legitimate, verifies whether the non-secret voting contents are complete, verifies whether the voting process is legitimate, and verifies whether the voter is eligible to vote; when all of the conditions are met, i.e., the non-secret certificate is legitimate, the non-secret voting contents are complete, the voting process is legitimate, and the voter is eligible to vote, then the non-secret voting contents statistics will be calculated and published; otherwise, they are not calculated or published.

16. The voting method of claim **15**, wherein the voting method further comprises a voting verification procedure in which the voter verifies the non-secret voting contents which are submitted by the voter; the voting affair management module further comprises a non-secret vote verification module; the voting verification procedure is achieved through the non-secret vote verification module; the detailed procedure is as follows:

request submitting step: the voter submits a vote verification request for the non-secret voting affair to the non-secret vote verification module;

information searching step: the non-secret vote verification module performs the search according to the non-secret voting affair and the non-secret voting certificate for the existence of corresponding non-secret voting contents; if they are found, it proceed to an information verification step; otherwise, a prompt appears indicating they are not found and it exits the voting verification procedure;

information verification step: verifies whether the non-secret voting contents are complete and whether the non-secret voting certificate corresponds one-to-one with the voter's information; when the non-secret voting contents are complete and the non-secret voting certificate corresponds with the voter's information, a prompt appears indicating that the information verification is successful; otherwise, a prompt appears indicating the voting verification results are inconsistent.

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