OVERVIEW FOR FSO(Free Space Optics)

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TOYO ELECTRIC CORP

Abstract
The time of IoT （Internet of Things）, the radio communication is important as communications infrastructure. Image transmission is also the time of the 4K and 8k, and stable means of-communications is needed at higher speed.
Radio radio technique develops and spreads, but therefore a problem of radio intervention is pointed out.
We're developing and are selling FSO as one of means to settle the problem.
I'll introduce about the outline about an optical communication system and our product.

IoT （Internet of Things）の時代、通信インフラとして無線通信は重要です。 映像伝送も 4K、8k の時代となっており、より高速で安定した通信手段が必要です。
電波無線技術が発展し普及していますが、それ故に電波干渉の課題が指摘されています。
その課題を解決する一つの手段としての FSO を当社は開発、販売しています。
その光通信システムについての概要と当社の製品について紹介をさせて頂きます。

Introduction of our FSO (Free Space Optics)

16 December 2017

Hideo Fujita
Toyo Electric Corp.

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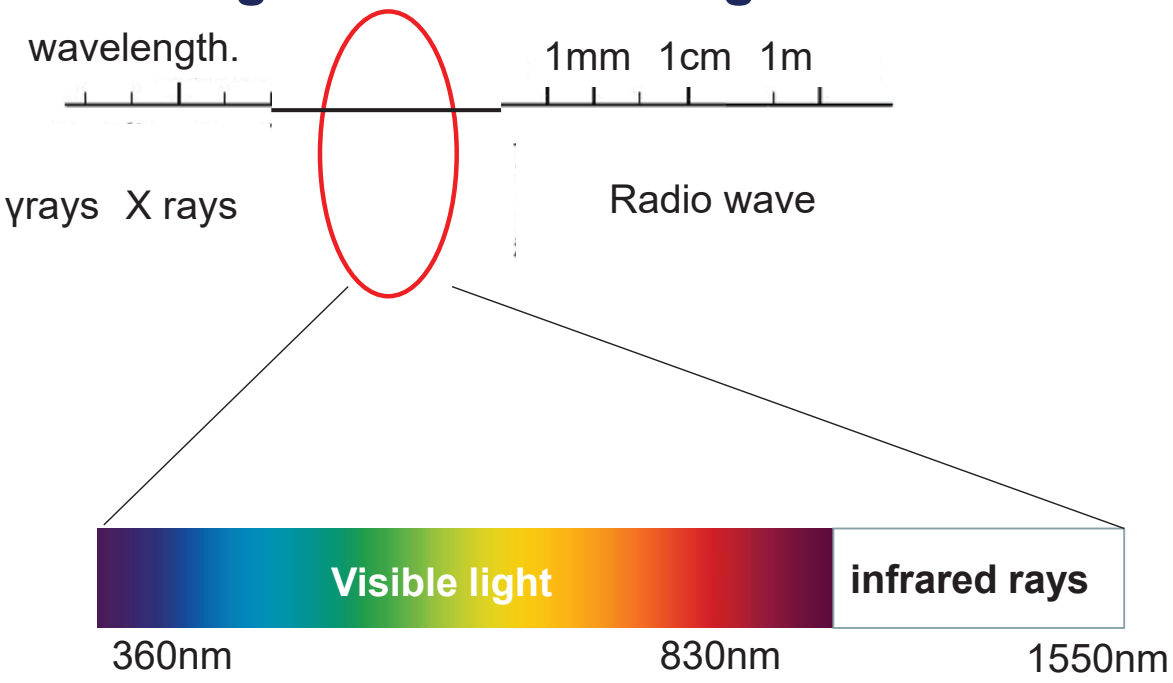
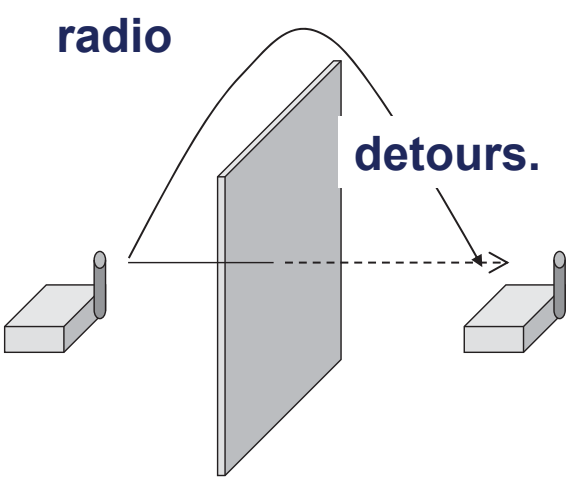
A beacon is ancient optical communication.

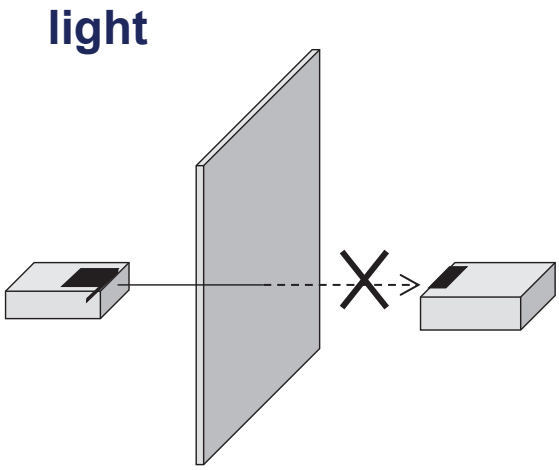
What is light?

Light is one region of "electromagnetic waves".



What is the difference between the radio wave and the light?

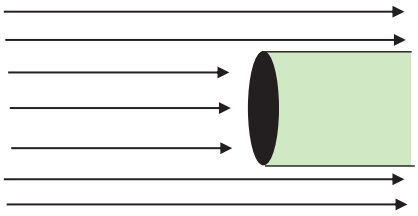




The feature of the light

(1) Straightness

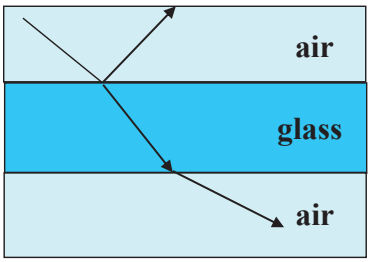
When it's the same substance, light goes straight.



(2) Refractivity

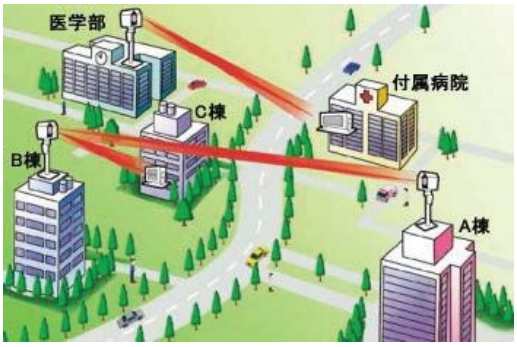
Surface of separation different in the refractivity

light curves.

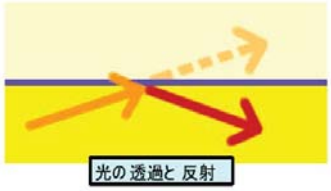


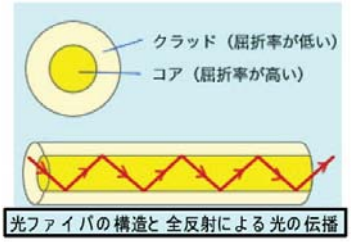
The kind of optical transmission.

(1) Optical wireless communication (Straightness)



(2) Optical fiber (Refractivity)





The feature of the optical communication

< Advantages>

(1) it's difficult to be tapped.

(2)license free

(3) High speed data transmission

< Disadvantages >

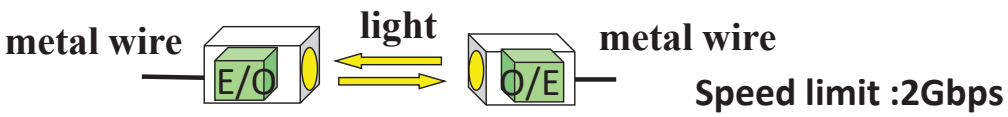
(1) When there is an obstruction, it's impossible to be transmitted.

(2) Optic axis is difficult to put together.

(3) It depends on the weather condition. (rain, fog, snow and air)

Two systems of optical wireless transmission

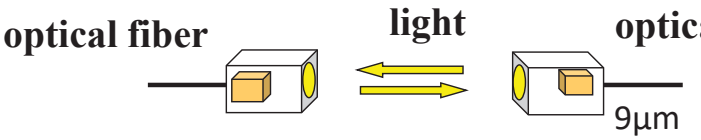
Previous system



Speed limit :2Gbps

Photoelectric exchange

New system



Speed limit : 40Gbps

* Depend on the rate of the optic fiber

Optical amplification

Photoelectric exchange type FSO

Data transfer unit

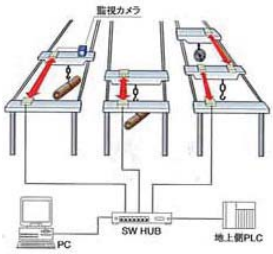
Ethernet support

SOT－ES/EQ series

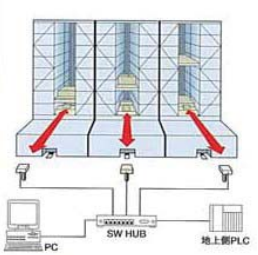
Specifications

Interface : 10base-T/100bace-t
Transmission distance : 80m ,100m,500m
Modulation method : FSK

Crane control system



Stacker crane



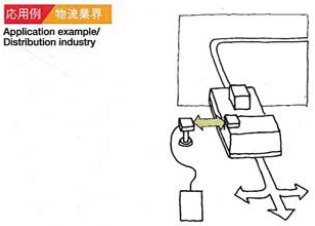
Serial / parallel

SOT－GS/NP series

Specifications

Interface : RS-232C,RS-422,Parallel
Communication speed : 38.4kbps max
Transmission distance : 70m,130m,250m
Modulation method : FSK

AGV



Body welding line

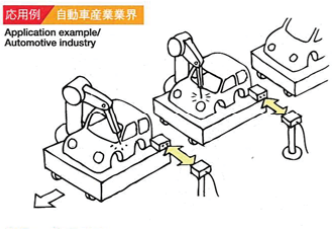


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Image transfer unit

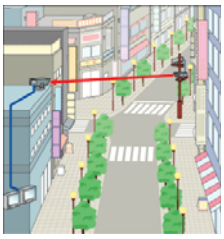
Ethernet support

US series

Specifications

Interface : 10base-T, 100base-T
Transmission distance : 50m,100m,200m
Modulation method : base band

Street



Elevator

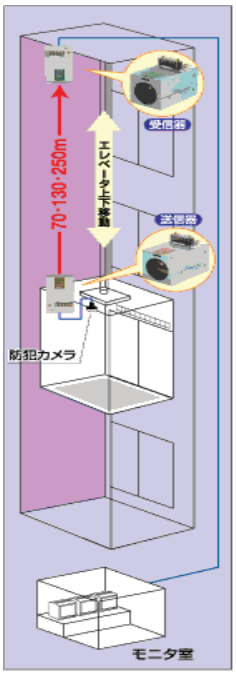


Image transfer unit

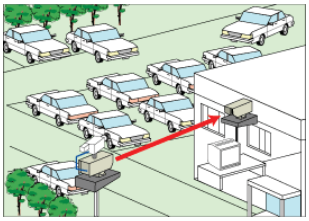
NTSC,PAL

SOT－AV series

Specifications

Interface : NTSC,PAL
Transmission distance : 70m,130m,250m
Modulation method : FM

Parking lot



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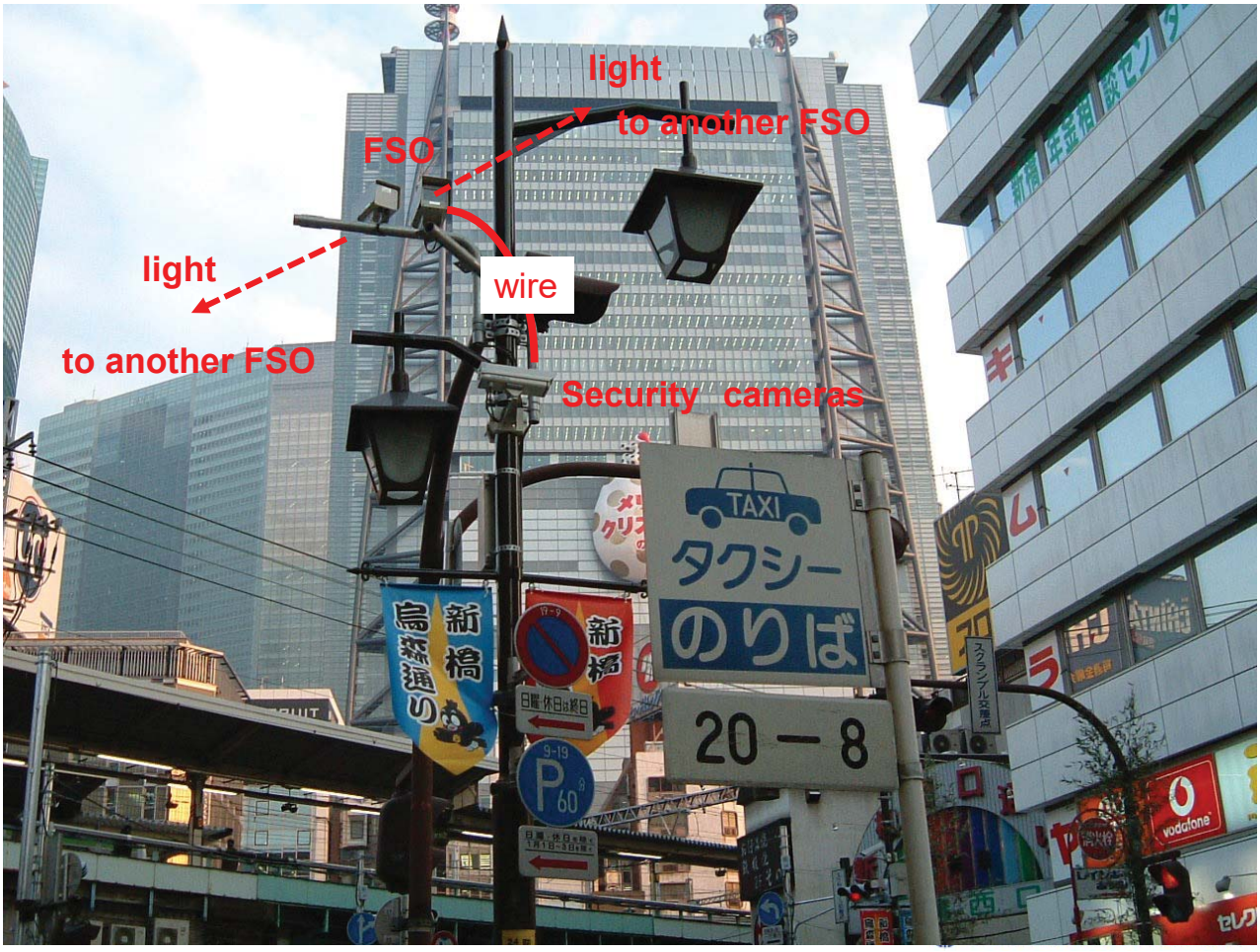
防犯カメラ映像伝送

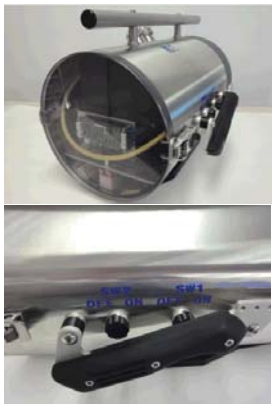


High-Speed Underwater Visible-Light Communications

東洋電機株式会社
TOYO ELECTRIC CORPORATION
TAIYO YUDEN
NHK Japan Broadcasting Corporation

— Wireless transmission in the water (IP communication)

Possible to transmit a great deal of data of a picture



■Communication Speed : Max. 50 Mbps
■Communication Distance : More than 15 m specification
＊These specifications aren't guaranteed.
It depend on the transmission factor in the water.)
■Both Directions
・The wireless LAN environment is possible in the water!
■Many colors (wavelength)
・It's possible to choose each color according to the water quality.
・From dark blue (447nm)to green (530nm)
■External dimensions
・Φ250mm × L450mm

This technology has been developed with NHK and TAIYO YUDEN

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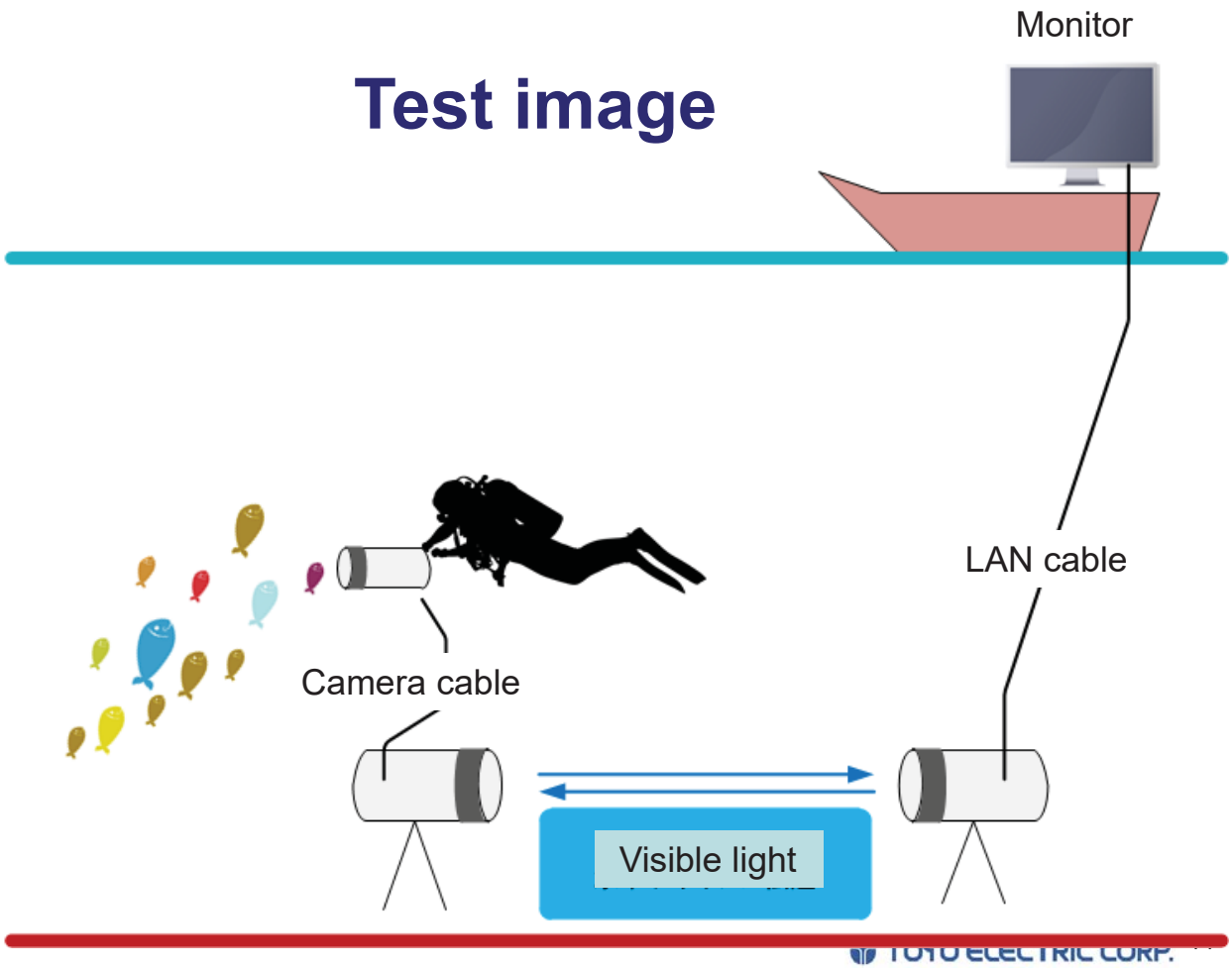
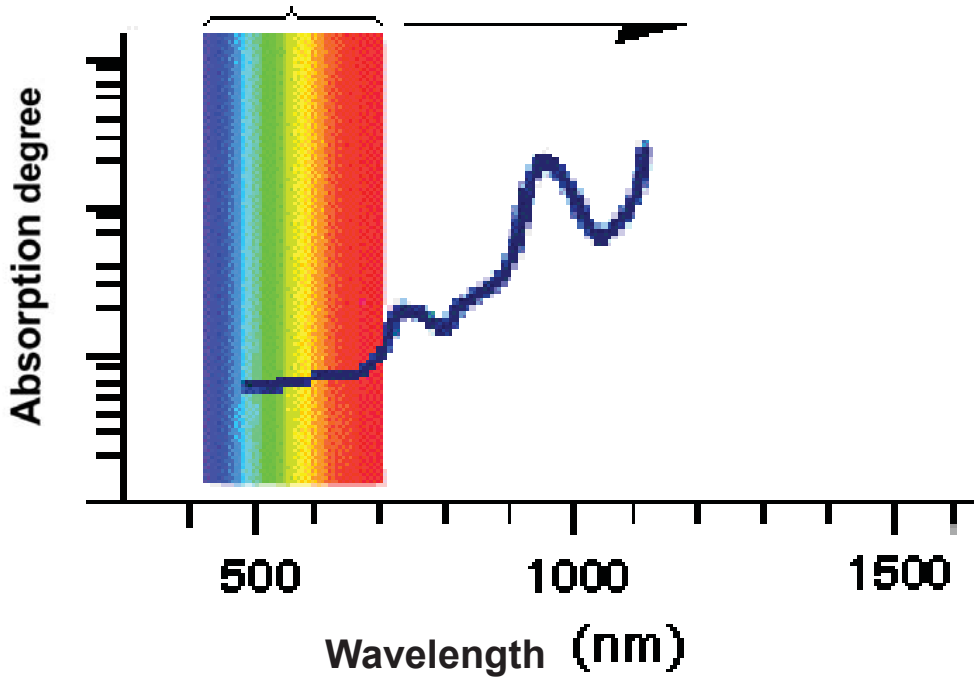
Test image



Why, blue LED?

A visible light Infrared rays.



Developed new FSO

（no photoelectric exchange type）

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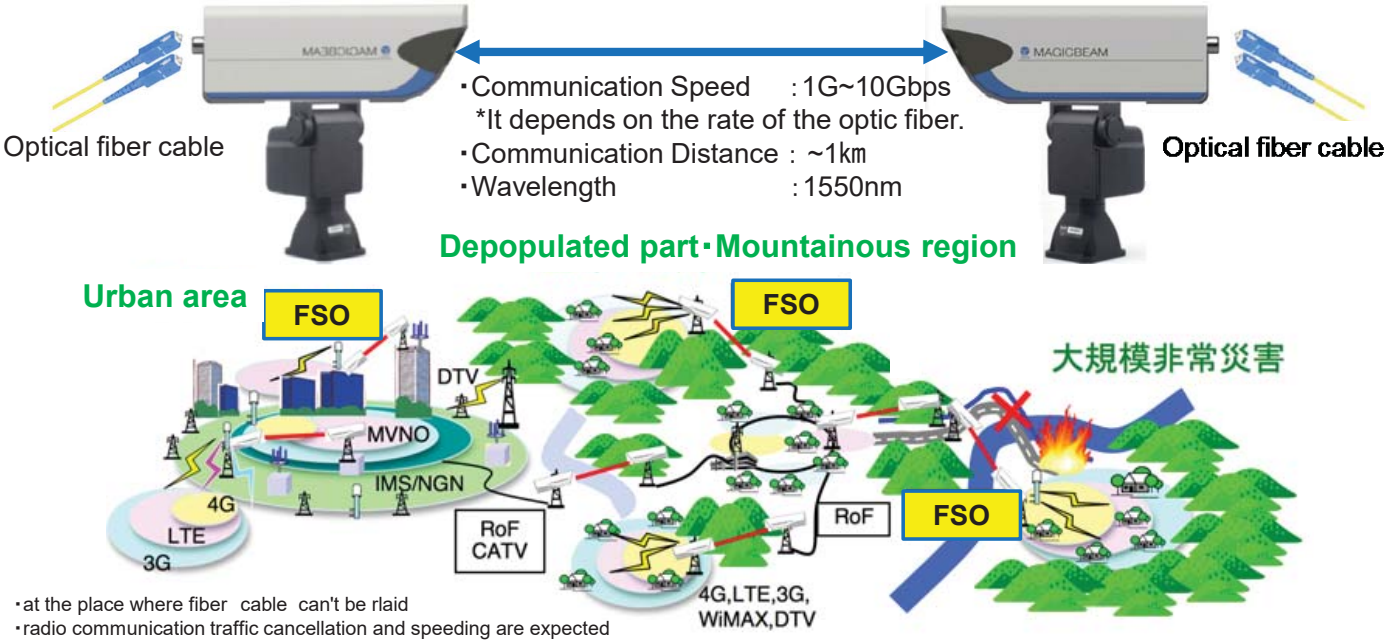
FSO(Free Space Optics)

電子の夢を創る 東洋電機株式会社 TOYO ELECTRIC CORPORATION

Wireless Gigabit transmission in Space

Possible to transmit a great deal of data



・at the place where fiber cable can't be rlaid
・radio communication traffic cancellation and speeding are expected

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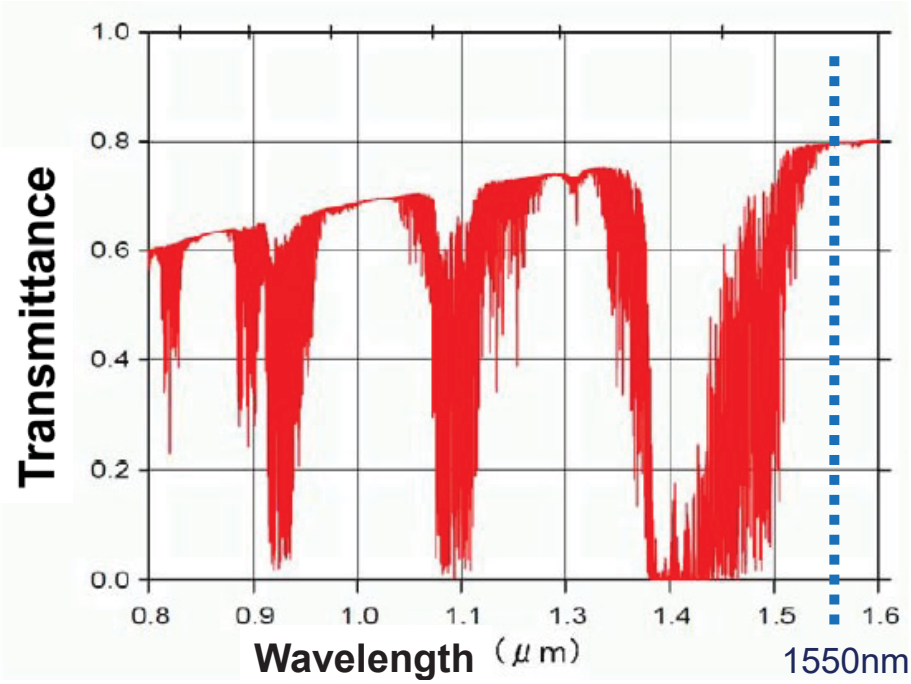
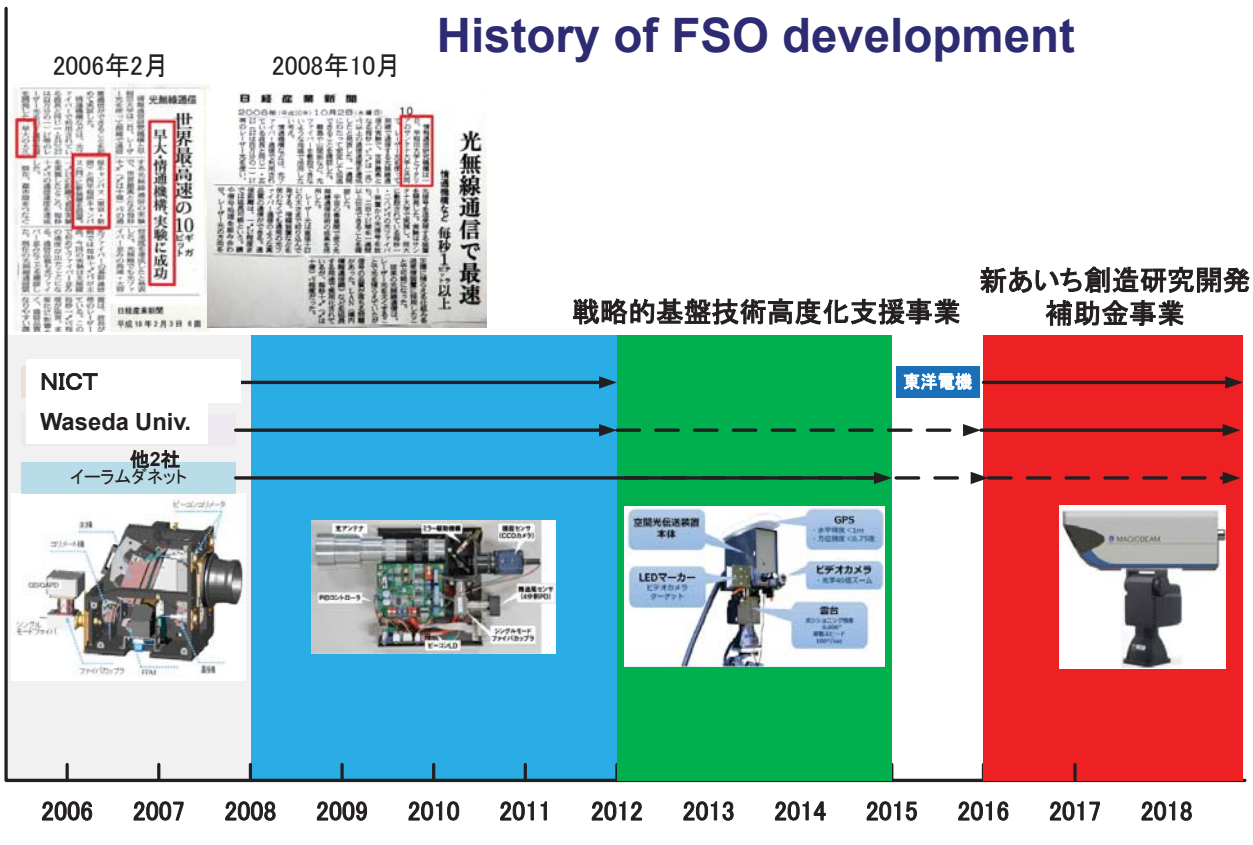
Why is light of the wavelength of the 1550nm used?

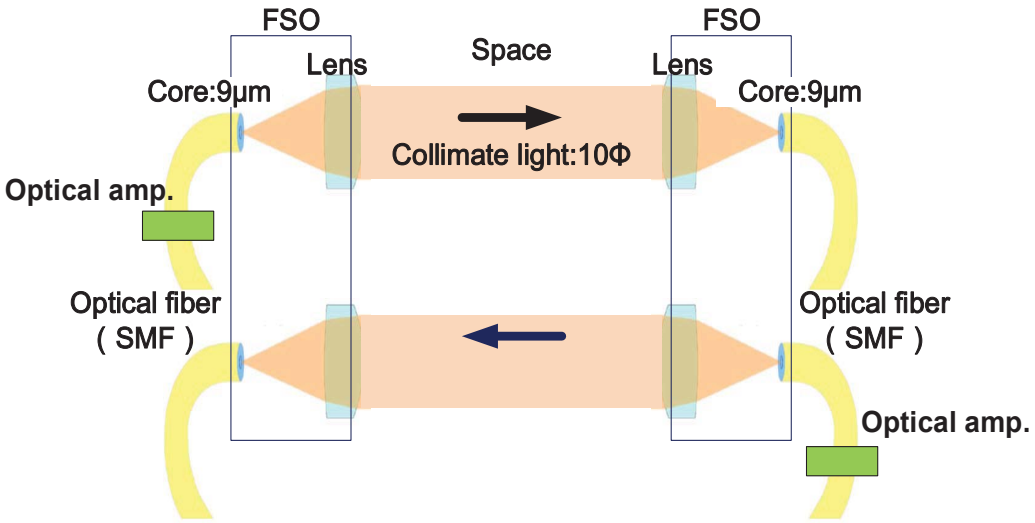


The transmission factor of the atmosphere in 1 km of distance of the urban area

History of FSO development



Basic function of FSO



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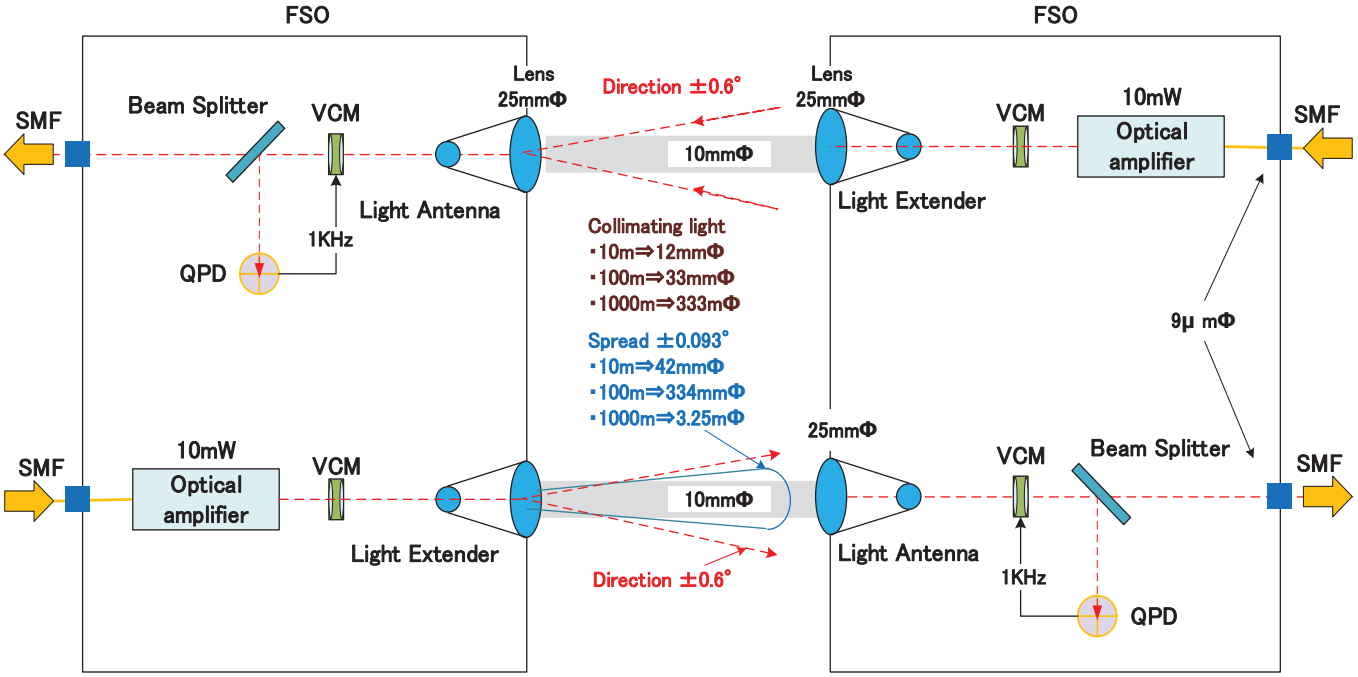
Detailed system schematic.



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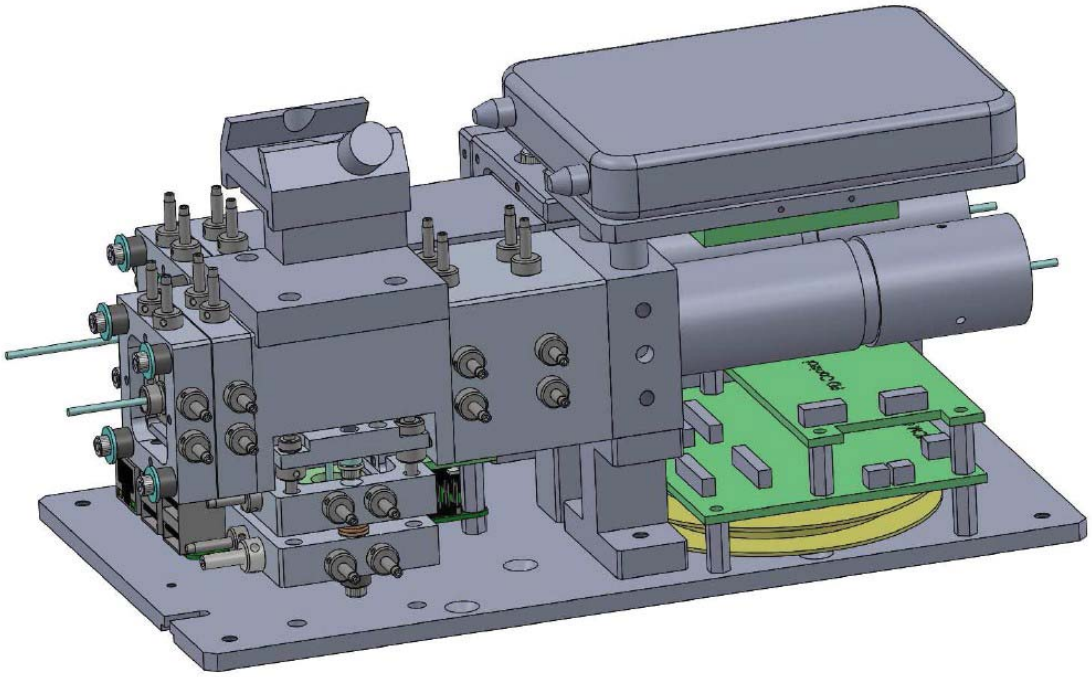
Mechanism
(The 2nd pilot model)



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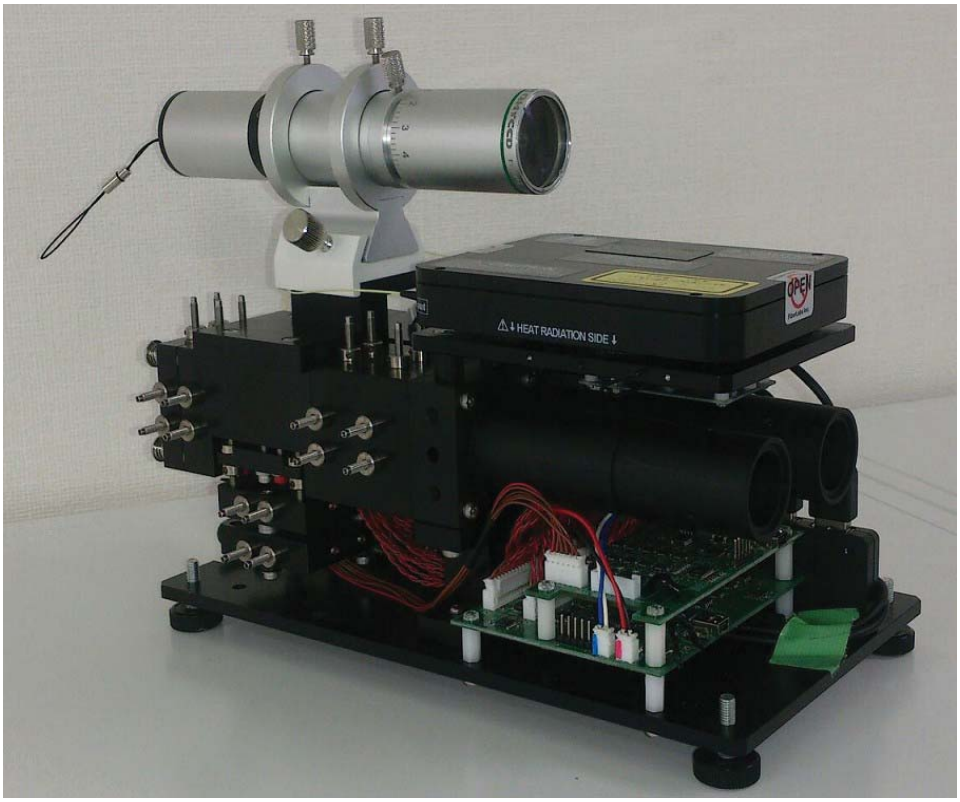
■ Secondary pilot model



Overall size 140 mm of length, 140 mm of width and 250 mm of depth (Scope is removed.)
Weight 2.5 kilogram

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Demonstration
by an exhibition

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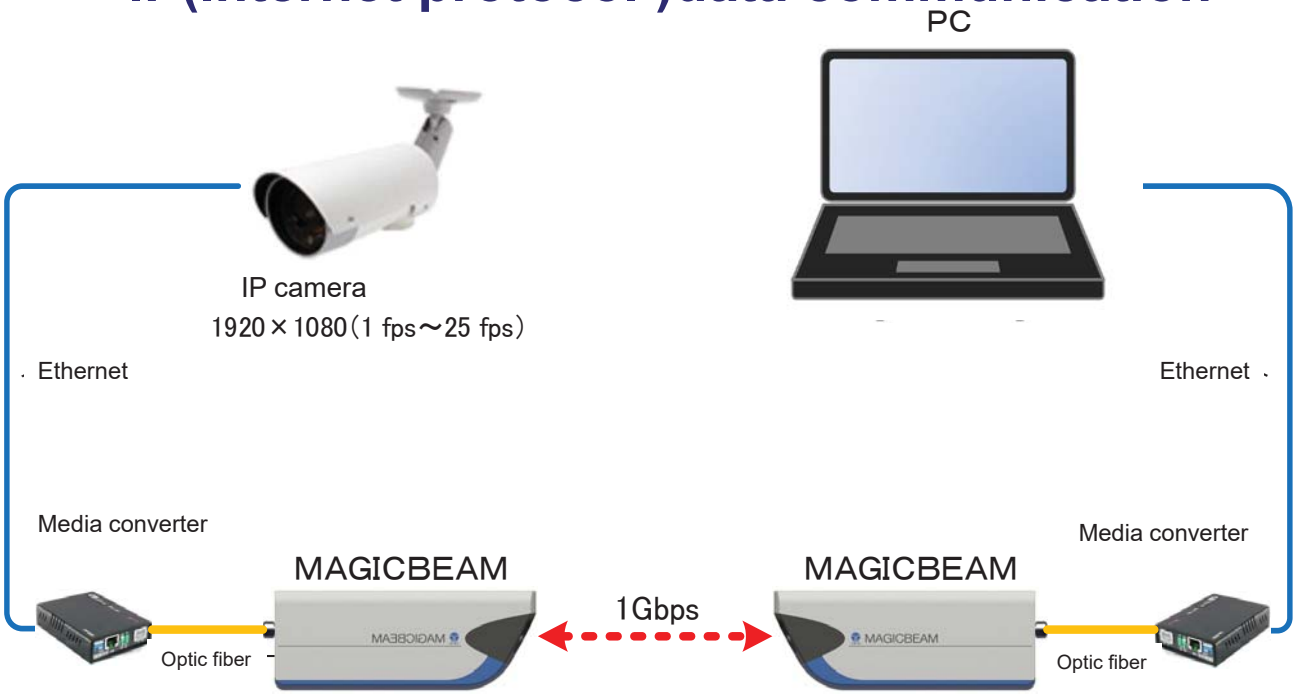
Wireless Japan 2017

May 24, 2017-the 26th

IP(Internet protocol)data communication



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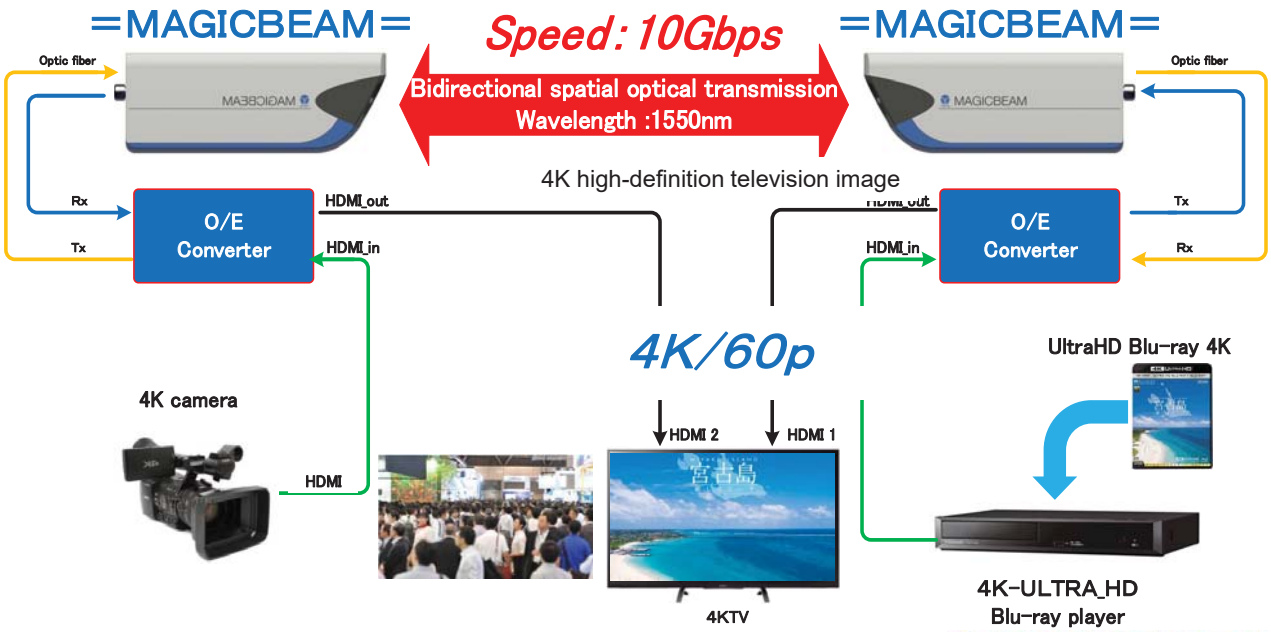
CEATEC 2017

October 3, 2017-the 6th

4K image transmission



Thank you for your attention

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