

## Featured Articles II

### Physical Security

## Integrated Physical Security Platform Concept Meeting More Diverse Customer Needs

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*OVERVIEW: To flexibly adapt to the growing and changing risks to public infrastructure and companies posed by threats such as terrorism in the lead-up to an international sports event to be held in Tokyo in 2020 and threats to food safety from contamination, organizations from throughout the Hitachi Group are currently making a collaborative effort to create a platform for physical security. The platform will be created around a core of functions that integrate multiple security systems such as video surveillance and access control systems. It will enable various physical security solutions, providing features such as system scalability, video analysis functions tailored to specific applications, and cloud system support. However, its applications will not be limited to just ensuring safety and security. In readiness for the IoT era, it will also enable active use as a platform for providing video analysis data and various other types of data to systems such as big data analysis systems, and production control systems in plants. These applications will extend the platform's physical security uses to customer business improvements such as optimizing operations in companies.*

### INTRODUCTION

RECENTLY there has been a seemingly unending succession of cases involving threats to public safety and security such as terrorism in public facilities and food contamination in plants. To prevent these acts, solutions to satisfy customer needs must be provided using various types of physical security systems.

The Hitachi Group is comprised of several companies that work with physical security systems such as video surveillance systems, video analysis systems, access control systems, and vehicle access control systems. Each of these companies has refined its expertise and abilities in the channel it specializes in. To link these companies together and provide single solutions to customers requires customized development tailored to each customer, making it a challenge to provide solutions in a timely manner. So, it became apparent that there was a need for an integrated physical security platform to link various systems together.

Companies in the physical security industry have been increasingly active recently in acquiring or collaborating with competitors. In today's dramatically

changing market environment, Hitachi is looking to use its integrated physical security platform to focus the combined abilities of Group companies on providing a wide lineup of solutions tailored to customer needs. This article discusses the concepts behind this integrated platform and the creation of the various solutions built on it.

### PLATFORM OVERVIEW

Fig. 1 shows an overview of the integrated platform proposed by Hitachi. Centered around a security system that combines surveillance cameras and sensors, the platform provides a comprehensive package of site data acquisition, management, analysis, and presentation functions for aims such as improving plant or distribution site productivity, and commercial facility customer flow analysis.

### Platform Objectives

When meeting a site's information usage needs, the optimum solution will vary in form according to the business operations it is being provided for. In terms of system configuration for example, facilities can range

from large facilities handling large numbers of cameras (such as airports), to small facilities dispersed over a wide area (such as coin-operated parking lots). In terms of functions, the information to be acquired can also vary. For example, the security industry needs to acquire information on the behaviors of an indeterminately large number of people, the manufacturing industry needs information on workers and production equipment operating conditions, and the logistics sector needs information on workers and shipment tracking.

There are a number of key attributes required for providing solutions that match customer needs in a timely and optimum manner: (1) convenience enabling flexible adaptation to the implementation format, (2) functionality that can meet a wide range of business improvement needs, and (3) expandability enabling both video surveillance and adaptation to multiple applications in the future.

Hitachi's integrated platform has been proposed as a general-purpose platform designed to provide these attributes.

### Technological Characteristics

The integrated platform technologies created to achieve the aforementioned convenience, functionality, and expandability are as follows:

To provide convenience, the system architecture has been designed to support both on-premises and

cloud-based systems, with a common interface (I/F) connecting the cameras and sensors. It supports scalability in numbers of cameras, and has functions to support various modes of use, such as map displays and smartphone linkage.

To provide functionality, Hitachi's integrated platform incorporates the workflow design concept, using a method that enables various video analysis functions and data analysis functions to be selected and combined. Video analysis functions operate as plug-ins, creating an environment that enables flexible configuration of functions meeting customer needs. For example, the number of people detected by an access control device can be compared with the number detected by a surveillance camera, to detect unauthorized tailgating access.

To provide expandability, Hitachi's integrated platform includes a data processing platform that gathers and records data acquired from sensors, and functions that can be used as an Internet of Things (IoT) platform. Functions that work together with a manufacturing execution system (MES) can also be developed to provide solutions for plants, and statistical analysis functions can be provided using an interface for communicating with business intelligence (BI) tools such as Pentaho\*.

\* An open-source BI tool created for professionals.

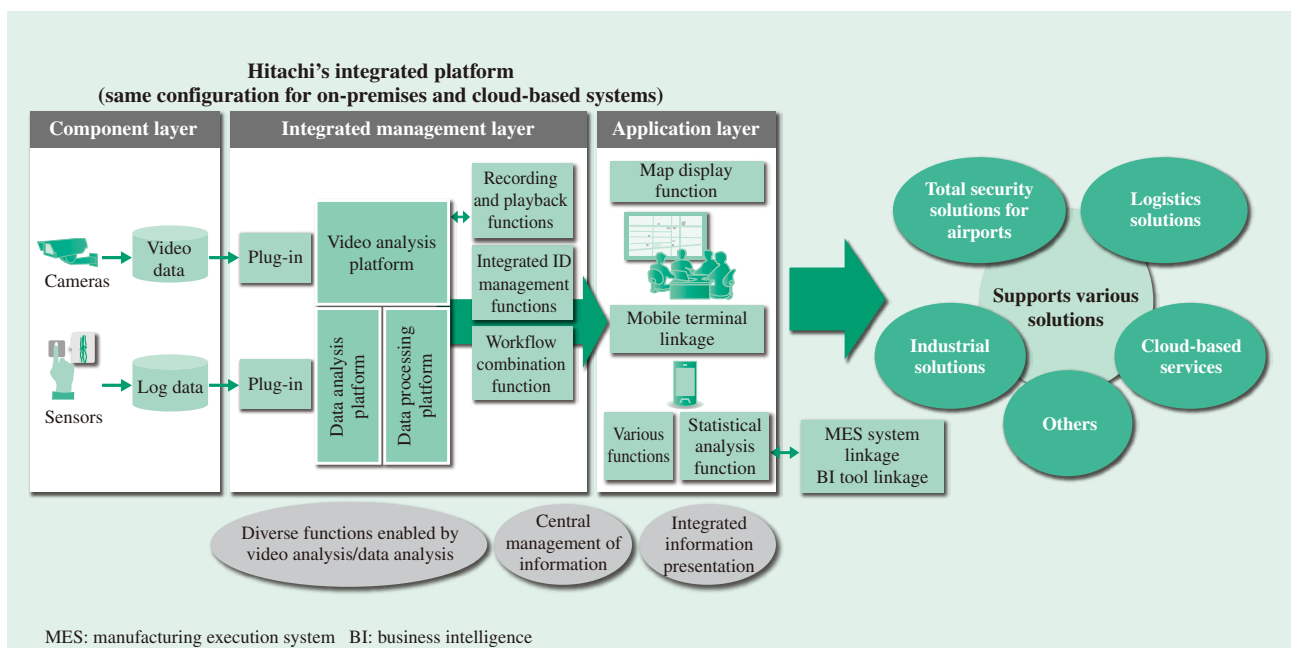


Fig. 1—Overview of Hitachi's Integrated Platform.

The platform proposed by Hitachi is characterized by features such as central management of information, diverse functions provided by video analysis and data analysis, and integrated information presentation.

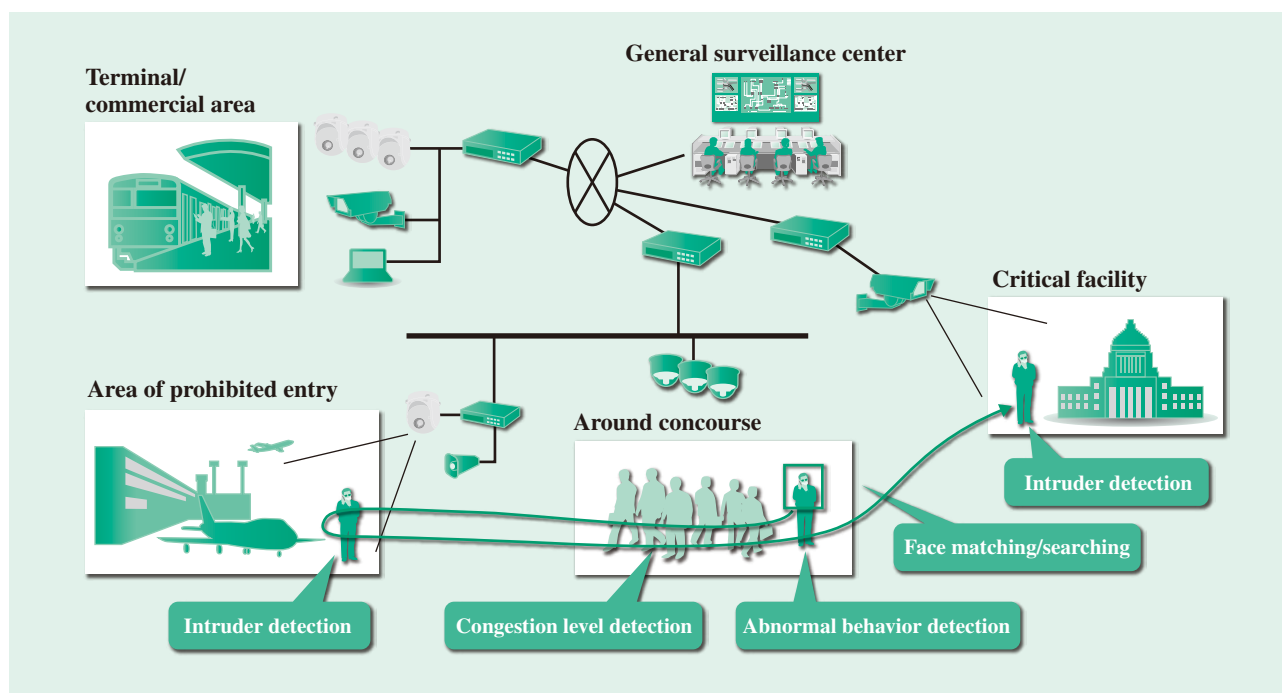


Fig. 2—Total Security Solution in Airports.

Airports have various facilities including areas of prohibited entry, critical facilities, and commercial facilities. The types of video analysis needed therefore vary greatly, requiring a total security solution.

## SOLUTIONS LINEUP

### Total Security Solutions for Airports

The network video surveillance system enables a large amount of video data from locations such as security/restricted areas in multiple terminal buildings, commercial areas, and airport peripheral facilities to be gathered by a general surveillance center. The video from these locations can be used to perform various image analysis functions on Hitachi's integrated platform, such as face matching/searching, congestion level detection, intruder detection, and abnormal behavior detection. These analysis functions can be used to ensure the safety and security of facility users, and to improve service. In times of disasters, they can also help create total security solutions that use information from various sources to provide appropriate operation management and evacuation guidance. Fig. 2 shows an example of a total security solution system configuration. Typical video analysis functions are listed below, along with examples of solutions that use them.

#### (1) Face matching

Live Face Matching is a Hitachi solution that detects when people that have been registered in advance are captured by a camera. It can be used to help find terrorists or wanted criminals in airport

facilities, to prevent terrorist acts or to reduce crime. When used with ID cards in access control systems for controlled areas, it can also help improve the security level by preventing identity theft.

#### (2) Congestion estimation

Hitachi's congestion estimation solution can be used to analyze areas with high concentrations of airport facility users to help prevent incidents or accidents by providing user guidance during times of canceled flights, or by detecting passengers or articles left behind. It can also detect lines at check-in counters and security gates to help improve the efficiency of security operations, or improve service by using digital signage to guide users according to the congestion levels in restaurants or other airport facilities.

### Industrial Solutions

Fig. 3 shows an example of a physical security solution designed for a plant. It uses Hitachi's integrated platform to implement external access control measures, along with internal control measures for employees.

Conventional physical security systems were implemented by installing individual systems for each function (such as vehicle access, biometric authentication-based access control, and video surveillance). However, when these systems are implemented individually, the surveillance work (the

work of checking alert/event times and locations using surveillance camera video) requires individual management of alert/event history information and surveillance video. This approach therefore requires information to be checked separately on different systems, resulting in poor operational efficiency, and risks such as key surveillance video being missed. To address this situation, Hitachi's integrated platform enables centralized management of surveillance information from multiple systems (such as intruder surveillance systems and access control systems). This approach enables more efficient surveillance operation, with display of surveillance camera video for relevant times and locations using information in the alert/event history.

Hitachi also plans to use the integrated platform to provide linkages to video analysis technologies for functions such as presence sensing, status and attribution recognition, and behavior understanding and prediction. In addition to simple video surveillance, these functions will enable autonomous surveillance that can detect events automatically

and assist operation by using behavioral analysis to predict what will happen next. In the future, the uses of Hitachi's integrated platform will not be limited to security applications, since it is planning to release solutions designed to solve various business challenges. Examples include a solution designed to improve business efficiency by analyzing employee work operations to provide visual demonstrations of work know-how, and a quality control solution that provides correlation analysis of production control information and video analysis results.

## Logistics Solutions

The recent explosive growth of electronic commerce (e-commerce) has increased the number of packages handled by the logistics industry, and the growth trend is expected to continue. However, Japan's declining birthrate and aging population have resulted in a shrinking of the labor force that has caused an increase in hiring of mainly foreign temporary workers, creating instability in the areas of rule compliance and safety management.

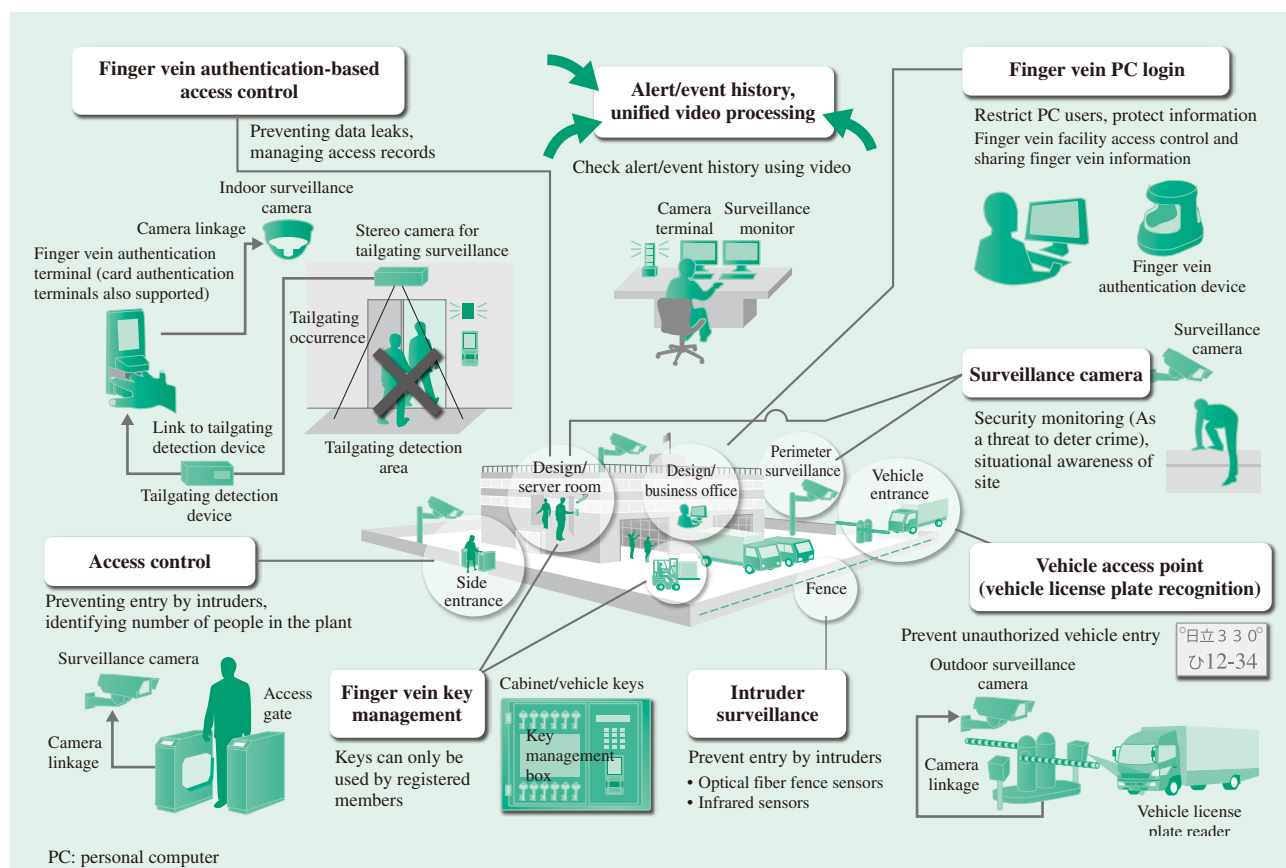


Fig. 3—Physical Security Solution in Plants.

Linking multiple security systems for integrated/central management of user information, alerts, history, and video lowers the management/surveillance workload and enables better business efficiency and quality through history/video correlation analysis.

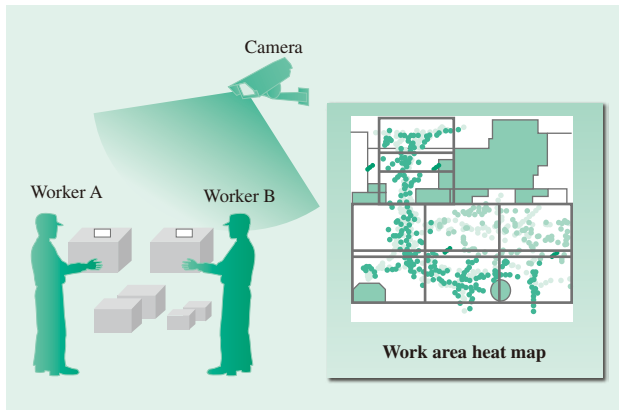


Fig. 4—Work Area Surveillance in Distribution Warehouse. Worker movement flows analyzed using surveillance camera video can be displayed on work area maps for use in various investigations.

By providing integrated linking of surveillance cameras, video analysis systems, and analysis tools, Hitachi's integrated platform can be used to propose various solutions to address these issues. For example, video analysis of images from surveillance cameras installed in distribution warehouse work areas can be used to identify worker action zones and movement flows, enabling analysis to determine whether the work layout is efficient and safe for workers (see Fig. 4).

Solutions can also be used to enable supervisors to carry out improvement measures. For example, video analysis can be used to detect workers and transport

equipment such as forklifts and pallet jacks, preventing collisions between them by sounding alarms. Behavior analysis can be used to determine whether work operations conform to rules, and the results used to create reports when infractions are found.

## CLOUD-BASED SERVICES

When operating chains of establishments or operating in certain locations, customers may have small establishments that require cloud-based services on networks. Coin-operated parking lots are described here as an example (see Fig. 5).

Coin-operated parking lots are generally unmanned. Along with ensuring neighborhood security and preventing crimes in the parking lot, video surveillance and control are important operation goals that can be met using video analysis to identify illegal lot users and monitor suspicious behavior. Cloud systems are characterized by generally being designed for use with Long Term Evolution (LTE\*) connections to connect the cloud system to the installed cameras or other sensors. (LTE is a pay-as-you-go public wireless network system.) So, unlike on-premises systems in local area network (LAN) environments, cost considerations prevent unlimited transfer of video data. Accordingly, methods are used to reduce the amount of data sent, such as sending still images periodically or sending still images whenever an event is detected (such as when a vehicle or person is detected, or a sensor is triggered). For fixed-interval video management, the video can be stored within the camera, and loaded into the system remotely when needed. Real-time video analysis in cloud systems creates a systematic time lag, so instead of monitoring video from the system, it may be more effective to use in-camera video analysis functions to send video to the cloud system when events are generated. In the future, cloud systems with embedded platforms may be able to use analysis functions installed as plug-ins to analyze accumulated video data analysis information and event logs in a correlated manner to provide added-value information tied to marketing and operational improvement.

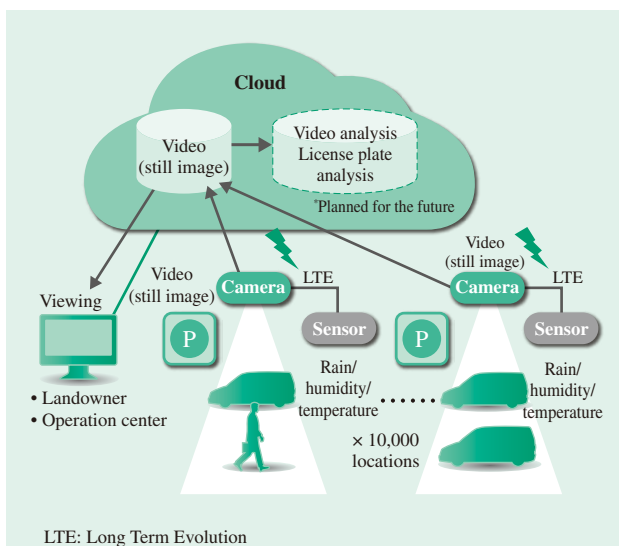


Fig. 5—Cloud-based Video Management System for Coin-operated Parking Lot. Cameras installed in the parking lot are connected to a cloud system with an LTE connection. Video is collected for uses such as identifying parking lot usage conditions and preventing crime.

## CONCLUSIONS

This article has provided some examples of solutions driven by the integrated platform now being created

\* LTE is a trademark of ETSI.



through the combined efforts of several Hitachi Group companies, and has described how the platform may be used in the future.

In the future, Hitachi will expand the range of linked Group companies, such as through ties to Hitachi's proprietary explosives trace detection system. It will

also consider teaming up with competitor systems. Working as a cross-organizational host within the Hitachi Group, and as a tool for providing advanced solutions to customers, it will be the driving engine behind resolutions to customer business issues and collaborative creation with customers.

## ABOUT THE AUTHORS

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