Lenovo

Troubleshooting Port Failures on a Lenovo Network Switch

Describes the reasons that a link is disabled

Shows how to diagnose the various causes

Provides useful commands for diagnosis and repair

Explains which switch features are involved

Scott Lorditch

LENOVO PRESS

Abstract

Why is my Lenovo Networking switch port down? Why is it in an `errdisable` state? There are several possible reasons and we describe the most likely reasons and ways you can fix the problem and restore your switch to full operation.

This paper reviews various conditions that can result in a port on a Lenovo Networking switch not passing traffic. Ports that are in states, such as `suspended` or `errdisabled`, are included in this paper; the conditions do not pass traffic and can be considered *down*.

This paper is intended as a reference for networking engineers. It includes a description of several features of Lenovo switch firmware and the scenarios in which their use can result in a port being disabled. Information about diagnosing port-down conditions also is included.

For more information about our most recent publications, see this website:

http://lenovopress.com

Contents

Spanning Tree and related causes

Ports that are not sending or receiving traffic because of Spanning Tree often show as “up” in a link status display. The reasons why they are prevented from sending or receiving traffic are described in this section.

Ports in blocked or discarding state

In all of its varieties, Spanning Tree functions by putting ports in a “blocked” or “discarding” state when necessary to prevent a loop. Our default Spanning Tree mode, Per-VLAN Rapid Spanning Tree (PVRST), works at the level of an individual VLAN and interoperates with Cisco, which developed this proprietary implementation of STP.

How to check

By using the **`show spanning-tree`** command, ports that are not carrying traffic on a specific VLAN are indicated.

Note: If a specific port is in discard mode as shown from a switch, the switch does not send traffic on that port; however, the switch at the other end of the link might still send traffic.

Errors with BPDU guard or PVST protection

There also are situations that are related to Spanning Tree that put a port into an error disabled state. The ports recover automatically if the cause of the error is remedied. The following errors can occur:

- Bridge Protocol Data Unit (BPDU) guard

  BPDU is received on a port that is configured as an edge/fastfwd port or a port with Spanning Tree Protocol (STP) disabled, when the BPDU guard feature is enabled. Enabling this feature is recommended to avoid network loop or broadcast storm, although edge ports often are server-facing ports.

- Per-VLAN Spanning Tree (PVST) protection

  A Cisco PVST/PVRST BPDU was received when Multiple Spanning Tree Protocol (MSTP) is run. Enabling this feature is recommended if there is a possibility of receiving such a BPDU, which can come from a Lenovo, Cisco, or other vendor’s device.

How to check

By using the **`show interface link`** command, the ports that are in an error disabled state are shown. Log messages indicate when a port is disabled because of BPDU guard or PVST protection.

Link Aggregation Control Protocol configuration-related causes

Link Aggregation Control Protocol (LACP) configurations can also result in ports being error-disabled, often to prevent loops, unintentional VLAN bridging, or other problems.

LACP suspend-individual

The LACP standard enables traffic to flow over a single port if no LACPDUs are received. This flow is desirable under some conditions because Bootstrap Protocol (BOOTP) and Dynamic Host Configuration Protocol (DHCP) can function on ports that become part of an LACP aggregation. The suspend-individual configuration option does not allow ports to pass traffic when no LACPDUs are received. Instead, a log message indicates that the ports are suspended.

How to check

Log messages indicate when a port is suspended and when a port is placed into individual state. In either case, if a LACPDU is later received, the ports show as having LACP up and a console message indicates that the port is no longer suspended.

Ports with mismatched LACP key

A similar situation (which also is allowed by the standard) enables two or more aggregation groups to be formed from a collection of ports on a switch that all have the same LACP key. These aggregations feature different aggregation instance numbers as seen by the switch, and can connect to the same device at the other end of the links or to different devices. If the configuration includes a static binding of the LACP key to a port-channel number (for example, `portchannel xx lacp key yy`), the switch enables only one aggregation to form and disables ports that otherwise formed extra channels.

As shown in Figure 1, the switch that is on the left side error-disables the port that is connected to the bottom link (as indicated by the red symbol).

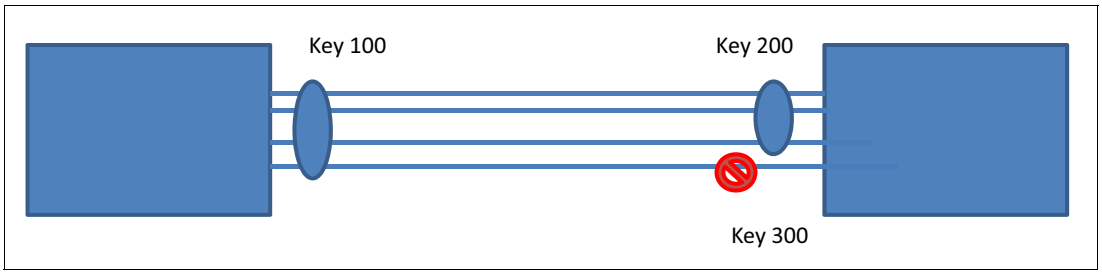

Figure 1 LACP aggregation with mismatched keys

How to check

By using the **`show lacp info`** command, you can identify the aggregation instance numbers that are associated with the ports, which is the same for ports in the same aggregation and different when ports in different aggregations. If one switch has ports with the same key that is bound to a port-channel number, LACP becomes active only on ports for a single aggregation whose partner also aggregates them together, as shown Example 1 on page 5.

Example 1 Console messages and "show lacp info" with key mismatch

```
Jan 18 15:56:10 R11-TOR-1 NOTICE  lacp: LACP misconfiguration detected on port 5:
Port partner key:106, does not match PortChannel partner key:105

Jan 18 15:56:10 R11-TOR-1 NOTICE  lacp: LACP is suspended on port 5

R11-TOR-1#sho lacp info
port    mode    adminkey  operkey   selected   prio  aggr  trunk  status  minlinks
--------------------------------------------------------------------------------
1       active       105      105    yes       32768    1     65*   up        1
5       active       105      105  suspended   32768   --     65*  down       1
```

Mismatched keys in a vLAG aggregation

vLAG with LACP always disables ports that are part of the same LACP instance on the two partner aggregation switches if they are not part of a single LACP aggregation on the access switch. This configuration means that ports that are part of a vLAG aggregation must use the same key on the two aggregation switches. All ports on the access switch similarly must be keyed alike.

As shown in Figure 2, the switch that is on the right side disables the link configured on the access switch at the bottom with LACP key 300.

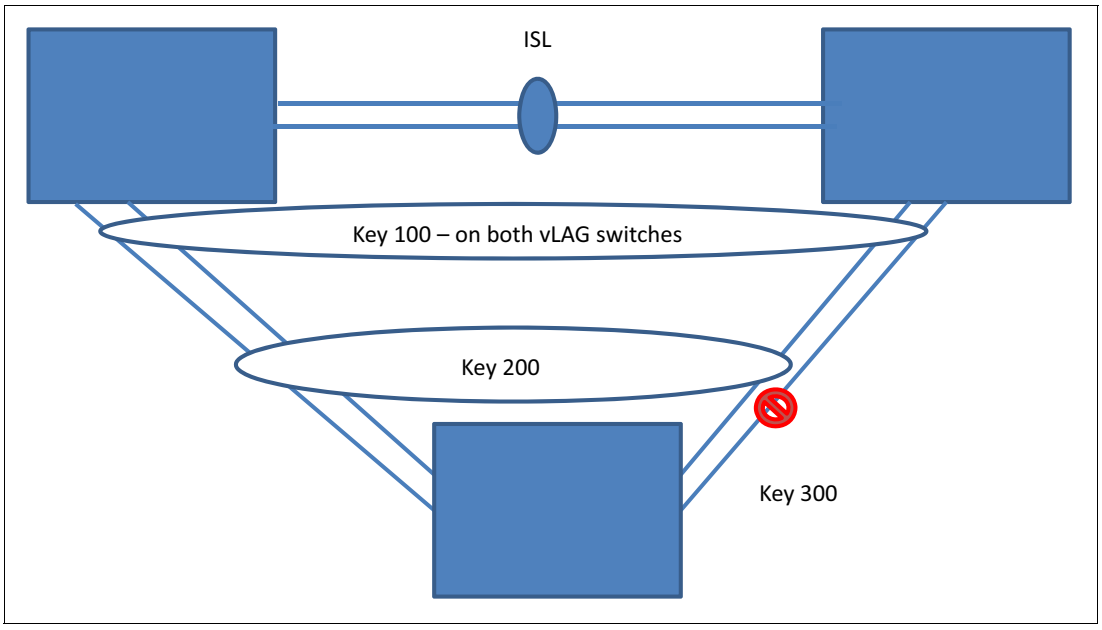

Figure 2 vLAG with LACP key mismatch

How to check

The two vLAG partners each enforce disabling the port where the LACP key does not match. The vLAG partner where the problem port is attached (which is the upper right switch in Figure 2) issues a log message when it occurs. Ports that are suspended because of this condition also can be identified by using the **`show lacp info`** command.

vLAG inter-switch link failure

If the inter-switch link (ISL) in a VLAG configuration is down but the partner switch is reachable (often via the health-check link), the VLAG member ports on the secondary partner are disabled to prevent a loop. This behavior is automatic and does not require any special configuration. Ports that are brought down because of this condition show as `errdisabled`.

If the ISL recovers, the ports are brought back up, and a log message is issued, as shown in Example 2.

Example 2 Console log showing simulated ISL failure

```
R11-TOR-2(config)#int port 1,5
R11-TOR-2(config-if)#shut
R11-TOR-2(config-if)#

Jul 15  3:39:19 R11-TOR-2 NOTICE  link: link down on port 1
Jul 15  3:39:19 R11-TOR-2 NOTICE  lacp: LACP is down on port 1
Jul 15  3:39:19 R11-TOR-2 NOTICE  link: link down on port 5
Jul 15  3:39:19 R11-TOR-2 NOTICE  lacp: LACP is down on port 5
Jul 15  3:39:19 R11-TOR-2 ALERT   vlag: vLAG ISL is DOWN

Jul 15  3:39:19 R11-TOR-2 NOTICE  vlag: ISL is down and peer is reachable, vLAG
ports will be brought down for loop protection.

Jul 15  3:39:19 R11-TOR-2 NOTICE  link: link down on port 17
Jul 15  3:39:19 R11-TOR-2 NOTICE  lacp: LACP is down on port 17
Jul 15  3:39:19 R11-TOR-2 NOTICE  link: link down on port 18
Jul 15  3:39:19 R11-TOR-2 NOTICE  lacp: LACP is down on port 18
Jul 15  3:39:19 R11-TOR-2 ALERT   vlag: vLAG on key 1718 is DOWN

R11-TOR-2(config-if)#sho int link
------------------------------------------------------------------------
Alias   Port   Speed    Duplex     Flow Ctrl      Link     Description
------- ----   -----   --------  --TX-----RX--   ------   -------------
1         1     40000     full      no     no    disabled     1  <- ISL
5         5     40000     full      no     no    disabled     5  <- ISL
9         9     40000     full      no     no      down       9
13        13    40000     full      no     no      down       13
17        17    1G/10G    full      no     no   errdisabled   17  <- vLAG port
18        18    1G/10G    full      no     no   errdisabled   18  <- vLAG port
```

How to check

The secondary vLAG partner issues a log message that states that vLAG ports are brought down. Both partners issue a message when the ISL fails.

Other conditions that cause ports to be disabled

There are more conditions that can cause a port on a Lenovo switch to be prevented from passing traffic. These conditions are described in this section.

UDLD-related errors

Uni-Directional Link Detection (UDLD) is a feature that is recommended for fiber links. It disables ports when a loop, mismatch (a pair of fibers do not connect to the same port at the other end), or if one direction of traffic flow is not functioning. Fixing this situation often requires physical intervention to check the fibers or transceiver.

This feature can be put in `aggressive` mode or disabled. Aggressive mode disables links when a probe from the partner is not received periodically; normal mode detects physical configuration errors only.

How to check

By using the **`show interface port <id> udld`** command, configuration and status information is provided. Log messages also are shown.

Link Flap Dampening

Link Flap Dampening disables a port that is experiencing excessive flaps (transitions between up and down states) beyond the configured threshold. It is likely that fixing a flapping port requires physical intervention.

This feature is configured by using the **`errdisable link-flap`** global and port level commands. The function can be enabled and the number of flaps and time can be specified.

How to check

Log messages indicate when a port goes up and down and when it is disabled because of flapping. The current parameters can be seen by using the **`show errdisable link-flap`** command.

Static LAG port attributes mismatch

A second or later port becomes active and its characteristics do not match those characteristics of the previous ports that are part of the same aggregation. Key attributes include speed and full/half duplex. These parameters can be determined when a port becomes active or when a transceiver is inserted; therefore, it is not reflected in the switch configuration. Mismatching configured attributes, such as VLAN membership and native VLAN, are rejected with an error message when configuring the port channel is attempted.

How to check

When this condition occurs, console messages are issued on the switch. By using the **`show int link`** command, the ports that were intended to be aggregated together are shown to have different attributes. In some conditions, it might be necessary to change the transceivers in one or more of the ports to remedy this condition.

General error disable options

Ports that are put into `errdisable` state because of UDLD, attribute-mismatch, and link-flap dampening can be set to recover after a configurable interval by using the **`errdisable recovery`** command.

This recovery must be globally enabled and can then be controlled on a port basis; the default for a port is enabled if the function was enabled globally. The delay before re-enabling a port can be specified by using the **`errdisable timeout`** command; the default is 5 minutes (300 seconds).

Conclusion

This guide includes many (but not all) of the possible reasons for a port to go down on Lenovo Networking switches. It is intended as an aid for troubleshooting. It is not intended as a substitute for the official documentation for Lenovo switches.

Author

Scott Lorditch is a Consulting System Engineer for Lenovo. He performs network architecture assessments and develops designs and proposals for solutions that involve Lenovo Networking products. He also developed several training and lab sessions for technical and sales personnel. Scott joined IBM as part of the acquisition of Blade Network Technologies and joined Lenovo as part of the System x acquisition from IBM. Scott spent almost 20 years working on networking in various industries, as a senior network architect, a product manager for managed hosting services, and manager of electronic securities transfer projects. Scott holds a BS degree in Operations Research with a specialization in computer science from Cornell University.

Thanks to David Watts of Lenovo Press for his contributions to this project.

Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

Lenovo (United States), Inc.
1009 Think Place - Building One
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing

LENOVO PROVIDES THIS PUBLICATION “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary.

Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

This document REDP-5244-00 was created or updated on July 30, 2015.

Send us your comments in one of the following ways:
- Use the online **Contact us** review Redbooks form found at:
  ibm.com/redbooks
- Send your comments in an email to:
  redbooks@us.ibm.com

Trademarks