COMMERCIAL VEHICLE OPERATION (CVO) IN KOREA

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Abstract: The Korean government has made efforts to establish ITS (Intelligent Transport Systems) strategic plans and to implement ITS. CVO (Commercial Vehicle Operation) has been developed in Korea as one of five subsystems of ITS and also in the context of Integrated Logistics Information Systems (ILIS). A low-level strategic plan was implemented beginning in October 1997, which has two subsystems and six major services. In this paper, we introduce CVO services, requirements and techniques, as well as operational tests, deployment cases and analysis of CVO cost-effectiveness.

1. INTRODUCTION

The Korean Ministry of Construction and Transportation (MOCT) and the National Police Agency (NPA) have taken on major roles in establishing and implementing ITS projects. Like other countries, Korea started ITS projects to reduce traffic congestion and increase safety. Parallel to ITS, the Korea government implemented Integrated Logistics Information Systems (ILIS) to enhance the logistics competitiveness of industries. Commercial Vehicle Operations (CVO) are designed to apply various ITS technologies in order to reduce transportation costs and improve the efficiency and safety of freight and fleet operations. CVO, a subsystem of Intelligent Transport Systems (ITS) has been developed in the context of Integrated Logistics Information Systems (ILIS) as well as ITS. Freight and Fleet Management Systems (FFMS) and Hazardous Material Management Systems (HMMS) are major elements of CVO.

2. SYSTEM ARCHITECTURE

In 1997, the Korea Transport Institute and Korea Telecom Inc. established a low-level strategic plan and system design for CVO. Korea Telecom Inc. is currently in charge of establishing CVO as a part of Integrated Logistics Information Systems (ILIS). The system architecture of CVO, especially for relevant services, is briefly described in Table 1. Each subsystem in CVO has three major services. FFMS contains Freight and Fleet Management Service, Transportation and Distribution Arrangement Service and Commercial Vehicle Electronic Clearance Service and HMMS contains Hazardous-material-carrying Fleet Management Service, Hazardous Material Management Service, and Hazardous-material Incident Management Service.

In information networks, FFMS server, HMMS server, and DB server connect information among the provider and users for CVO and ILIS. Switching hubs and routers are connected to servers and users can get CVO services using modems, cellular phones, etc., as described in Fig. 3 and Fig. 4.

Table 1. CVO Services

Sub-system	Services	Service Interpretation	Information Requirements	Methods for Information Gathering
Freight and Fleet Management System (FFMS)	Freight and Fleet Management Service	-Real-time Monitoring and Vehicle Tracking with Automatic Vehicle Location (AVL) Service -Automated Commercial Vehicle Administrative Processes	-Recognition of Real-time Truck Location -Fleet Location information	-GPS satellite -In-vehicle transponder -Two-way communication system
	Transportation & Distribution Arrangement Service	-Providing Matching Services for Drivers, Fleet and Freight Information	-Fleet information -Freight information -Facility information -Arrangement information	-User transponders -GPS satellites -Database in the CVO center
	Commercial Vehicle Electronic Clearance Service	-Non-stop inspection and tolling -Automated Roadside Inspections	-Information related to dispatching (class of vehicles, weights, regulations, alternate route information)	-Related organizations and institutions -Electronic clearance facilities and equipment -WIM(weigh-in-motion) equipment -ETC(electronic toll collection) equipment
Hazardous-Material Management System (HMMS)	Hazardous-material-carrying Fleet Management Service	-Management of Hazardous material – carrying fleets and freights with real-time information -Route guidance	-Vehicle location -Characteristics of materials in fleet	-User transponders -GPS satellites -In-vehicle transponders -Digital map
	Hazardous Material Management Service	-Notification of areas and potential areas in emergency or hazards	-Fleet location -Material status in fleets	-In-vehicle transponders -In-vehicle safety devices -Cargo tag
	Hazardous-material Incident Management Service	-Hazardous Material Incident Detection and Notification -Quick Response on Emergencies	-Characteristics of fleets -Vehicle location -Accident history of vehicles and drivers	-GPS satellite -In-vehicle warning system -In-vehicle safety notification device

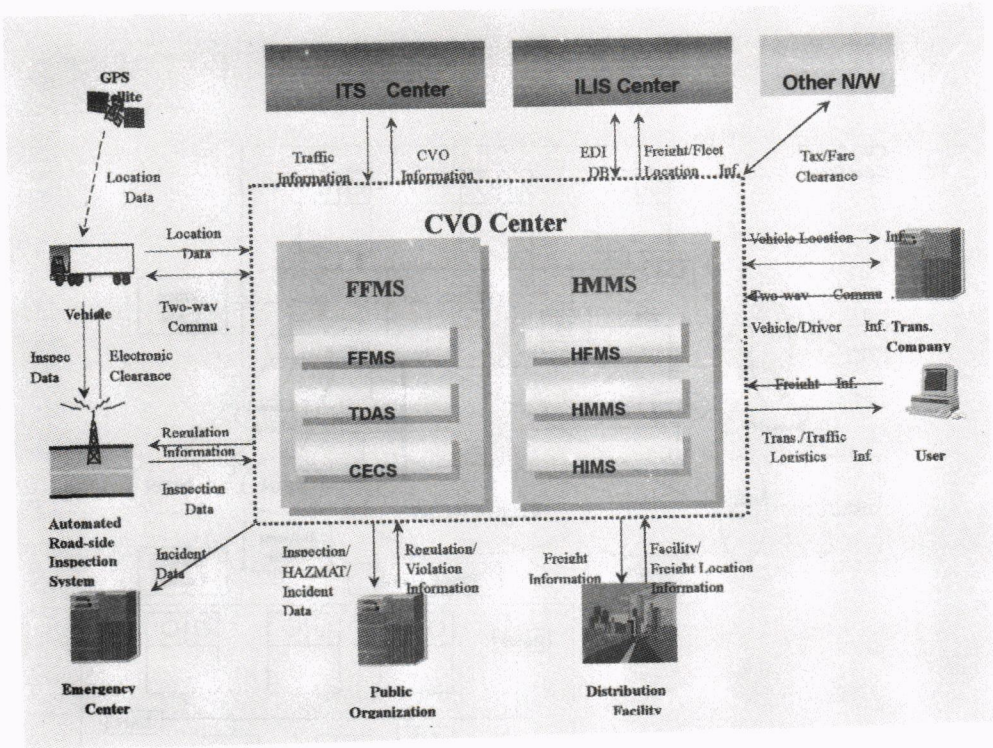

Figure 1. Structure of CVO Services

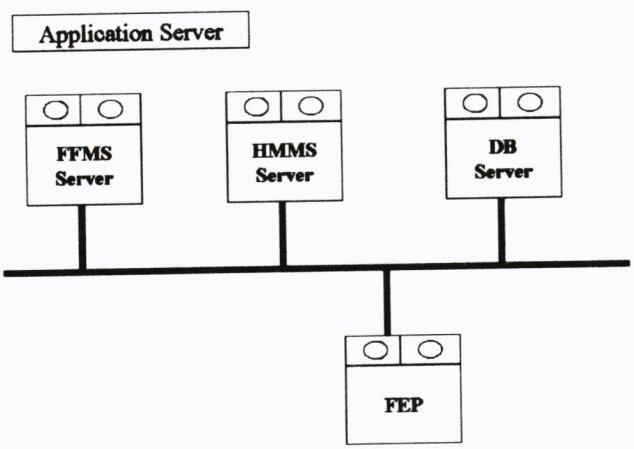

Figure 2. A Simplified Structure of Information Network

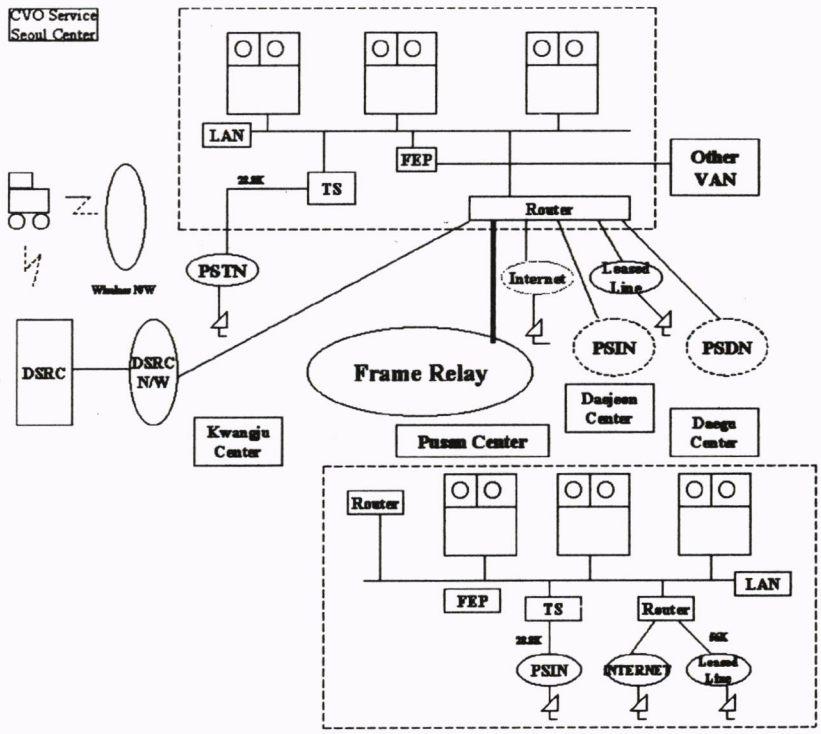

Figure 3. A Framework of Communication Network

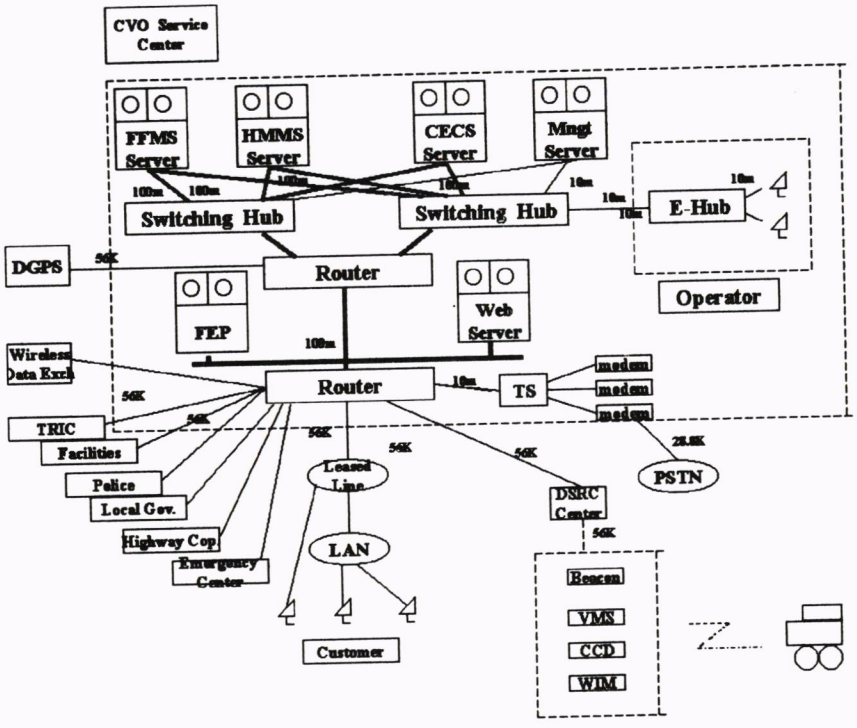

Figure 4. A Framework of Information Network

3. EXPERIENCES IN CVO OPERATIONAL TESTS AND DEPLOYMENT

Current operational tests and deployment of CVO include the following: 1) KT (Korea Telecom) commercial vehicle information systems with vehicle tracking services, 2) Container-terminal EDI services and the gate automation system of the Ministry of Maritime Affairs and Fisheries (MOMF). These pilot tests show quite promising results and Tables 2 and 3 list the results of Korea-Telecom Inc.'s operational tests for vehicle tracking services and the Ministry of Maritime and Fisheries' gate automation systems in BCTOC (Busan Container Terminal Operation Corp.) and PECT (Pusan East Container Terminal Co., Ltd.). We examined twenty trucks for KT's service, and the results of MOMF's gate automation system are based on seven gates of the BCTOC and twelve of the PECT. Average Loading Rate means the weights of truck-loads per trip compared to the capacity of the truck and Loading Efficiency considers the distance traveled and loaded distance, in addition.

Table 2. Results of Korea-Telecom Inc.'s CVO Operational Tests: Vehicle Tracking Service

M.O.E.	Without VTS	With VTS	Comments
No. of Trips	1.45/day	2.32/day	60% increase
Average Loading Rate	80.3%	85.0%	6% increase
% of Empty Vehicle-kilometer	44.4%	36.2%	18% decrease
Loading Efficiency	45.5%	53.5%	18% increase

Table 3. Effectiveness of MOMF's Gate Automation System

	Duration time	Comment
1995	74 hours	Before the service
1996	62 hours	After the service
Time Savings	12 hours	

Source: Ministry of Maritime and Fisheries, 1997

4. FUTURE PLANS

CVO programs will be deployed in three stages: stage 1 (present-2000), stage 2 (2001-2005), and stage 3 (2006-2010). In stage 1, early deployment of FFMS is planned and regional management centers will be established in Seoul and Pusan. In addition, operational tests are planned for automated electronic clearance services for trucks. In stage 2, regional management centers will be established in the six metropolitan areas (Seoul, Pusan, Daegu, Kwangju, Incheon, Ulsan). Operational tests are planned for HMMS, and FFMS services will cover major highways and expressways, as well as the above-mentioned six metropolitan areas. In the final stage, CVO services will cover the nation-from urban areas to rural areas and from highways to arterial. Investment by the year 2010 is estimated to reach approximately 267 billion won (220 million dollars) for ILIS and 28 billion won (23 million dollars) additionally due to enlargement of services for HMMS, resulting in total costs of 295 billion won (243 million dollars).

5. CONCLUDING REMARKS

The rise of logistics costs in recent years has become a grave concern of the Korean government, as well as private companies. The government vigorously started the national logistics system network, the ILIS (Integrated Logistics Information System), and the system includes CVO services, which also appear in ITS. The gate automation service shows quite promising results and other container terminals plan to provide similar services. The results of Korea Telecom, Inc.'s vehicle tracking service are also promising, but the results are not statistically significant other than the number of trips-because the sample size was too small. The second operational test is scheduled this year, and we expect to have significant results from that. For the test, MOCT will invest approximately 1 million dollars to help trucking companies to buy CVO transponders and use CVO services.

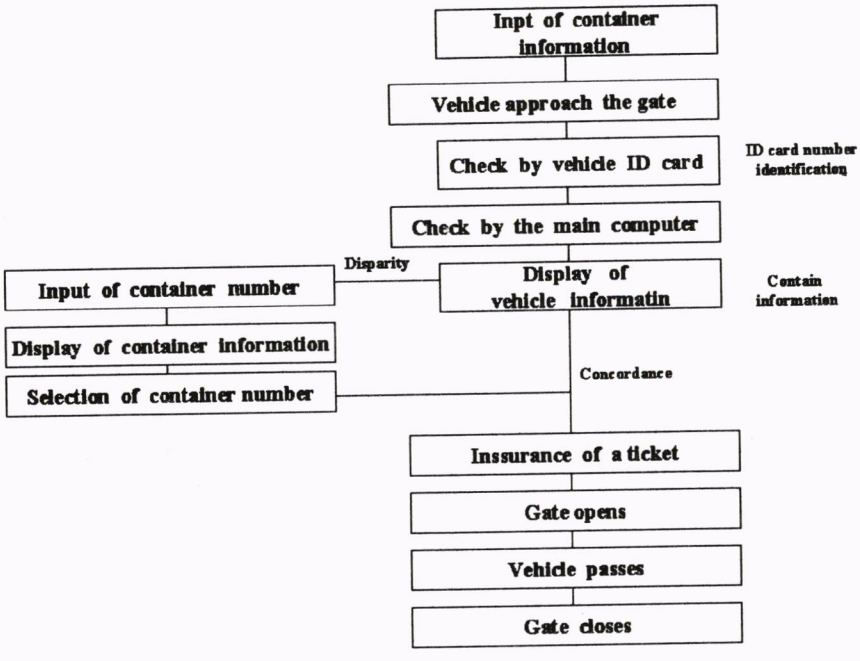

Figure 5. Flowchart of the Gate Automation Service in Container Terminals

There are some obstacles in deploying CVO. The decrease in commodity flows due to the recent economic crisis in Korea is a major obstacle. Prices on some devices and equipment have increased rapidly because of a rise in exchange rates, which also delays the schedule of deployment. Nevertheless, as the government reduces investment in infrastructure such as roads, railways and ports, ILIS and CVO are the only viable solution to reduce freight costs and logistics costs in the near future.

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