IOWN INTEGRAL

NTT R&D FORUM 2024

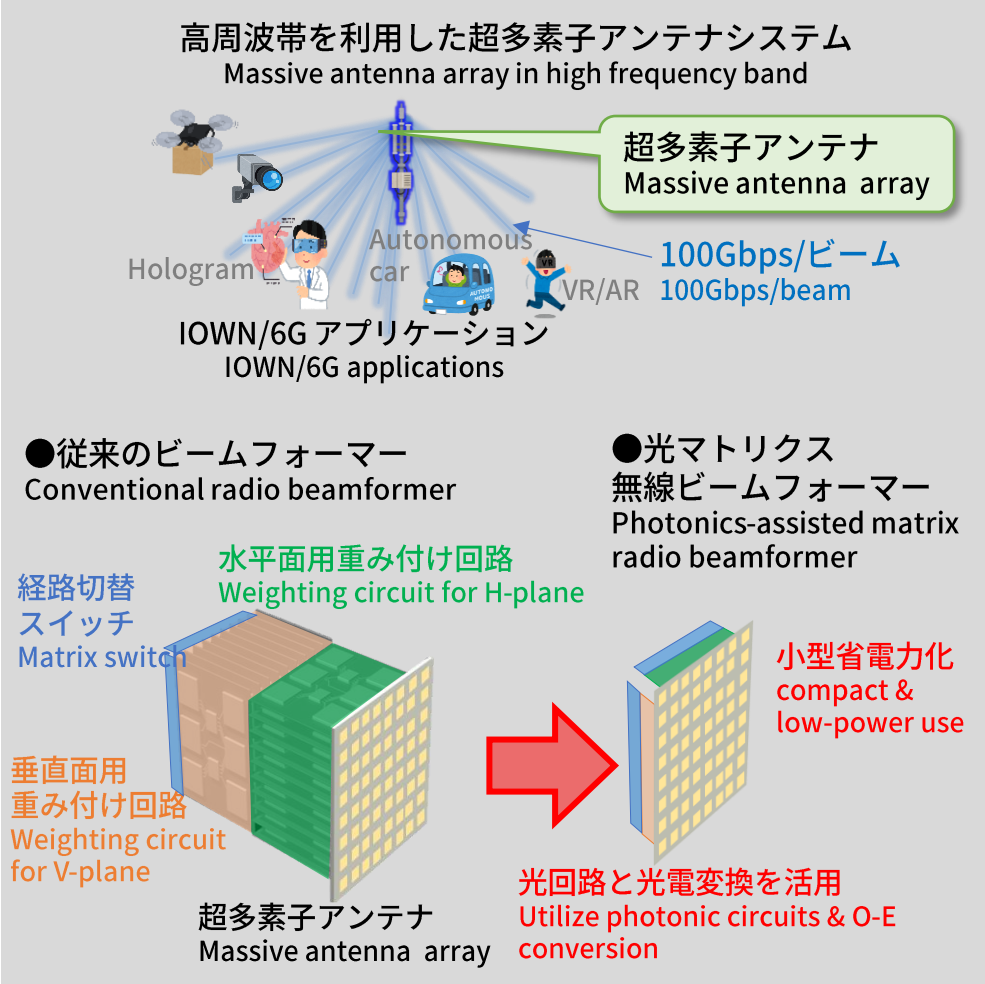
RESEARCH

γ10-05

Photonics-assisted matrix radio beamformer

Integrating photonics-based signal processing into wireless systems enables ultra-high-speed, energy-efficient networks

#Customer Experience Value Creation



///Technical Issue

High-frequency wireless requires controlling beams from large-scale array antennas, but this is challenging without increasing circuit size or power use.

///Research Goal

To provide wireless access to massive users with capacities exceeding 100 Gbps by utilizing high-frequency bands (millimeter waves and THz bands).

---Technology

- A circuit design for two-dimensional beamforming using a planar structure, leveraging the property where the phase difference between two photonic signals is translated to the radio signal phase via photoelectric conversion.
- Multibeam formation using WDM photonic signals.

---Novelty

- Simple and planar circuit configuration utilizing the nature of photoelectric conversion reduces circuit size and power consumption to 1/10th (target) of those of conventional products.
- Multiplexing and processing signals for each beam at different optical wavelengths enables simultaneous multibeam generation within a single circuit.

---Applicable Business

- ICT：Enhancement of IOWN/6G networks for high-speed, large-capacity, e.g., 100 Gbps per user x 100 users (IOWN/6G services in the late 2030s).
- Manufacturing and transportation industries：Electromagnetic wave imaging for security and product inspection, enabling high-resolution and high-speed inspections using multiple electromagnetic beams (late 2020s).

Exhibitors=NIPPON TELEGRAPH AND TELEPHONE CORPORATION

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