ICT-combined Voting & Counting System

NATIONAL ELECTION COMMISSION

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Election, the flower of democracy

The NEC will achieve good politics, provide good services for the people and shape a good future to realize advanced democratic elections which are free and fair.

CONTENTS

E-Government Survey by UN
Top ranked 3 consecutive times

ICT Development Index Evaluation by ITU
Top ranked 4 consecutive times

In the Republic of Korea, the world's best ICT infrastructure enables voters to vote from anywhere in the nation and allows fast and accurate vote counting.
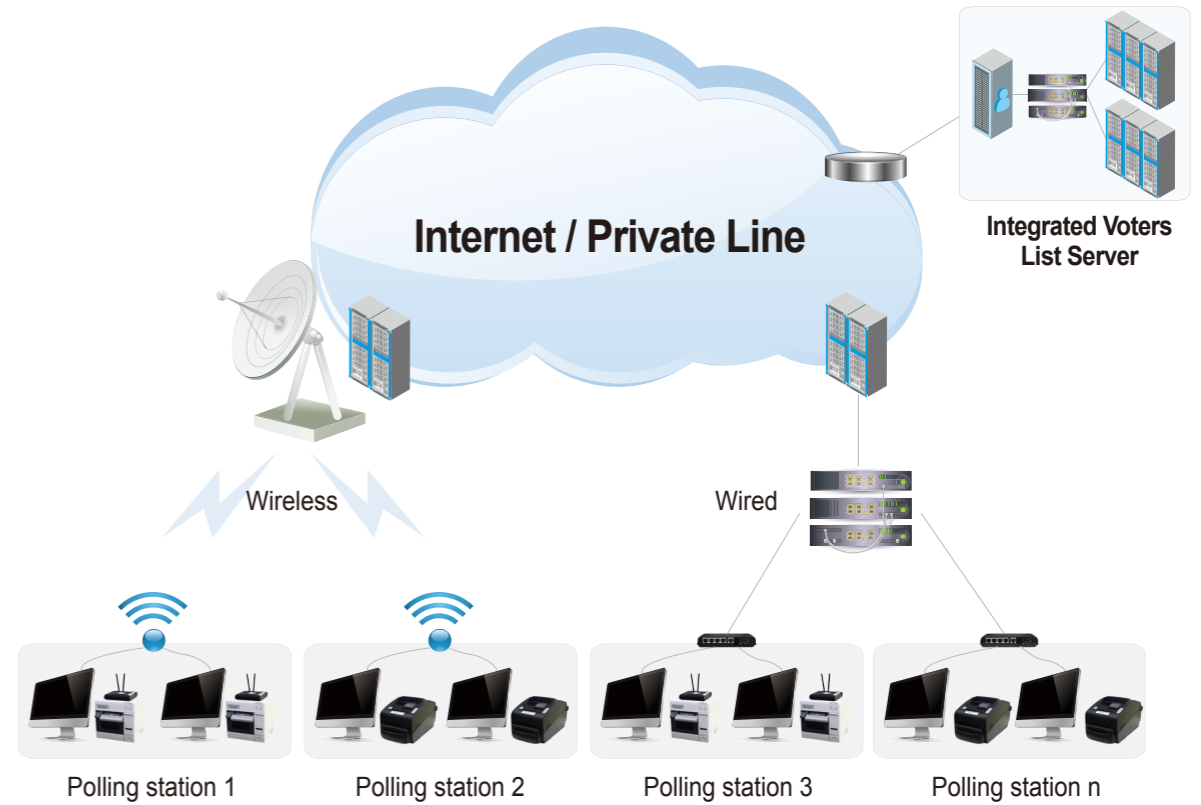
Also, voters not able to vote in Korea on election day can still cast their vote anywhere across the five oceans and six continents through the overseas voting and shipboard voting systems.

Ballot Paper Print

Voter ID Check

Identification
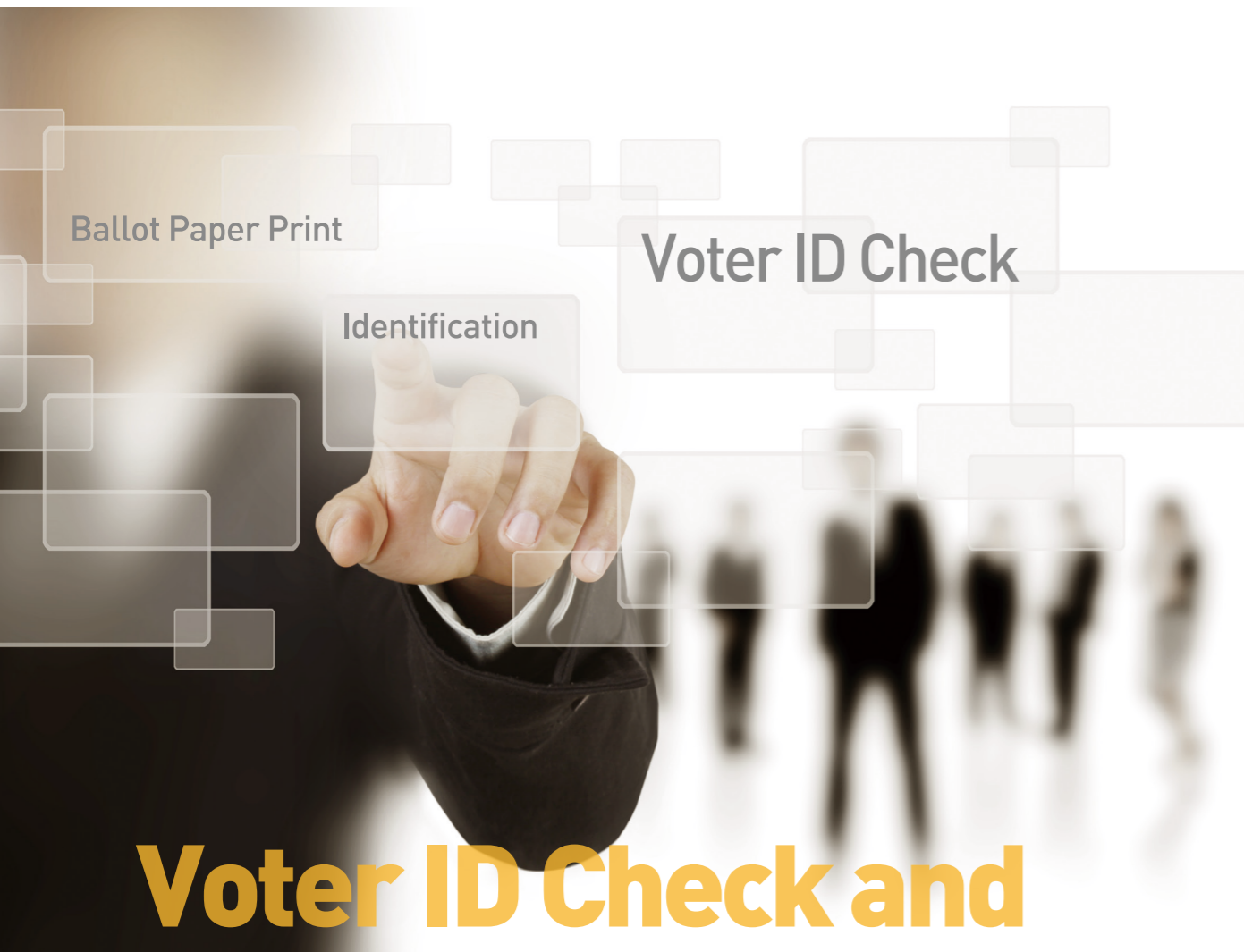
Voter ID Check and Ballot Paper Printing

Registered voters can cast their ballot at any polling station across the country thanks to the integrated voters list and wired/wireless networks, after the voter ID check and the issue of a ballot paper for the relevant constituency. Such familiar paper-based voting and enhanced voter convenience can improve the turnout, reduce human resources and costs and prevent invalid votes resulting from the resignation of a candidate.

Objectives	• Improve the voter turnout by making it easier and more convenient for voters to access polling stations • Prevent invalid votes resulting from the resignation of a candidate, invalid registration, etc. • Reduce the costs and workload required to produce and manage ballot papers
Utilization	• Developed and used in entrusted and private elections in 2010 • Used for overseas voting for the 19th National Assembly elections and 18th presidential election in 2012 • Used for early voting for the 6th nationwide local election in 2014
Special Features	• Registered voters can cast their ballot at any polling station across the country, based on the integrated voters list • A ballot paper for the relevant constituency is issued immediately after the voter list check • Possible to check a turnout in real time and to automate counting by using barcodes

Internet / Private Line

Integrated Voters List Server

Wireless   Wired

Polling station 1   Polling station 2   Polling station 3   Polling station n

■ Ballot Paper Printing Equipment

Wired/wireless communications equipment

Voters list terminal

Ballot paper printer (inkjet, color)

Ballot paper printer (thermal printer, black and white)

■ Ballot Paper Printing Equipment

| Communications devices | wired / wireless communications devices (encrypted communications section)

| Voters list terminal | a memory card-based OS, a touchscreen monitor, all-in-one ID scanner/signature pad/fingerprint recognition machine, smart card issuance, ballot paper printing

| Ballot paper printer | inkjet color printing (ink, ballot paper), black & white thermal printing (ribbon, ballot paper)

Tray
The sorted ballots to be sent to the trays allocated to each candidate

Scanner
The image of ballots to be scanned

Printer
The sorting result to be printed out

Inserting section
Ballots to be inserted

Optical Scan Counter

As an auxiliary device used to assist with swift and accurate counting, it classifies ballot papers by election / candidate and prints the result through a printer. Classified ballots as well as ballots unclassified due to vague marking are all examined manually by the Examination & Tabulation Team for their validity and invalidity, tabulated, and then recorded manually in the counting result sheet.

■ Counting Procedure

| Open a ballot box | → | Sort ballot papers | → | Examine and tabulate | → | Review by commissioners | → | Chairperson's announcement |

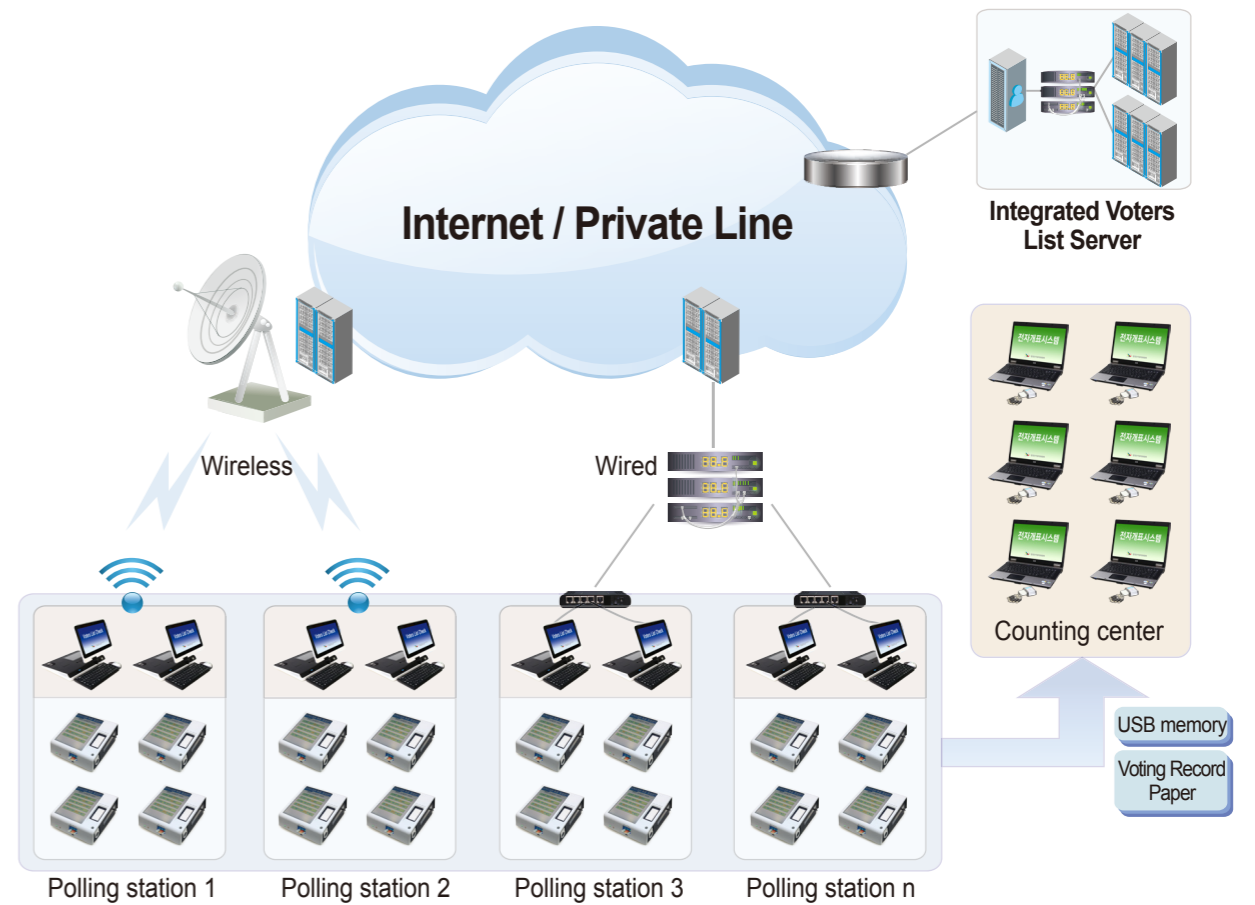| **Objectives**	• Secure accuracy and speed of counting • Smooth counting in a number of simultaneous elections such as local elections • Reduce social costs incurred for overnight counting, etc.
Operating Principle	• Insert and scan a ballot paper, and then recognize the location and form of marking • Send recognized ballots to trays and ambiguous ballots to the "unclassified" tray • Check whether ballots have been loaded properly in the tray and send the result to the control unit
Main Features	• A control unit, a sorting unit, a printer, and a card reader in one device • Automatically control ballot paper insertion and prevent double-feed • Automatically recognize ballots, sort and load them by candidate, and tabulate the result • Sort by election through the recognition of barcodes and adopt a touchscreen • Entirely or individually adjust the length of a tray according to the ballot size • Maintain security by blocking the connection to outside communications networks and encrypting the public key
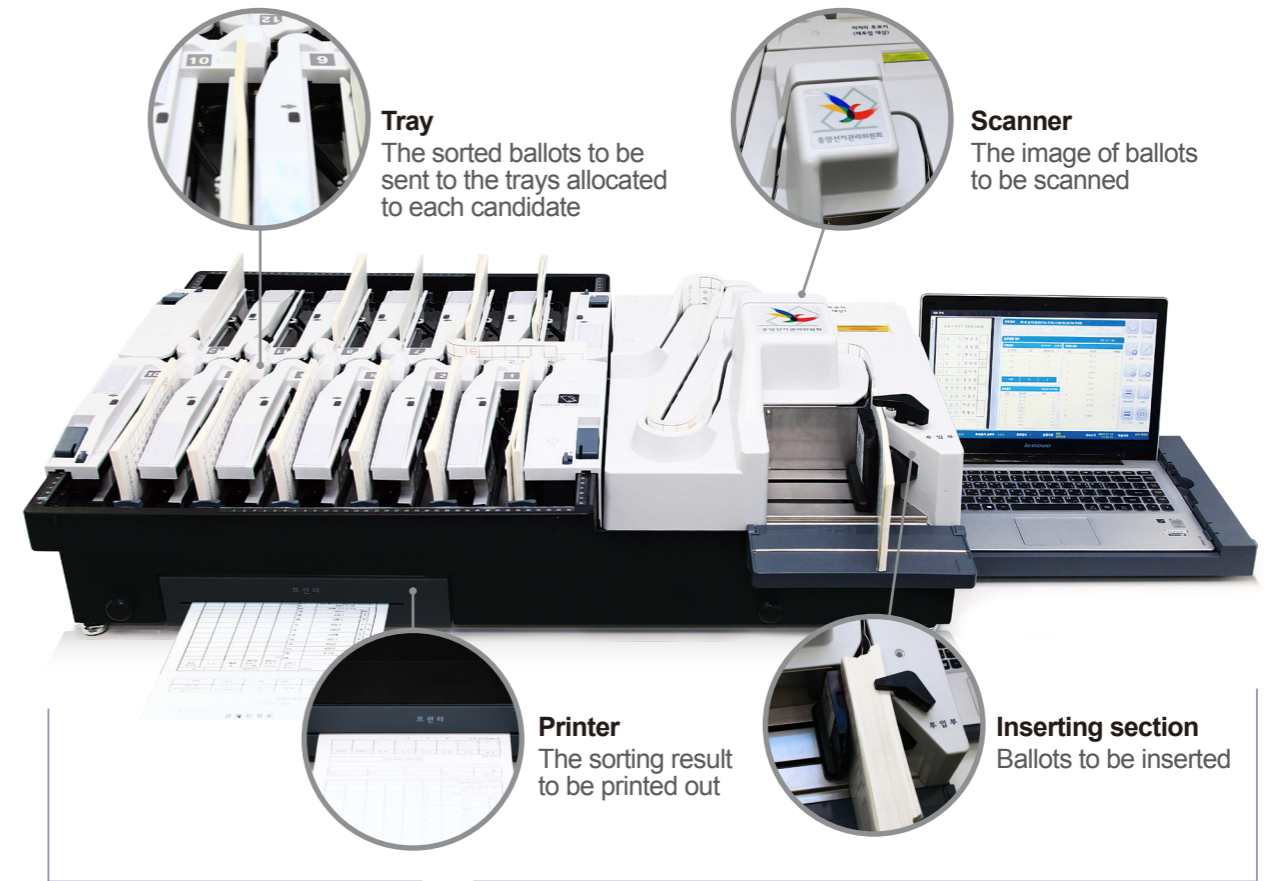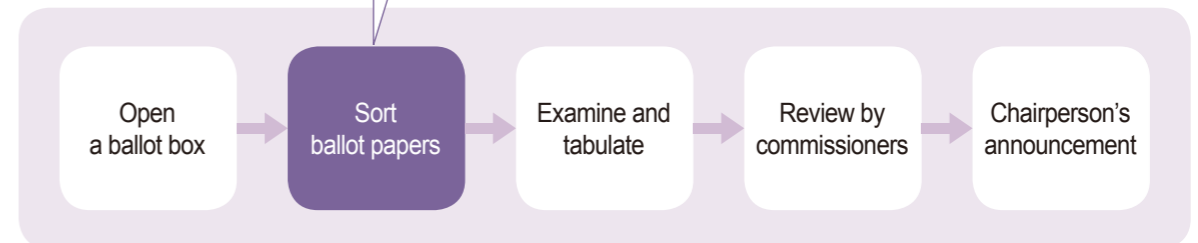
■ Composition of Optical Scan Counter

Control Unit	· Windows 8 touchscreen operating system · Intel Core i5 4200u 4G CPU · 4G DDR RAM, 256GB SSD · 13.3" Touchscreen LCD
Sorting Unit	· Composed of a ballot inserting part, a recognizing part and trays · Dual CCD Scanner (24Bit True Color), 300DPI · Automatic control of an inserting interval by using Feed Reverse Roller (FRR) · Sort up to 420 ballot papers per minute, recognize OMR and scan a barcode · 12 trays (excluding trays for ballots unprocessed and to be discharged outside)
Printer	· Thermal Printer · A4 Size continuous form paper in use

Electronic Voting
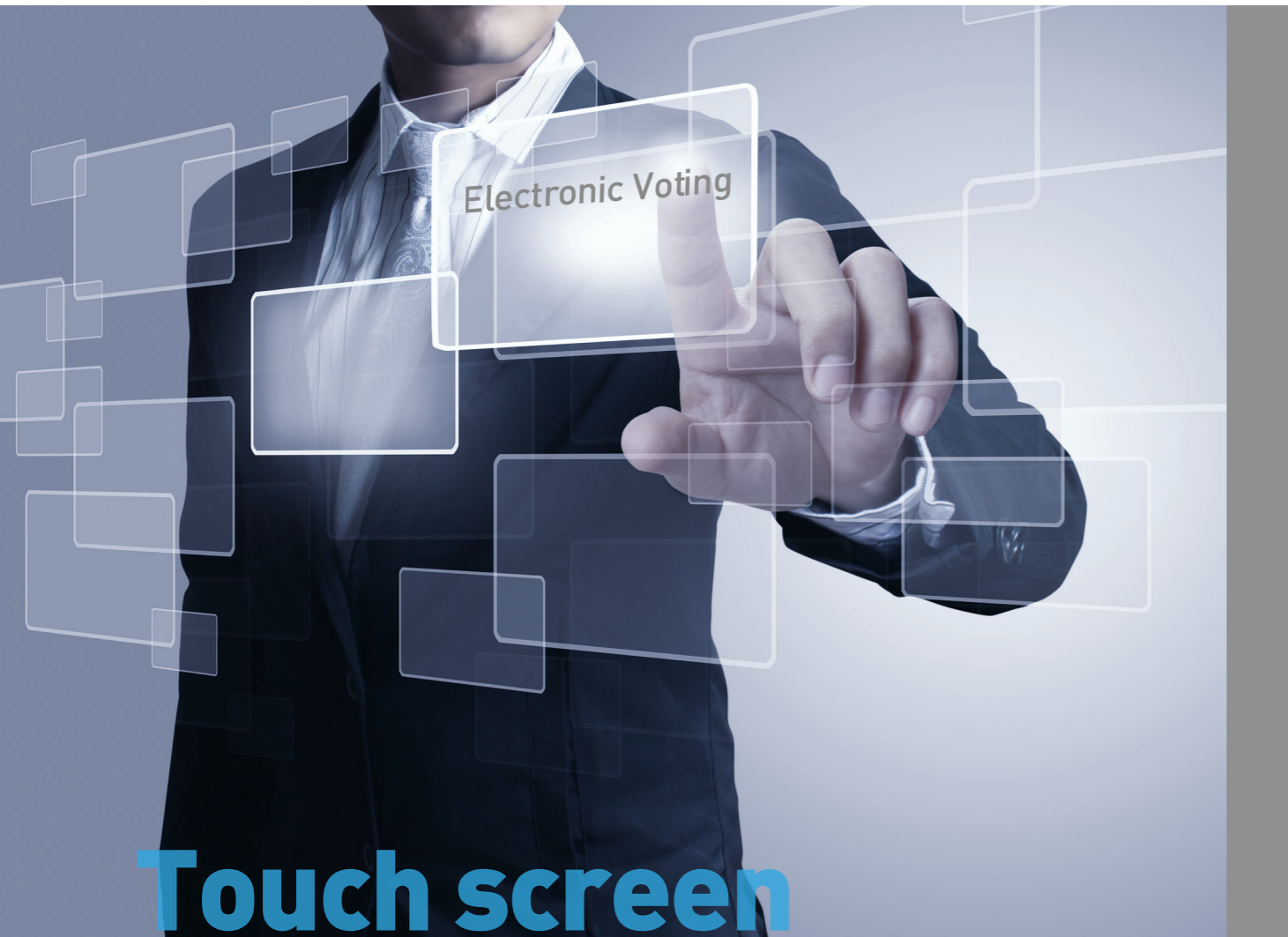
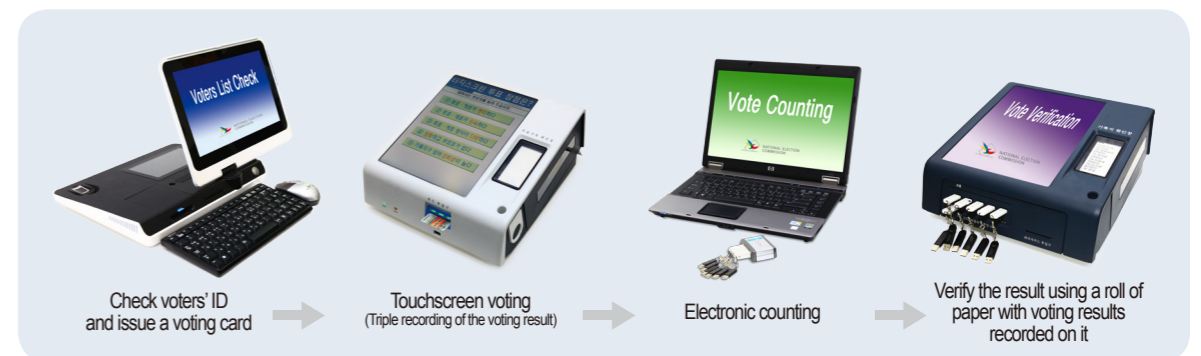# Touch screen
Voting System

The system uses the integrated voters list and wired/wireless network, allowing voters to cast a vote, with their voting cards issued after a voter check, on touch screen machines at any polling station across the country. It can support various voting methods, improve a turnout by enhancing voter convenience, reduce human resources and costs, prevent invalid votes, and facilitate swift and accurate counting.

Objectives	• Improve a voter turnout by enhancing voter convenience • Support various voting and counting methods including an open vote with plural entry, alternative voting, etc. • Reduce the cost and workload required to produce and manage ballot papers
Utilization	• System development in 2006 • Utilized more than 3,600 times in various entrusted and private elections (as of Oct. 2014) • Over 90% satisfaction rate on touchscreen voting
Special Features	• Voting available at any polling station across the country through the integrated voters list • Excellent security based on the independent use of voting machines and public key encryption • Possible to conduct swift and accurate electronic counting and verify the result using a roll of voting record paper

Internet / Private Line

Integrated Voters List Server

Wireless   Wired

Counting center

USB memory

Voting Record Paper

Polling station 1   Polling station 2   Polling station 3   Polling station n

■ Voting & Counting Procedure

Voters List Check   Vote Counting   Vote Verification

Check voters' ID and issue a voting card → Touchscreen voting (Triple recording of the voting result) → Electronic counting → Verify the result using a roll of paper with voting results recorded on it
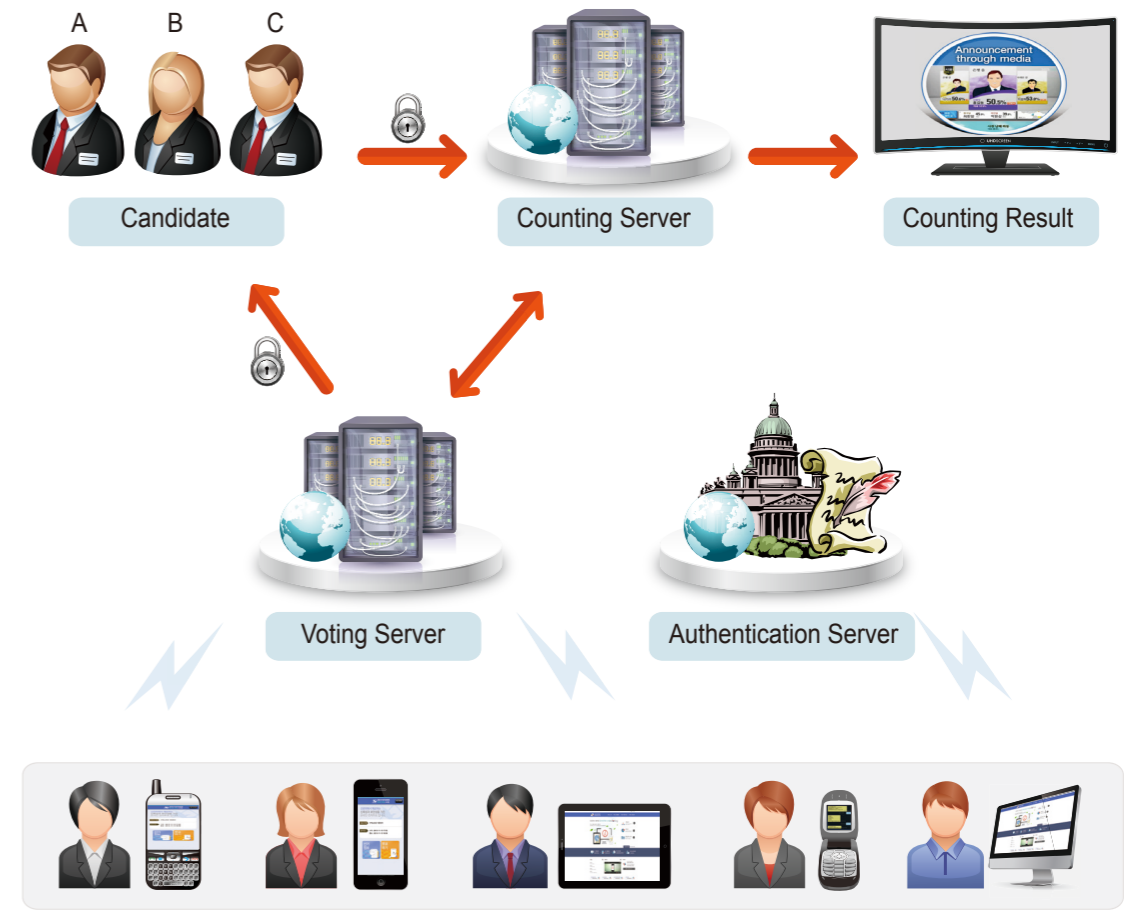
■ Touchscreen Voting Equipment

| Voters list terminal | a memory card-based OS, a touchscreen monitor, all-in-one ID card scanner/signature pad/ fingerprint recognition machine, smart card issuance, ballot paper printing

| Touchscreen voting machine | a memory card-based OS, network connection blocking, triple recording of the voting result, a touchscreen monitor, a smart card reader, a voting record printer

| Counting machine | a commercial laptop, a smart card reader, a USB memory hub

| Counting machine | a commercial laptop, a smart card reader, a verifying machine for scanning and recognizing a roll of voting record paper

Candidate   Counting Server   Counting Result

Voting Server   Authentication Server

Online Voting System

An organization can set various types of voting and counting methods on its own, while voters can cast their ballot anywhere by using Internet-connected PCs or mobile devices such as smartphones. Such a system leads to a high turnout due to its voter convenience, enables voters to check the counting result upon voting, and ensures security and credibility since the principles of accuracy, confidentiality, verifiability, legitimacy, etc., which are essential to online voting, are applied to the system.

Objectives	• Support voting for private elections held to resolve social conflicts and elect representatives of apartment residents, organization, etc. • Secure an efficient voting and counting means, with the scope of entrusted elections expanding • Diversify election services by using cutting-edge ICT infrastructure
History	• The Internet and mobile voting pilot system developed in 2011 • Trial services provided since 2012 for an election for the Korea Association of Social Workers, etc. • The online voting system expanded in 2013
Special Features	• Convenient voting through various IT devices such as PCs and smartphones • Secure high credibility with various authentication means, non-repudiation technology, key partitioning, etc. in use • Maintain managerial, physical and technical security, preventing hacking, DDoS, etc.

■ Types of Online Voting

Yeas and Nays
Cast a vote in favor of or against an agenda or candidate

Selective Voting
Select an agenda or candidate

Range Voting
Rate on an agenda on a specific scale

Score Voting
Enter a score on an agenda or candidate
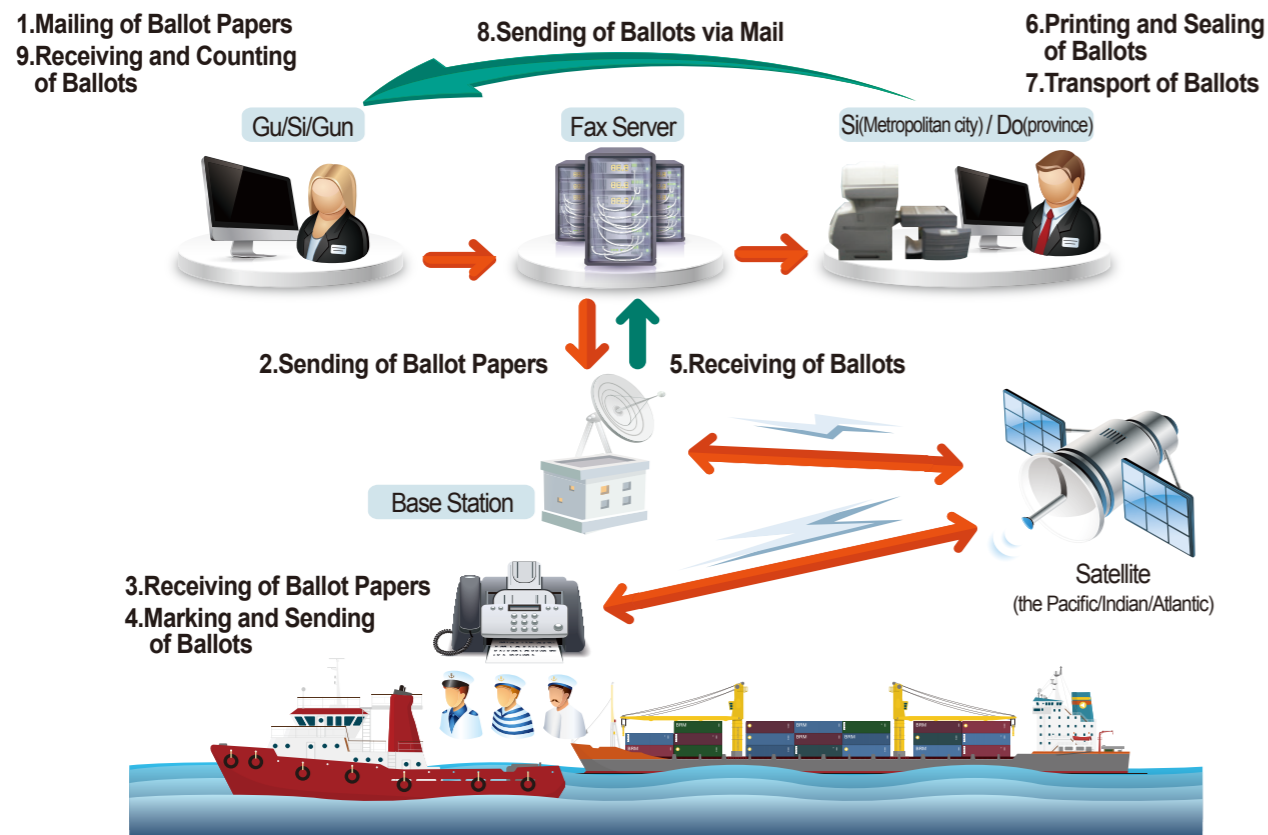
■ Voting Method and Credibility

| Voting method | remote voting (using PC, mobile devices such as smartphones) or voting at the polling station (touchscreen voting or paper-based voting through the ballot paper printer)

| Credibility of Online Voting | · Accuracy : count and reflect all legitimate valid votes into the voting result
· Verifiability : verify the voting result to prevent manipulation of the voting result
· Completeness : any ballot stuffer's interruption is shut off and illegal votes are not counted
· Unity : no non-registered voter can participate in voting
· Legitimacy : a registered voter can participate in voting only once
· Confidentiality : guarantee confidentiality between a voter and the voting result
· Fairness : the data of the votes already cast should not impact the rest of the votes
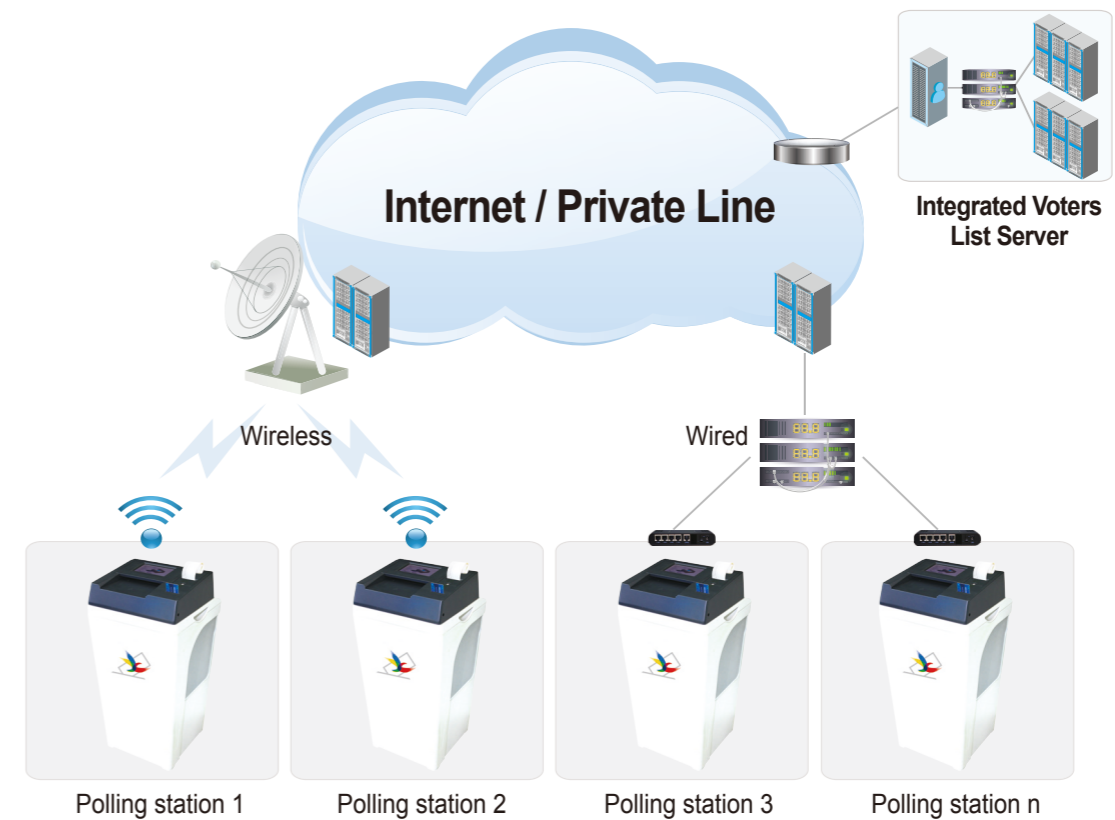
Online Voting System

Shipboard Voting System

When a voter is aboard a ship and unable to vote, the system allows the voter to vote easily on board if he/she makes a shipboard absentee voter report. All processes including absentee voter report, ballot paper preparing and sending, ballot paper receiving and voting, ballot submission, printing in the form of an envelope take place through a fax server and a satellite. As the ballot is sealed and printed through the shield fax, the confidentiality of voting is maintained.

1.Mailing of Ballot Papers
9.Receiving and Counting of Ballots

8.Sending of Ballots via Mail

6.Printing and Sealing of Ballots
7.Transport of Ballots

Gu/Si/Gun   Fax Server   Si(Metropolitan city) / Do(province)

2.Sending of Ballot Papers   5.Receiving of Ballots

Base Station

Satellite
(the Pacific/Indian/Atlantic)

3.Receiving of Ballot Papers
4.Marking and Sending of Ballots

Objectives
- Provide sailors at sea on election day with an opportunity to exercise political rights
- Enhance their sense of pride and patriotism as the people of the Republic of Korea
- Diversify election services by using ICT infrastructure

Introduction Status
- The shipboard voting system developed in 2012 using a fax server and a satellite
- Used in the 18th presidential election in 2012 (turnout: 93.8%, 6,617 voters)
  * Targeted elections: presidential election and the National Assembly elections held at the end of the term

Special Features
- Automatically produce a ballot paper and submit the ballot through a fax server and a satellite
- Submit ballots by entering a unified three-digit number from any ship
- The relevant Commission prints a ballot paper in the form of an envelope after the automatic recognition of the voter

Precinct Count Optical Scanner

In a case where there are many candidates or multiple elections are held simultaneously, the scanner automatically recognizes and tallies up the voting result when voters select candidates marked on an A4-sized ballot paper and insert the ballot into the ballot box. The ballots in each ballot box can be counted immediately after the poll closes, and the counting result can be printed through a printer or submitted to a server through wired or wireless communications.

Internet / Private Line

Integrated Voters List Server

Wireless   Wired

Polling station 1   Polling station 2   Polling station 3   Polling station n

Research Background
- Review a measure appropriate for voting / counting for simultaneous elections and elections with many candidates competing
- Secure voter convenience and facilitate easy and swift counting
- Diversify voting and counting services by using cutting-edge ICT infrastructure

History
- The precinct count optical scanner developed in 2009
- In pilot operation in 2010 in private elections with multiple candidates competing
- Technical support provided since 2012 to a country which introduces the precinct count optical scanner

Special Features
- Easy to mark for multiple candidates in multiple elections (A4 - B4 ballot papers)
- Insert ballots into the ballot box after recognizing marking results and discharge incomplete ballots
- Count the result right after voting and submit the voting result online (secure communications)

"Democracy to Grow
for All Worldwide"

A·WEB
Association of World Election Bodies

A-WEB is an international organization founded with the vision to efficiently and effectively spread free, fair, transparent and participative elections worldwide.

With the objective of strengthening electoral democracy worldwide, A-WEB aims to identify the latest trends, challenges and development in democratic election management and electoral processes and to promote exchange of experiencand expertise among election management bodies.