IEEE 802.1 YANG Data Model Standards Enhance Next-Generation Network Management

By Glenn Parsons, IEEE 802.1 Working Group Chair
Marc Holness, Editor: IEEE 802.1Qcp, 802.1Qcx, 802.1X (YANG)
Mick Seaman, Editor: IEEE 802.1X

Today, network operators and enterprises alike are looking to utilize YANG Data Models to support their new and next-generation network management systems and to address issues related to Time-Sensitive Networking (TSN), Software-Defined Networking (SDN), cloud-based control, fault management, network security and more. In order to address growing industry needs related to YANG, the IEEE 802.1 Working Group initiated its YANG standards development program in 2018 with the publication of IEEE 802.1Qcp™-2018—IEEE Standard for Local and metropolitan area networks—Bridges and Bridged Networks—YANG Data Model.

YANG is a formalized data modeling language that can be used by NETCONF and RESTCONF, widely accepted protocols used to simplify network configuration. Development of a YANG data model for manageable entities specified in IEEE 802.1Q™ leverages the flexibility and extensibility of YANG to ensure interoperability, helping to streamline industry network management practices and save on time and costs.

IEEE 802.1Qcp enables a compatible interconnection of information technology equipment attached to separate individual Local Area Networks (LANs), significantly simplifying networking management tasks. The standard amendment represented the first standards development project that addressed industry-wide recognition that YANG has emerged as the basis for ensuring interoperability for next-generation network management systems. Following those efforts, the IEEE 802.1 Working Group has been busy developing new standards and amending key IEEE 802.1 standards to incorporate YANG Data Models in response to industry demand.

New YANG Standards

IEEE Standards Association (IEEE SA) recently published IEEE 802.1Qcx™-2020—IEEE Standard for Local and metropolitan area networks—Bridges and Bridged Networks—Amendment: YANG Data Model for Connectivity Fault Management.

IEEE 802.1Qcx-2020 provides an industry standard YANG data model for Connectivity Fault Management that can be used for Operations, Administration and Maintenance (OAM) of IEEE 802.1™. The standard amendment has been widely adopted and was developed with a good deal of industry and standards bodies' participation, having been developed collaboratively with the ITU Telecommunication Standardization Sector (ITU-T) Study Group 15 and the Broadband

Forum. The standard amendment also facilitates a nimble extension to support other enhanced Ethernet OAM capabilities defined by ITU-T to enhance capabilities for telecom operators deploying such things as first mile networks, cloud-based networks, or even data center interconnects, as well as supporting developers and providers of networking services and equipment.

Network security continues to be a topic of major concern. The recently published standard, IEEE 802.1X™-2020 - IEEE Standard for Local and Metropolitan Area Networks--Port-Based Network Access Control defines the YANG model for Port-based network access control allowing a network administrator to restrict the use of IEEE 802 LAN service access points to secure communication between authenticated and authorized devices.

This standard is widely used in Ethernet (IEEE 802.3) and Wi-Fi (IEEE 802.11) networks that provide access to critical data, support mission critical applications, or that charge for service. Protocols that configure, manage, and regulate access to these networks and network-based services and applications typically run over the networks themselves. Port-based network access control regulates access to the network, guarding against transmission and reception by unidentified or unauthorized parties, and consequent network disruption, theft of service, or data loss.

Moving Forward

Automated provisioning of network systems and nodes have become the norm, and YANG has emerged as the best choice for configuration and control within all types of networks. The IEEE 802.1 Working Group is committed to facilitating the ongoing development and adoption of YANG standards and amendments. Individuals interested in providing use cases or additional functionalities for network management support in TSN or 802.1 protocols can learn more about participating by visiting the IEEE 802.1 Working Group web page.

IEEE 802.1Qcp, IEEE 802.1Qcx and IEEE 802.1X are available for purchase at the IEEE SA Standards Store.