Seoul Fire Services

119 Integrated Emergency Management System of Seoul

Ver 1.0

Seoul Fire Services 119

Seoul Fire Services

Contents

1. System Overview

The 119 IEMS(Integrated Emergency Management System) was established to achieve a unified control system with cooperation from related agencies to better prepare against and respond to disasters.

Basis of Establishment

- The Framework Act on Fire Services: The Ministry of Public Safety and Security, director general of Fire and Disaster HQ shall establish and operate the 119 Emergency Operations Center to perform various tasks with collective resources to better prepare for disasters and accidents.

Necessities of Establishment

- (The Public) Reduce casualties and damages to properties through prompt response to disasters
- (The Public) Initiate prompt search and rescue mission
- (Government) Establish and maintain efficient firefighting forces through the 119 IEMS
- (Government) Provide proper support to best respond to disasters and accidents depending on situation
- (Government) Optimize and utilize the firefighting resources with the cooperation of related organizations.

Status of Seoul Metropolitan City

- Seoul is a densely populated city with 10 million citizens. The citizens of Seoul suffer from various disasters and accidents that occur everyday.
- From 2011 to 2013, according to the study, the second highest casualties was due to fires, mountain climbing accidents, and flood preceeded by traffic accidents. Fire was the number one cause for property damage in Seoul.

System Overview

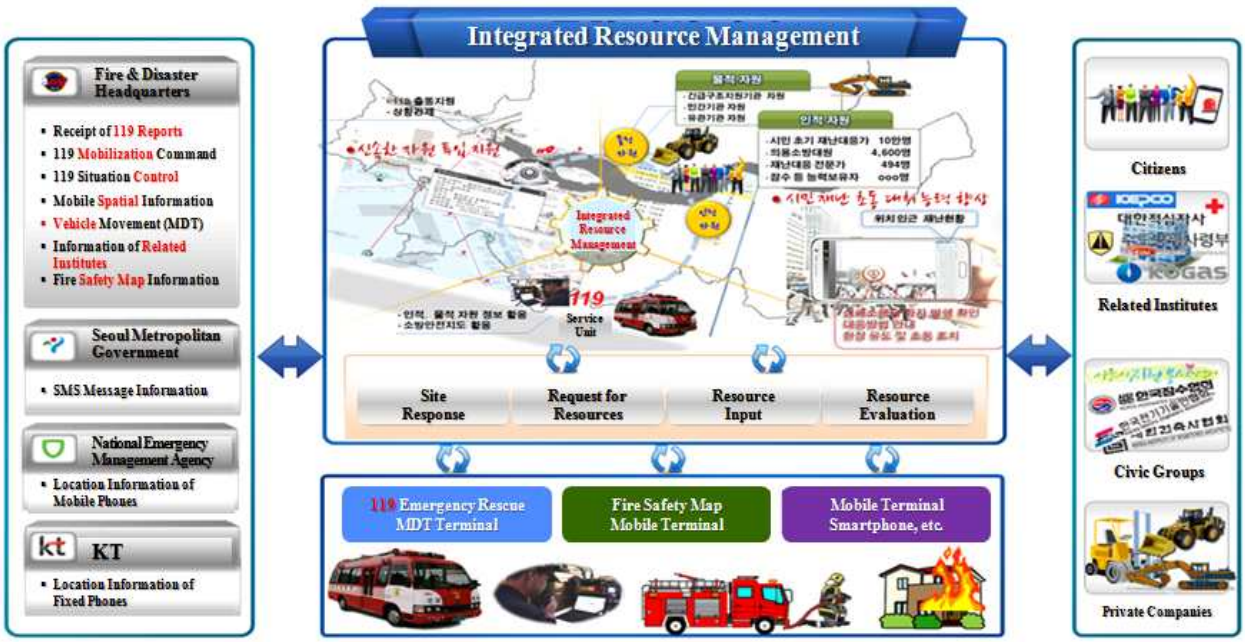
Concept of 119 IEMS

The main task of 119 IEMS is to take 119 calls and initiate firefight operations/rescue missions and dispatch appropriate units to the disaster sites with precision and efficiency.

Process of Fire Protection and Disaster Prevention

Receipt of Reports	Formation of Emergency Service Unit	Situation Info Dissemination	Dispatch	Site Mobilization State Management	Additional Support Request	Request for Higher Authority's Support	Site Information Management	Input of Emergency Rescue Results	Statistical Analysis

Concept of 119 Management



System Overview

119 IEMS - Seoul Emergency Operations Center

With the integrated situation control functions of the Disaster Status Control Center and the Civil Defense Control Agency, The Seoul Emergency Ops. Center acts as a general control tower for disaster management with scientific safety networks established in the system.

Roles

- Specialized emergency rescue processing through an automatized dispatch command system
- Perform close cooperation with related organizations.

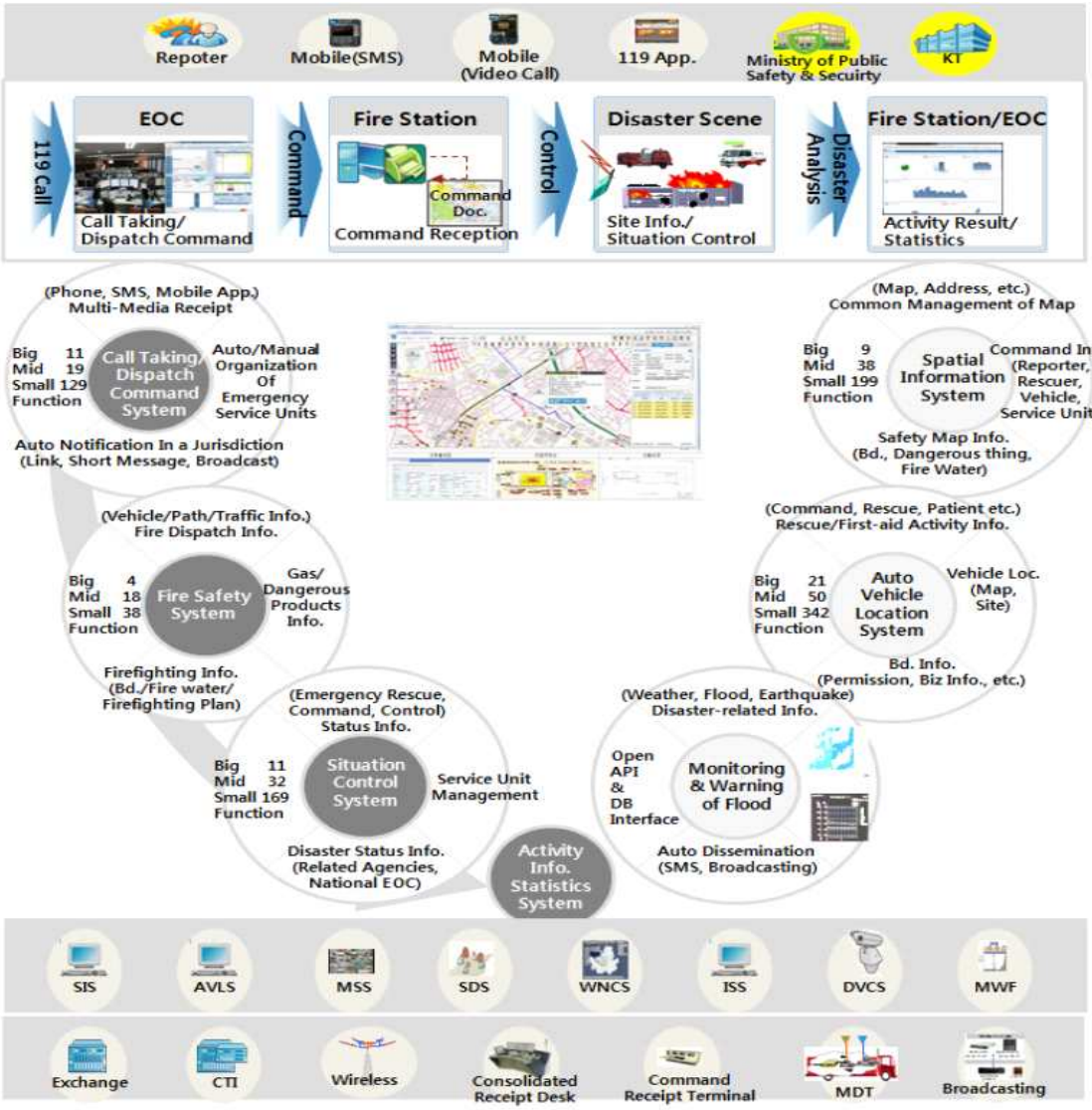
Expected Effects

Before Establishment	After Establishment
❍ Time required to reach disaster site: 35 minutes	❍ Time required to reach disaster site: ~ 1 minute
❍ Insufficient safety measures for firefighters - Unable to locate firefighters and analyze the situation. - Increased number of casualties - Lives of citizens and properties are more likely to be at risk	❍ Supply of firefighter location information - Increased understanding of site situations - Decreased number of casualties - Can monitor each firefighter's action
❍ Experience-based Rescue/firefighting activities - Operations led by experience - Unable to determine any possibility of inflammable gas leaks in advance - Insufficient information on explosions, collapse, etc.	❍ Supply of Safety Map - Prompt grasp of site information and intensive site commands - Secured safety for public facilities - Use of the established fire map for fire safety inspection
❍ Insufficient improvement of site response time - Limited transmission of information to disaster sites - Insufficient information of site situations	❍ Time reduction through use of information on disaster sites - Prevention of large disasters through use of disaster site information - Use of disaster site information

System Overview

119 IEMS

The 119 IEMS's main tasks are to take reports of citizens to 119, to organize fire service units automatically or manually, to issue dispatch command to the frontline organizations, and to generally control the situations.

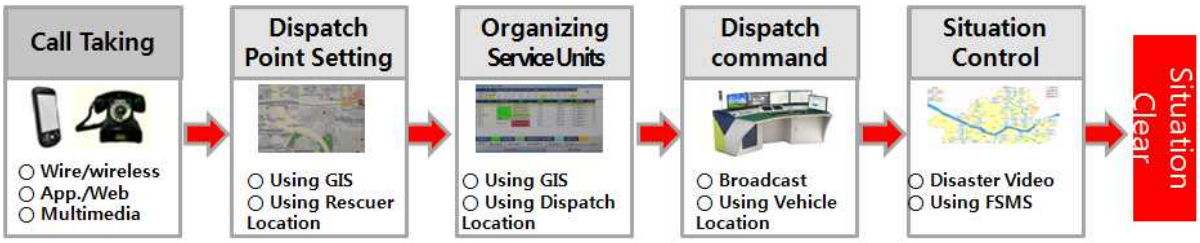


- **Configuration of Main System**
  - 119 Call-taking System, Dispatch Command System
  - Situation Control System, Fire Safety Map System, Activity Statistics System
- **Configuration of Support System**
  - Spatial Information System, Automatic Vehicle Location System, Multi Screen System, Situation Dissemination System, Wireless Network Control System, Info. Support System, Disaster Video Control System, Monitoring and Warning of Flood
- **Special Equipment**
  - Landline Telephone System, Wireless Communication Network System, Mobile Phone, Consolidated Receipt Desk, Command Receipt Desk, MDT, Broadcasting System

2. 119 Main System

The 119 main system supports the Emergency Ops. Center, fire stations, and service units by taking calls for reports, issuing dispatch commands, controlling site situations, and providing statistical activity information.

119 Emergency Rescue Function



Configuration and Functions

Item	Main Function
119 Call Taking System (CTS)	A system that initiates a series of activities after receiving 119 calls - Receive reports via multimedia (text messages, mobile web, etc.) - Determine caller's location - Manage several 119 calls using Computer-Telephone Integration(CTI) system
Dispatch Command System (DCS)	A system that handles dispatch commands - The process of the system is connected wit the Situation Dissemination System
Situation Control System (SCS)	A system that oversees the situation and dispatched units until the end. - Provide any additional information necessary to dispatched units - Provide information regarding the situation to related organizations (i.e. police, maritime police, army, institutes related to gas/electricity/communication/environments, etc.)
Fire Safety Map System (FSMS)	A system that automatically navigates the dispatched units to disaster sites - Before dispatch: status/location of objects, size of dispatched service unit, shortest path, obstacles, etc. - On dispatch: obstacle points, real-time vehicle location, quantity of fire hose near the site - After arrival: location of fire departments, information on toxic chemicals, firefighting plan, real-time images, etc.
Activity Information Statistics System (ASS)	After the operation, reports are made to be recorded and archived for analysis and study in the future. These reports are categorized depending on the type of situation and additional relevant information is available as well.

Receipt of Disaster Report

119 Call-Taking System

A system that collectively takes calls on reports to 119 on fires, situations of rescue and first-aid, natural disaster, civil complaints, and other emergencies via multiple media types, such as wired and wireless communications, text messages, web, SNS, and other communication technology in the 119 emergency operations room.

Functions of 119 Call-Taking System

- **Various reporting methods for citizens' convenience**
  - Mobile phone (wireless), LAN, Web, SMS, MMS, SNS, Automatic Fire-related News receipt, etc.
- **Automatic positioning of callers' location**
  - 119 Call-taking system can locate the caller's location and automatically display it on screen
- **Automatic 119 report in line with fire alarm system**
  - High-value areas (subways, cultural properties, underground shopping areas, etc.)
- First-aid support for emergencies
  - Linked to U-Safety Call, 119 Life Number, Life Tag, etc., people with serious medical conditions can call for immediate medical help/hospital transfer.

Main Features

- **Allows the system to receive reports via multimedia**
- **Allows to review any recorded 119 calls for legal matters**
- **Allows to precisely locate the caller in line with the Spatial Information System**
- **Enables to provide immediate medical care to patients with history of calling 119 for medical attention**

Related Systems

- **Exchange • CTI System, Location Information System, Spatial Information System, etc.**

Dispatch Command System

A system that organizes optimized dispatch service units according to the type and scale of a given disaster; issues dispatch commands in various methods via wireless communication, broadcasting, command papers, etc.; and displays the disaster scene on the MDT mounted in the dispatched vehicles for prompt disaster responses.

Functions of Dispatch Command System

- **Selection of emergency service unit according to disaster type and scale**
  - Selection of the service units can be classified into the categories of fire (39 types), rescue (11 types), first-aid (8 types), and others (11 types)
- **Issuing dispatch commands**
  - The dispatch commands can be notified through PC monitor, fire station speakers, MDT in fire engines, and radio
- **Management of emergency broadcasting devices and recordings of the broadcast**
- **Transmission of text messages regarding CPR patients to near Safety Guards**
  - Text messages will be sent to near Safety Guards who can perform CPR on a patient if they can reach the site before 119 can
- **Real-time transmission of 119 call to dispatch units**
  - Helps the dispatch unit to prepare necessary equipment needed for the operation as well as giving the commander to formulate a strategy plan
- **Transmission of various information to the MDT mounted in fire engines**

Main Features

- **As a result of having the dispatch commands issued in a variety of methods, the dispatched service units can check the occurrence of disasters promptly and easily.**
- **The recording of calls can be used as evidence in assistant of legal matters**
- **The dispatch unit can be optimized and formed in response to various ceratin types of disasters, thus saving resources and manpower**
- **The resuscitation rate of CPR patients has been increased through the maintenance of cooperative relationship with the Safety Guards**
- **Providing optimized route to dispatch unit in real-time allows shortest response time possible and increase the efficiency of disaster response**

Related Systems

- **Integrated Video Control System, Situation Dissemination System, Vehicle Movement Management(VMM) System, Broadcasting System, etc.**

Situation Management for Center

Situation Control System

This system provides rapid informational support between the disaster scenes and 119 Emergency Ops. Center, allowing exchanges of information and also maintaining a cooperative system with the related organizations.

Functions of Situation Control System (Site Support)

- **Displaying real-time video of the disaster site**
  - The real-time video can be seen via 14,720 CCTVs, 2 cameras at each fire station connected to the Emergency Ops. Center
- **Supplying various information necessary to firefighters to better perform at the disaster sites**
  - Various information include real estate portals, any hazardous object around the area, nearby fire hydrants, hospitals, and etc.
- **Real-time management of disaster scenes**
- **Notifying any related agencies for additional information**
  - Notification to 112, KEPCO, etc.
- **Identifying any at-risk citizens near the disaster site**
  - Additional information regarding at-risk citizens can be notified to dispatched units to perform search and rescue missions
- **Real-time video conference calls between the site and the Emergency Ops. Center**
- **Emergency alarm in case of a large-scale disaster**
  - Civil defence alarm system, CBS, DITS (disaster broadcasting), VMS (electronic displays on the road, etc.), etc.

Main Features

- **Allows dispatch of additional service units promptly and the control of site commands by viewing the disaster scene video information in real-time**
- **Prevents accidents of firefighters on the sites and supports appropriate response activities**
- **Reports information to the related institutions in a variety of ways for prompt transmission and prevention of report omissions**
- **Supports life-saving rescues by providing information on at-risk people, such as the disabled who are unable to seek refuge without assistance**
- **Enables remote command and control using the real-time site video conference call**

Related Systems

- **Situation Control System, Integrated Video Control System, Fire Safety Map System, Situation Dissemination System, Wireless Control System, etc.**

Situation Management for Scene

Fire Safety Map System

This is a web-based operation map system that provides all information necessary for fire responses from the dispatch stage in real-time. It provides the location of the fire, the status of buildings, the status of dispatched service units, the location of toxic chemicals, firefighting plans, and fire water, and is reports the information to the related persons in charge.

Functions of Strengthened Response to the Disaster Scenes

- **Real-time supply of information on disaster situations**
  - Real-time supply of information on the initial and additional reports, changes of reports
  - Supply of video information on the activities of first arriving service units and site command post, and functions allowing the determination of whether additional service units are required or not
- **Supply of various types of information on neighboring areas**
  - Supply of information on areas vulnerable to fire, hazardous facilities, traffic, etc.
  - Supply of information on neighboring fire water, disabled residents, etc.
- **Supply of information on the buildings in the disaster areas**
  - Supply of information on building structures, objects, drawings, etc.
- **Response plans and response prediction for the disaster areas**
  - Analysis and supply of information on dead zones, areas with frequent illegal parking, traffic congestion, etc. in order to provide detours for dispatch
  - Supply of information on disaster responses, including placement of fire engines, use of fire water, fire extinguishment plan, etc.

Main Features

- **Allows use of site information on buildings and other necessary items using the mobile phones**
- **Provides automatic supply of information on the neighboring areas upon the issuing of the dispatch command**
- **Enables the provision of appropriate information according to the dispatch steps (prior to dispatch, during dispatch, and after arrival at the disaster scene**

Related Systems

- **Situation Control System, Disaster Image System, Situation Dissemination System, Wireless Control System, etc.**

Analysis of Fire Protection and Disaster Prevention

Activity Statistics System

After the situation is cleared, the activity reports are made to be stored and registered in the system for further analysis in the future. These can be categorized by the types of situations such as fire/rescue/fire-aid. Various types of such information are used to for scientific and systematic *ex post facto* management.

Activity Information and Statistic Analysis by Situation

- **Confirmation of dispatch info. for fire/rescue/first-aid activities and general activities**
  - Linked to the information on fire/rescue/first-aid situations registered on 119 Dispatch Command System, detailed information including the scale of fire forces and other relevant information are input into the system
  - General information related to the general activities of fire forces, such as distance to the disaster scene, arrival time to the scene, termination time, damages to lives and property, etc.
- **Management of natural disaster processing information**
  - Management of information on storms, heavy rain, river flooding, house flooding, deaths, injuries, safe rescues, number of victims, etc.
- **Quality management of rescue activities including the rate of first-aid for the patients**
  - Quality management and evaluation of the rates of medical treatment required and executed for cardiac arrest, severe trauma, medical instruction, etc.
  - Evaluation of individual firefighters using evaluation point criteria, evaluation score tables, and other information
- **Info. Management on persons vulnerable to disasters (the disabled, the elderly living alone, etc.)**
  - Management of information on persons vulnerable to disasters by gender, age, disability, etc. and supply the site service unit with such information
- **Retrieval of various statistics on disasters**
  - Supply of statistics on dispatch history by disaster type, arrival time, contacts with patients, transfer distance, etc.
- **Retrieval of disaster information and issuance of certificates**
  - Supply of report date and time, report methods, contents of accidents, disaster scenes, arrival time, etc.

Main Features

- **Enables the Establishment of a scientific response system and the operation of a fire force by disaster type through use of the activity info. and various statistics on the disaster scenes**
- **Enhances firefighting services for citizens through shorter arrival times, quicker disaster response times, etc.**

Related Systems

- **Dispatch Command System, Situation Control System, etc.**

3. 119 Support System

A system that provides commonly used functions such as spatial information, vehicle movement, wireless network control, etc. in order for the operation of the 119 Disaster Management System

Support System

Item	Main Functions
Spatial Information System (SIS)	As a unit system that deals with retrieval and search of locations for emergency rescue, retrieval and search of layers related to the basic maps and the fire thematic maps, it supports efficient operations of command, control, and information dissemination.
Automatic Vehicle Location System (AVLS)	This system provides real-time information on locations, routes, surroundings, etc. to the terminals (such as notebook, MDT, PDA, UMPC, smart pad, etc.) installed in all the dispatched engines using the wireless data communication network in response to the 119 reports. It supports disaster site activities and facilitates an efficient response to the emergency situations.
Multi Screen System (MSS)	The information on the 119 disaster information in progress and the video images on the activities in the disaster sites are displayed on the large screens to establish command systems through real-time information sharing. It also provides information on weather and resources for emergency medical service to support systematic situation management.
Situation Dissemination System (SDS)	A system that reports real-time situations of site responses and measures and supports the operation of a dissemination system for flexible pre-emptive responses to and efficient handling of the main disaster site situations.
Wireless Network Control System (WNCS)	A system that supports the persons in charge of report receipt and situation control by controlling smooth communications with fire defence headquarters, fire stations, 119 safety centers, site dispatch service units, and dispatched vehicles using wireless network from the time of report receipt to the termination of situations. - Management of remote base stations, radio device and radio terminals
Information Support System (ISS)	A system that retrieves and searches for information on fire stations, objects, fire water, hospitals, related organizations, etc. necessary for command operation, situation control, site activities, and other tasks.
Disaster Video Control System (DVCS)	A system that monitors various disaster image information in real-time by connecting CCTV for main objects to 119 emergency operations room in order to provide maximized work efficiency by prompt response to the disaster situations and intensive situation management.
Monitoring & Warning of Flood (MWF)	A system that acquires disaster related information from the Meteorological Administration, flood control center, rainfall meter, and other sources, and transmits the related information to inside organizations and outside institutes in order to support the pre-emptive activities of related organizations, local governments, and rural communities.

Geographical Information of Real World

Spatial Information System

As a unit system that deals with the retrieval and searching of locations for emergency rescue, retrieval and search of layers related to basic maps and fire thematic maps, it supports efficient operations of command, control and information supply using visualized geographical text information.

Functions of Spatial Information Management and Supply

- **Tracking of geographical positions of reporters and disaster sites**
  - Linked with geographical information such as 119 command information system, data for vehicles (MDT), fire safety map, etc.
- **Editing of maps and data such as building names, fire facilities, degree of hazardous objects, etc.**
  - Editing of information on objects, fire water, fixed obstacles, areas with frequent illegal parking, and other vulnerable points
- **Proposal of optimized and shortest path considering the attributes of roads and streets**
  - Analysis and supply of information on shortest dispatch path avoiding traffic congestion and fixed obstacles
  - Supply of judgment on topography using the digital evaluation model (DEM) for terrain height
- **Display of emergency rescue sites, management of neighboring fire stations/centers and supply of related information**
  - Supply of information on the fire stations in the shortest distance from the location of emergency rescue and on the moving firefighting forces

Main Features

- **Supplies exact location information by displaying locations on the map by disaster type**
- **Supplies visual information on facilities, fire forces, and other relevant information from the detection stage of emergency rescue situation through to the termination stage**
- **Supplies geographic information for command operation, command control, information support, etc. of each affiliated institute**

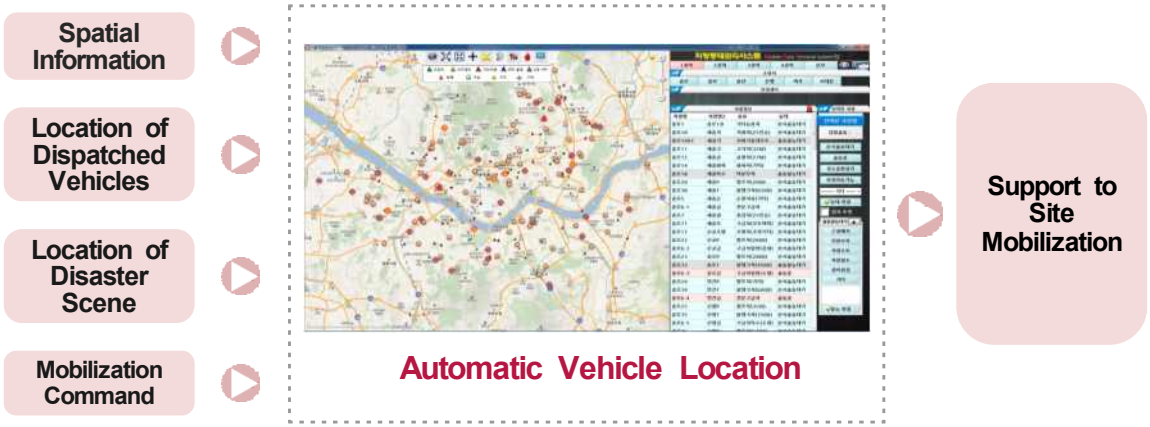
Related Systems

- **119 Call-taking System, Dispatch Command System, Situation Control System, General Disaster Management System, Fire Safety Map, etc.**

Vehicle Control and Support

Automatic Vehicle Location System

This system controls the entrance and exit of fire response vehicles and provides real-time location information to support efficient organization of fire engines for dispatch in case of emergency disasters, and shares information between the center and the dispatched vehicles.



Function of Vehicle Management and Site Information Management

- **Real-time supply of information on the entrance and exit of vehicles to and from garages when dispatch commands are issued**
  - Supply of information on location and path of vehicles
- **Real-time supply of information on homing vehicles for dispatch commands**
  - Real-time supply of information on the vehicles returning to the station after site activities
- **Vehicle Control and Vehicle Movement Management**
  - Supply of information on location and path of vehicles and their movement management
- **Function to search necessary information in the dispatched vehicles**
  - Analysis and supply of information on detours and the shortest path, avoiding heavy traffic, fixed obstacles, etc.
  - Supply of information on dispatch command, reports/patients, objects, hazardous objects/materials, fire water, etc.
- **Management of disaster progress in case of first-aid dispatch**
  - Supply of management functions for first-aid, including arrivals on site, transfer to hospitals, etc.

Main Features

- **Supplies real-time information on fire response vehicles exiting garages, arriving on sites, returning to the station, etc. using GPS**
- **Supplies real-time information on location of fire engines based on the spatial information system**
- **Enables real-time command receipt through the MDT installed in the vehicles and auto disaster site setting**

Related Systems

- **119 Call-taking System, Dispatch Command System, Situation Control System, Activity Information Statistics System, Spatial Information System, etc.**

Supply of 119 Report Information

Multi Screen System

This system displays information on the 119 disaster information in progress and the video images on the activities in the disaster sites on large screens, allowing for the establishment of command systems through real-time information sharing. It also provides information on weather and resources for emergency medical service to support systematic situation management.

Functions of General Situation Bulletin System

- **Real-time display of ongoing 119 disaster information on large screens**
  - Sharing of disasters in progress and under control in the entire Seoul area with all fire service unit members
- **Real-time display of image information on disaster scenes (CCTV, etc.) on a large screen**
  - Connection to 14,720 units of disaster video information (CCTV), 2 cameras in every fire station and video transmission system
- **Supply of information on real-time weather and forecasts according to the site of the Meteorological Administration**
  - Display of wind direction, wind speed, temperature, air temperature, humidity, barometric pressure, rainfall, snowfall, sunrise, sunset, etc.
- **Enables real-time supply of information on 119 emergency medical service resources (hospitals)**
- **Enables real-time display of the number of 119 reports and requests for first-aid service on standby**
- **Enables receipt counting to check the interval of real-time report receipt (in seconds)**
- **Allows for the separate display of disaster situations on the general bulletin by scale, quantity, etc.**
- **Displays a sign board (PR) in case of visits by distinguished external personnel**

Main Features

- **Allows all members in charge of report receipt, control, supervision, report, etc. to share the disaster information in real-time for situation management**
- **Enables remote site command and control in the emergency operations room by sharing the image information on disaster sites**
- **Facilitates flexible operation focusing on the users by dividing image information on the screens for 119 emergency medical services, GIS, image information, etc.**

Related Systems

- **119 Call-taking System, Dispatch Command System, Situation Control System, Integrated Video Control System, Link with the weather information of the Meteorological Administration, Vehicle Movement Management System, etc.**

Pre-emptive Response

Situation Dissemination System

A system that reports real-time situations of site responses and measures and to support operation of dissemination system for flexible pre-emptive responses to and efficient handling of the main disaster site situations.

Functions of Situation Dissemination System

- Transmission of reports on disaster situations to the related organizations via Fax server
- Functions to disseminate situation information by sending SMS, MMS, ACS, etc. to mobile phones of responsible persons and to confirm their receipt
- Installation of cyber-situation room, emergency summons, and use of reports
- Previous registration and management of related organizations classified to the groups for reports
- Function to generate random disaster scenarios and to implement simulation training for disaster responses
- Dissemination of urgent disaster information to the all fire departments and organizations via simultaneous broadcasting facilities
- Dissemination of situations to all organizations including the central administrative institutes, local governments, etc. and confirmation of their receipts

Main Features

- Allows previous selection and registration of groups for situation dissemination to which reports are quickly made via fax, text message, all paging system, etc. according to the type of occurring disasters
- Enables the leading of rapid response activities by providing information to most widely used mobile phones
- Allows the maintenance of consistent report lines and exact responses to situations by sharing the reports and their use made in the cyber situation room
- Allows the dissemination of situational information in the most prompt and accurate manner to all fire stations by voice notification through all paging broadcasting facilities
- Enables the enhancement of abilities of response through simulation training based on the random disaster scenarios
- Facilitates the dissemination of disaster situations to the public using the function to make batch reporting to all central departments and all local governments and to confirm their receipt of such reports

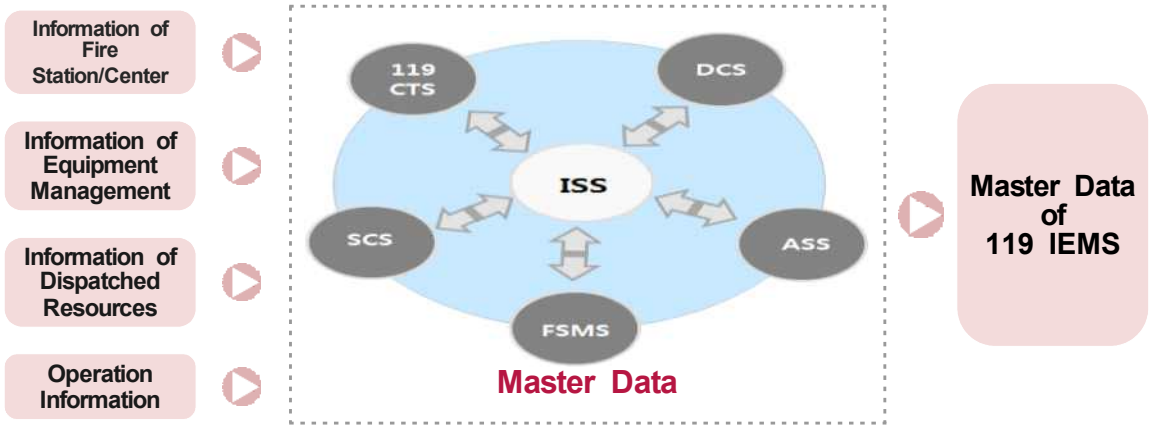
Related Systems

- General Disaster Management System (disaster status control room, cyber situation control room), Fax·SMS·ACS systems, Broadcasting System, etc.

Basic Information

Information Support System

A system that provides basic information and system management for the efficient operation of the 119 Disaster Management System and provides convenience to the emergency operation room and persons in charge of firefighting duties



Function to Supply Basic Information of 119 Disaster Management

- **Supply of Fire Station/Center Information**
  - Supply of basic and organization-related information on fire stations/centers
- **Supply of Equipment Management Information**
  - Supply of information on vehicles, mounted device, radio terminals, etc.
- **Supply of Mobilized Resources Information**
  - Supply of information on related organizations, hospitals, volunteer fire fighters, emergency rescue, fire water, etc.
- **Supply of Operation Information**
  - User and code management

Main Features

- **Establishes and supplies standard basic information in 119 Fire Protection and Disaster Prevention System**
- **Considers use of information of other systems like fire water**

Related Systems

- **119 Call-taking System, Dispatch Command System, Situation Control System, Activity Information Statistics System, etc.**

Field Communication

Wireless Network Control System

A system that supports the persons in charge of call-taking and situation control by enabling smooth communications with fire defence headquarters, fire stations, 119 safety centers, site dispatch service units, and dispatched vehicles using wireless network from the time of call-taking through to the termination of situations

Functions of Wireless Network Control and Operation

- **Function of Control and Operation**
  - Display of wireless base station and channel information based on the location of 119 reporters
  - Channel control and radio activation based on channel information
  - Sharing of emergency rescue information
- **Wireless Network Management**
  - Monitoring of wireless relay station status
  - Monitoring of radio terminals status
- **Interworking function of heterogeneous wireless devices**
- **Issuance and display of alarms for abnormalities**

Main Features

- **Monitors working status of wireless network systems and device**
- **Works with existing wireless networks**

Related Systems

- **119 Call-taking System, Dispatch Command System, Situation Control System, Spatial Information System, etc.**

Disaster Images

Disaster Video Control System (using CCTV)

A system that allows the monitoring of various types of disaster image information in real-time by connecting CCTV for main objects to the 119 emergency operations room for maximized work efficiency by prompt response to the disaster situations and intensive situation management.

Functions of Integrated Video Control System for Disaster Monitoring

- **Real-time monitoring using the image information from 14,942 units of CCTV operated by the related organizations, such fire defence departments, the National Police Agency, etc.**
  - Fire watch (fire defence-47 units), traffic monitoring (police-263 units), monitoring of subway line 1~8 (Seoul Metropolitan Rapid Transit Corporation-8,049 units), monitoring of underground shopping areas (262 units), monitoring of underground communal areas (Seoul City-62 units), 2nd Lotte World building (1,723 units), and others.
- **Real-time remote command for large fires using image information**
- **Monitoring of rivers, drainage systems, forest fires, water levels, hazardous areas, etc.**
  - Linked to the traffic control centers in 8 cities and provinces (nationwide disaster image monitoring system operated by the Ministry of Public Safety and Security)
- **Issuance of alarms and display of locations of fire according to the disaster monitoring systems of related key institutes (security systems, firefighting system, etc.)**
  - Fire protection systems for underground shopping areas (22 areas), communal area monitoring systems (5 areas), and cultural asset monitoring systems for 4 main palaces
- **Guidance for emergency medical services and support for local residents and foreigners via video conference**

Main Features

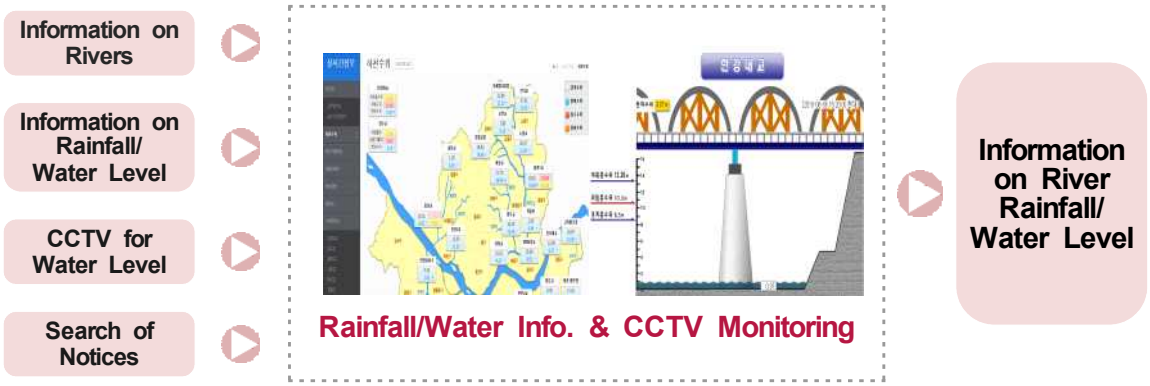
- **Features intensive situation management using CCTV image information and remote command for main disasters**
- **Minimizes damage to lives and property by improving the capability of initial responses using site image screens**
- **Enables the dispatch of additional firefighting forces promptly and the control of site commands efficiently using real-time image information on disaster sites**
- **Facilitates prompt initial responses by receiving fire alarms for important objects like cultural assets**
- **Enhances the brand image of Seoul by providing emergency medical services via video conferences for foreigners visiting Insa-dong**

Related Systems

- **Surveillance CCTV (for fire, traffic, subway, facilities, rivers, forest fires, tunnels, cultural assets, etc.), fire protection system for underground shopping areas, communal area monitoring system, cultural asset monitoring system for four main palaces, nationwide disaster image monitoring system, Insa-dong guidance system, fire breaking news facilities, disaster image system, etc.**

Monitoring and Warning of Flood

A system that acquire disaster-related information from the Meteorological Administration, flood control center, rainfall meter, and other sources and transmits the related information to inside organizations and outside institutes in order to support the pre-emptive activities of related organizations, local governments, and rural communities.



Functions of Monitoring of Flood Forecasting and Warning and Indication of Prior Preparation

- **Possible to identify flood forecasting and warning in the emergency operations room in real-time**
  - Real-time monitoring of information on rivers, rains and water levels of Seoul
- **Real-time monitoring of video information of river state via CCTV**
  - Linked with the Seoul river image transmission system
- **Graphic data display based on GIS**
  - Intuitive data display by map-based expansion and graphs
- **Dissemination of prior preparation information to related organizations, local governments and rural communities, etc. using the situation dissemination system**

Main Features

- **Allows the securing of a golden time for evacuation by real-time monitoring of disaster scenes and dissemination of situations**
- **Facilitates proper disaster response activities by providing various information on disaster sites**

Related Systems

- **Situation Control System, Fire Safety Map, Situation Dissemination System, National Disaster Management System, etc.**

4. 119 Special Equipment

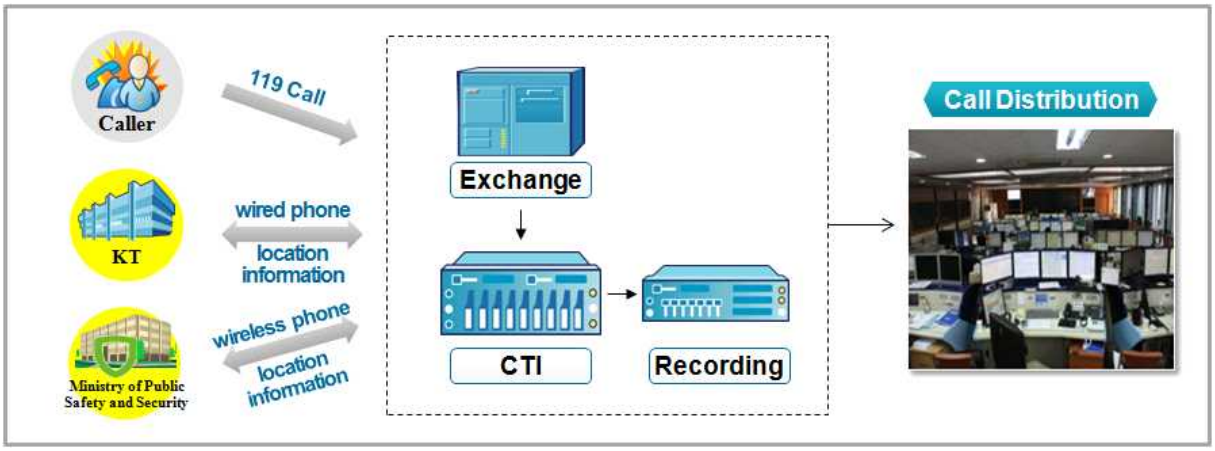
Various types of special device are used to establish advanced emergency rescue systems in integrated and systematic manners to cope with all disasters.

Item	Main Functions
Fixed Telephone System	A system that distributes the 119 emergency reports from citizens via wire and wireless media to the consolidated receipt desk. It is operated based on the principle of call distribution and linked to other cities and provinces.
Wireless Network System	The UHF in 440MHz bands with about 3,000 terminal and remote link station, was used as communication network for on-site fire-fighting. The digital TRS in 800MHz bands(200 channels) with 2,000 terminal and relay station was used as communication network for command, rescue and first-aid activities.
Consolidated Receipt Desk	A special device with which the receptionists proceed calls for 119 reports, operation of commands, information support, GIS, broadcasting, radio communication, reports on site activities, etc.
Command Receipt Terminal	A special device that receives dispatch commands from the consolidated receipt desk of the emergency operations room and makes the information recognized, registered, retrieved and output
Mobile Data Terminal (MDT)	A terminal for disaster management activities. It is installed in the vehicles and used in the AVLS.
Broadcasting System	A broadcasting system that sends dispatch commands to each fire station automatically or manually by type of emergency situation (fire, rescue, first-aid and others)

119 Special Equipment

Fixed Telephone System (Exchange, CTI)

This is a system that distributes the emergency calls of citizens to 119 via wired and wireless media to the consolidated receipt desk. It is operated based on the principle of call distribution, being linked to the other cities and provinces.



Functions of CTI

- **CTI (Computer Telephony Integration), usually called an integration of computer and telephone, is a combination of hardware and software that expands the capability of a computer for tasks related to the public telephone network area.**
  - Distribution of incoming 119 calls, transfer of report calls to ARS or other receipt desks, conference calls, etc.
  - Call transfer to the other cities or provinces
- **Computer, phone, switch, network, voice data, etc. are integrated to send various information to customers**

Functions of Exchange

- **Receipt of various reports via 119 report phone lines from general phone calls, mobile phone calls, etc., to interwork with CTI**
- **Group/two-way communication, instruction statement, auto-response, caller ID display, status monitoring of consolidated receipt desk, etc.**

Functions of Location Search

- **Receipt of address information of fixed phones in cooperation with fixed phone communication service provider (KT-EDS)**
- **Receipt of location information according to the location information system of mobile communication networks**

Main Features

- **Receives report calls via switch, return call, etc.**
- **Determines the necessity of and requests call distribution by CTI program**
- **Receives incoming calls with the receipt phones and makes calls at the consolidated receipt desk**

Related Systems

- **119 Call-taking System, Dispatch Command System, Situation Control System, Spatial Information System, Consolidated Receipt Desk, etc.**

Wireless Communication System

The wireless communication system consists of D-TRS, UHF, and VHF networks. D-TRS network is used for command and report activities, UHF network for site operation, and VHF network for air communication.

Mandatory Functions of Disaster Safety Wireless Communication System

- Direct call between terminals, relay of calls, maintained call connection to the system, no call congestion, etc.
- Individual/group call, paging for specific zones, call intercepting, information on location of terminals, etc.

Features of D-TRS Wireless Network

- D-TRS uses digital communication technology and relay communication method.
- Excellent security level with signal encryption applied
- Many convenient functions, including caller ID display, priority call, call intercepting, etc.
- Communication in broader areas
- Excellent voice quality

Features of UHF (Ultra High Frequency) Wireless Network

- Advantageous for in-building and underground area communication, it uses a direct communication method different from that of D-TRS (in relay communication method)
- Advantage of high survivability, as it is not influenced by fixed line communication networks or troubles of base stations

Related Systems

- 119 Call-taking System, Dispatch Command System, Situation Control System, Information Support System, etc.

Consolidated Receipt Desk

The call-takers precede 119 reports receipt, operation of commands, information support, GIS, broadcasting, radio communication, reports on site activities, etc.

Functions of Consolidated Receipt Desk

- **Receipt of calls to 119 distributed from Exchange/CTI**
  - Increased understanding of the reports contents through conversations with the reporters on the line
  - Retrieval of location information using the telephone numbers of reporters
- **Classification of disasters and registration of location based on the phone call with the reporters using the call-taking system**
  - Linked with disaster classification information and location information
- **Organization of service unit and issuance of commands (broadcasting) using the dispatch command system**
  - Linked with disaster classification information and location information
- **Cooperation with related organizations**
  - Establishment of cooperative system with organizations related to electricity, gas, and the environment

Main Features

- **Ergonomic design in consideration of the flow of human traffic and sound**
- **Installation of additional phone lines in case of line troubles**

Related Systems

- **119 Call-taking System, Dispatch Command System, Situation Control System, Information Support System, etc.**

Command Receipt Terminal

Command receipt terminal receives dispatch commands from the emergency operations room; confirms that the responsible fire station was received such commands, makes the information recognized, registered, retrieved; and outputs the information. When receiving a dispatch command, it is also used to search and output the dispatch command for the relevant reports and disasters and emergency rescue information.

Functions of Command Receipt Terminal

- **Receipt of command using the dispatch command system**
  - Selection of the type of emergency rescue and organization of service unit
  - Retrieval of location information using the telephone numbers of reporter
- **Output of command using the dispatch command printer**
  - Linked with classification of disaster type, location information, etc.
- **Organization of service unit, receipt and report of commands and broadcasting using the dispatch command system**
  - Linked with classification of disaster type, location information, etc.

Main Features

- **Function to check vehicle movement (dispatch, arrival on the site, and return to the station)**
- **Receipt of dispatch command and display of location**
- **Retrieval of information related to dispatch commands to check information on disaster, reporters, etc.**
- **Map screen control function including zoom-in, zoom-out, screen selection, screen change, etc.**

Related Systems

- **119 Call-taking System, Dispatch Command System, Situation Control System, Information Support System, etc.**

119 Special Equipment

MDT (Mobile Data Terminal)

This system provides real-time information on locations, routes, surroundings, etc. to the terminals (such as notebook, MDT, PDA, UMPC, smart pad, etc.) installed in all the dispatched fire engines using the wireless data communication network in response to the 119 reports. It provides real-time information on location, surroundings, dispatch command, navigation for the dispatched vehicles, path for dispatch, and other important issues.

Functions of Vehicle Terminal (MDT: Mobile Data Terminal)

- Function to change vehicle movement (dispatch, arrival on site, departure from the site, arrival at hospitals, etc.) and to manage the driving time
- Functions to provide information related to patient transfer, including patient transfer status, patients' state, emergency treatment, completion of transfer, etc.
- Receipt of dispatch command and display of locations according to spatial information system
- Retrieval of information related to dispatch commands to view information on a disaster, reporters, etc.
- Retrieval of information related to space or location, including address, firefighting objects, fire water, and hazardous things
- Map screen control function, including zoom-in, zoom-out, screen selection, screen change, etc.
- Function to check the location of a member's own car, to guide the path of the car, to provide navigation services, and other services related to vehicle driving
- Function to set the environment of terminals, map layer lists, etc.

Main Features

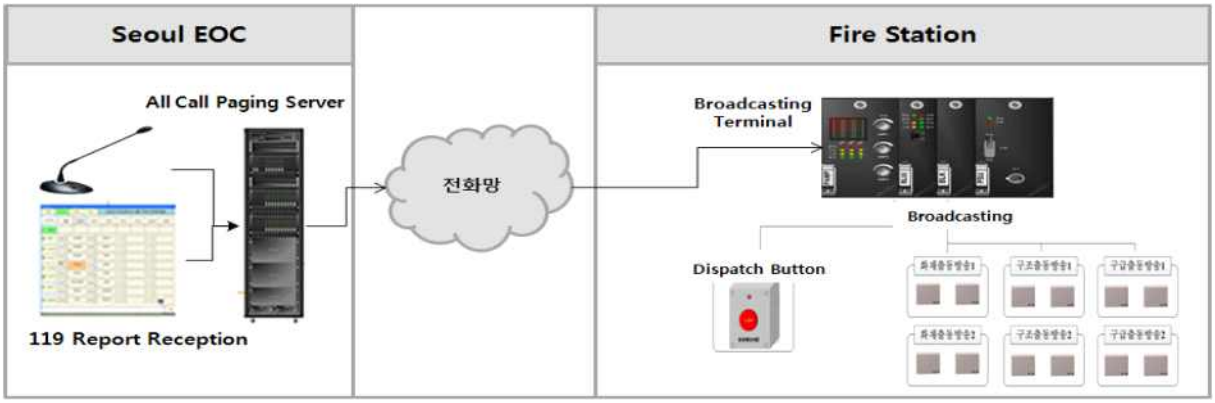
- Support to site activities and analysis of activity information to establish a rapid dispatch system

Related Systems

- 119 Call-taking System, Dispatch Command System, Situation Control System, Information Support System, etc.

Broadcasting System

The broadcasting system sends dispatch commands to each fire station automatically or manually in accordance with the reports received by the 119 call-taking systems by type of emergency situations (fire, rescue, first-aid and others). With the operational functions of individual, group, and all paging broadcastings available, it has features such as preview transmission, improvement of voice quality, and others.



Functions of Broadcasting System

- **Broadcasting of dispatch by the type of disasters with dispatch commands issuance**
  - Broadcasting to the situation rooms of responsible fire stations and safety center in mechanical broadcasting and by voice
- **Forewarning for pre-emptive responses when receiving 119 reports**
  - Real-time transmission of details of phone call with reporters to the fire station using live broadcasting facilities
- **Broadcasting of general notices and automatic broadcasting at a specified time**
- **History management by real-time monitoring of broadcasting terminal status (in remote control, etc.)**
- **Various types of broadcasting (individual, group and all paging) are available using the LCD touch terminal on the receipt desk**
- **Function to transmit success and failure of broadcasting to the emergency operations room**

Main Features

- **Divided bell sounds (for fire, rescue, first-aid and others) for intuitive recognition**
- **Allows the checking of the status of terminal dives in real-time and the success or failure of broadcasting**
- **Connection with various networks**
  - Self wireless network, telephone network (PSTN), mobile communication network
- **Adjustment of broadcasting volume (self-adjustment, remote adjustment by the headquarters)**
- **Redundancy of central control unit and circuit selection (for individual, group, or all paging broadcasting)**

Related Systems

- **119 Call-taking System, Dispatch Command System, Situation Control System, etc.**

Glossary

Standard Terminology	Description
119 Report Receipt	A firefighting procedure whereby reports on situations requiring emergency rescue services are received via all available methods, including fixed line communication, wireless communication, FAX, Internet, verbal notification, and others, then accepted and utilized to formulate necessary measures in response
Fixed Base Station	A fixed radio system installed in the emergency operations room of the headquarters for radio communication via portable and mobile vehicle radio terminals
Spatial Data	Map data displayed on the main screen
First-aid Gear	Gear used for first-aid activities, as stipulated in regulations governing the organization of first-aid units, rescue units, and their operation.
First-aid Location	Location where disasters requiring first-aid treatment occur
Classification of Transferred Emergency Patients	Classification of first-aid patient transfer units into chief/member of first-aid unit, experts, public health doctors, etc.
Classification of First-aid Patient Accepters	Classification of first-aid patient accepters into doctor, nurse, etc.
Symptom of First-aid Patient	Classification of symptoms of first-aid patients into paralysis, faint, dizziness, etc.
Time Required for Rescue	Amount of time taken to rescue patients
Rescue Equipment	Equipment used for rescue activities, as stipulated in regulations governing the organization of first-aid unit and rescue unit and their operation. (Except devices used of first-aid unit)
Rescue Location	Location where disasters requiring rescue services occur.
Homing Date and Time	Date and time when the dispatched service units return to the stations and make reports after dealing with the emergency rescue situations (phone/wireless/terminal)
Basic Statement	All statements used in ARS
Base Station	A fixed radio station used to communicate with the mobile base stations. It receives data from the repeaters/relays, transmits it to the server, and uses a wireless modem to send the data in the server.
Control Desk for Fire Protection & Disaster Prevention	A desk used to take charge of controls, from receiving the contents of 119 reports and the measures taken in response to controlling activities at the emergency rescue site
Range of Emergency Rescue	Range by which to distinguish emergency rescues and to organize the dispatched service unit
Location of Emergency Rescue	Location where situations related to fire, rescue, and first-aid requiring emergency rescue services occur
Type of Emergency Rescue	Type of situation requiring emergency rescue services, such as fire, first-aid, rescue, forest fire, flood damage, etc. in which the fire stations take command of responses
Information of Emergency Rescue	General information, such as type, scale, location, etc., of emergency rescue situations
Emergency Rescue Command	Procedure by which information of emergency rescue situations is propagated via broadcasting/radio/command order, etc. to make each responsible fire station have accurate and appropriate information regarding a given situation
Emergency Rescue Site	Disaster site or neighboring areas where emergency rescue situations related to fire, rescue, first-aid, or otherwise requiring disaster management activities occur

Glossary

Standard Terminology	Description
Recording Equipment	A system that records voice, command broadcasting, radio communication, and other information on film, tape, disc, CD, etc. when emergency rescue situations occur.
Arrival Date and Time	Date and time when the dispatched service unit arrives at the emergency rescue site
Mobilized Equipment	Classification of device dispatched for emergency rescue activities
Same Emergency Rescue	An emergency rescue identical to the received rescue
Same Emergency Rescue Statement	A statement sent when a report refers to the same emergency rescue situation reported by other reporters
Radio Command	Command is transmitted by radio when the dispatched vehicle is on its way to the disaster scene
Cultural Assets	Constructions designated as cultural assets by the Cultural Properties Protection Law
Occurrence Time	Time when disasters occur
Broadcasting Equipment	Equipment used to broadcast dispatch command to each fire station/119 safety center
Hospital	A related organization, authorized by the national government for the treatment of patients
Situation Control Agent	Members who receive the emergency rescue reports and manage the circumstances of the dispatch command
Classification of Fire Station/Center Type	Classification of type of fire station/center into emergency operations room, 119 safety center, headquarters department, etc.
Fire Station (Center)	Fire station, 119 safety center, and 119 regional team that perform actual disaster management activities for emergency rescue under the instruction/supervision of the fire department
Fire Water	Water in fire water facilities such as fire hydrants, water towers, water tanks, etc. and in lakes, ponds, etc. used for disaster management activities
Fire Engine	Vehicle used for disaster management activities such as fire suppression, rescue, first-aid, firefighting support, etc.
Fire Fighting Gear	Machines, devices, gear, vehicles including fire trucks, fire planes, fire boats, and other device used for disaster management activities, such as fire suppression, rescue, first-aid, inspection, and examination of fire
Fire Fighting Boat	General term referring to a firefighting boat, rescue boat, command boat, transportation boat, etc. that performs disaster management activities from/in a body of water
Fire Thematic Map	Thematic maps specifically created for fire stations (fire water, fire station/center, related organizations, hospital, etc.)

Glossary

Standard Terminology	Description
Location of Reporter	Location where reporters are making 119 reports
Reporter Information	Information on the reporter making the emergency rescue report
Guide Speech	The initial guide statement when a report is made
Forewarning Command	Forewarning for dispatch issued when specific circumstances of an emergency rescue situation are not clear
Statement of Misidentification	Statement sent to reporters when emergency rescue is misidentified
Receipt of Misidentified Report	Type of receipt of misidentified reports
Cause of Misidentified Mobilization	Causes of unnecessary dispatch, for example as a result of smoke from cooking or waste incineration
Related Institute	Related organizations such as hospitals, police, electricity companies, gas corporations, communication service companies, and others related to emergency rescues and accidents
Wire Command	Type of command using fixed line broadcasting facilities
Voice Recording	Recording of voice information of reporter's report and circumstances of situation agent
Voice Command Broadcasting	Transmission of voice commands via broadcasting device
First-aid	First-aid treatment, such as securing of a breathing passageway, CPR, etc. made during the transfer of a patient to a hospital
Medical Institute	Hospitals, clinics, public health center, etc.
Time Required for Transfer (First-aid)	Time taken for patient transfer as a result of first-aid activity
Statement for Mischievous False Report	ARS statement against mischievous and false reports
Arrival Time at a Disaster Scene	Time when the service units arrive at the disaster scene
Receipt Route	Classification of report receipt route into general LAN phone, mobile phone, public phone, etc.
Terminal for Receipt	Computers used to receive reports and to manage organization of dispatch service units, etc.
Consolidated Receipt Desk	A desk used to receive 119 reports, to determine the situation of emergency rescue including location and scale of emergency rescue, to organize dispatch service units, and to control forewarning and dispatch commands
Receipt Number	Emergency rescue receipt number generated when pressing receipt confirmation button Receipt Number=Year + Month + City and Province Code + order
Emergency Operations Room	A place where controls are implemented for activities related to emergency rescue from receipt119 call-taking, dispatch command, site activity support, firefighting plan, etc.
Command Control	A system for the receipt desk of general operation room of fire & disaster headquarters
Receipt of Command	A system that receives the dispatch command and supplies dispatched units with information on emergency rescue, locations, and other relevant information
Command Receipt Desk (Fire Station/Center)	A desk used to receive the dispatch command message from the desk of emergency operations room of fire & disaster headquarters or to manage emergency reports

Glossary

Standard Terminology	Description
Clinics	Subject of medical treatment for first-aid patients
Fire Fighting Activities	A series of firefighting procedures to resolve emergency rescue situations such as fire, rescue, first-aid, etc.
State of Progress	Classification of progress and circumstances into report receipt, dispatch command, arrival at disaster scene, etc.
Data Terminal for Vehicle	A computer-based aspect of the MDT (Mobile Data Terminal) used in vehicles
Vehicle Movement	Vehicle status of each 119 safety center, fire station, etc.
Radio Terminal for Vehicle	A radio terminal-based aspect of the MDT (Mobile Data Terminal) used in vehicles
Arrival of Call	Call connection to the switch
Incoming Call	Telephone number, among the information (incoming call number, code of phone classification, name of reporter, incoming state code, etc.) of an incoming call connected to the switch and going through KT-EDS (Korea Telecommunication Electronic Data System, a database in which name and address of KT subscribers are stored)
Classification of Incoming Call Processing	Classification of incoming call processing into normal, false, all paging, etc.
Information of Incoming Call	Information of an incoming call connected to the switch and going through KT-EDS
Number of Incoming Call	Incoming Date + Incoming Call ID
ID of Incoming Call	Serial number (00001-99999) of incoming call connected to the switch
Channel	Internal line number
Channel Monitoring Equipment	Equipment used to monitor the current state of all radios of the fixed base station and to transfer the state information to the MCU
Channel ID	Names by which to divide channels (P01-P04, A01-A16)
Listening	The process by which the person in charge of receipt listens to the reporter's voice in the middle of ARS service before accepting the report
Desk for General Supervision	A desk used to control, supervise, and support command activities of the emergency operations room
General Mobilization	Mobilization of all service units
Additional Mobilization	Additional dispatch made by several 119 safety centers randomly selected after the 1st dispatch (not the2nd dispatch)
Scale	Specific proportion used when displaying the actual topography on paper
Mobilization Type	Mobilization is classified into confirmation dispatch, 1st dispatch, 2nd dispatch, 3rd dispatch, general dispatch, air force dispatch, support dispatch, homing dispatch, and others
Mobilized Service Unit	Mobilized resources to be used for emergency rescue situations
Automatic Organization of Service Unit for Mobilization	A series of procedures to automatically organize the dispatch unit with highest adaptability to the reported situation after 119 call-taking

Glossary

Standard Terminology	Description
Location for Mobilization	Location of a disaster
Date and Time of Mobilization	Date and time when dispatch commands are issued
Mobilization Command	Order given to mobilize the fire service units
Communication Room	Location where communication device used for 119 Disaster Management System is managed and operated
Communication Equipment	Equipment necessary for communication and information exchange in order to perform firefighting duties
Call	Calling signal recognized at the switch
Classification of Calls	Classification of call statues into Busy and Idle
Code to Check Stand-by Calls	A code that checks if the receipt desk is ready to receive calls (T/F)
Status of Call	Display of classification of calls by channel, number of incoming call, received date and time, progress date, and time
Call Signal	Calling signal recognized by the switch when making calls
ACD (Automatic Call Distributor)	ACD is a phone facility that manages incoming calls based on the processing instructions regarding the number of incoming calls. ACD is used for services such as identification of callers, response to the external calls, call transfer to the person in charge, callers' message recording, statistics on use, balanced use of phone lines, etc.
ACS (Adaptive Channel Sensing)	Device that connects the incoming signals using the switching signals transferred by the order of MCU to the main and sub-speakers and transmits user's incoming signals
ALI (Automatic Location Identification)	GPS (satellite Global Positioning System) is used for the mobile communication service providers to position the location of mobile phone subscribers with a margin of error of tens of meters, and is extremely useful during emergency situations or disaster rescue. E911 (enhanced 911) is a service that positions the subscribers' location with a margin of error of tens of meters using satellite and delicate GPS technology, and broadcasts such information automatically to fire stations and polices. E911 Phase Ⅱ is an obligatory service of communication service providers stipulated by the FCC (Federal Communication Commission), which also makes the ALI (Automatic Location Identification) function available. Whereas with Phase I it is possible to view the identity of the reporter, Phase II also allows the tracing of the exact location of the reporter.
ANI (Automatic Number Identification)	ANI is a service that provides the caller's phone number to the receiver. This function is used from time to time when the caller needs to notify the rescue service unit in the emergency center of its location for rescue. If the phone number of the caller is known, it is possible to determine the exact location of the caller. In general, the ANI function is included in the 119 number related to public safety.
ARS (Automatic Response Service)	This is a service with which a computer with recorded response contents interprets external questions and provides answers to callers.
CCSE (Call Control Service Entity)	An engine that controls the signals of switch and receipt desk in link with the switch in the CTI link

Glossary

Standard Terminology	Description
CDMA (Code-Division Multiple Access)	CDMA (Code Division Multiple Access) is a technology used to encode the signals of each channel for distinction and multiple access. CDMA makes it possible for two base stations or mobile radio stations to communicate with each other using a repeater, as well as for multiple numbers of base stations to communicate with one another in a multiple access method using a repeater. It is one of the technologies used to avoid interference caused by the use of a repeater by multiple base stations.
CID (Caller-ID Service)	A service used to notify the receiver of the caller's phone number
CRIS (Cognitive Radio Intermediate System)	A system that receives a wireless signal (IDO from MCU), to search its own database to find the relevant receipt desk, and to transmit communicated messages to the relevant receipt desk
CSU/DSU (Channel Service Unit/Digital Service Unit)	CSU/DSU are hardware devices in the external model used to convert the digital data frames generated by the communication technologies used for local area networks to the frames appropriate to be sent to the wide area network.
CTI (Computer-Telephony Integration)	This is used to manage phone calls using computers. This terminology is used to refer to the computerized switching service that connects the incoming call from the outside to the internal relevant department. It is sometimes used to make phone calls and to manage a number of calls.
CVI (Channel Voice Interface)	Interface unit of the receipt desk
DBMS (Database Management System)	This is the program that enables a multiple number of computer users to record data on the database or to access the database. DBMS allows anyone or any program in the multiple user environments to use data without knowing where such data is stored in the storage by managing the requirements of users or other programs.
DID (Direct Inward Dialling)	A method by which the external subscribers dial the extension numbers directly. There are two types: analog and digital (T1/E1)
DOD (Dial Outward Dialling)	A method for the internal subscribers to occupy the main wire for dialling
DTMF (Dual Tone Multiple Frequency) Tone Decoder	A device used to detect and transmit the ID in each radio terminal to the MCU
Dynamic Panning	Quick movement of screens
E-1	E1 is the European digital transmission standard designed by ITU-T and named by CEPT (Conference of European Postal and Telecommunications administrations), corresponding to the T1 standard of North America. The E1 signal format accommodates 32 channels of 64Kbps in speed, resulting in a data transmission speed of 2.048Mbps.

Glossary

Standard Terminology	Description
GPS (Global Positioning System)	GPS is a system that can position locations in real-time in air, at sea, and on land regardless of whether the location is static or moving. It was initially a military navigation system developed by the US Department of Defense, but can now be used for civil purposes in limited ranges. It is a radio navigation system using satellites. GPS is also a general terminology referring to positioning technology using satellites.
KT-EDS	A KT database used to store name and address of KT subscribers
MDF (Main Distribution Frame)	MDF is a unit connecting external lines with internal lines. It is used to connect the public or private lines coming from outside to the internal network. MDF is generally installed near the telephone switch. The number of terminals in the line side is higher than that of the switch. As a result, MDF takes the role of line concentrator.
MDT (Mobile Data Terminal)	Wireless data terminal
PCM (Pulse Code Modulation)	PCM is the technology used to digitalize analog data to be transmitted. PCM signal has only two codes, displayed as either 1 (high) or 0 (low), even in the case of highly complex analog wave forms. It is possible to digitalize all kinds of analog data such as video, voice, music, remote measurement, virtual reality, etc. using PCM technology.
PSTN (Public Exchanged Telephone Network)	PSTN refers to globally connected public telephone networks that focus on voice communication, including both commercial and state owned networks. PSTN is a set of circuit switching telephone networks continuously developed from the age of Alexander Graham Bell, the inventor of the telephone. Today's PSTN has been digitalized, with the exception of the vertical links from the telephone office to the users.
T-1	The T1 line system was introduced by Bell Systems in the USA in the 1960s, the first system to successfully support voice transmission. With a transmission speed of 1.544Mbps, the T1 line is widely used for Internet connections by Internet service providers.
TTS (Text-To-Speech)	Voice synthesis application used to convert the text of computer documents into voice. A computer with voice synthesis function converts characters into voice for output to speakers.
UHF (Ultra High Frequency)	UHF has a wavelength of 1m to 10m and a frequency of 300MHz to 3,000MHz. Its wavelength is shorter than that of VHF (Very High Frequency) and the linearity is stronger, meaning UHF can have an increased number of channels despite its limited service area (range).
VoIP (Voice Over Internet Protocol)	A system that makes communication available using the IP network (Internet) and the existing PSTN network (telephone). It converts voice to data, and then sends that data via the Internet network using gateway device. Communication costs for long distance calls (toll call, overseas call) can be saved using this technology.
VPN (Virtual Private Network)	With virtual private networks, users who do not have their own communication network can operate and manage a private network using a public data network. Internet VPN services that use the Internet network as a virtual dedicated (private) network are useful for companies with overseas branches, because a dedicated network can be configured by connecting the headquarters with an ISP (Internet Service Provider) and connecting the ISP to their branch offices.

Seoul Emergency Operations Center: Responsible for People's Safety

Seoul Fire Services