



# **An RNO's guide to Carrier Class Routers**

Roland Trice

Manager, Senior Engineering Team

ULCC



# Introduction

- Overview of existing SJ4 router platform
- What is a Carrier Class Router?
- Features we must have
- Features we'd like to have
- Likely suspects



# Overview of existing platform

- Cisco GSR 12416
  - Sixteen Slots
  - 10 Gbit/s switching fabric
  - 10 Gbit/s line cards
  - Monolithic OS
  - Limited CPU fail-over
  - Limited hot-swappable hardware
  - Controllers and line cards obsolete



# Overview of existing platform

- Upgrade path
  - New 80 Gbit/s switch fabric
  - Modular OS (like the HFR)
  - New controllers and line cards needed
- Not likely to be cheap
- Will be disruptive and take a long time
  - Remember the last fabric upgrades
  - Very very new
  - Can upgraded box last until 2010/2012?



# What is a Carrier Class Router?

- Designed to aggregate large PoPs
  - Combines edge and core functionality
  - SJ5 won't need to deploy BARs
    - Reduced complexity
    - Reduced CAPEX and OPEX
- High Capacity
  - 40 Gbit/ chassis slots
  - High port density on line cards



# What is a Carrier Class Router?

- Very high reliability (99.999%)
  - Assuming you leave it alone 😊
- Modular operating software
  - Designed around a Unix kernel
    - Live patching or bug-fix to specific modules
    - Reduce risk of bug-fix OS introducing more bugs
- Graceful processor and process fail-over
  - Routing and forwarding not affected by hardware or software faults

# What is a Carrier Class Router?



- Genuine hot swappable redundant hardware
- Logical/virtual routers
  - Enables multiple router domains in a single chassis
  - Hardware based
    - Multiple CPUs dedicated line cards
  - Software based using protected memory
    - Uses switch fabric to route traffic

# What is a Carrier Class Router?



- Clustering
  - Connect multiple chassis as single router
    - Live expansion
    - Reduce complexity of multiple routers PoPs
    - Probably won't need this in practice



# Features we must have

- 40 Gbit/s slot capacity
  - Even if no 40 Gbit/s line cards on day one
- Truly graceful fail-over
  - Preserves routing and forwarding
  - Allows OS upgrade to live system
    - Reduce impact of development programmes
- Everything must be hot swappable
  - From controllers to the switch fabric
    - The longer a system is powered up, the more unhappy it will be to when powered cycled



# Features we'd like to have

- Modular OS
  - Live patching or bug-fix to specific modules
  - Reduce risk of bug-fix OS introducing more bugs
- Issues of version control, backwards compatibility etc



# Features we'd like to have

- Logical/virtual routers
  - **IF IT IS SAFE** this feature may allow
  - Development in parallel with operational network
    - New services developed more quickly
    - Lower risk to production service
- Clustering
  - Good if we ever need to expand a PoP



# Pre-Procurement activities

- Informal discussions with suppliers
- RFI to distil responses
  - **IS NOT a procurement**
- Four are supplying kit for testing
  - Because they have all the things we are interested in now
- We may test more if we have time in 2005
  - Other suppliers will have interesting things by Q1 2005



# Chiaro

- Chiaro Enstara
  - All the features we need by end 2004
  - Optical switch fabric
    - Want more capacity, add another lambda
  - Long product lifetime
- Start-up company
  - Brand new product
  - Low number of installed systems
  - Will they survive?

# Cisco



- Cisco HFR “Half Q”
  - All the features we need by end 2004
  - Very high capacity
  - Long product lifetime
- But
  - Brand new product
  - Low number of installed systems



# Juniper

- Juniper T640
  - All the features we need by end 2004
  - High capacity
  - High number of installed systems
  - Proven track record since
  - Strong candidate if we were procuring NOW
- But
  - System already 2 years old
  - Will it last until 2010/2012?



# Procket

- Procket PRO 8000
  - All the features we need by end 2004
  - Suite of systems for all our needs
  - Long product lifetime
- But
  - New product
  - Low number of installed systems (but growing)
    - Australian NRN is deploying now



# Pre-Procurement activities

- Testing is informal
  - Not part of a procurement
  - Enable us to write better ITT
- Routers loaned under NDA
  - Not much we can say about the results