

## Understanding Loop Protection for STP, RSTP, and MSTP on EX-series Switches

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EX-series switches provide Layer 2 loop prevention through Spanning Tree Protocol (STP), Rapid Spanning Tree protocol (RSTP), and Multiple Spanning Tree Protocol (MSTP). Loop protection increases the efficiency of STP, RSTP, and MSTP by preventing ports from moving into a forwarding state that would result in a loop opening up in the network.

A loop-free network in spanning-tree topologies is supported through the exchange of a special type of frame called bridge protocol data unit (BPDU). Peer STP applications running on the switch interfaces use BPDUs to communicate. Ultimately, the exchange of BPDUs determines which interfaces block traffic (preventing loops) and which interfaces become root ports and forward traffic.

However, a blocking interface can transition to the forwarding state in error if the interface stops receiving BPDUs from its designated port on the segment. Such a transition error can occur when there is a hardware error on the switch or software configuration error between the switch and its neighbor.

When loop protection is enabled, the spanning-tree topology detects root ports and blocked ports and makes sure both keep receiving BPDUs. If a loop-protection-enabled interface stops receiving BPDUs from its designated port, it reacts as it would react to a problem with the physical connection on this interface. It doesn't transition the interface to a forwarding state, but instead transitions it to a loop-inconsistent state. The interface recovers and then it transitions back to the spanning-tree blocking state as soon as it receives a BPDU.

We recommend that you enable loop protection on all switch interfaces that have a chance of becoming root or designated ports. Loop protection is most effective when enabled in the entire switched network. When you enable loop protection, you must configure at least one action (**alarm**, **block**, or **both**).

An interface can be configured for either loop protection or root protection, but not for both.

- Related Topics**
- Example: Configuring Loop Protection to Prevent Interfaces from Transitioning from Blocking to Forwarding in a Spanning Tree on EX-series Switches
  - Understanding Root Protection for STP, RSTP, and MSTP on EX-series Switches
  - Understanding BPDU Protection for STP, RSTP, and MSTP on EX-series Switches
  - Understanding MSTP for EX-series Switches
  - Understanding RSTP for EX-series Switches
  - Understanding STP for EX-series Switches

