Open Internet Standards

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Executive Summary

The Internet's incredible power for creativity and economic growth rests on a simple but powerful foundation: open standards. These publicly available technical building blocks ensure anyone can launch a new service and have it work seamlessly across the globe, without having to ask for permission. To protect this engine of economic and social innovation, the processes for creating standards must remain open to broad participation. Governments must also recognize their vital role as participants in the standards development process and users of open standards, as well as their role in encouraging the use of open standards through, for example, awareness raising and procurement.

Introduction

Open Internet standards are the cornerstone of the Internet's success. They enable its existence, facilitate its growth, and provide a platform that supports creativity, as well as social and economic opportunity for billions of users. Open standards are implemented around the world in all kinds of Internet services, from communications, to IoT to AI agents.

Internet standards are agreed-upon technical specifications that underpin the infrastructure of the Internet and are the building blocks that enable interoperability, compatibility, and consistency across networks, countries, and markets. As the Institute of Electrical and Electronics Engineers (IEEE) points out, "standards also make it easier to understand and compare competing products. As standards are globally adopted and applied in many markets, they also fuel international trade".[1]

Open standards are publicly available and developed via transparent process and open to broad participation. In contrast, proprietary standards are privately owned by one or more entities that control their development, distribution, and access.

Open standards let people and organizations set up new services and make them available across the rest of the Internet without permission. Crucially, they also enable interoperability and provide building

[1] IEEE webpage on standards, https://futuredirections.ieee.org/handbook/standards/

blocks that can be used together in new and innovative ways to offer new features or services. A good example of this is the World Wide Web ("the Web"), which was developed—without permission from anyone—by a researcher at the European Organization for Nuclear Research (CERN) in Geneva to organize and make the vast amount of Internet information more accessible. Web content is transmitted using the Hypertext Transfer Protocol (HTTP), which itself is open and free for anyone to use, and makes it possible for anyone to share a webpage or launch Web-based services without having to get permission or pay fees to do so. Most people use the secure version of HTTP (HTTPS), which uses another open standard from the Internet Engineering Task Force (IETF) known as Transport Layer Security (TLS) to encrypt the communication between a user's device and a web server. Digital certificates for HTTPS communications are also available from the free, open, and automated certificate authority Let's Encrypt, which uses the IETF Automated Certificate Management Environment (ACME) protocol to verify that an entity controls a domain name and to issue the certificate.

All these protocols and standards are open and free for anyone to use. As a result, the Web emerged and then evolved through a combination of different open Internet standards to become more secure and privacy-protecting for users.

The Internet began as a research experiment in internetworking designed to allow different kinds of networks, each using its own proprietary set of protocols (or languages), to connect to and work with each other. The Internet Protocol (IP) is the core set of standards that facilitates information transit across multiple networks using different physical media, including copper wire, fiber optic cable, satellite, and wireless spectrum. The IP open standards also enable information to transit networking devices, such as routers and servers, made by different manufacturers, and millions of IoT devices to connect to the Internet.

There are a broad variety of open Internet standards, including standards that facilitate email [Simple Mail Transfer Protocol (SMTP) and Internet Message Access Protocol (IMAP)], convert IP addresses into human-friendly domain names (Domain Name System (DNS), enable Internet-based real-time communications technologies (Web Real Time Communication (WebRTC), and secure our online interactions.

Because anyone can participate in the development of open standards, the development process has benefited from the best technical know-how and takes into account new conditions or requirements as new users come online. Simply put, new and innovative technical advances are an outcome of broad participation in open standards.

Application developers can take advantage of the levels of compatibility afforded by the standards, which, in turn, helps developers create new applications that might not have been previously possible.

Key Considerations

This open approach to standards development was described by key players in Internet-related standards development, including the Institute of Electrical and Electronics Engineers (IEEE), the Internet Engineering Task Force (IETF), the Internet Architecture Board (IAB), the World Wide Web Consortium (W3C), and the Internet Society in the Open Stand.[2] Those principles are:

- Cooperation
  Respectful cooperation between standards organizations, whereby each respects the autonomy, integrity, processes, and intellectual property rules of the others.
- Adherence to Principles
  Adherence to the five fundamental principles of standards development:
  - Due process: Decisions are made with equity and fairness among participants. No one party dominates or guides standards development. Standards processes are transparent, and opportunities exist to appeal decisions. Processes for periodic standards review and updating are well defined.
  - Broad consensus: Processes allow for all views to be considered and addressed, such that agreement can be found across a range of interests.
  - Transparency: Standards organizations provide advance public notice of proposed standards development activities, the scope of work to be undertaken, and conditions for participation. Easily accessible records of decisions and the materials used in reaching those decisions are provided. Public comment periods are provided before final standards approval and adoption.
  - Balance: Standards activities are not exclusively dominated by any particular person, company or interest group.
  - Openness: Standards processes are open to all interested and informed parties.
- Collective Empowerment
  Commitment by affirming standards organizations and their participants to collective empowerment by striving for standards that:
  - are chosen and defined based on technical merit, as judged by the contributed expertise of each participant;
  - provide global interoperability, scalability, stability, and resiliency;
  - enable global competition;
  - serve as building blocks for further innovation; and
  - contribute to the creation of global communities, benefiting humanity.
- Availability
  Standards specifications are made accessible to all for implementation and deployment. Affirming standards organizations have defined procedures to develop specifications that

[2] The OpenStand - https://open-stand.org/about-us/

can be implemented under fair terms. Given market diversity, fair terms may vary from royalty-free to fair, reasonable, and non-discriminatory terms (FRAND).

- Voluntary Adoption
  Standards are voluntarily adopted, and success is determined by the market.

Challenges

Open standards and the processes that develop them are currently challenged in several ways.

- Proprietary approaches: Companies often implement a particular function in ways that do not build on current open standards. They might do this because no standard exists to meet their needs, they decide to implement the same function without relying on standards for business reasons, or because they are unaware a standard exists.
- Open standards process agility: Open standards process, by definition, promote broad participation. As a result, standards might take a significant amount of time to finalize. This sometimes results in a "deploy first, standardize later (if at all)" approach to developing services or applications.
- Deployment of open standards: The use of open standards is voluntary, so people use a standard when they see value, for example, being able to connect to other networks, and when they are ready. This means that it can take a long time for an Internet standard to be deployed throughout the Internet. Still today, the Internet is not 100% IPv6. However, it also means that useful Internet standards will get broad adoption at a pace that works for all the different types of entities that might want to use them, from large networks to a content provider to an individual business owner.
- Lack of sufficient government recognition: Currently, some government regulations and laws cannot legally reference open standards because some jurisdictions only recognize intergovernmental organizations for standard setting, which can create uncertainty, prevent, or limit their use. This could reduce interoperability if services in one country cannot use a standard used widely elsewhere or reduce user security and privacy if services cannot use security standards, such as TLS 1.3 and ESNI (encrypted server name indication).

Guiding Principles for Open Internet Standards

Open standards were at the core of the Internet's past development and are key to its future growth and evolution. Open standards can be advanced in several ways, including:

- Promote broad participation in Internet standards processes. Open standards benefit from broad input and participation. This input provides the best view of the real requirements faced by diverse Internet users. Broad participation means that the best thinking can be applied to developing a solution that meets these requirements. Policymakers and other stakeholders

should encourage participation in open standards activities and initiatives to increase the availability of technical skills training.

- **Recognize open standards in government laws and regulations**. Where appropriate, policymakers and regulators should reference the use of open standards so that both governments and the broader economies can benefit from the services, products, and technologies that are built on such standards. Governments should work to ensure that standards developed through open processes (including the IETF, W3C, and IEEE) are fully recognized.

- **Ensure consideration of solutions based on open standards as part of government procurements**. Governments can support open standards by ensuring that government technology procurements are open and supportive of solutions built on open standards. Governments should identify and remove unnecessary regulatory obstacles that block the take up of open standard solutions in government procurement.

- **Promote awareness**. Governments can encourage the application of the open standards making principles (described above) in their jurisdictions. They should also encourage the adoption of these principles in the international standards activities in which they participate.

Conclusion

For decades, the open and collaborative process of developing Internet standards has fueled the Internet's remarkable growth and provided a platform for global innovation. The future of that growth, however, is not guaranteed. Challenges ranging from the rise of proprietary systems to insufficient government recognition threaten to slow innovation and inhibit the Internet's full potential. By actively promoting and formally recognizing open standards in public policy, we can protect the building blocks that enable interoperability, compatibility, and consistency across networks, countries and markets, to ensure the Internet remains a vibrant, interoperable, and open resource for the world.