All-Photonics Network (APN) Common Infrastructure Technology

- Project: All-Photonics Network Common Infrastructure Technology
  ~ Control Technologies and Equipment Configuration Technologies for Interconnection of All-Photonics Networks among Multiple Operators ~
- Project members: NTT, KDDI, Fujitsu, NEC, Rakuten Mobile
- Project duration: From December 2024 for up to 5 years.

Project overview

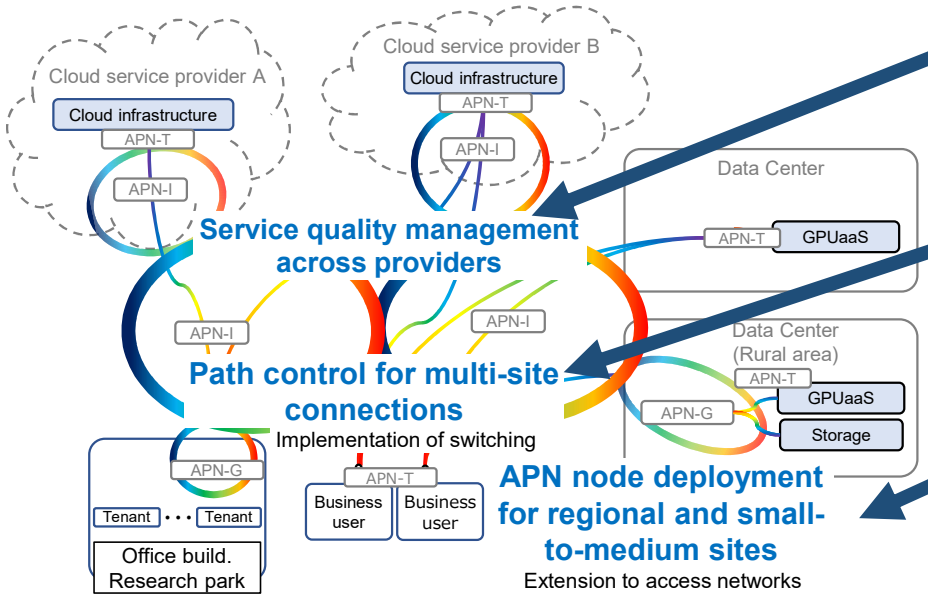
This research result was obtained from the commissioned research No. JPJ012368C09001 by National Institute of Information and Communications Technology (NICT) , Japan.

■ R&D Item 1. Formulation of the Overall Architecture for All-Photonics Networks

Develop an overall architecture for network interconnection spanning multiple operators.

Establish a comprehensive architecture that defines the required functions for all-photonics networks and optimal equipment configurations.

■ R&D Item 2. All-Photonics Network Common Infrastructure



(a) Photonic Network Federation

Enable cooperation among multiple operators' APNs to ensure fault tolerance and service quality.
➡Realize an APN network that traverses multiple operators.

(b) Subchannel Circuit eXchange

Achieve communication according to user demands through logical circuit multiplexing layers over optical paths.
➡Enable simultaneous use and flexible switching among multiple user clouds and data centers.

(c) Distributed ROADM

Develop APN nodes deployable to regional data centers and small- to medium-sized sites by applying high-density implementation and low power consumption technologies.
➡Expand APN user base by reducing equipment footprint.

Subchannel Circuit eXchange (SCX) Technology

SCX is a logical multiplexing technology that aims to realize multiple connections and flexibility while having the features of APN (high-speed and low-latency).

- On APN, (1) ultra-high-speed communication for AI using distributed DC, (2) mobile fronthaul, etc.
- Supports RDMA and PTP that require deterministic communication (lossless, low latency, and low jitter)
- Efficiently accommodates time-varying traffic, such as traffic interaction according to AI workload, day and night variation of traffic, etc.

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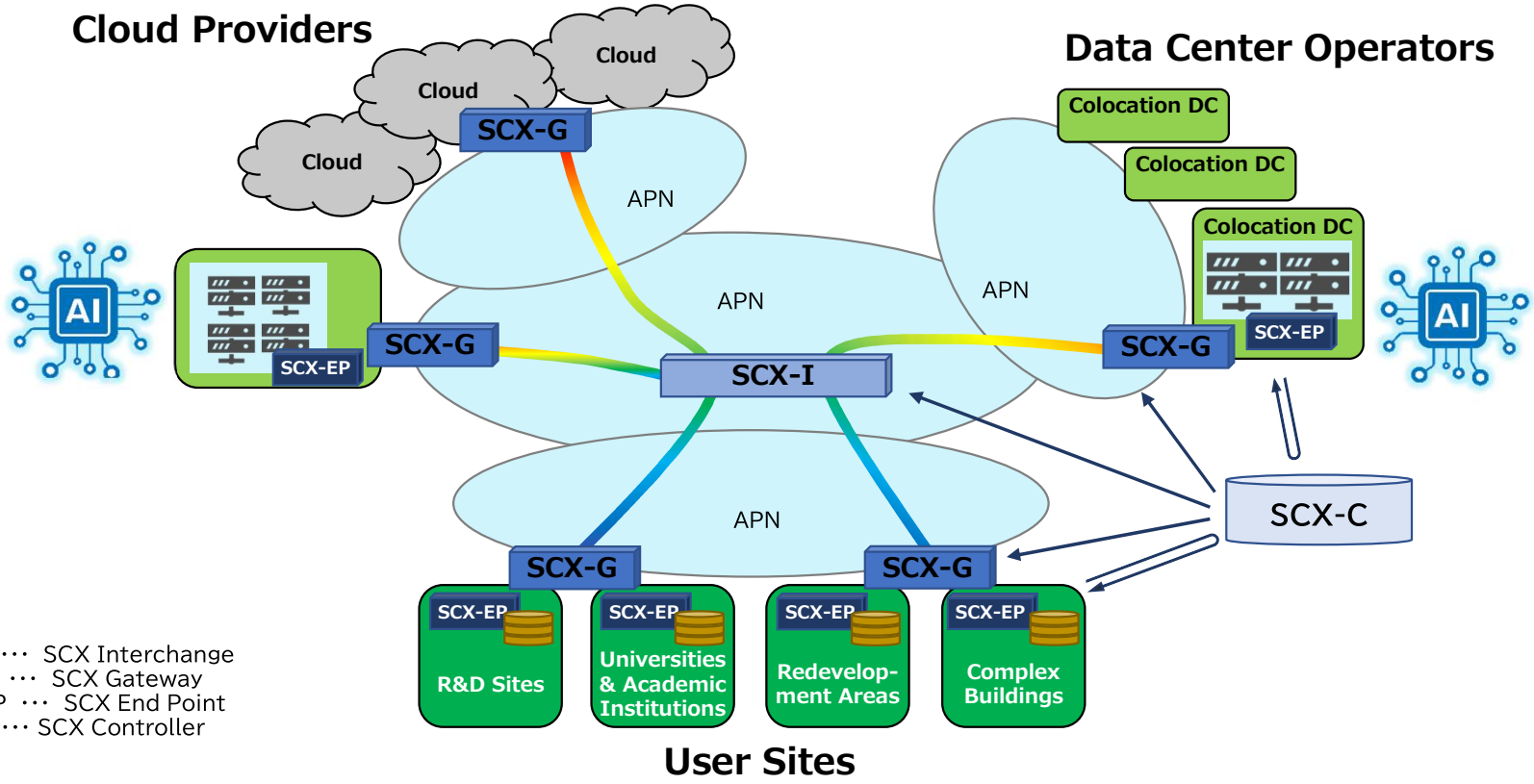

SCX-I ⋯ SCX Interchange
SCX-G ⋯ SCX Gateway
SCX-EP ⋯ SCX End Point
SCX-C ⋯ SCX Controller

Exchange services that promote the use of applications making use of distributed DCs

Support for RDMA that requires deterministic communication (currently limited to within DC)

Efficient connections that don't waste wavelengths between sites (full-mesh wavelength connections are costly)