

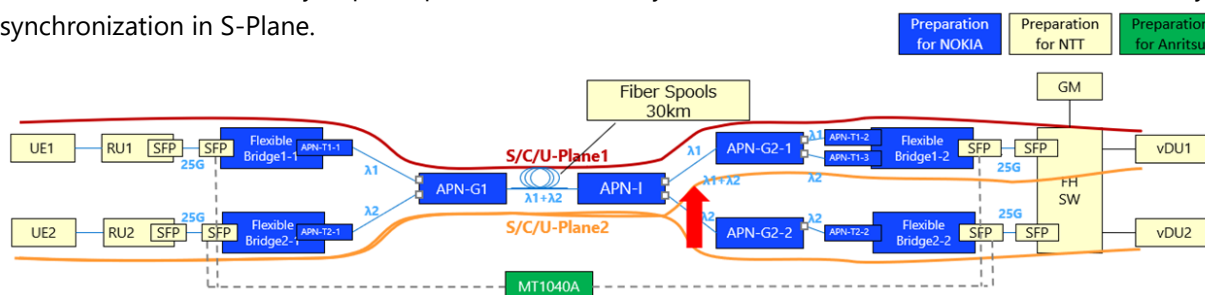
Introduction to Anritsu's Activities in IOWN Verification

400G Ethernet Analyzer MT1040A

10/100G Ethernet Analyzer MT1000A

Evaluating Throughput and Delay Characteristics in Mobile Networks

Anritsu participates in IOWN Global Forum activity (Elastic Load Balancing PoC for Mobile Network Task Force) and has verified network performance for each APN path (between Flexible Bridges) in mobile networks. Delay and jitter are measured to verify U-plane performance, and SyncE and PTP Time Error are measured to verify time synchronization in S-Plane.



Measurement Points

- Monitoring U-plane/S-plane performance between APN edges
- Looking ahead, planning to develop measurements simulating user environments including wireless segments between UE and servers, and expanding to evaluate total network performance, including wireless domains

Evaluating Submarine Cable Throughput and Delay Characteristics

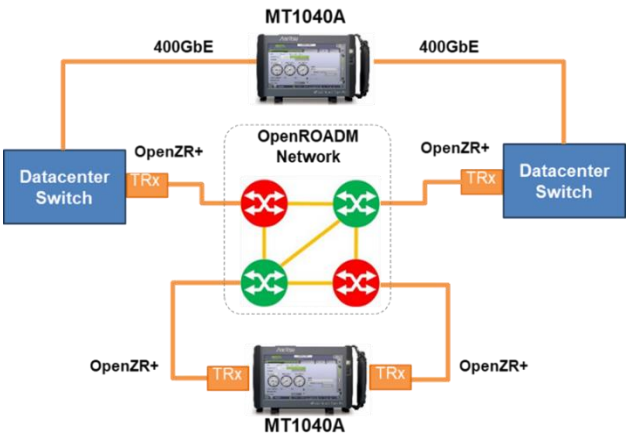
Delay and jitter in Ethernet communications over long-distance networks for APN connections between Japan and Taiwan are being evaluated. Additionally, TCP throughput is being measured considering data replication use cases. We have demonstrated that communication over undersea cables can achieve theoretical TCP throughput values without experiencing packet loss or retransmission.

Measurement Points

- Measuring delay and jitter in Ethernet communications
- Implementing TCP throughput measurements using FPGA-controlled TCP processing to eliminate processing delay impact from TCP algorithms, achieving accurate and reproducible measurements

Collaborating with Data Center Exchange Demonstrations at OFC Exhibition

At OFC 2024, Anritsu demonstrated a network simulating a data center exchange connecting with ultra-high capacity, low delay, and low power consumption at NTT's booth. We have also used the MT1040A, which can simultaneously transmit and receive two 400G OpenZR+ signals, to demonstrate network performance.



Measurement Points

- Verifying coherent connections using OpenZR+/OpenROADM optical modules
- Measuring delay and throughput using 400GbE client signals

Measuring Distributed Data Center Connections

Anritsu's MT1040A was used at PoC verification to evaluate delay between data centers (UK 89 km, US 4 km) using APN connections, confirming communications at the theoretical values (0.890 ms for 89 km, 0.040 ms for 4 km).

Measurement Points

- Measuring delay and jitter at ns level, supporting comparison with optical transmission speed (5 ns/m) using optical fiber
- Supporting separate uplink and downlink measurements using high-precision oscillator with GNSS time synchronization function



NTT IOWN Technology Report 2024

	Delay	Delay jitter
United Kingdom	0.893 milliseconds	0.035 microseconds
United States	0.062 milliseconds	0.045 microseconds

<https://group.ntt/en/newsrelease/2024/04/12/240412a.html>

Product Information



MT1040A 400G Ethernet Analyzer

- Supports testing from 10 Mbps to 400 Gbps
- Supports 400ZR/OpenZR+/OpenROADM pluggable Coherent
- Supports multiple port testing

MT1000A 10/100G Ethernet Analyzer

- Supports testing from 10 Mbps to 100 Gbps
- User-friendly GUI on compact chassis and large display
- All-in-one configuration with OTDR and GNSS Disciplined Oscillator