

# P1910.1

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**Submitter Email:** [nxsvks@rit.edu](mailto:nxsvks@rit.edu)  
**Type of Project:** New IEEE Standard  
**PAR Request Date:** 14-Mar-2013  
**PAR Approval Date:** 10-May-2013  
**PAR Expiration Date:** 31-Dec-2017  
**Status:** PAR for a New IEEE Standard

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**1.1 Project Number:** P1910.1  
**1.2 Type of Document:** Standard  
**1.3 Life Cycle:** Full Use

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**2.1 Title:** Standard for Meshed Tree Bridging with Loop Free Forwarding

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**3.1 Working Group:** Loop-Free Switching and Routing (COM/SDB/1910 WG)

**Contact Information for Working Group Chair**

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**Contact Information for Working Group Vice-Chair**

None

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**3.2 Sponsoring Society and Committee:** IEEE Communications Society/Standards Development Board (COM/SDB)

**Contact Information for Sponsor Chair**

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**4.1 Type of Ballot:** Individual

**4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot:** 08/2014

**4.3 Projected Completion Date for Submittal to RevCom:** 08/2015

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**5.1 Approximate number of people expected to be actively involved in the development of this project:** 10

**5.2 Scope:** This standard specifies a meshed tree bridging protocol for the purpose of forwarding unicast, multicast and broadcast frames in a loop free forwarding topology with zero convergence time on detection of link or switch failure. The meshed tree scheme imposes low operational and control overhead by operating through local information dissemination without flooding or forwarding link details to all switches in the topology. Advanced features are incorporated from the ground-up by defining two additional mutually non-exclusive modes; secure and static topology construction.

**5.3 Is the completion of this standard dependent upon the completion of another standard:** No

**5.4 Purpose:** The purpose of this standard is to specify the methods for establishing several tree-like structures on an existing topology. The protocol leverages any useable path rather than eliminating possible alternate links. Upon changes to the topology, the meshed tree protocol will converge in zero time through the immediate use of alternate pre-determined viable pathways on failure detection.

**5.5 Need for the Project:** Loop free forwarding and unacceptable convergence times are continuing challenges in layer 2 networks that provide link and path redundancy. Solutions to overcome frame looping in bridged or switched networks are addressed by special protocols at layer 2. These solutions block ports to prevent frame forwarding and build loop free topologies. Recent developments attempt to improve upon these issues through the use of link state routing techniques, which increase protocol and computing complexity, requiring another layer of frame encapsulation.

The meshed tree algorithm aids in building and maintaining multiple overlapped tree branches from a single root without blocking any ports from forwarding frames. Upon detection of link failure, nodes fall back to another branch without the need for information dissemination resulting in zero convergence time. The tree branch from the broken link can be pruned without impacting frame forwarding.

There can be multiple instances of the meshed tree algorithm in order to provide Virtual Local Area Networks (VLAN) specific topologies.

Security in bridging protocols has not been considered in existing standards. The specifications of the meshed tree bridging protocol will incorporate a secure mode of operation that will prevent un-authorized bridges from joining the network and participating in the meshed-tree creation algorithm.

## 5.6 Stakeholders for the Standard: Communications system manufacturers and solution developers

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### Intellectual Property

**6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?:** No

**6.1.b. Is the Sponsor aware of possible registration activity related to this project?:** Yes

**If yes please explain:** The multicast destination Medium Access Control (MAC) address needs to be reserved for the operation of the protocol.

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**7.1 Are there other standards or projects with a similar scope?:** Yes

**If Yes please explain:** IEEE Standard for Local and Metropolitan Area Networks: Medium Access Control Bridges - Virtual Bridged Local Area Networks - Amendment 20: Shortest Path Bridging.

Scope: This standard specifies shortest path bridging of unicast and multicast frames, specifying protocols to calculate multiple active topologies that can share learned station information, and support of a VLAN by multiple, per topology shortest path VLAN identifiers.

IETF RFCs on Transparent Interconnection of Lots of Links (TRILL) and Routing Bridges (RBridges) Base Protocol Specification.

Scope: Routing Bridges (RBridges) provide optimal pair-wise forwarding without configuration, safe forwarding even during periods of temporary loops, and support for multipathing of both unicast and multicast traffic. They achieve these goals using (Inter System-Inter System) IS-IS routing and encapsulation of traffic with a header that includes a hop count.

### and answer the following

**Sponsor Organization:** IEEE, IETF

**Project/Standard Number:** IEEE Std 802.1aq-2012, IETF RFCs 5556 & 6325

**Project/Standard Date:** 29-Jun-2012

**Project/Standard Title:** IEEE Standard for Local and Metropolitan Area Networks: Medium Access Control Bridges - Virtual Bridged Local Area Networks - Amendment 20: Shortest Path Bridging.

IETF RFCs on Transparent Interconnection of Lots of Links (TRILL) and Routing Bridges (RBridges) Base Protocol Specification.

### 7.2 Joint Development

**Is it the intent to develop this document jointly with another organization?:** No

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**8.1 Additional Explanatory Notes (Item Number and Explanation):** 5.2, 5.4 and 5.5 - The following paper provides additional information for the project scope, purpose, and need: Nirmala Shenoy, "A Meshed Tree Algorithm for Loop Avoidance in Switched Networks", The Eighth International Conference on Networking and Services (ICNS), St. Maarten, The Netherlands Antilles, 25-30 March 2012, [http://www.thinkmind.org/index.php?view=article&articleid=icns\\_2012\\_3\\_10\\_10060](http://www.thinkmind.org/index.php?view=article&articleid=icns_2012_3_10_10060).