



# Coventry University

Making your 3 Tier Network  
reconverge in (2) seconds

Paul Brennan & Peter North - Networkshop 38 - 31<sup>st</sup> March 2009

- Overview
- The network as it was
- The Core
- The Distribution layer
- The Access layer
- Spanning Tree

- Routing
- ASA firewall stateful failover
- Removal of 3<sup>rd</sup> Core switch
- The Network as it is
- Summary
- Questions

## ALL CISCO

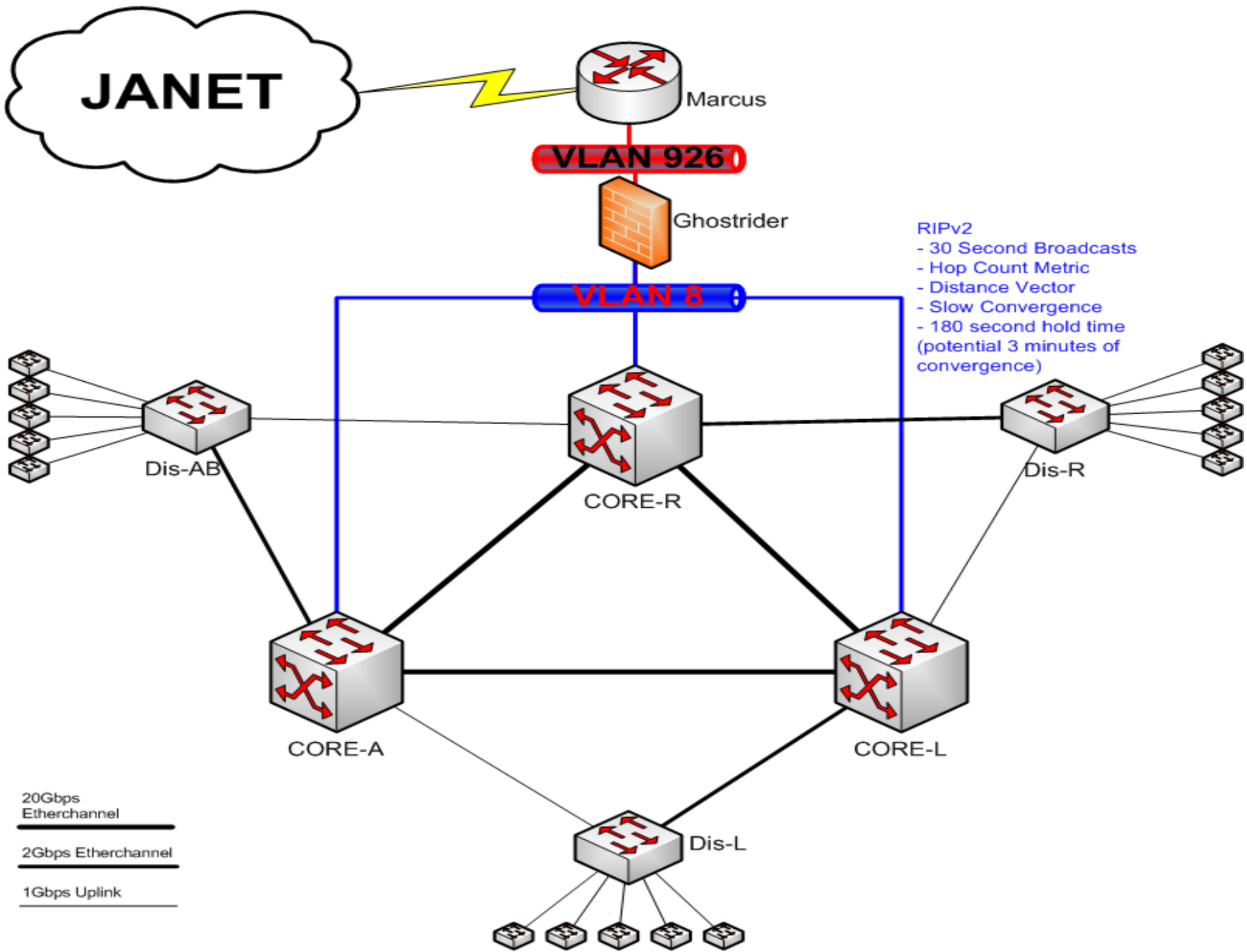
- 400+ switches
- 589 Wireless Aps
- 4 WiSMs
- 11 Firewalls (6 Logical)
- 2 Routers
- IPS
- CS-MARS

Overview

- 18,000 Students
- 2,500 Staff
- 30 Buildings
- 100 Comms Rooms



## Overview



RIPv2

- 30 Second Broadcasts
- Hop Count Metric
- Distance Vector
- Slow Convergence
- 180 second hold time (potential 3 minutes of convergence)

20Gbps  
Etherchannel

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2Gbps Etherchannel

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1Gbps Uplink

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- 6500s with SUP-720
- 20Gbps links between cores
- Gigabit links to Distribution
- WiSMs
- Resilient ASA firewalls

The Core

- Distribution Switch per building
- 6500s and 3750s
- 27 Distribution Switches
- Resilient Links to Cores

The Distribution Layer

- 2960s, 3750s and 3560s
- PoE switches for VoIP and APs
- 250+ VoIP phones
- 300+ Switches
- 589 APs

The Access Layer

- Cisco PVST+
- No admin defined root bridges
- Danger of accidental network outage
- Full 50 seconds of forward delay

Spanning Tree

- RPVST
- Root bridges defined
- Reduced risk of downtime
- Faster network convergence

Spanning Tree Changes

- Access layer switches configured first
- Access config pushed using Solarwinds
- Distribution and Core manual config
- RSTP enabled prior to root bridge selection

## Spanning Tree Migration Process

- spanning-tree mode rapid-pvst
- spanning-tree vlan *101,104* root primary
- spanning-tree vlan *101,104* root secondary

## Spanning Tree Commands

- HSRP running in the core
- Operating on 250+ VLANs
- Default timers being used
- No authentication

HSRP

- Hello timer tuned to 500 ms
- Hold timer tuned to 1.5 s
- MD5 auth implemented

HSRP Changes

- standby 20 timers msec 500 msec 1500
- standby 20 authentication md5 key-string 7 cisco

## HSRP Commands

- RIP v2
- Distribution lists for filtering
- Offset lists for influencing route selection
- Default timers used
- Extended downtime during convergence

- EIGRP Implemented
- Timers tuned for faster convergence
- MD5 authentication used
- Downtime significantly reduced
- Route manipulation made easier

Routing Changes (IGP)

- Secondary link installed
- BGP configured
- HSRP tracking outside interfaces
- HSRP timers tuned
- IBGP running

Routing Changes (EGP)

- Default unit failover times changed
- Default Interface failover times changed
- Limited by the software

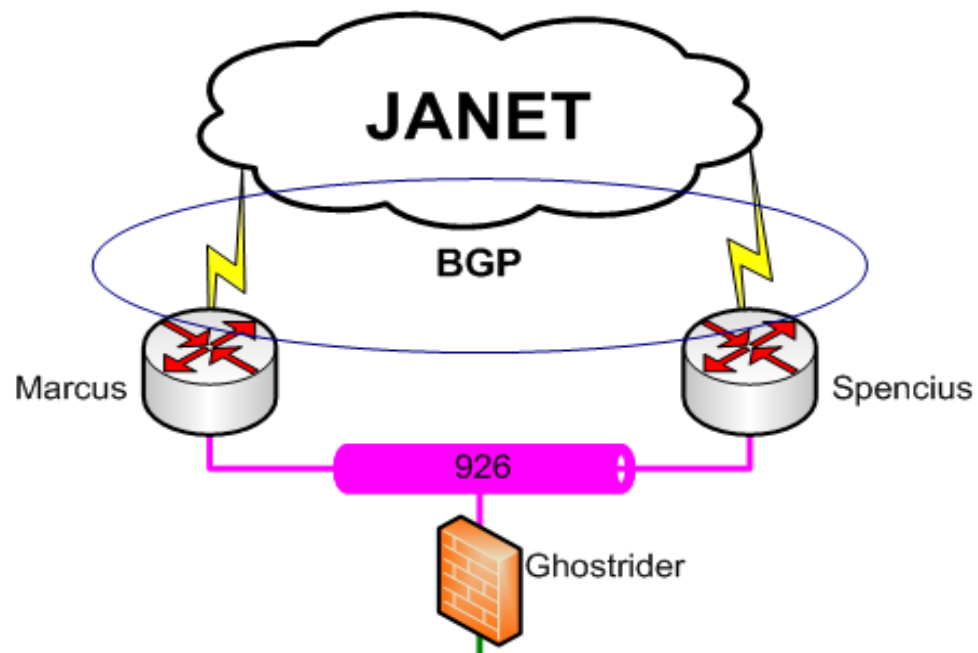
ASA Firewall Stateful Failover

- Configuration changes easier
- Reduced risk of error
- Modules moved to other cores
- Full network on chassis failure

Removal of Core-A

- 6500s have dual SUP-720
- 40Gbps links between cores
- Gigabit links to Distribution
- Dual WiSMs
- Resilient ASA firewalls

The Core as it is now



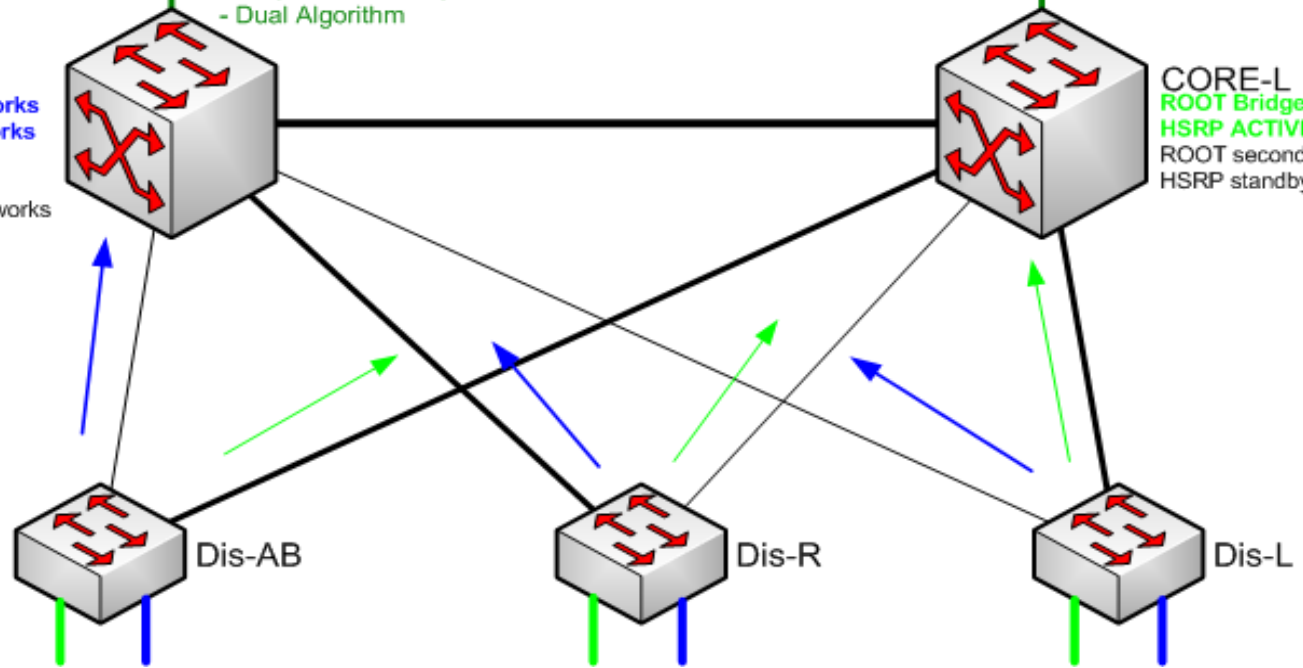
**EIGRP**

- Hybrid Link State/Distance Vector Protocol
- Metric Based on Bandwidth and Delay by default
- sends bounded partial updates as soon as a state change is detected
- Very Fast Convergence, almost instant where an FS is available
- Dual Algorithm

**CORE-R**  
**ROOT Bridge For all STAFF networks**  
**HSRP ACTIVE for all STAFF networks**  
 ROOT secondary for all STUDENT networks  
 HSRP standby for all STUDENT networks

**CORE-L**  
**ROOT Bridge For all STUDENT networks**  
**HSRP ACTIVE for all STUDENT networks**  
 ROOT secondary for all STAFF networks  
 HSRP standby for all STAFF networks

- STUDENT VLAN
- STAFF VLAN
- 40Gbps Etherchannel
- 2Gbps Etherchannel
- 1Gbps Uplink



- Configure the dual supervisors
- SSO&NSF
- Further Security Improvements
- 10 Gbs from Dist to Core

Future Plans

- HSRP failover now 1.5 seconds
- Spanning Tree converges in seconds
- ASA stateful Failover down to 1 second
- Routing convergence almost instantaneous
- Redundant internet connection
- In Service maintenance a reality

Summary

Any Questions?