

Interoperability Testing Using Actual Equipment at a Network Technology Event

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1. Introduction

The procedures for network construction and operation are becoming increasingly complex as networks and related technologies evolve and new systems emerge. Testing using actual equipment is an effective approach to ensure seamless interoperability in such intricate network environments.

This article introduces ShowNet, the network built for Interop Tokyo, a major network technology event, as an example of large-scale interoperability testing using actual network equipment.

2. Interop

Interop is a global event dedicated to network technologies. It originated in 1986 as the TCP/IP Vendors Workshop in Monterey, California, and was later renamed Interop, expanding to multiple countries worldwide. The name “Interop” is derived from “interoperability,” reflecting the event’s core purpose—building a network within the venue to serve as a testing environment for interoperability. In Japan, Interop Tokyo was first held in 1994 and has since become an annual large-scale event in June at Makuhari Messe. The network built for this event is known as ShowNet.

3. ShowNet

ShowNet is a concept network designed as an innovative model for the next 5 to 10 years, incorporating the latest technologies and cutting-edge equipment provided by exhibitors. It provides internet connectivity for exhibitor booths and visitor Wi-Fi. Attendees can see and experience firsthand how these state-of-the-art technologies and equipment operate with ensured interoperability, helping them make informed decisions for future technology and equipment selection. This chapter outlines ShowNet, its construction, history, distinctive operations, and significance.

3.1 ShowNet Organization

ShowNet is organized by Network Operation Center (NOC) team members (assigned by Interop Tokyo organizers), contributors (companies and organizations providing equipment and services), and ShowNet Team Members (STM; volunteer members recruited from the public). In 2024, ShowNet featured 95 contributor companies and 650 engineers (including NOC members, STMs, and contributors). Over 2,300 devices and services were provided, making it one of the world’s largest

interoperability testing events.

3.2 ShowNet Design

NOC team members are invited around September of the previous year and begin discussions on the ShowNet concept in October. In December, exhibitors who are willing to join ShowNet (will participate as contributors) are gathered and briefed on the concept for the following year. Contributors then propose the equipment they plan to provide for ShowNet. NOC team members design the network based on the proposed equipment to align with the concept. From January to May, monthly meetings are held to refine the parameters, culminating in specific IP address allocations and interface connections by May.

3.3 ShowNet Construction

ShowNet is built over 12 days, starting from the Friday two weeks before Interop Tokyo. The first 8 days are known as the HotStage, where ShowNet is built while conducting interoperability tests to ensure the network functions as designed. Since ShowNet incorporates many world-first products and newly implemented technologies, interoperability testing during the HotStage is crucial in ensuring the network is built as designed. At the same time, multiple health checks are conducted on the ShowNet backbone to ensure that the constructed network remains stable and operational. These tests are repeated continuously until the backbone is fully stabilized, right up until the exhibition. Since HotStage takes place at the location where the ShowNet booth is set up, it also serves as an opportunity to begin building ShowNet in advance. Once HotStage concludes, ShowNet enters the Deploy phase. During this phase, after the exhibition hall for Interop Tokyo becomes available, ShowNet is deployed across the entire venue. In the deployment process, the integrity of each exhibitor’s network is verified from both logical and physical perspectives. Through this approach, ShowNet establishes a network as illustrated in the diagram. ShowNet integrates emerging technologies and builds networks reflecting the most relevant industry trends of the time. Key areas include network models for telecom carriers, ISPs, enterprises, and campuses, as well as concepts for wireless and broadcasting industries. As a result, the volume of equipment used in ShowNet continues to grow each year, and the technology involved is becoming increasingly complex. Consequently, the workload required for ShowNet’s construction has also increased.

To achieve efficient construction, ShowNet hosts Pre-HotStage events for each domain, providing increased opportunities for interoperability testing and pre-configuration. Additionally, ShowNet aims for efficient and rapid network construction through detailed pre-event discussions and the use of a proprietary trouble ticket database (TTDB), among other strategies. TTDB not only provides conventional trouble ticket functionality but also consolidates information on equipment and connections used in ShowNet. In an environment involving many participants, accurate data collection and swift information sharing are crucial for troubleshooting. These efforts enable ShowNet to achieve efficient network construction within a short time frame.

3.4 ShowNet History and Achievements

ShowNet has been an ongoing project since the inaugural Interop Tokyo in 1994. Staying true to its core concept of implementing networks that reflect the state of the industry two to three years ahead, ShowNet has continuously integrated pioneering technologies ahead of commercial deployment (see

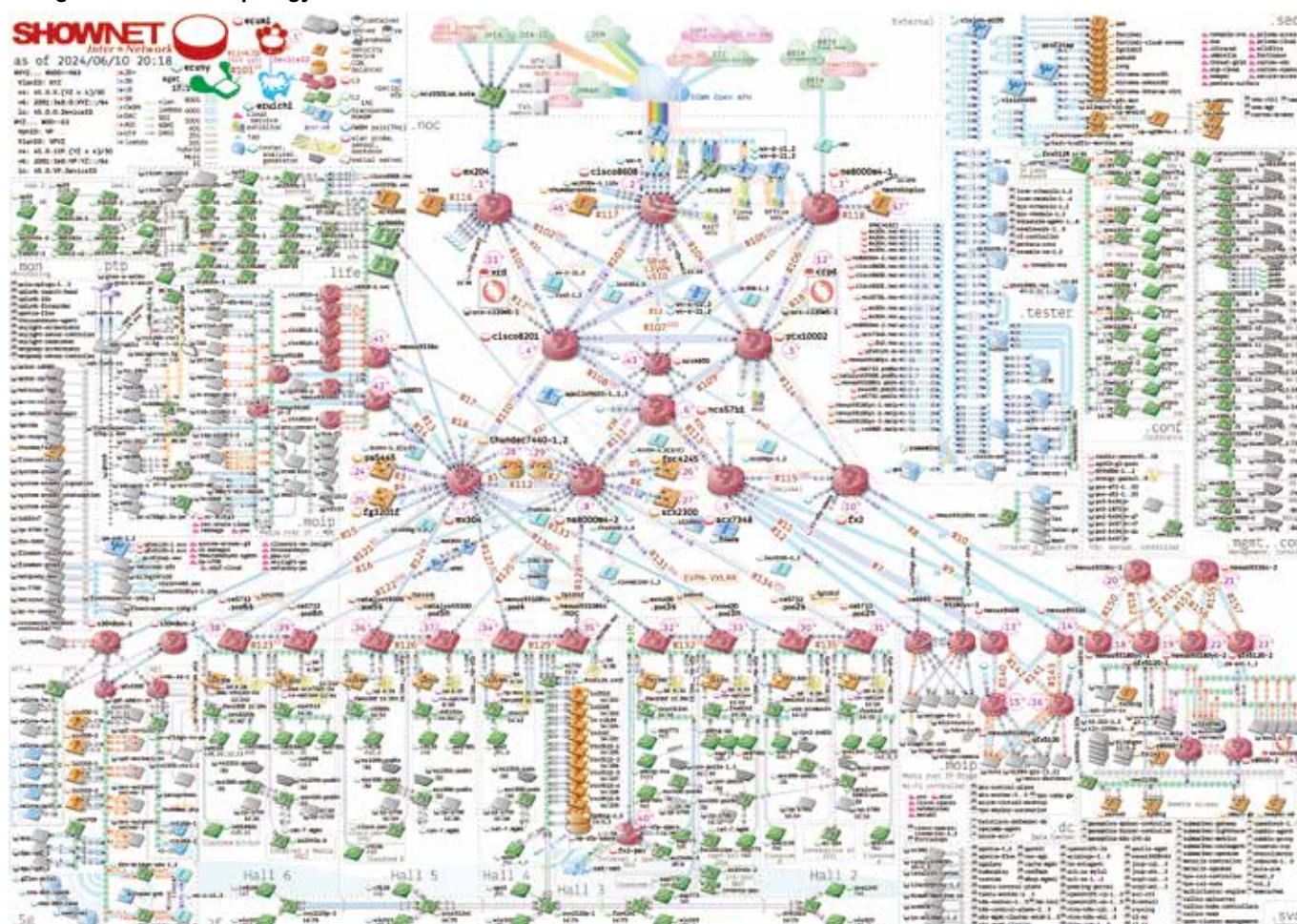
table).

These initiatives have provided feedback for product development by contributors and even led to proposals for standardization activities by NOC members. Notable examples include the Internet-Drafts, such as *draft-upa-srv6-service-chaining-exp* in 2019 (a document summarizing insights gained from the real-world operation of SRv6-based service chaining in ShowNet) and *draft-eden-srv6-tagging-proxy* (a proposal introducing the END.AT method as a new approach for SRv6 Proxy, designed to support large-scale, multi-chain configurations like those used in ShowNet's service chaining).

3.5 ShowNet Operations and Publicity

At ShowNet, it is common for contributors to bring in products equipped with pre-release components or development-stage firmware. Furthermore, as a testing environment for new technologies, not all interoperability connection testing is guaranteed to succeed. Due to this experimental nature, sensitive information—such as details on unreleased products,

■ Figure: ShowNet Topology



■ **Table: Pioneering technologies introduced by ShowNet**

Era	ShowNet initiatives	Commercial service trends
1990s	ATM Metro Ethernet	ATM Mega Link Wide-area Ethernet services
2000s	ADSL Carrier-grade NAT SOC	DSL services CGN SOC services
2010s	100GbE SDN Service chaining	100GbE services SDN/NFV Network slicing
2020s	Segment routing SASE Zero Trust Wi-Fi 6E, Wi-Fi 7 Media over IP	

the success or failure of new technology trials, and network design parameters—is strictly managed as confidential among participants. To ensure this, all participants are required to sign a non-disclosure agreement. This safeguard allows companies to confidently contribute their latest products and actively engage in interoperability testing. At the same time, ShowNet serves as a platform for exhibitors to promote their products and showcase their adoption of emerging technologies to a large audience. Therefore, effectively communicating the results of interoperability tests is crucial. Managing the balance between confidentiality and publicity remains an ongoing challenge each year. This information control is primarily handled through coordination between the NOC team and the Interop Tokyo operations office. In particular, various outreach activities are conducted during the event, including ShowNet walking tours led by NOC team members and presentations on the ShowNet Stage. After the event, NOC team members compile the results and host `shownet.conf_`, a conference dedicated to sharing key findings with the broader community.

Operating a large-scale testbed like ShowNet requires significant investment. Nevertheless, the interoperability results demonstrated at ShowNet provide valuable insights for attendees, helping them evaluate and adopt new equipment and services. This, in turn, increases the likelihood that ShowNet contributors' products will be selected for deployment. Additionally, participation in ShowNet fosters industry collaboration, as members engage in discussions, exchange feedback, and work together on interoperability challenges. As a result, many contributors return as exhibitors at the following year's Interop Tokyo, allowing the exhibition to evolve. In this way, ShowNet has established itself as a business ecosystem for conducting

interoperability testing with concepts that resonate with attendees, making sustainable activities possible—one of its key features.

3.6 The Significance of ShowNet

ShowNet serves not only as a network providing internet connectivity during the event but also as a platform where engineers and companies from industry and academia come together to share the latest technologies. This project goes beyond theoretical designs and product specifications—it demonstrates, in a short period, the whole process of interconnecting devices, running services, and operating the network. This enables attendees to see firsthand how a particular device or technology can be used and will function in their next project. Under the pioneering concepts proposed by the NOC team members, contributors bring a wide range of devices to simultaneously conduct large-scale interoperability testing, while promoting their technologies to the next market. The most significant aspect of ShowNet is testing and validating cutting-edge network technologies in a real-world environment.

Additionally, for STM members—volunteers recruited through an open call—ShowNet provides a rare opportunity to gain hands-on experience with the latest technologies and build large-scale networks in a short time frame. Many of the NOC team members who lead ShowNet's design and construction are former STMs, highlighting how the STM program not only fosters the growth of engineers but also provides them with visibility in the industry. This, too, is a key part of ShowNet's significance.

3.7 How to Participate in ShowNet

To participate in ShowNet as a contributor providing

equipment or services, the primary requirement is to be an exhibitor at Interop Tokyo. Since there are various ways to participate, contacting the Interop Tokyo operations office for details is recommended. Typically, the first round of exhibitor applications for the following year closes at the end of November. By December, an announcement is made to exhibitors regarding the recruitment of ShowNet contributors. There is no specific participation fee for ShowNet. However, companies must cover expenses such as shipping costs for some equipment and travel costs for engineers. Once a company expresses its intent to participate, it can join the project. Participating companies are categorized into different sponsorship tiers based on their level of contribution, with various marketing benefits provided according to their rank. For further details, please contact the Interop Tokyo operations office.

Additionally, individuals can participate through the STM program, an open-call volunteer initiative. Recruitment for STMs is typically announced around December via Interop Tokyo's official website and ShowNet's social media accounts. Since the number of available positions is limited and selection is competitive, not everyone can participate. However, those who are enthusiastic about networking technology are encouraged to apply.

4. Conclusion

This paper has introduced the initiatives of Interop Tokyo ShowNet as a large-scale interoperability testing environment. Network architectures vary widely, as do their roles, but ShowNet facilitates the continuous evolution of the know-how in network design, construction, and operation to match these characteristics. By doing so, it enables the broader sharing of valuable insights and results within the industry. We hope that more companies, organizations, and individuals will join this initiative in the future. At the same time, we remain committed to sustaining this important effort in the networking industry going forward.

Cover Art



Cherry Blossoms on the Sumida Bank (Tokyo Sumidate no sakura) from A Hundred Views of Musashi Province

Woodblock prints depict famous landmarks in Tokyo.

Kobayashi Kiyochika
(1847-1915)

Source: National Diet Library,
NDL Image Bank
(<https://nnavi.ndl.go.jp/imagebank/>)