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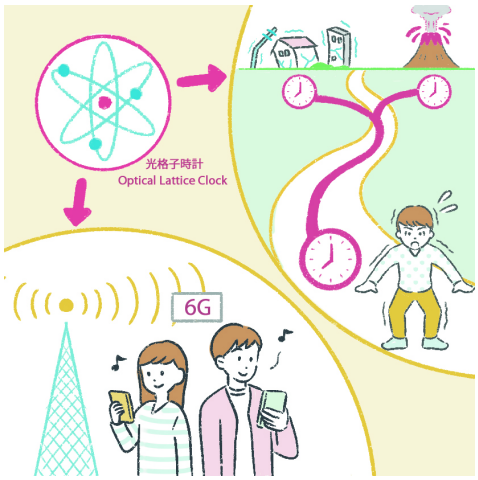
Disaster prevention against earthquakes/volcanic eruptions & highly stable 5G/6G communications

Optical lattice clock network to share a highly accurate frequency

IOWN Future

Network Technologies Supporting Future Information Distribution



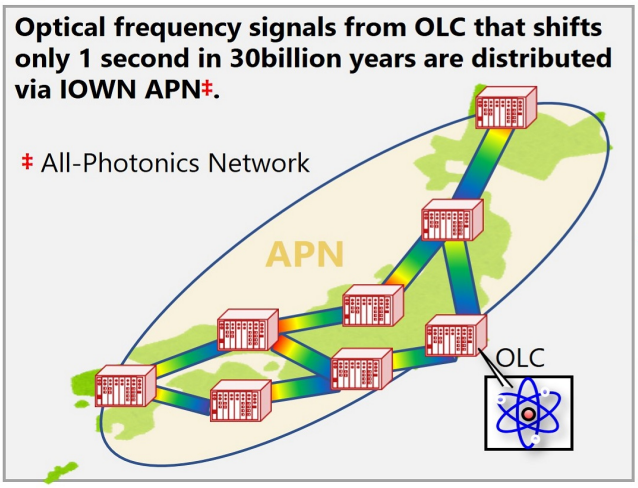
Background

Recently, optical lattice clocks, achieving precision over 100,000 times higher than conventional telecom frequency standards, have been studied. NTT is developing optical lattice clock network to transfer highly precise optical frequencies via optical fibers, enhancing social infrastructure.

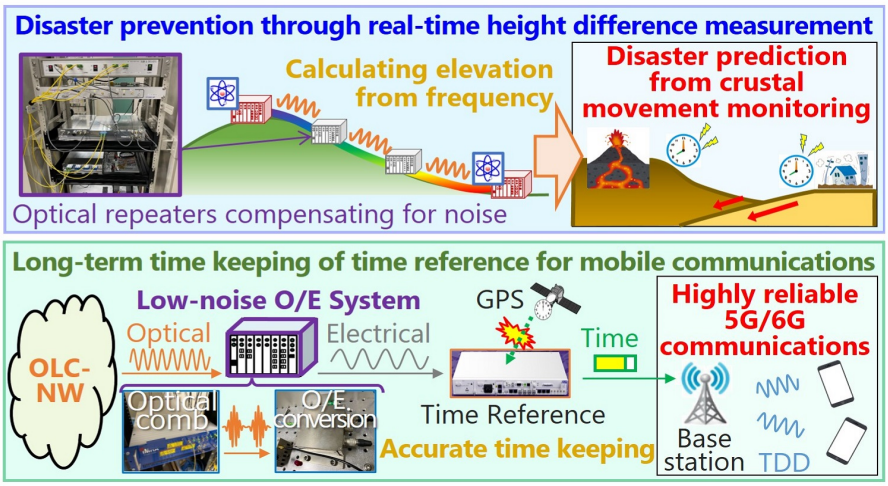
Summary

We achieved real-time height difference measurements by detecting frequency difference in optical lattice clocks over long-range optical fibers. We also succeeded in maintaining the timing necessary for 5G/6G, even during GPS signal interruptions, by leveraging these ultra-precise signals.

Optical Lattice Clock Network (OLC-NW)



OLC-NW Use Cases



Features

- Development of optical frequency repeaters using planar lightwave circuit to achieve ultra-high precision frequency transmission in urban areas with high ambient noise
- Building a low-noise photoelectric conversion system, including an optical frequency comb and a prototype photoelectric conversion device, enabling timekeeping for a long time

Future_benefits

Real-time height difference measurement can aid in earthquake and volcano disaster prediction. Stabilizing mobile time reference will enable highly reliable 5G/6G communications.

Collaboration partners

JST-Mirai Program, The University of Tokyo, Institute of Physical and Chemical Research

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