DE-CIX

German Internet Exchange

# Design and Deployment Experiences with the New DE-CIX Infrastructure

## RIPE57 Plenary

**JW Marriott Hotel,**
**Dubai, 2008-10-26**

# Agenda

- Motivation
- Design of new infrastructure
- Implementation of new infrastructure
- Summary

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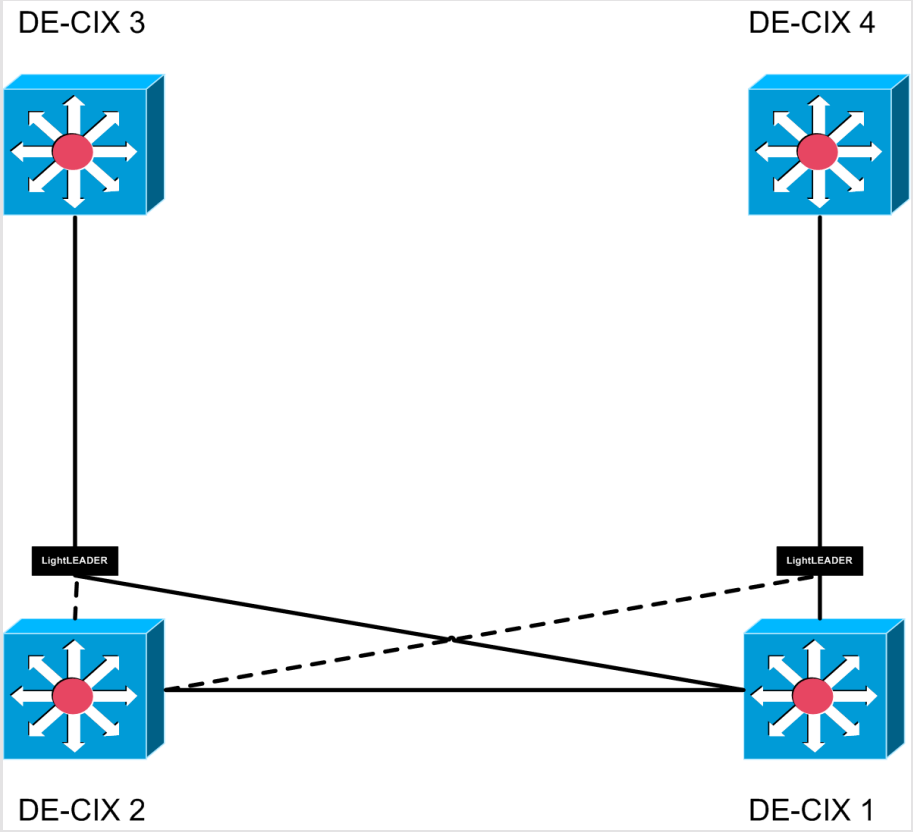
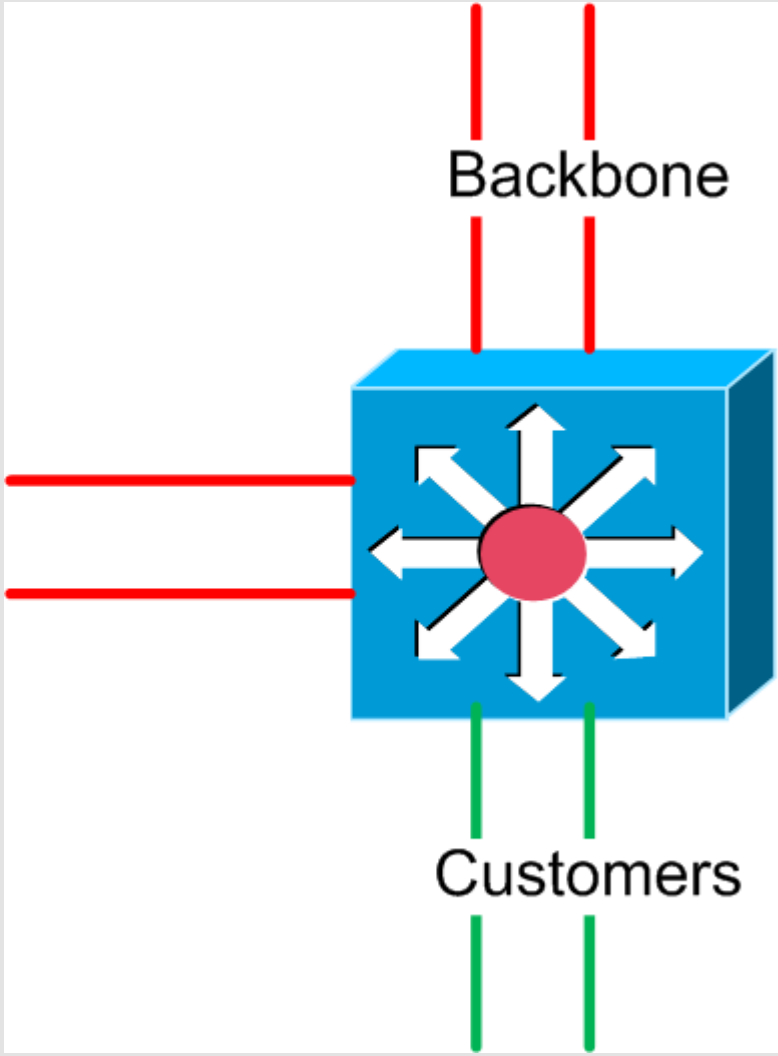
# Locations

# Topology until mid 2008

- DE-CIX1 and DE-CIX2 on the same campus, DE-CIX3 and DE-CIX4 in separate colocations
- combined edge and distribution in resilient star
- grown over time since 1995 from single switch, dual edge, STP resilience to fibre protection based resilience



- mix of edge and distribution
- hard to plan for growth in backbone bandwith and ports for customers
- outage of distribution switch also affects customers



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# Design of new infrastructure

- which topology?
  - star
  - ring
- which technology for interconnects?
  - simple dark fibre
  - DWDM
- which technology for resilience?
  - STP
  - MRP
  - Layer 0

# Design of new infrastructure

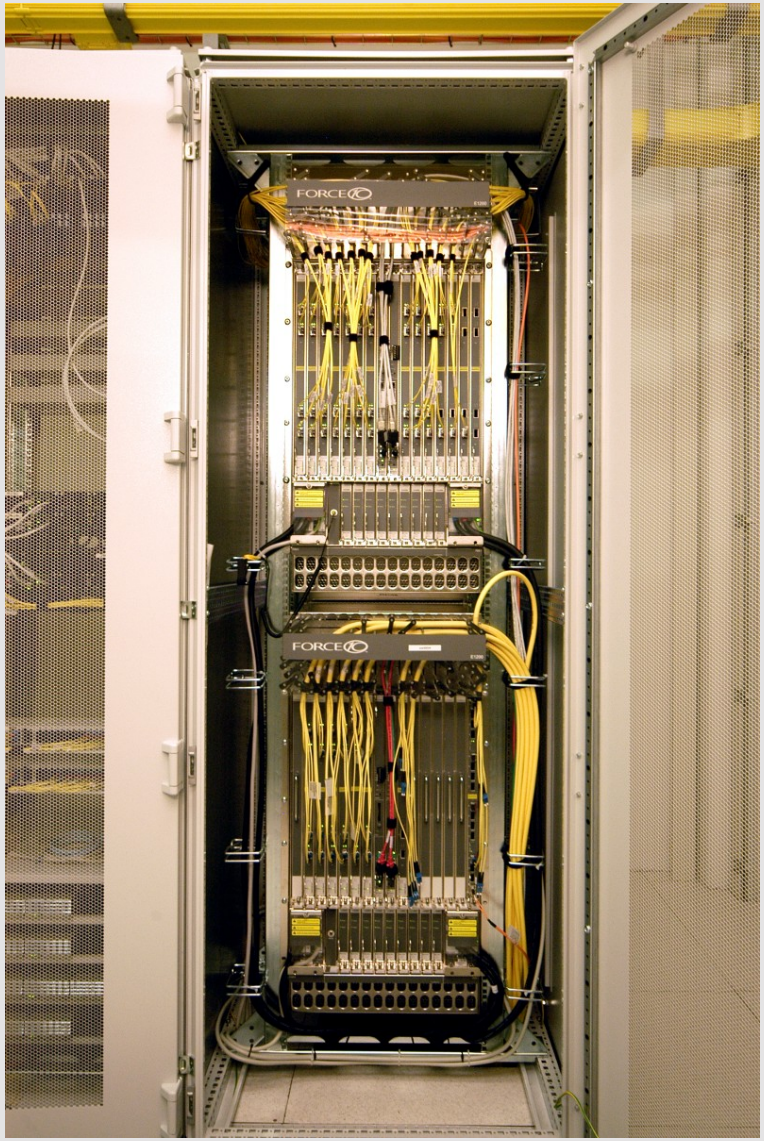
- star topology
- DWDM technology for interconnects
- Layer 0  technology for resilience
- other considerations
  - scalable, simple and robust
  - cost-efficient
  - easy migration

# Building blocks

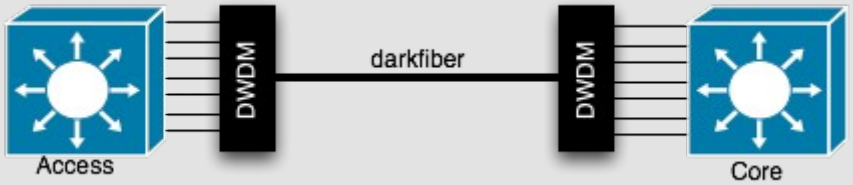
- core switches (star)
- DWDM de/muxes (interconnect)
- optical switches (resilience)

# cores

- where to locate
  - new POP?
  - existing POP?
  - which POP?
- Take existing POP's
- Hardware is Force10 networks E1200



# DWDM / dark fibre




- passive
- up to 16 channels
- diverse routes
- one pair per edge
- Cube Optics as a system partner

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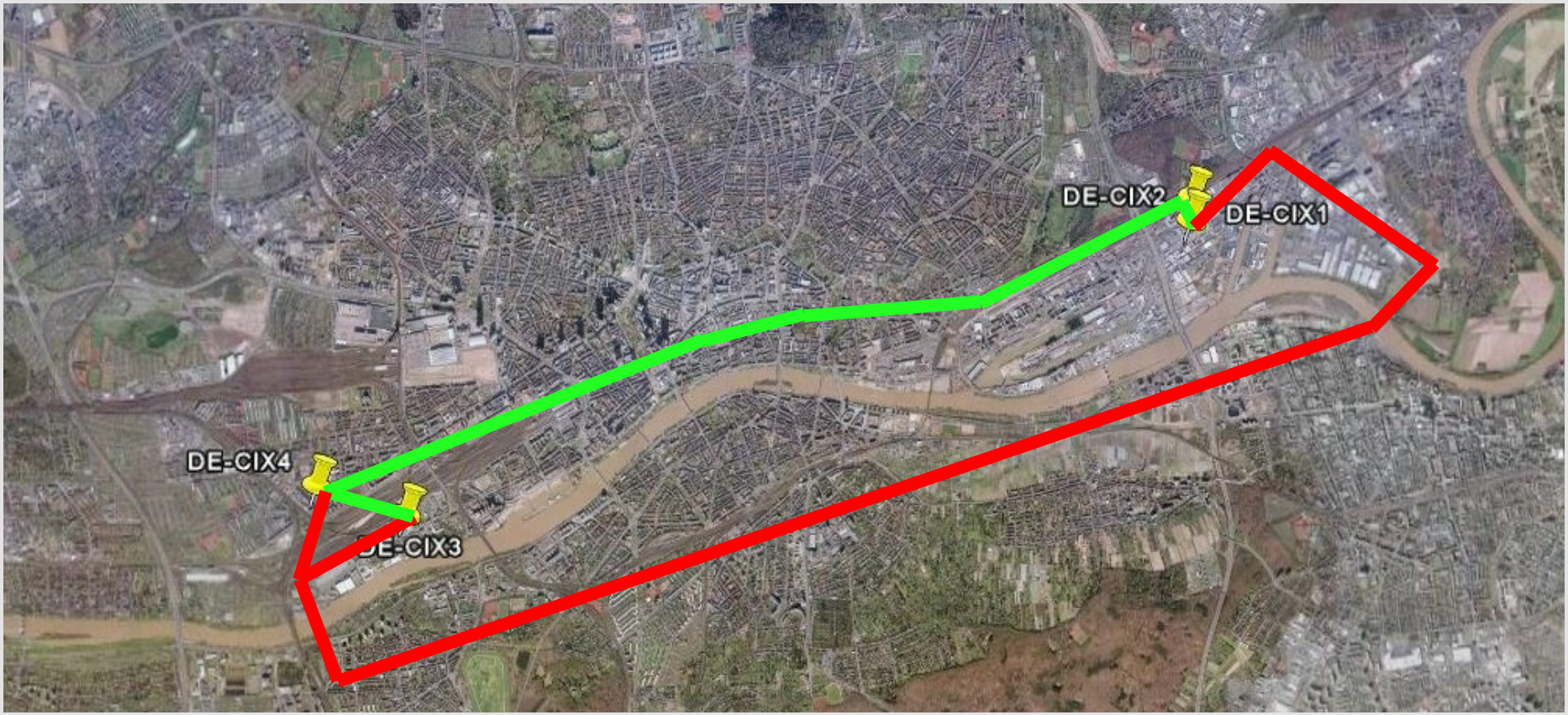
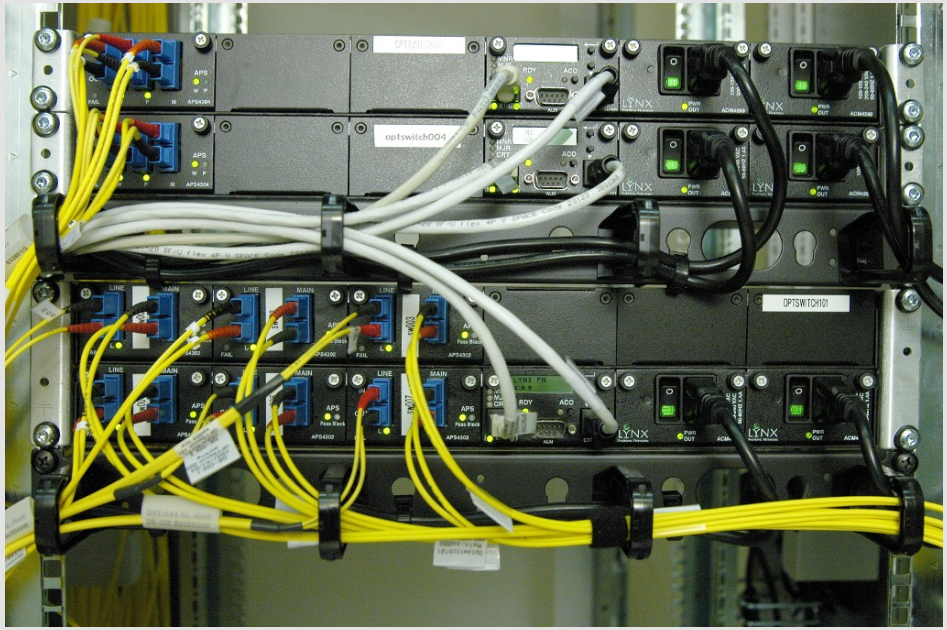
# darkfiber routes



# Resilience

- using simple fibre switches
- power is only needed to switch fibres
- primary and backup path going via diverse fibres
- master/slave
- Lynx networks Lightleader
- all optical switches synchronisly switch over to standby core



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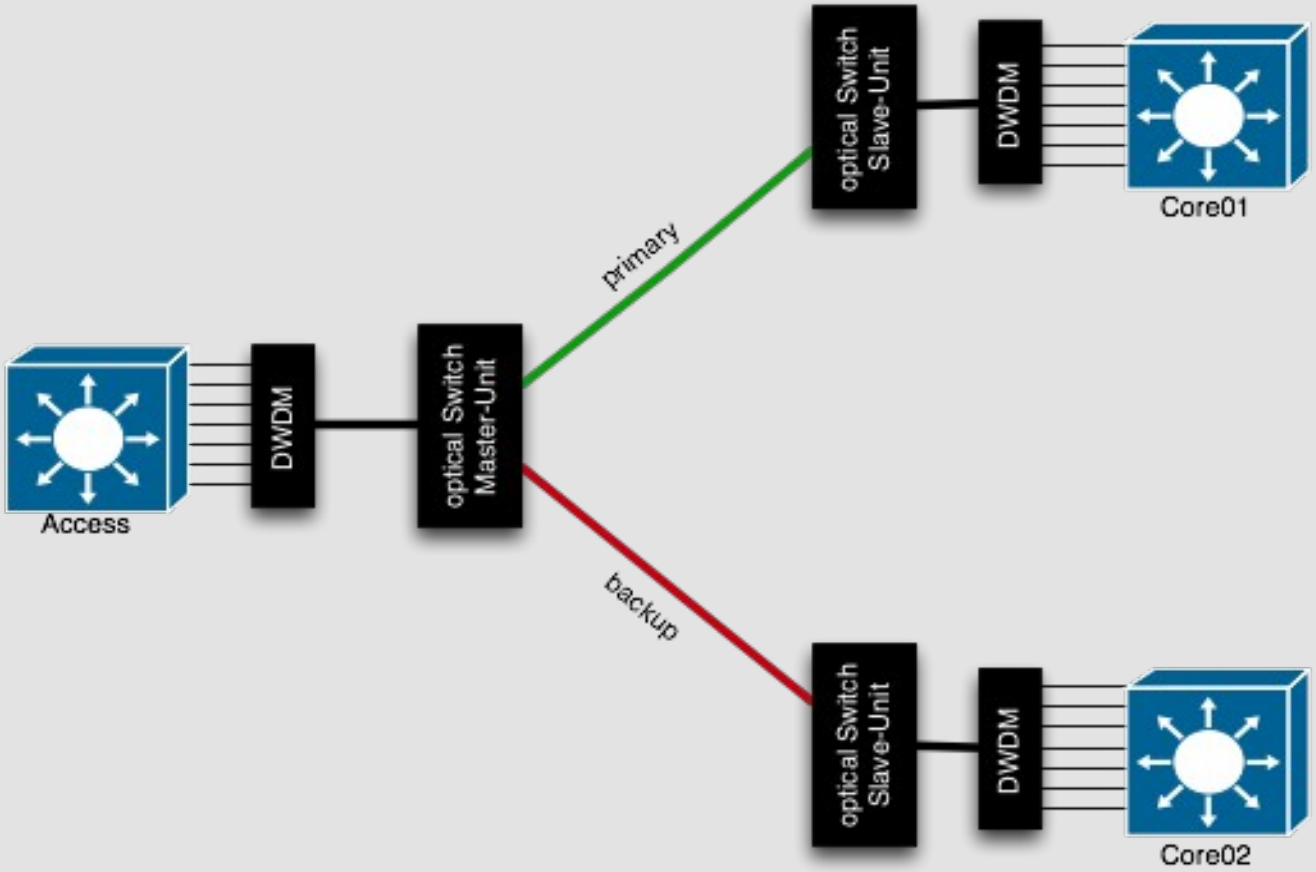
# optical protection



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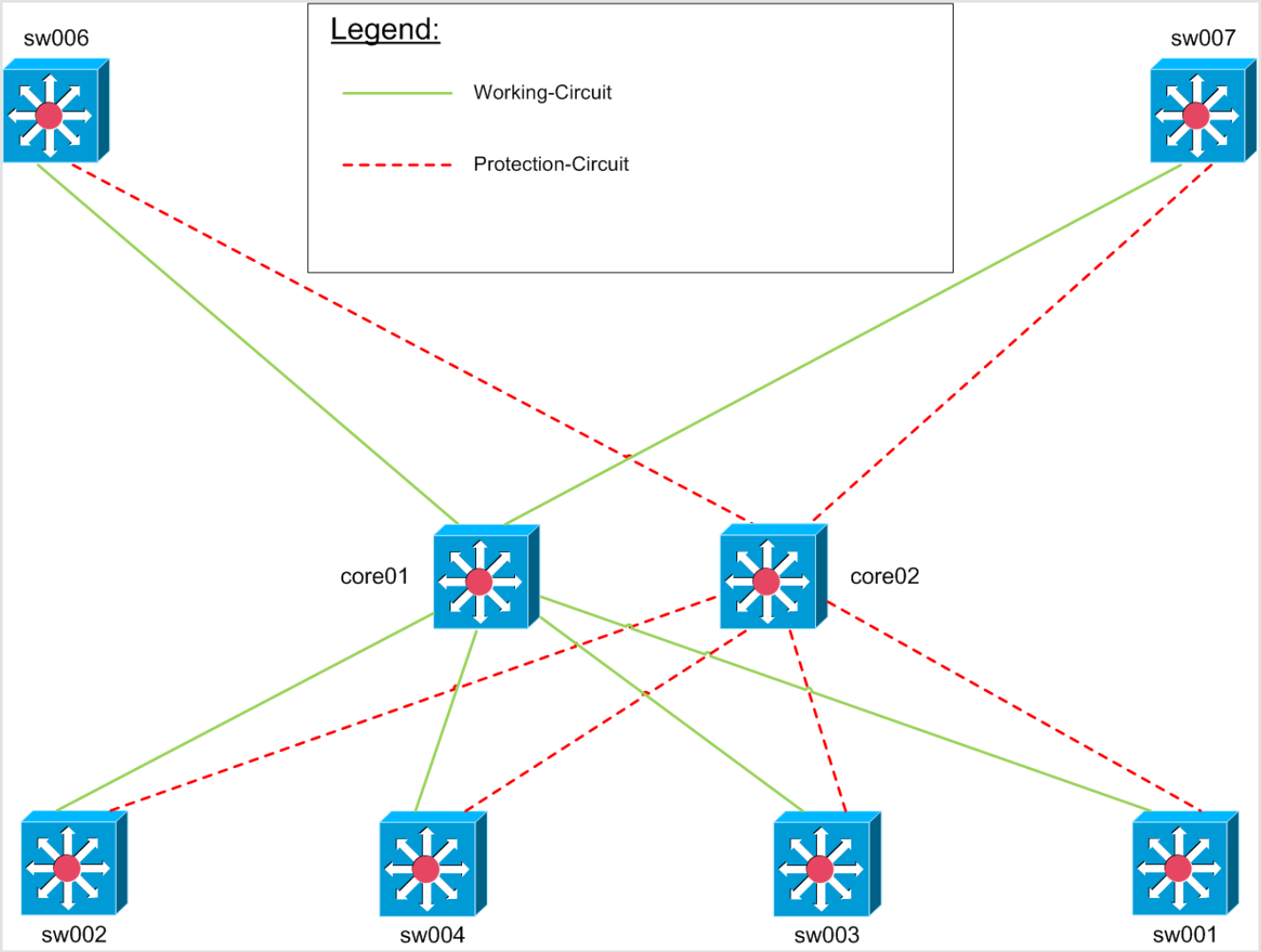
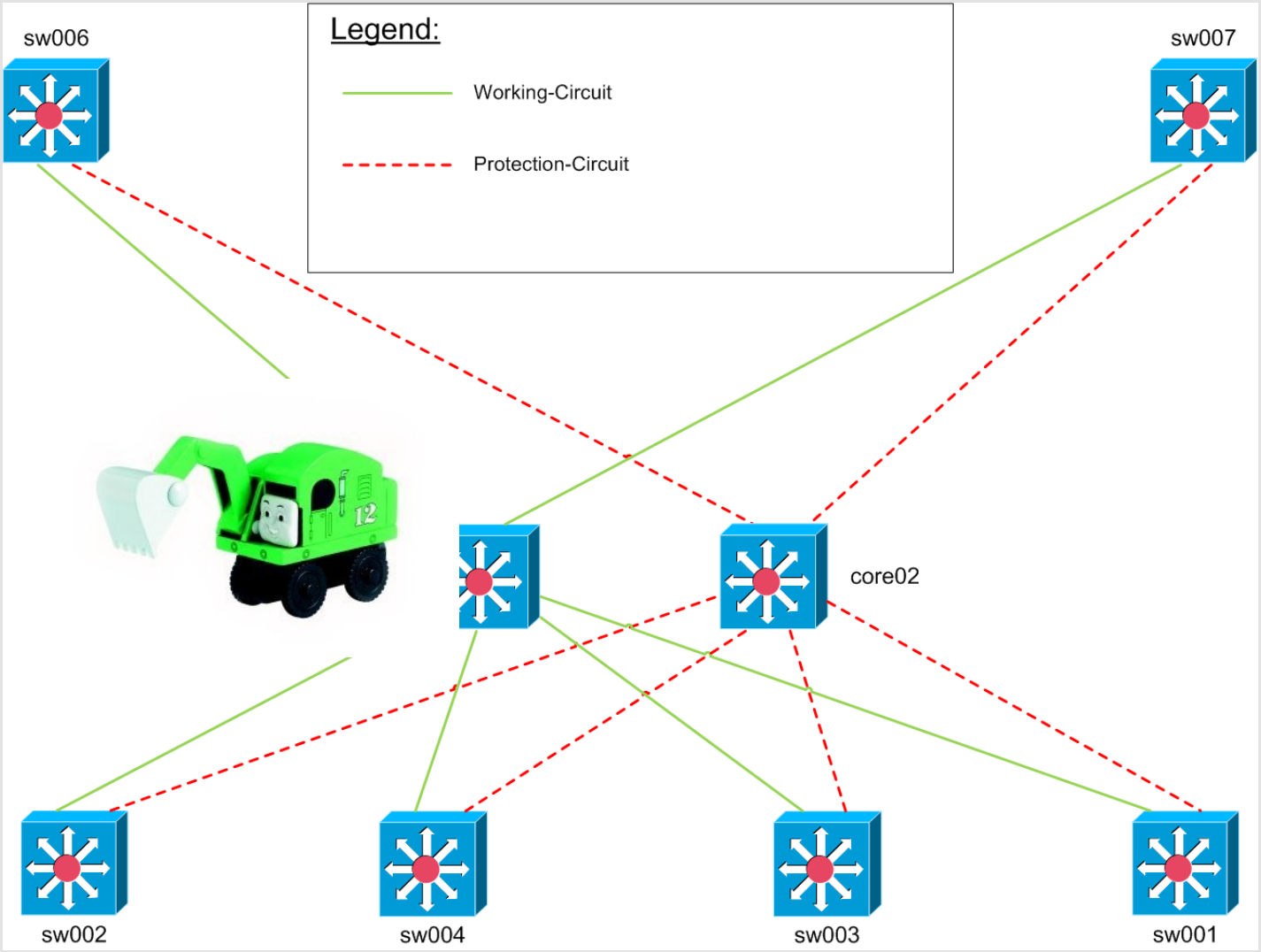
# Normal operation mode ☺



# Something went wrong ☹



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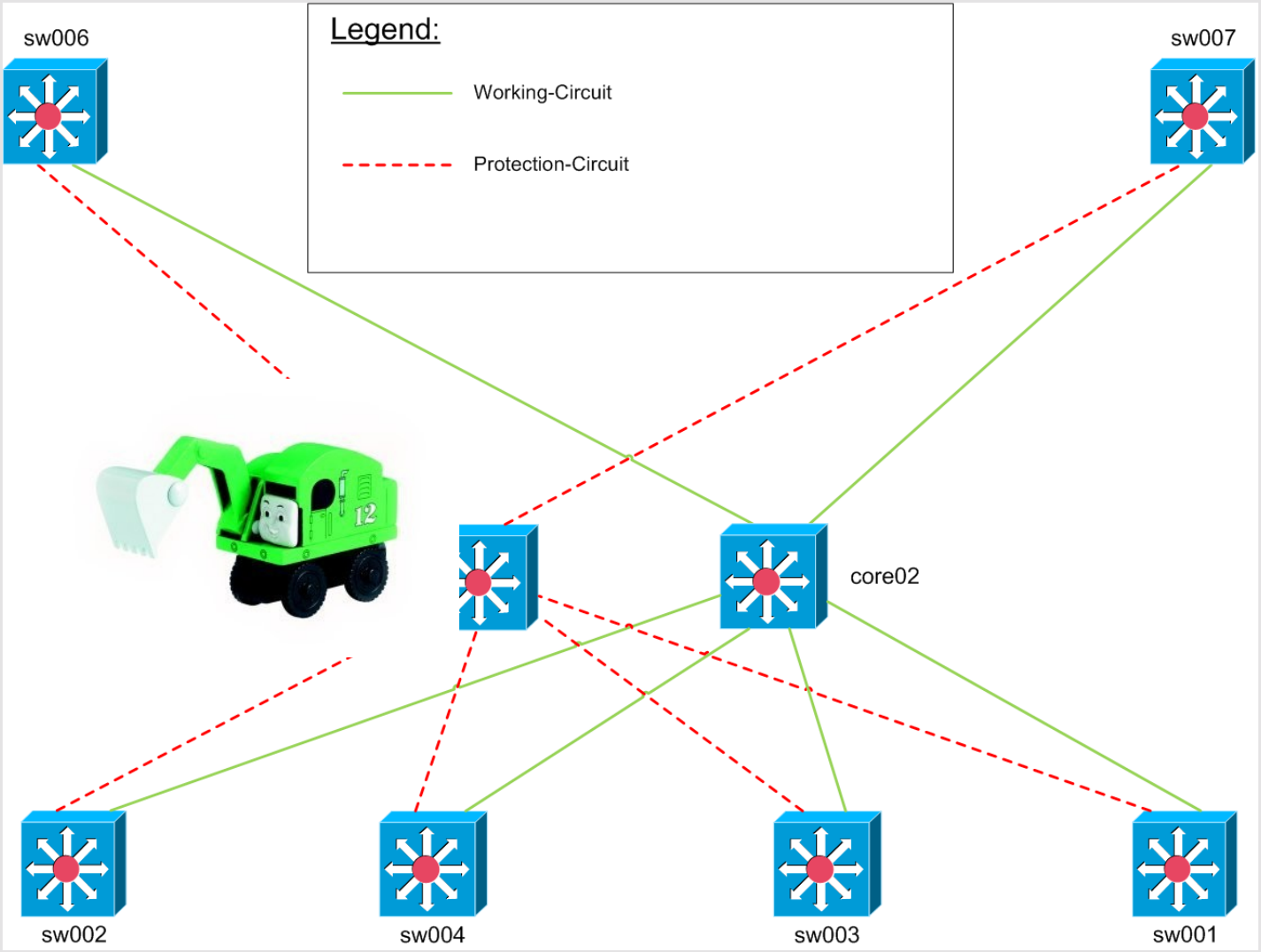
# Protection operation mode 😐



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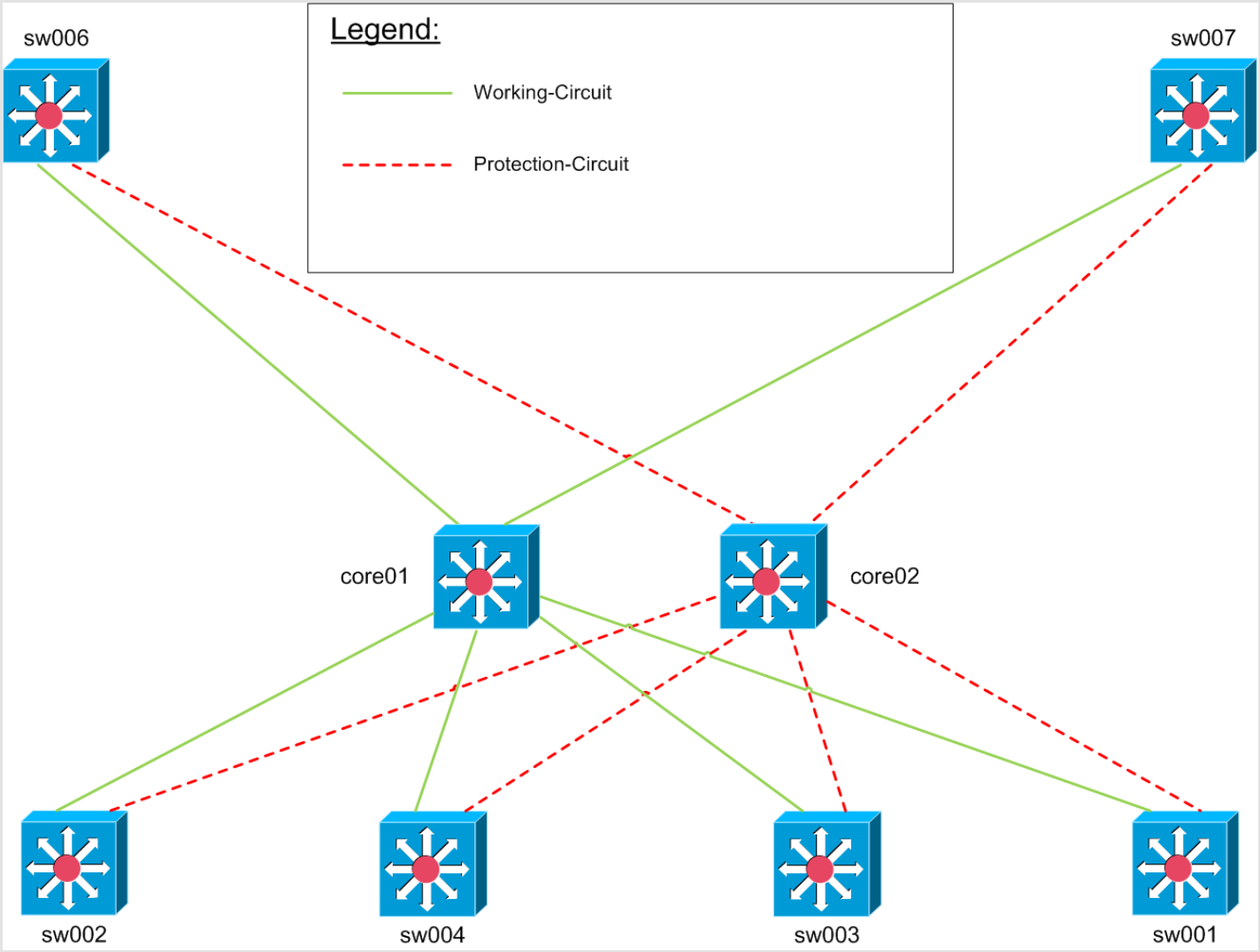
# Problem fixed → Normal operation mode ☺



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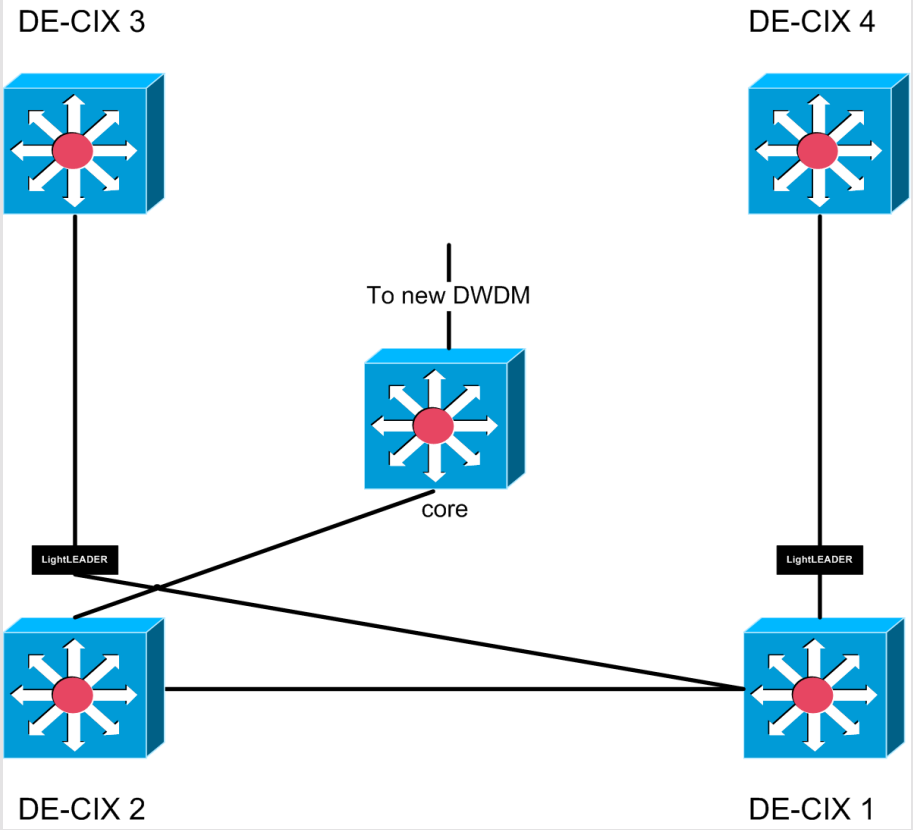
# Implementation

- Order lines, DWDM transceivers (long leadtime), DWDM chassis, fibre switches and core switches
- Install and test everything
- connect core to existing infrastructure

# Migration

- replace existing connections with DWDM/LL connections
- use old backup ports to interconnect new core
- during off peak hour replace existing interconnects (etherchannels) with new interconnect to core
- test failover scenario



# Testing failover

- simulating fibre cut by re/plugging a cable
- doing a contolled failover
- while testing failover backup connection of one edge did not come up
- optical budget was not enough
- removing attenuator solved the problem
- failover will be done on a regular basis

# Summary / Plans

- Whole project from early planning till failover test took nine months
- Migration to new infrastructure was hitless
- Only short outage for one edge while doing failover test
- Daniel Melzer did a great job
- We will have to replace cores in 2009 by bigger boxes

# Thanks !

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