Explosion-Proof Wireless LAN Solution: LANEX^{TM} Series†

1. Introduction

Various services and applications utilizing wireless local area network (LAN) have been widely adopted in recent years, supported by the popularization of compact wireless tablet terminals, as represented by the smart-phone.

Systems utilizing wireless LAN can be expected not only to reduce construction costs because no cables are required, but also to be applied in factory operation and maintenance work support systems, as it is possible to transmit large volumes of data in real time while moving. Recently, the fields where application is expected have also expanded to emergency communication systems for use during disasters in response to the effects of the Great East Japan Earthquake of 2011, etc.

JFE Engineering is engaged in the development and sale of wireless LAN devices which can be used in hazardous areas. This report introduces the features of various devices and examples of system introduction.

2. System Configuration

2.1 Advantages of System Introduction

Conventionally, systems for voice communication such as personal handy-phone system (PHS), transceivers, etc. were the main stream in mobile communication systems for use in hazardous areas. However, with the progress of information technology in recent years, needs for mobile solutions have expanded from systems based mainly on cable communication/voice communication to wireless LAN systems which enable integrated large-volume data transmission/voice communication (**Fig. 1**).

2.2 Features of Explosion-Proof Wireless LAN System Devices

2.2.1 Explosion-proof access point "LANEX^{TM}-AP"

An access point (hereinafter, AP) is a relay device for transmission of data from various types of wireless ter-

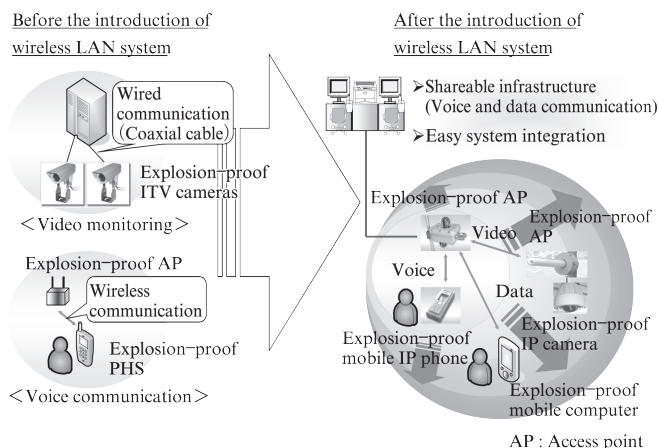†Originally published in *JFE GIHO* No. 35 (Feb. 2015), p. 69–71

Fig. 1 Advantage of introduction of explosion-proof wireless LAN system

minals to other devices via a LAN, etc. The features of LANEX^{TM}-AP (**Photo 1**) are described below.

(1) Possible to select the most appropriate antenna for the installation location.

The lineup of LANEX^{TM}-AP products includes directional antennas, which are effective in cases where the user wishes to secure a linear communication area, for example, along roads, in tunnels, etc., and the optimum omnidirectional antennas for securing a 360° omnidirectional communication area from the AP. Selection of antennas is possible according to the installation purpose.
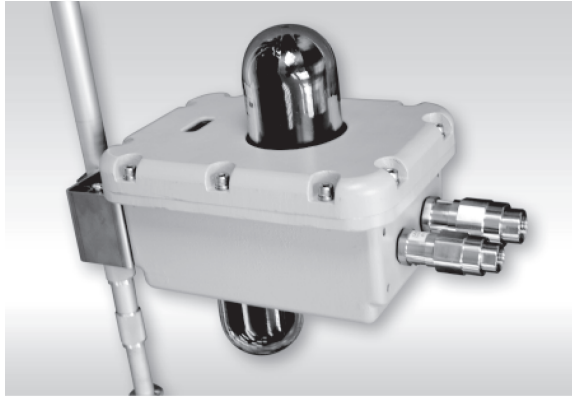
(2) Possible to use in hazardous areas up to Zone 1.

Explosion-proof certification for the explosion-proof enclosure (Explosion-proof class: Exd II BT4) has been obtained from the Technology Institution of Industrial Safety (The Public Interest Incorporated Association), enabling use in hazardous areas up to Zone 1. It is also possible to use devices which include an omnidirectional antenna in equipment for handling hydrogen (Explosion-proof class: Exd II B+H2T4).

(3) Realizes efficient radio-wave propagation by dedicated explosion-proof antenna.

These products were not commercialized based on antennas available in the market. Dedicated explosion-proof antennas, which are housed in an explosion-proof case, were developed in-house by

Omni-directional antenna type

Directional antenna type

Photo 1   LANEX™-AP

JFE Engineering and incorporated in these devices in order to obtain the maximum effect of the antenna. Although performance will differ depending on the environment in which the device is installed, the communication range with directional antennas is as much as 400 m from the AP.

(4) Support the most recent IEEE802.11n in the same housing.

At present, LANEX™-AP devices support IEEE802.11g (Communication speed: max. 54 Mbps) /11b (Communication speed: max. 11 Mbps) and the most recent standard IEEE802.11n (Communication speed: max. 300 Mbps) under IEEE802.11 (Standard for wireless LAN established by IEEE (The Institute of Electrical and Electronics Engineers)).

2.2.2 Explosion-proof tablet "LANEX™-Tablet/m"

This explosion-proof tablet is a mobile device incorporating the iPad* mini manufactured by Apple Inc. The features of the LANEX™-Tablet/m (**Photo 2**) are presented below.

(1) First tablet in Japan which can be used in hazardous areas.

This is a product which uses technology introduced from Xciel Inc. (US) and is the first domestic tablet terminal to receive explosion-proof certification (Explosion-proof class: Special type of protection sG3) from the Technology Institution of Industrial Safety. This tablet realizes light weight of 900 g including the carrying case. Its screen operability and radio communication performance maintain the same levels as general non-explosion-proof tablets.

(2) IP Mobile telephone function and various types of

Photo 2   LANEX™-Tablet/m

applications can also be used.

It is possible to use various types of applications which have been produced/marketed for use with iPad* mini. Use as an internet protocol (IP) mobile phone is also possible by installing a softphone application.

(3) Still and video photography is possible.

Still photography and video photography are possible by using the camera incorporated in the explosion-proof tablet. By using the table in combination with a wireless LAN, it is possible to transmit images photographed at the site to a control room or other remote location in real time.

2.2.3 Explosion-proof IP camera "LANEX™-CM"

The IP camera is a camera which can be used under IP network environments, including wireless LAN. The features of the LANEX™-CM (**Photo 3**) are as follows.

(1) Possible to use in hazardous areas up to Zone 1.

Because this product has received explosion-proof certification for the explosion-proof enclosure (Explosion-proof class: Exd II BT4) from the Tech-

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* Trademark or registered trademark of Apple Inc. registered in United States and other countries.

Photo 3 LANEX™-CM

Fig. 2 Mobile DCS

nology Institution of Industrial Safety, the dome-type IP camera can be used in hazardous areas up to Zone 1.

(2) Provides clear image quality, and monitoring is also possible under low light intensity.

Image monitoring (1.3×10^6 pixels, Transmission rate: max. 30 frames per second) can be performed by selecting from the MPEG-4, M-JPEG, and H264 image compression methods. In addition, by using the electronic intensification function, monitoring with the same brightness as in daytime is also possible, even under low light intensity (0.06 lux).

(3) Possible to use outdoors in cold regions (−20°C).

A built-in space heater is provided, enabling use in cold regions.

3. Examples of System Introduction

(1) Mobile DCS

This is a system for the purposes of checking alarms during field work and achieving high efficiency in plant operation by enabling plant monitoring while at the site. **Figure 2** shows an example of introduction.

(2) Plant Maintenance Support System

This system performs digitization of work instructions and equipment inspection sheets, and also makes it possible to photograph/record the condition at the site with a camera. **Figure 3** shows an example of introduction.

4. Conclusion
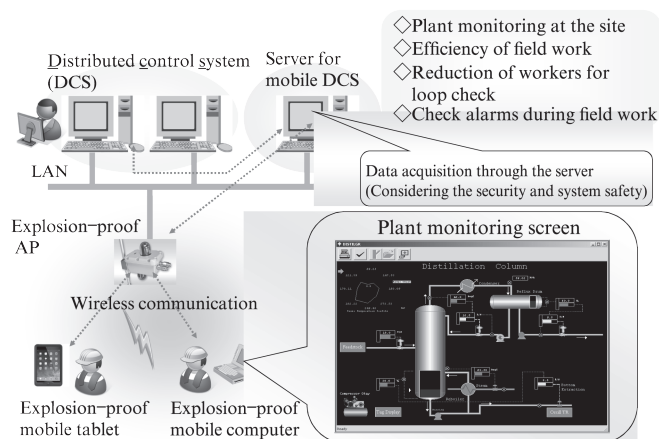
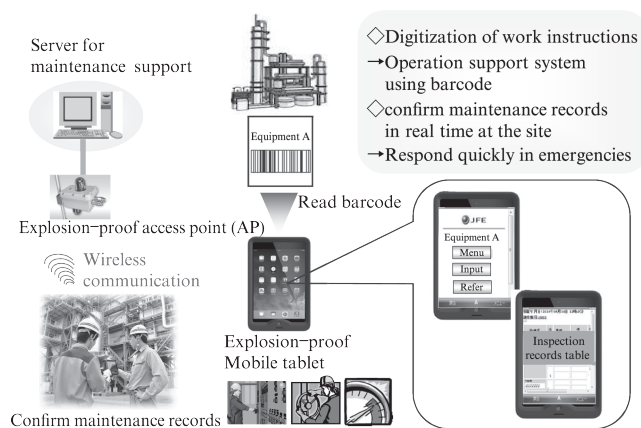An increasing number of companies in the gas, pet-

Fig. 3 Plant maintenance support system

rochemical and chemical industries, etc. are studying introduction of wireless applications. Full-scale introduction of wireless LAN is expected from FY 2014, including hazardous areas. The systems and products described in this report are expected to promote higher efficiency in plant operation and to contribute to improved safety and security.

For Further Information, Please Contact: