

# Constructive Ideas of Comprehensive Transportation Dispatch and Emergency Command System in the New Era

Bin Wei<sup>1</sup>, Jiandong Cao<sup>2,\*</sup>, Weirong Luo<sup>3</sup>

\*caojiandong@catsic.com

<sup>1</sup>Sangfor Technologies Inc. Shenzhen 518000, China

<sup>2</sup>China Academy of Transportation Science Beijing 100010, China

<sup>3</sup>Sangfor Technologies Inc. Shenzhen 518000, China

**Abstract:** In the new Era, comprehensive transportation dispatch and emergency command system has become a concerned subject. By sorting out business characteristics, overall architecture and construction, the article summarizes development status of comprehensive transportation dispatch and emergency command system. Proceed to the next step, the article thoroughly analyzes two major changes of comprehensive transportation dispatch and emergency command system in the new Era: management transforms from data management to data asset management, and application transforms from data statistics to data intelligence. In view of the above, the article proposes overall architecture, horizontal and vertical logical architecture for comprehensive transportation dispatch and emergency command system.

**Keywords:** Comprehensive Transportation, Data, Dispatch, Emergency Command.

## 1 INTRODUCTION

In the new era, empowering transportation development with data resources and building a comprehensive transportation data center system has become an important task in the construction of a strong transportation country. Therefore, it is necessary to conduct in-depth research and discussion on the construction ideas of comprehensive transportation data brain (also known as comprehensive transportation dispatch and emergency command system).

## 2 CURRENT STATUS OF DISPATCH AND EMERGENCY COMMAND SYSTEM

The construction of comprehensive transportation dispatch and emergency command system started from "Highway and Waterway Traffic Safety and Smooth and Emergency Disposal System Project" in the 12th Five-Year Plan period, and developed to "Comprehensive Transportation Dispatch and Emergency Command System, Transportation Information Resources Exchange and Sharing and Open Application Platform" in the 13th Five-Year Plan period, covering transportation modes from the initial highway and waterway to various

transportation modes such as highway, railroad, waterway, civil aviation, postal service and public transportation in key cities, and covering business departments from the initial transportation industry internal coordination to cross-industry multi-departmental coordination such as public security, emergency response, health committee, land and weather [1].

## 2.1 Dispatch and Emergency Command System 1.0

In the first year of the 12th Five-Year Plan, the Ministry of Transport officially issued the "Highway and Waterway Transportation Information Technology '12th Five-Year' Plan for Development", which pointed out that the Ministry of Transport organizes the construction of four major projects, including highway and waterway traffic safety and smooth and emergency disposal system, transportation economic operation monitoring and early warning and decision analysis system, highway and waterway traffic travel information service system, highway and waterway construction and transportation market credit information service system. Among them, the highway and waterway safety and emergency disposal system can be regarded as "dispatch and emergency command system 1.0".

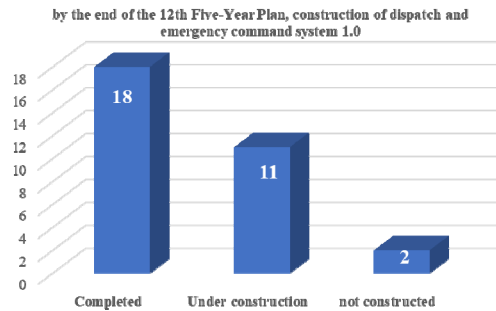


Figure 1 Construction of dispatch and emergency command system 1.0

### 2.1.1 Business Characteristics

Highway and waterway traffic safety and smooth and emergency disposal system is positioned to solve three major business problems: the first is to realize the visible, measurable and controllable properties of highway and waterway infrastructure and carriers; the second is to achieve the cross-regional and cross-level information sharing and coordination and command of highway and waterway; the third is to address the emergency communication guarantee and emergency disposal coordination of highway and waterway emergencies.

### 2.1.2 Overall Architecture Model

In terms of construction content, highway and waterway traffic safety and smooth and emergency disposal system mainly constructs national and provincial road network management system, highway network management system, road transport operation management system, waterway operation management system, waterway safety operation management system and other professional systems and transportation emergency disposal comprehensive system, supplements and improves the basic database of highway and waterway, safety and emergency database, constructs the dynamic monitoring terminal covering important highway sections, bridges, emergency rescue vehicles, emergency

transport vehicles, improves wired and wireless communication system and comprehensive communication and dispatching system, etc.

## 2.2 Dispatch and Emergency Command System 2.0

In the first year of the 13th Five-Year Plan, the Ministry of Transport officially issued the "13th Five-Year Plan" for the Development of Transport Informatization, which proposes to focus on "three promotion, five enhancement, two guarantee" industry informatization project. Among the "five enhancement", the Comprehensive Transportation Dispatch and Emergency Command System, Transportation Information Resources Exchange and Sharing and Open Application Platform can be regarded as a common "dispatch and emergency command system 2.0".

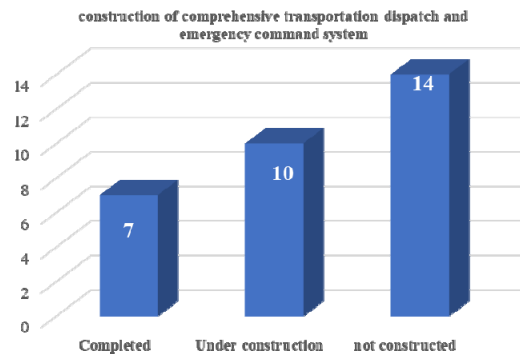


Figure 2 Construction of comprehensive transportation dispatch and emergency command system

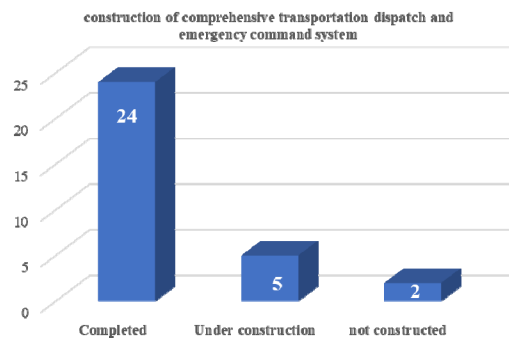


Figure 3 Construction of transportation information resources exchange and sharing and open application platform

### 2.2.1 Business Characteristics

The Comprehensive Transportation Dispatch and Emergency Command System is positioned to improve three major capabilities: the first is to improve the macro operation control capability, and realize the tracking and monitoring of the operation status of highways, railroads, waterways, civil aviation, postal services and public transportation in key cities; the second is to improve the efficiency of emergency command and dispatch, and realize the

coordination and linkage of dispatch within the transportation system, between the Ministry of Transportation and relevant ministries, and between the Ministry of Transportation and the national bureaus under the control of the Ministry; the third is to improve the macro decision support capability, and realize the prediction and warning of traffic operation in natural disasters, the prediction and warning of traffic operation in emergencies, and the prediction and warning of traffic operation in important activities, etc. [2,3]

The Transportation Information Resources Exchange and Sharing and Open Application Platform is positioned as the main hub of industry information resource exchange and sharing, focusing on three major roles: the first is a resource platform to realize the convergence and integration of industry shared resources, unified management of shared resources, and the formation of a unified transportation shared information resource pool; the second is a transmission channel to realize the collaborative scheduling of industry information resources and provide a safe, efficient, reliable and convenient data transmission channel for cross-regional and cross-system data transmission; the third is a service window to realize the departmental docking, industry sharing and opening of transportation information resources to the outside world. In particular, the transportation information resource exchange and sharing and open application platform provides data support for the nationwide and cross-regional business collaborative operation of the comprehensive transportation dispatch and emergency command system [4-7]

### **2.2.2 Overall Architecture Model**

In terms of construction content, the Comprehensive Transportation Dispatch and Emergency Command System mainly constructs comprehensive transportation operation dynamic management system, comprehensive transportation operation prediction and early warning system, comprehensive transportation emergency command system and other comprehensive systems, and completes emergency plans, emergency cases, emergency resources, emergency watch, prediction and early warning databases; while the Transportation Information Resources Exchange and Sharing and Open Application Platform mainly builds comprehensive systems such as information resource directory service system, data exchange and sharing and open management system, data exchange and sharing and open portal system, data quality audit system, comprehensive query system, etc., and completes the exchange and sharing library, open service library and other databases.

## **3 NEW REQUIREMENTS FOR DISPATCH AND EMERGENCY COMMAND SYSTEM**

In the new era, building a comprehensive transportation data center system with data as the key element and core driver, and constructing a comprehensive transportation dispatch and emergency command system has become an important task for the construction of a strong transportation country.

Firstly, the data management of comprehensive traffic dispatch and emergency command system changes to asset-based. In the period of Dispatch and emergency command system 1.0 and 2.0, the industry has not yet formed an objective and scientific understanding of big data and data resources value utilization, and there exist phenomena such as blindly chasing

investment in hardware facilities and belittling data resources accumulation and value mining utilization. In the new period, data has become a factor of production alongside land, labor, capital and technology, and the country treats data as an important asset for circulation, management and operation. By focusing on the whole life cycle of data, the comprehensive transportation dispatch and emergency command system collects and stores the full amount of data, deeply promotes data sharing and convergence, encourages the opening of public information resources, and promotes the intensive integration, collaborative development, efficient utilization and network sharing of production factors with data flow to form a new resource allocation model.

Secondly, the data application of comprehensive traffic dispatch and emergency command system changes to intelligence. In the period of dispatch and emergency command system 1.0 and 2.0, data application was more concerned with what was happening at present and describing the development trend. In the new period, the data application of comprehensive traffic dispatch and emergency command system has entered the intelligent stage characterized by deep excavation and fusion application. The previous "people looking for data" is gradually changing to "data looking for people", and data applications can not only predict what may happen in the future and present the development trend of things, but also guide the industry to make correct decisions based on the current development trend of things.

#### 4 NEW IDEAS FOR THE DISPATCH AND EMERGENCY COMMAND SYSTEM

In the new era, comprehensive transportation dispatch and emergency command system 3.0 returns to the essence of "data" and is a new infrastructure that takes data as the key element and core driver to promote the continuous integration and interaction of transportation activities in physical and virtual space [8-10]

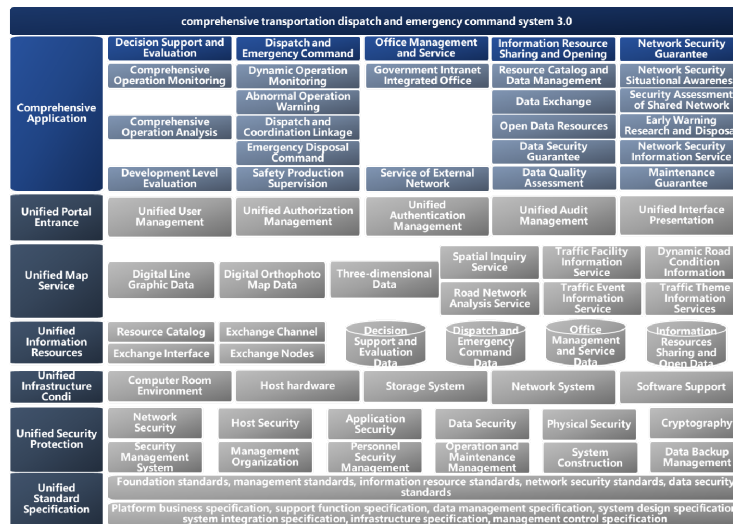


Figure 4 Overall architecture model of dispatch and emergency command system 3.0

In terms of comprehensive applications, the focus is on cross-industry, cross-sector, cross-department and cross-level applications such as decision support and evaluation, scheduling and emergency command, government office management and services, information resource sharing and opening, network security and operation and maintenance protection, etc., to realize the deep integration of new generation information technology and transportation management and decision-making. For example, the comprehensive application of decision support and evaluation can be considered to achieve digital, graphical and panoramic control of infrastructure planning, planning, construction progress and overall operation of various modes of transportation, and to achieve scientific assessment of the development level, development speed, development quality, development direction, interaction between the industry and national economy and contribution of various modes of transportation.

In terms of data management, it will accelerate the improvement of the industry data resource chain from diversified collection, integration and sharing, open circulation to social application, establish a comprehensive transportation information resource directory covering all elements and multiple levels, build a complete and standardized comprehensive transportation industry information resource "general ledger", promote cross-regional, cross-industry, cross-sector and cross-level comprehensive transportation data resources to the dispatch and emergency command system, assess the data security risks that the comprehensive transportation dispatch and emergency command system may face, and do a good job of risk control such as sensitive data identification, sensitive data access, data flow risk monitoring and data leakage traceability.

At the same time, the portal portal, map services, information resources, basic conditions, security prevention and control, standards and specifications and other basic common architecture for unified design, unified construction, so as to form an integrated comprehensive traffic dispatch and emergency command system support and security system. For example, the infrastructure of basic conditions can be considered to realize the intensive construction and integrated management of various hardware and software support resources such as operating system and middleware, database management system, computing resources, storage resources, network resources, security resources, etc., so as to provide a safe, reliable, independent and controllable basic environment support for comprehensive application and data management.

## **5 CONCLUSION**

By proposing overall architecture, horizontal and vertical logical architecture, the thesis provides new ideas for comprehensive transportation dispatch and emergency command system with data as the core. In view of the above, this study fills the gap in the research of construction ideas in this field.

## **REFERENCES**

- [1] Yang L.B., Han H., Lei M.Y. (2013) Status and Trends of Highway Intelligent Transportation Standardization. *Telecommunications Network Technology*, 8:70-73.

- [2] Lu X.W., Li D.Z., Xue N. (2019)Study and Design of Integrated Traffic Operation Monitoring and Emergency Command Information Integration Platform. HIGHWAY, 12:210-216.
- [3] Wang D.J., Fu J.M., Zhou T.T. (2022)Study on Key Technology for Design and Application of Regional Transport Infrastructure Group Monitoring System. Journal of Highway and Transportation Research and Development, 6:124-135.
- [4] Liu R.J. (2020)Prospect of Intelligent Transportation Construction in Tianjin under the Background of Big Data Era. Tianjin Construction Science and Technology, 6:72-74.
- [5] Wang Y., Li P. (2022)Construction of intelligent transportation data center platform under background of digital transportation. Chinese Journal of Computer Application, 18:57-59.
- [6] Zhu J.B. (2022)Construction Scheme of Urban Rail Transit Big Data Center Based on Hadoop+MPP Architecture. Urban Mass Transit, 5:54-57.
- [7] Dong Y., Dong P., Tang M. (2019)Research on the Current Situation and Development Countermeasures of ITS in China. Journal of Highway and Transportation Research and Development(Application Technology Edition), 8:264-266.
- [8] Jiao Y.P. (2019)Forge Towards a Country with Strong Transportation Network. China Highway, 19:10.
- [9] Wu H.Q. (2021)Applications and challenges of intelligent data fusion. Journal of Chongqing University of Posts and Telecommunications(Natural Science Edition), 1:1-6.
- [10] Du Y.C., Liu C.L., Wu D.F. (2022)Framework of the New Generation of Smart Highway. China Journal of Highway and Transport, 4:203-214.