

June 23, 2022

Nippon Electric Glass Co., Ltd.

Development of New Products Expanding 5G Wireless Communication Area

Nippon Electric Glass Co., Ltd. (Head Office: Otsu, Shiga, Japan, President: Motoharu Matsumoto) has developed a transparent antenna, which is made of a glass substrate, and a repeater,^{*1} which uses radio wave lenses and does not require power supply, for 5G millimeter-wave wireless communication technology. These products will be exhibited at the fifth 5G Technology Expo to be held at Tokyo Big Sight from June 29 to July 1, 2022.

5G uses radio waves of two frequency bands, Sub6 (under 6 GHz) and millimeter wave (28 GHz). To achieve high-speed communication, it is necessary to use the millimeter-wave band, which can secure a wide bandwidth. However, the millimeter waves are significantly attenuated in the atmosphere. Due to strong linearity of propagation, they do not diffract behind obstacles. To cover a wide area, a mechanism to resolve these issues is required.

The newly developed transparent antenna has a special antenna pattern on a glass substrate, whose dielectric constant^{*2} (4.0) and loss tangent^{*3} (0.002) are the smallest in the world.^{*4} This is a highly efficient transparent antenna. The size of glass substrates can be increased, making it possible to manufacture multiple products from a single substrate. This contributes to improving the antenna productivity and enables formation of antennas for multiple bands on a single substrate.

By making the antenna transparent, the antenna functionality can be added without spoiling the design and landscape of the installation location. The antenna can be installed in various locations, such as windows, walls, displays, and vehicles.

The repeater, which is the other newly developed product, consists of two radio wave lenses and a waveguide. It receives and retransmits radio waves and changes the direction of radio waves without power supply even under circumstances where radio waves are blocked by walls and window glass. By changing the shape of the lens, radio waves can be transmitted in a certain direction or over a wide range. The lens is not subject to deterioration caused by ultraviolet rays because it is made of glass. It can be used stably over a long period in various places indoors and outdoors.

The Company will contribute to expanding and spreading the use of millimeter-wave radio waves by marketing the two newly developed products.

- *1 Repeater: A relay to receive and retransmit radio waves.
- *2 Dielectric constant: An index of polarizability when a voltage is applied to a material. The lower the relative permittivity, the lower the signal attenuation.
- *3 Loss tangent: a measure of energy when a dielectric substance is polarized. The smaller the loss tangent, the lower the conversion of electromagnetic energy into heat, and as a result attenuation of signals is reduced.
- *4 Smallest in the world: Among multi-component glass substrate, in 28 GHz, based on a survey conducted by the Company in June 2022.

[Product photos and usage (images)]



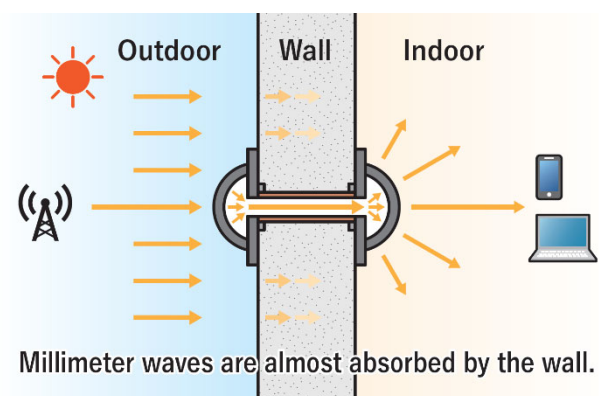
Transparent antenna



Usage of the transparent antenna (image)



Repeater using radio wave lenses



Usage of the repeater (image)

[Expected usage location]

