



5. On information and belief, defendant EMC Corporation is a Massachusetts corporation with a principal place of business at One Dell Way, Round Rock, Texas 78682. EMC Corporation is wholly owned by its corporate parent, Dell Technologies Inc.

**JURISDICTION AND VENUE**

6. This is an action for patent infringement which arises under the Patent Laws of the United States, in particular, 35 U.S.C. §§ 271, 281, 284, and 285.

7. This Court has jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a).

8. This Court has specific and general personal jurisdiction over each defendant pursuant to due process and/or the Texas Long Arm Statute, because each defendant has committed acts giving rise to this action within Texas and within this judicial district. The Court's exercise of jurisdiction over each defendant would not offend traditional notions of fair play and substantial justice because each defendant has established minimum contacts with the forum. For example, on information and belief, each defendant has committed acts of infringement in this judicial district, by among other things, selling and offering for sale products that infringe the asserted patent, directly or through intermediaries, as alleged herein.

9. Venue in the Western District of Texas is proper pursuant to 28 U.S.C. §§1391 and/or 1400(b). Each defendant has established places of business in the Western District of Texas. Each defendant is registered to do business in Texas. Upon information and belief, each defendant has transacted business in this District and has committed acts of infringement in this District.

**COUNT ONE - INFRINGEMENT OF  
U.S. PATENT NO. 8,913,489**

10. Brazos re-alleges and incorporates by reference the preceding paragraphs of this Complaint.

11. On December 16, 2014, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,913,489 (“the ‘489 Patent”), entitled “System and Method for Virtual Fabric Link Failure Recovery.” A true and correct copy of the ‘489 Patent is attached as Exhibit A to this Complaint.

12. Brazos is the owner of all rights, title, and interest in and to the ‘489 Patent, including the right to assert all causes of action arising under the ‘489 Patent and the right to any remedies for the infringement of the ‘489 Patent.

13. Defendants make, use, sell, offer for sale, import, and/or distribute in the United States, including within this judicial district, products such as, but not limited to, networking switches with Virtual Link Trunking (VLT), including but not limited to, C9000 series switches (collectively, the “Accused Products”).

14. The Accused Products provide multi-rate, modular switching platforms, which can be used for campus, mid-market, and large-enterprise networks and support Layer 2 multipath using VLT.

Dell Networking C9000 Series Switches



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Next-generation modular chassis switch

<https://www.dell.com/en-us/work/shop/povw/networking-c9000-series>

15. The Accused Products operate based on Dell Networking OS (DNOS), which incorporates features from Force10 Networks's Force10 Operating System (FTOS), including VLT. VLT allows two physical switches to be represented as a single logical switch, which can be regarded as a part of a multi-chassis link aggregation group (MC-LAG). With physical links as a port-channel, connecting two individual switches configured with VLT would logically group it as a single entity only for the access switches which connect to the VLT domain.

### **Virtual Link Trunking (VLT)**

Virtual link trunking (VLT) is supported on Dell Networking OS.

#### **Overview**

VLT reduces the role of spanning tree protocols (STPs) by allowing link aggregation group (LAG) terminations on two separate distribution or core switches and supporting a loop-free topology.

To prevent the initial loop that may occur prior to VLT being established, use a spanning tree protocol. After VLT is established, you may use rapid spanning tree protocol (RSTP) to prevent loops from forming with new links that are incorrectly connected and outside the VLT domain.

VLT provides Layer 2 multipathing, creating redundancy through increased bandwidth, enabling multiple parallel paths between nodes and load-balancing traffic where alternative paths exist.

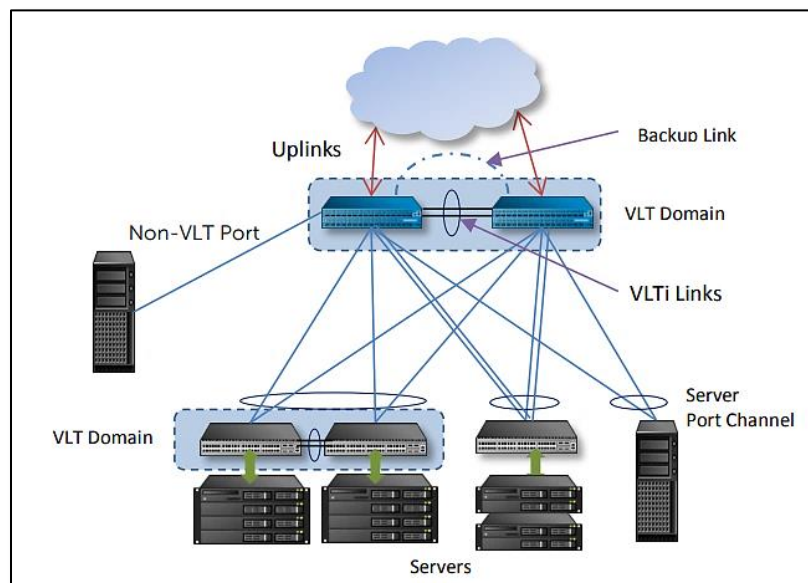
Virtual link trunking offers the following benefits:

- Allows a single device to use a LAG across two upstream devices.
- Eliminates STP-blocked ports.
- Provides a loop-free topology.
- Uses all available uplink bandwidth.
- Provides fast convergence if either the link or a device fails.
- Optimized forwarding with virtual router redundancy protocol (VRRP).
- Provides link-level resiliency.

[https://topics-cdn.dell.com/pdf/networking-c9000-series\\_users-guide\\_en-us.pdf](https://topics-cdn.dell.com/pdf/networking-c9000-series_users-guide_en-us.pdf)

16. For example, a VLT topology may include two switches, including an Accused Product, in a VLT Domain that communicates with servers by forming a multi-chassis link aggregation group over port interfaces of the switches.

## 1.6 Typical VLT Topology



[https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%202%200\\_External.pdf](https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%202%200_External.pdf)

17. Further, as shown in the example above, switches in the VLT Domain may be considered VTI peer devices and connected using a VLTi interconnect port-channel, which acts a virtual fiber link. The VLT interconnect (VLTi) carries MAC, ARP Tables, and IGMP State information between the VLT peer switches in a VLT topology.

### VLT Terminology

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- **VLT interconnect (VLTi)** – The link used to synchronize states between the VLT peer switches. Both ends must be on 10G or 40G interfaces.

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- **VLT peer device** – One of a pair of devices that are connected with the special port channel known as the VLT interconnect (VLTi).

VLT peer switches have independent management planes. A VLT interconnect between the VLT chassis maintains synchronization of L2/L3 control planes across the two VLT peer switches. The VLT interconnect uses either 10G or 40G user ports on the chassis.

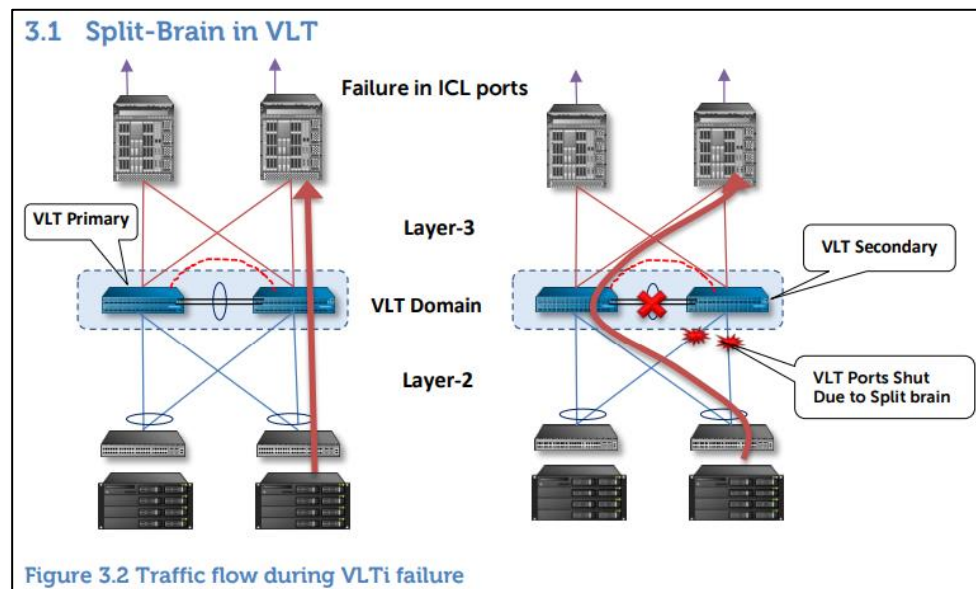
[https://topics-cdn.dell.com/pdf/networking-c9000-series\\_users-guide\\_en-us.pdf](https://topics-cdn.dell.com/pdf/networking-c9000-series_users-guide_en-us.pdf)

## 1.2 VLT Implementation

Periodic hello messages are sent through the VLT Interconnect (VLTi) and the VLT control messages are sent in TLV format through the VLTi links for synchronizing the L2/L3 control planes across the two VLT peers. MAC, ARP tables, IGMP States are synchronized between the VLT peers ensuring traffic flow across the links and seamless failover in case of VLT link or node failure. The VLT feature ensures the local traffic on a VLT Switch takes the shortest path to the destination through the VLT links and not through the VLTi links. However VLTi carries the traffic during the link failure states. (Figure 1.0)

[https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%20%200\\_External.pdf](https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%20%200_External.pdf)

18. The Accused Products can determine a connection failure of the VLTi interconnect.



[https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%20%200\\_External.pdf](https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%20%200_External.pdf)

## Configuration Notes

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- Failure scenarios

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- If all ports in the VLT interconnect fail, or if the messaging infrastructure fails to communicate across the interconnect trunk, the VLT management system uses the backup link interface to determine whether the failure is a link-level failure or whether the remote peer has failed entirely. If the remote peer is still alive (heartbeat messages are still being received), the VLT secondary switch disables its VLT port channels. If keepalive messages from the peer are not being received, the peer continues to forward traffic, assuming that it is the last device available in the network. In either case, after recovery of the peer link or reestablishment of message forwarding across the interconnect trunk, the two VLT peers resynchronize any MAC addresses learned while communication was interrupted and the VLT system continues normal data forwarding.

[https://topics-cdn.dell.com/pdf/networking-c9000-series\\_users-guide\\_en-us.pdf](https://topics-cdn.dell.com/pdf/networking-c9000-series_users-guide_en-us.pdf)

19. When the MC-LAG is disrupted (e.g., after the Accused Products determines VLTi and back uplink failure between VLT peer switches), the MC-LAG can be reconfigured into two link aggregates associated with each VLT peer switch to take the primary role and continue to communicate traffic over link aggregates to the end node. In the Accused Products, the VLT backup link can be configurable. If a VLT backup link is not enabled, then during VLTi failure, both VLT peer switches may take primary roles to form link aggregates.

### 3.1 Split-Brain in VLT

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In case of both VLTi and backup link failure, both the VLT nodes take primary role and continue to pass the traffic if the system mac is configured on both the VLT peers. However there would not be MAC/ARP synchronization.

[https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%202%200\\_External.pdf](https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%202%200_External.pdf)

## Configuring a VLT Backup Link

To configure a VLT backup link, use the following command.

1. Specify the management interface to be used for the backup link through an out-of-band management network.

CONFIGURATION mode

```
interface managementethernet slot/ port
```

[https://topics-cdn.dell.com/pdf/networking-c9000-series\\_users-guide\\_en-us.pdf](https://topics-cdn.dell.com/pdf/networking-c9000-series_users-guide_en-us.pdf)

20. In the event of VLTi failure causing disruption of the MC-LAG, the spanning tree protocol (STP) may be initiated in the first set of port interfaces to avoid a traffic loop.

## 5.1 Dell#1 Switch Configurations and Verification

**Dell#1#sh run | find protocol**

```
protocol spanning-tree pvst
```

```
no disable
```

```
vlan 1,20,800,900 bridge-priority 0
```

*(Take note that deploying VLT does NOT preclude the need to deploy the spanning tree protocol (STP). STP will be acting as a loop prevention mechanism in the event of a VLT failure or an errant connection that creates a physical bridging loop.*

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<https://www.dell.com/community/s/vjauj58549/attachments/vjauj58549/Network/35449/1/Route%20VLT%20v1.2.pdf>

21. In view of preceding paragraphs, each and every element of at least claim 8 of the '489 Patent is found in the Accused Products.

22. Defendants continue to directly infringe at least one claim of the '489 Patent, literally or under the doctrine of equivalents, by making, using, selling, offering for sale,



importing, and/or distributing the Accused Products in the United States, including within this judicial district, without the authority of Brazos.

23. Defendants have received notice and actual or constructive knowledge of the '489 Patent since at least the date of service of this Complaint.

24. Since at least the date of service of this Complaint, through its actions, Defendants have actively induced product makers, distributors, retailers, and/or end users of the Accused Products to infringe the '489 Patent throughout the United States, including within this judicial district, by, among other things, advertising and promoting the use of the Accused Products in various websites, including providing and disseminating product descriptions, operating manuals, and other instructions on how to implement and configure the Accused Products. Examples of such advertising, promoting, and/or instructing include the documents at:

- <https://www.dell.com/en-us/work/shop/povw/networking-c9000-series>
- <https://www.dell.com/en-us/work/shop/productdetailstxn/force10-ftos>
- [https://topics-cdn.dell.com/pdf/networking-c9000-series\\_users-guide\\_en-us.pdf](https://topics-cdn.dell.com/pdf/networking-c9000-series_users-guide_en-us.pdf)
- [https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%202%200\\_External.pdf](https://downloads.dell.com/solutions/networking-solution-resources/Virtual%20Link%20Trunking-Reference%20Architecture%202%200_External.pdf)
- <https://www.dell.com/community/s/vjauj58549/attachments/vjauj58549/Network/35449/1/Routed%20VLT%20v1.2.pdf>

25. Since at least the date of service of this Complaint, through its actions, Defendants have contributed to the infringement of the '489 Patent by having others sell, offer for sale, or use the Accused Products throughout the United States, including within this judicial district, with knowledge that the Accused Products infringe the '489 Patent. The Accused Products are especially made or adapted for infringing the '489 Patent and have no substantial

non-infringing use. For example, in view of the preceding paragraphs, the Accused Products contain functionality which is material to at least one claim of the '489 Patent.

**JURY DEMAND**

Brazos hereby demands a jury on all issues so triable.

**REQUEST FOR RELIEF**

WHEREFORE, Brazos respectfully requests that the Court:

(A) Enter judgment that Defendants infringe one or more claims of the '489 Patent literally and/or under the doctrine of equivalents;

(B) Enter judgment that Defendants have induced infringement and continue to induce infringement of one or more claims of the '489 Patent;

(C) Enter judgment that Defendants have contributed to and continue to contribute to the infringement of one or more claims of the '489 Patent;

(D) Award Brazos damages, to be paid by Defendants in an amount adequate to compensate Brazos for such damages, together with pre-judgment and post-judgment interest for the infringement by Defendants of the '489 Patent through the date such judgment is entered in accordance with 35 U.S.C. § 284, and increase such award by up to three times the amount found or assessed in accordance with 35 U.S.C. § 284;

(E) Declare this case exceptional pursuant to 35 U.S.C. § 285; and

(F) Award Brazos its costs, disbursements, attorneys' fees, and such further and additional relief as is deemed appropriate by this Court.

Dated: May 19, 2020

Respectfully submitted,

/s/ James L. Etheridge

James L. Etheridge

Texas State Bar No. 24059147

Ryan S. Loveless

Texas State Bar No. 24036997

Travis L. Richins

Texas State Bar No. 24061296

ETHERIDGE LAW GROUP, PLLC

2600 E. Southlake Blvd., Suite 120 / 324

Southlake, Texas 76092

Telephone: (817) 470-7249

Facsimile: (817) 887-5950

[Jim@EtheridgeLaw.com](mailto:Jim@EtheridgeLaw.com)

[Ryan@EtheridgeLaw.com](mailto:Ryan@EtheridgeLaw.com)

[Travis@EtheridgeLaw.com](mailto:Travis@EtheridgeLaw.com)

**COUNSEL FOR PLAINTIFF**