

Overview of the 10th International Conference on IP + Optical Network (iPOP2014)

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1. Introduction

The tenth International Conference on IP + Optical Network (iPOP) was held this year. This event consisted of an international conference and exhibition on next-generation networks combining optical and IP technology, and as the largest conference of its kind it has important influence over de jure and de facto standards. This report describes the features and purpose of this event.

2. Overview of iPOP

To understand iPOP, it is very helpful to understand the event's creation and history. In the United States, there is a well-established event called the SDN/MPLS conference that is concerned with software-defined networking and multi-protocol label switching (originally known as the MPLS conference)^[1]. It has been held 17 times now, and is sponsored by Isocore Corporation^[2] in the United States (Figure 1).

Isocore is North America's test and validation site for communication protocols and service interoperability. In practice, it performs pre-verification of protocols specified by the Internet Engineering Task Force (IETF) and fabricates test sample protocol implementations (running code).

The IETF regards running code as essential, and requires that it forms the basis of a consensus. In general, the basic concepts are implemented as test code without considering the occurrence of faults or abnormalities (called irregular systems), and the validity and issues of a system are extracted based on inter-operability. After standardization in the IETF, the protocols are combined into a Request for Comments (RFC), and development proceeds on this basis. Here, network products also require interconnectivity with some interfaces. Consequently, activities like ISOCORE and the Photonic Internet Lab (PIL) at Keihanna Information and Communications Open Labs are very important to the developer community. PIL is a virtual research organization consisting of universities, communications carriers and communications equipment vendors with the shared aim of standardizing and commercializing GMPLS technology through partnerships between Japan's industrial, academic and government sectors, centered on Keio University and NTT Research Laboratories.

The SDN/MPLS conference is an event held by Isocore to provide a forum for exhibition booths and presentations on the hottest topics of published research. This is a huge conference with as many as 1,000 participants from various countries in Asia, Europe and America, most of whom are executives and engineers from communications equipment vendors and communications carriers.

The iPOP and SDN/MPLS conferences have built up a complementary relationship, with iPOP held in Japan in the spring, and SDN/MPLS held in the United States in the fall. With 200–300 participants, the iPOP conference is smaller in scale than SDN/MPLS.

3. iPOP issues

Whereas SDN/MPLS provides a forum for discussions on the carrier backbone technology that forms the basis of the Internet, the iPOP conference is concerned with carrier backbone technology based on the combination of optical and IP technology. Figure 2 illustrates how these technologies have evolved over the

Figure 1: History of iPOP

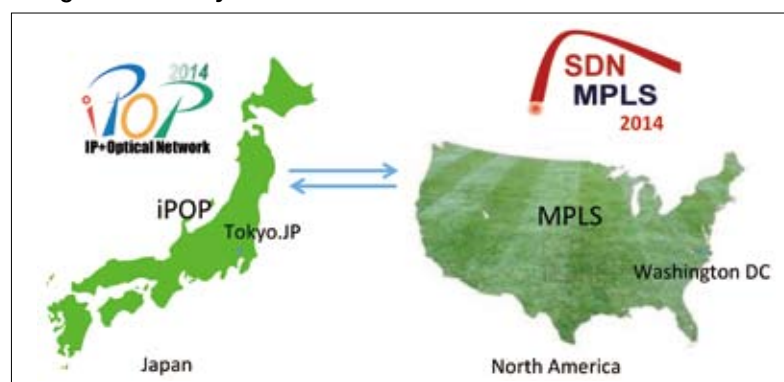
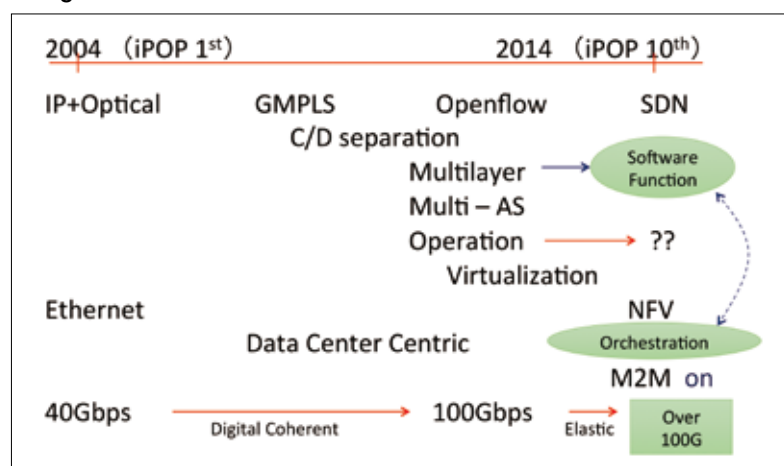


Figure 2: Technical trends in iPOP



last ten years.

When iPOP started, its main topic was an extension of MPLS called GMPLS (Generalized MPLS)^[3, 4], which tied in with the introduction of WDM (wavelength division multiplexing) networks and the concept of a wavelength path (λ path). GMPLS aims to provide a consistent way of handling not only C-plane and D-plane separation and packets but also all λ paths and TDM (time division multiplexing) paths as RSVP (Resource Reservation Protocol) extension parameters (i.e., integration of operations). At the same time, techniques such as PBB-TE (Provider Backbone Bridge Traffic Engineering) have emerged with the aim of applying Ethernet LAN (local area network) technology to carrier backbone networks. A common feature of these technologies is the fact that the provider backbone requires OAM and traffic control techniques that are lacking from the LAN protocol. That is, it has not been easy to implement functions that will allow a network to automatically identify the location of a new fault or automatically switch communication paths around the fault. This has led to complicated protocols and has limited the scope of large-scale network applications.

The next topic that came up was the application of data center network technologies such as Openflow and SDN to carrier networks. Over half of iPOP is still concerned with issues related to SDN. In recent years, the hot topic for applications has been next-generation networks, especially data/content-centric network technology. On the other hand, advances in these network technologies have been consistently supported by optical transmission technology, which has evolved from 10 Gbps to 40 Gbps and 100 Gbps leading to lower costs and an increasing tendency for complex processes and services to be run in the cloud. As a result, network traffic has been converging on data centers and instead of aiming to reduce costs by using traffic applications with electronic packet switching (Ethernet switches or IP routers) in carrier networks without any spare bandwidth, it is instead considered that staying within the allocated bandwidth is used to bring down the operating costs, and there is a tendency for applications to be discarded.

4. iPOP configuration and participants

The iPOP conference is an intensive event that normally runs for just two days.

- (1) The first day starts with plenary and keynote sessions featuring world-renowned members such as the IETF working group chairs. These are followed by a closed lunch meeting aimed at establishing cooperation with ISOCORE and PIL.
- (2) There is often a business session in the afternoon. This is a popular session in which the leading companies in the field introduce their latest product developments and corporate strategies.
- (3) A major feature of iPOP is the exhibition booths and live demonstrations (exhibition). These are quite different from commonplace exhibitions, with exhibition booths showing actual equipment produced by leading companies, national research institutions and universities, while holding in-depth

Figure 3: iPOP schedule

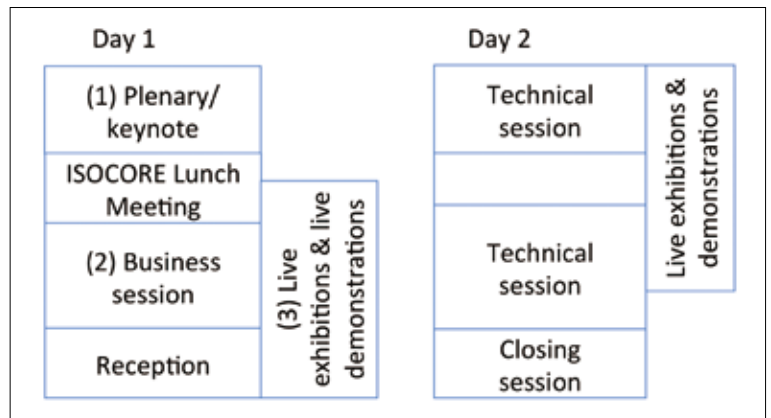
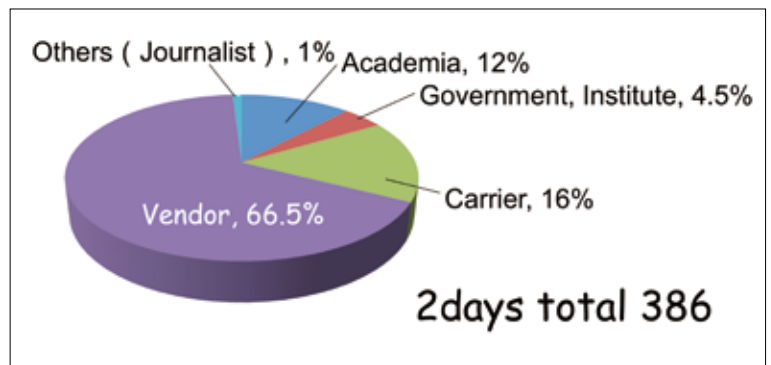


Figure 4: Visitor statistics for iPOP2014



discussions with visitors.

They include interconnection demonstrations of the latest protocols (e.g., in 2014, multi-matching of metro/access/core networks at SDN speeds of over 100 Gbps), as described in more detail in a separate article. These exhibitions are definitely worth a look.

Figure 4 shows a breakdown of the visitors in 2014. Over 80% of the visitors were members of communications equipment vendors or communications carriers, and we have seen none of the recent tendency for businesses to stay away from international conferences.

5. Conclusion

This article has presented a summary of iPOP (International Conference on IP + Optical Network). This year's tenth conference was a quite unique event in Japan, and has had an impact on the communications industry and on the latest standardization efforts. While establishing ties with the IETF and ISOCORE in the United States, the event featured extensive exhibitions and demonstrations as well as technical paper presentations. In Japan, we need this sort of consortium-type research and development style and global impact in order to enable the creation of de facto standards.

REFERENCES

- [1] <http://www.isocore.com/sdn-mpls/>
- [2] <http://www.isocore.com/>
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- [4] N. Yamanaka (Editor), "Understanding MPLS, GMPLS, photonic networks and SDN" (in Japanese), Ohmsha (2014)