Lab - Research Networking Standards

Step 1: Research Networking Standards Organizations

1. Who is Jonathan B. Postel and what is he known for?

Jonathan B. Postel (1943–1998) was an American computer scientist who made many significant contributions to the development of the Internet. He is best known for being the editor of the Request for Comments (RFC) document series from 1969 until his death, for helping develop core Internet protocols such as TCP/IP, SMTP, and DNS, and for creating and administering the Internet Assigned Numbers Authority (IANA). He was often referred to as the "God of the Internet" due to his comprehensive influence on Internet standards and governance. He was also a founding member of the Internet Society (ISOC) and served on its Board of Trustees.

2. Which two related organizations are responsible for managing the top-level domain name space and the root Domain Name System (DNS) name servers on the internet?

The two related organizations are the Internet Corporation for Assigned Names and Numbers (ICANN) and the Internet Assigned Numbers Authority (IANA). ICANN is responsible for coordinating the maintenance and procedures of several databases related to the namespaces of the Internet, while IANA, which operates under ICANN, is responsible for the global coordination of the DNS Root, IP addressing, and other Internet protocol resources.

3. Vinton Cerf has been called one of the main fathers of the internet. What internet organizations did he chair or help found? What internet technologies did he help to develop?

Vinton Cerf co-founded the Internet Society (ISOC) with Bob Kahn in 1992 and served as its founding president from 1992 to 1995. He helped with the creation of ICANN and served as chairman of its board from 2000 to 2007. He also chaired the Internet Architecture Board (IAB) from 1989 to 1991. In terms of technologies, Cerf co-designed the TCP/IP protocols (Transmission Control Protocol/Internet Protocol) with Robert Kahn, which form the fundamental communication protocols of the Internet. He also contributed to the development of the first commercial email service (MCI Mail) and worked on packet radio and packet satellite technologies at DARPA.

4. What organization is responsible for publishing Request for Comments (RFC)?

The Internet Engineering Task Force (IETF) is responsible for publishing Request for Comments (RFC) documents. The RFC Editor, which was historically managed by Jon Postel, handles the publication process. The IETF develops and promotes Internet standards, particularly the standards that comprise the Internet protocol suite (TCP/IP).

5. What do RFC 349 and RFC 1700 have in common?

Both RFC 349 and RFC 1700 deal with Assigned Numbers for Internet protocols. RFC 349, titled "Proposed Standard Socket Numbers," was published in 1972 by Jon Postel and proposed a system for assigning standard socket (port) numbers. RFC 1700, titled "Assigned Numbers," was published in 1994, also by Jon Postel (with Joyce Reynolds), and served as a comprehensive registry of assigned numbers for Internet protocols, including port numbers, protocol numbers, and other parameters. RFC 1700 obsoleted RFC 349. Both documents focus on the standardization and assignment of numbers used in Internet communication protocols.

6. What RFC number is the ARPAWOCKY? What is it?

The ARPAWOCKY is RFC 527, published in June 1973 by R. Merryman. It is a humorous parody of Lewis Carroll's nonsense poem "Jabberwocky," rewritten with ARPANET and networking terminology. It is considered the first humorous RFC and helped inspire the tradition of publishing humorous April Fools' Day RFCs by the IETF, which has continued almost every year since 1989.

7. Who founded the World Wide Web Consortium (W3C)?

Tim Berners-Lee founded the World Wide Web Consortium (W3C) in 1994 at the Massachusetts Institute of Technology (MIT) Laboratory for Computer Science, with support from the European Commission and DARPA. Berners-Lee is also the inventor of the World Wide Web itself.

8. Name 10 World Wide Web (WWW) standards that the W3C develops and maintains.

Ten W3C standards include:

1. HyperText Markup Language (HTML)
2. Cascading Style Sheets (CSS)
3. Extensible Markup Language (XML)
4. Scalable Vector Graphics (SVG)
5. Document Object Model (DOM)
6. Web Ontology Language (OWL)
7. Web Real-Time Communication (WebRTC)
8. Web Accessibility Initiative (WAI/WCAG)
9. Extensible Hypertext Markup Language (XHTML)
10. Web Open Font Format (WOFF).

9. Where is the Institute of Electrical and Electronics Engineers (IEEE) headquarters located and what is the significance of its logo?

The IEEE is headquartered in New York City, with its operations center located in Piscataway, New Jersey. The significance of its logo lies in its representation of the history of electrical engineering. The diamond shape of the logo represents Benjamin Franklin's kite from his famous lightning experiment. The central arrow and circular design represent the right-hand rule of electromagnetic forces, symbolizing the relationship between electricity and magnetism. The logo was created in 1963 when the American Institute of Electrical Engineers (AIEE) and the Institute of Radio Engineers (IRE) merged to form the IEEE, combining elements from both predecessor organizations' logos.

10. What is the IEEE standard for the Wi-Fi Protected Access 2 (WPA2) security protocol?

The IEEE standard for WPA2 (Wi-Fi Protected Access 2) is IEEE 802.11i (formally IEEE 802.11i-2004). This amendment to the original IEEE 802.11 standard specifies security mechanisms for wireless networks and was ratified on June 24, 2004. WPA2 is the Wi-Fi Alliance's interoperable implementation of the ratified 802.11i standard, using AES-based encryption (CCMP) instead of the older RC4 used in WEP.

11. Is the Wi-Fi Alliance a non-profit standards organization? What is their goal?

Yes, the Wi-Fi Alliance is a non-profit organization. It was formed in 1999 (originally as the Wireless Ethernet Compatibility Alliance, or WECA) and is based in Austin, Texas. Its goal is to promote Wi-Fi technology and certify Wi-Fi products for interoperability, ensuring that wireless networking products from different manufacturers work together seamlessly. The Wi-Fi Alliance owns the Wi-Fi trademark, and manufacturers may use it to brand products that have been certified for interoperability.

12. Who is Hamadoun Touré?

Hamadoun Touré (born 1953) is from Mali and served as the Secretary General of the International Telecommunication Union (ITU) from 2007 to December 2014. He was re-elected for a second four-year term in 2010. He holds a master's degree in Electrical Engineering and a doctorate in telecommunications. Before leading the ITU, he had a distinguished career in the satellite industry, working with Intelsat and managing its expansion in Africa.

13. What is the International Telecommunication Union (ITU) and where is it headquartered?

The International Telecommunication Union (ITU) is a specialized agency of the United Nations (UN) that is responsible for issues concerning information and communication technologies (ICTs). The ITU coordinates the shared global use of the radio spectrum, promotes international cooperation in assigning satellite orbits, works to improve telecommunication infrastructure in the developing world, and assists in the development and coordination of worldwide technical standards. Its headquarters are located in Geneva, Switzerland.

14. Name the three ITU sectors.

The three ITU sectors are:

1. Radiocommunication (ITU-R) manages the international radio-frequency spectrum and satellite orbit resources
2. Standardization (ITU-T) develops international standards (known as Recommendations) for telecommunications
3. Development (ITU-D) helps spread equitable, sustainable, and affordable access to information and communication technologies

15. What does the RS in RS-232 stand for and which organization introduced it?

RS in RS-232 stands for "Recommended Standard." It was introduced by the Electronic Industries Alliance (EIA). RS-232 is a standard for serial communication that defines the signals connecting between a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment). It was originally introduced in 1960.

16. What is SpaceWire?

SpaceWire is a standard for high-speed data links and networks used onboard spacecraft. It is based in part on the IEEE 1355 standard of communications. SpaceWire is coordinated by the European Space Agency (ESA) in collaboration with international space agencies including NASA, JAXA, and RKA. It is designed to connect sensors, processing units, mass-memory, and telemetry subsystems onboard spacecraft.

17. What is the mission of the ISOC and where are its headquarters located?

The mission of the Internet Society (ISOC) is "to promote the open development, evolution, and use of the Internet for the benefit of all people throughout the world." ISOC was founded in 1992 by Vint Cerf and Bob Kahn. Its headquarters are located in Reston, Virginia, USA, with an additional office in Geneva, Switzerland.

18. What organizations does the IAB oversee?

The Internet Architecture Board (IAB) oversees the Internet Engineering Task Force (IETF) and the Internet Research Task Force (IRTF). The IETF is responsible for developing Internet standards, while the IRTF focuses on longer-term Internet-related research.

19. What organization oversees the IAB?

The Internet Society (ISOC) oversees the Internet Architecture Board (IAB). ISOC provides the organizational framework and support for the IAB and the broader Internet standards process.

20. When was the ISO founded and where are its headquarters located?

The International Organization for Standardization (ISO) was founded on February 23, 1947. Its headquarters are located in Geneva, Switzerland. ISO is an independent, non-governmental international organization with a membership of over 160 national standards bodies. It develops and publishes international standards across a wide range of industries and technologies.

Step 2: Reflect on Internet and Computer Networking Experiences

1. How do the internet standards allow for greater commerce? What potential problems could we have if we did not have the IEEE?

Internet standards allow for greater commerce by ensuring that all devices, software, and networks can communicate with each other using common protocols. This interoperability means businesses can reach customers globally, process online transactions securely, and exchange data reliably regardless of the hardware or software being used. Without the IEEE, there would be no standardized networking protocols such as Ethernet (IEEE 802.3) or Wi-Fi (IEEE 802.11). This would result in incompatible networking equipment from different manufacturers, making it extremely difficult to build reliable, interoperable networks. Businesses would struggle to connect their systems, and the global Internet infrastructure we rely on for commerce would not function as it does today.

2. What potential problems could we have if we did not have the W3C?

Without the W3C, there would be no standardized web technologies such as HTML, CSS, and XML. Different web browsers and platforms would likely implement their own proprietary formats, leading to a fragmented web where websites would only work on specific browsers or platforms. Web developers would need to create multiple versions of websites for different systems, increasing costs and reducing accessibility. Innovation on the web would slow down significantly, and users would have a poor, inconsistent browsing experience.

3. What can we learn from the example of the Wi-Fi Alliance with regard to the necessity of networking standards?

The Wi-Fi Alliance demonstrates the critical importance of certification and interoperability testing in addition to standards development. While the IEEE develops the technical wireless standards (802.11), the Wi-Fi Alliance ensures that products from different manufacturers actually work together through its certification program. This teaches us that having a standard alone is not enough — there must also be a mechanism to verify and certify that products conform to the standard. The Wi-Fi Alliance's success shows that industry cooperation through a non-profit organization can drive widespread adoption of technology, benefit consumers through interoperability, and create a thriving market for wireless products.