Aggregate Link Verification Protocol: Justification and Requirements

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Introduction

- Present consequences of AgL misconfiguration
- Propose a list of requirements for a AgL verification protocol

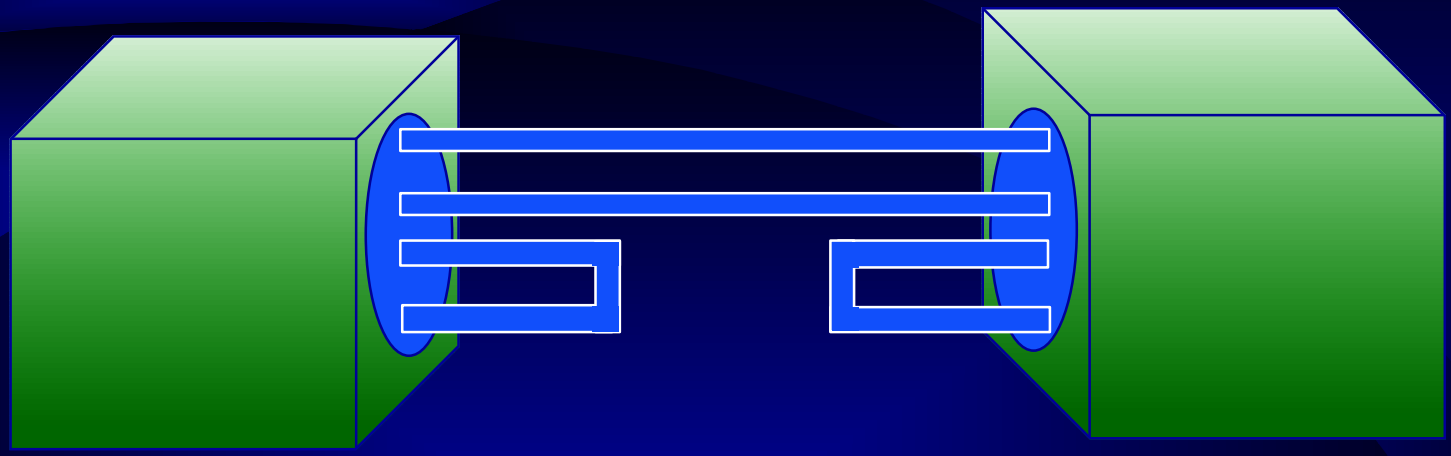
Overview

- Network Misconfiguration major cause of network failure
  - Much larger cause than equipment failure
- AgL increases likelihood of misconfiguration
  - more ports and links to manage
- AgL increases severity of network failure
  - AgL misconfig confuses STP
  - AgL misconfig can cause rapid continuous address moves
- A simple verification protocol can detect misconfiguration and prevent network failure

Misconfiguration

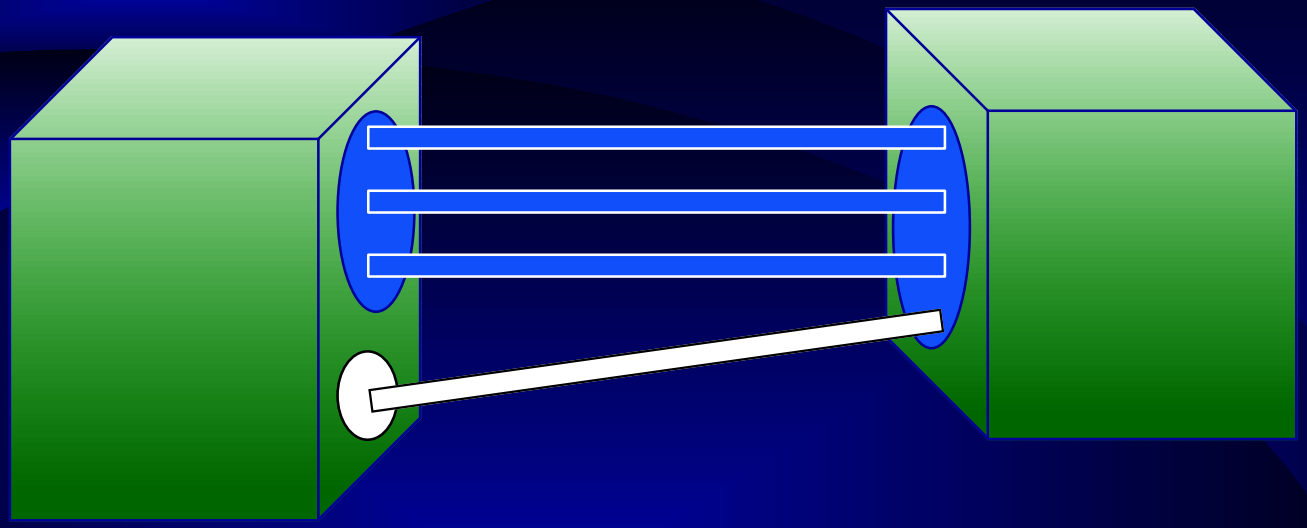
- Loopbacked individual links
- Split Aggregate Links

Misconfiguration: Loopback



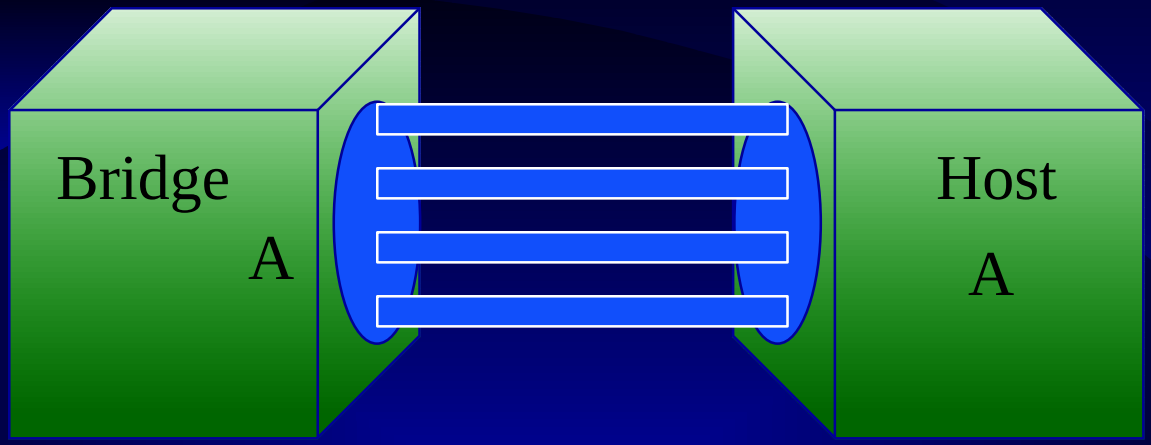
- Loopback links turn trunks back on themselves
- **Result:** Some conversations **disappear**
- **Result**: Bridge loop
- **Result:** Erroneous & excessive address moves

Misconfiguration: Split-AgL



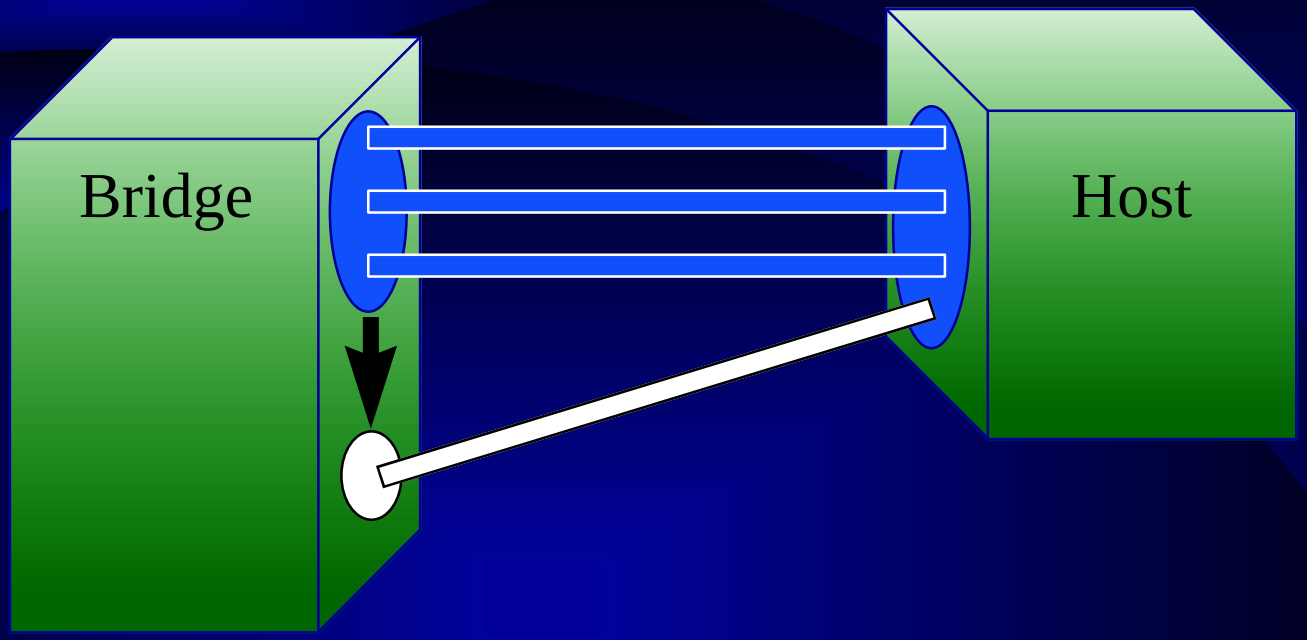
- Split AgL created when a port is taken out of an AgL on one side
- **Result:** Some conversations **disappear**
- **Result:** Excessive address moves
- **Result:** Spanning Tree failure

Misconfiguration: Split-AgL Example



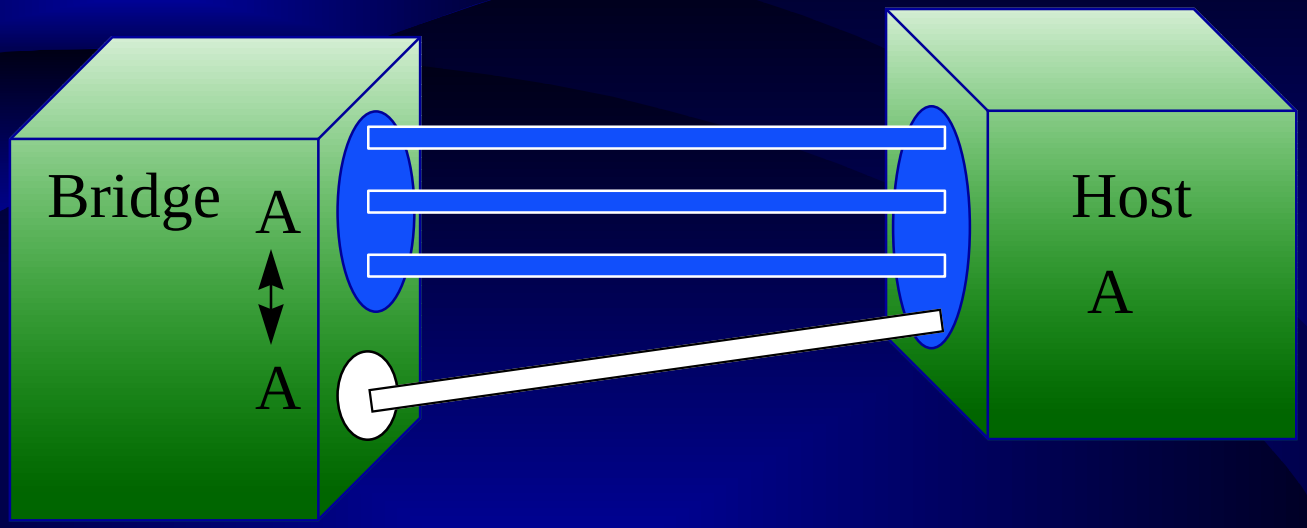
- Assume:
- AgL connects Bridge and End Host
- End Host as Mac Address A
- Bridge has learned Host's Mac Address

Misconfiguration: Split-AgL created



- mgr reallocates a port from one AgL to another
- OR a wire is plugged into the wrong port

Misconfiguration: Excessive address moves



- At this point Address A moves from on AgL to the other on the bridge depending on to which AgL the last packet was sent

Misconfiguration: Consequences

- Out of Order Packets
- If AgL are in different Vlans
  - lost packets
- If Host is a Bridge
  - many mac addresses will move so many devices will be impacted
  - large #s of packets lost and subsequent retries
  - Spanning Tree will not detect the problem and may reconfigure constantly

Requirements: General

- Network Configuration is a planned event
- Configuration and Verification done in ~1-3 seconds
- Unlike equipment failure, which can happen at inopportune events
  - failover probably should be handled in 0.1 seconds or less

Requirements

- Verify:
  - matching AgL configurations on either end
  - individual link speeds equal
  - individual link modes equal
  - individual link functioning
- Simple:
  - Low CPU overhead
  - Simple message format
  - Minimal network utilization

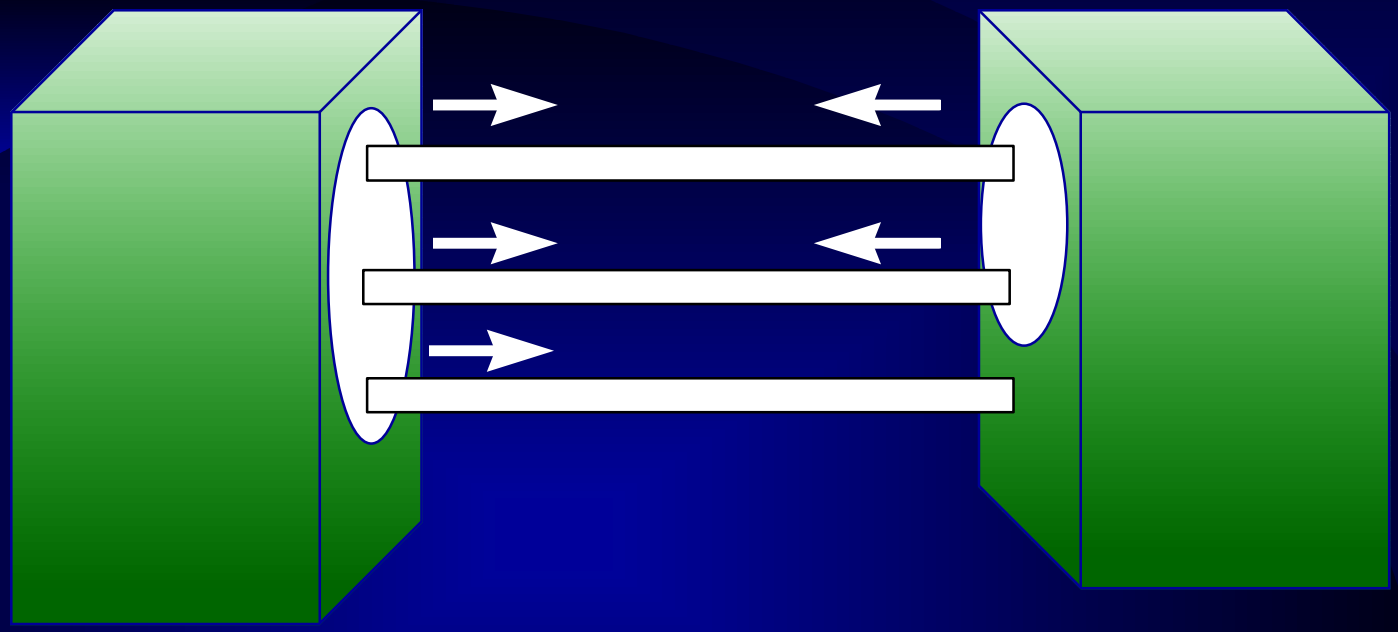
Requirements: When

- Triggers
  - Link addition or removal
  - Link up event
- Periodic
  - Catch failed triggers
  - 1 poll every 2 seconds

Requirements: Auto-Configuration Protocol

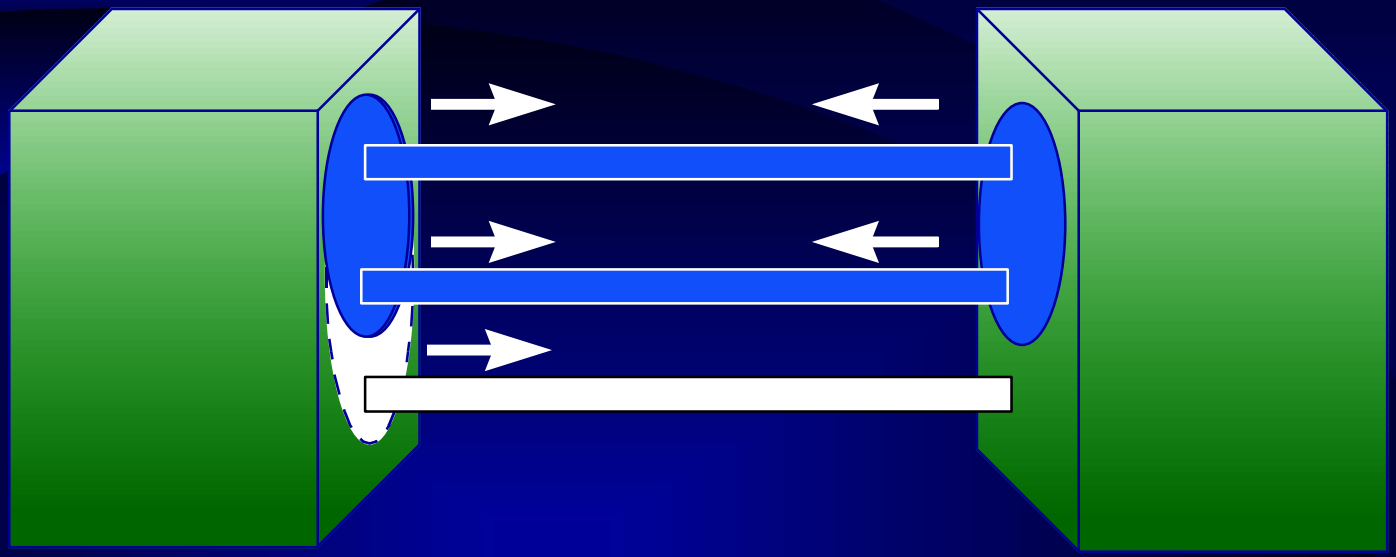
- May be part of an auto-configuration protocol
- Must be useable in a manual configured situation

Requirements: example



- each end first sends AgL verification packets out of each individual port
- no data packets initially

Requirements: example cont.



- each end uses the individual links that receive matching packets from the other side
- each end periodically sends verification packets

Summary

- AgL misconfiguration can have severe and hard to detect consequences
- Simple protocol required to verify configuration