AUSNOG 2016

Dylan Chidgey – NOC Manager
Fixed Point Wireless: Raising the Service Level

Introduction

- Fixed point wireless provider
- Owns and operates one of Australia's largest fixed point wireless networks with nearly 250 sites and network in most major population centres
- Focus on:
  - filling the gaps in the traditional telecommunications delivery model (copper, fibre)
  - Redundancy
- Focus on wholesale of "access tails" to business / government customers
- Direct competitor to copper and fibre

A brief history lesson

- Founded in 2004
- Started with a regional, residential focus
- Government incentive programmes
- Went through an acquisition phase in 2007 – 2008
  - It's a pain!
  - Haven't done it since
  - Doesn't align with business objectives

A brief history lesson

- Shift towards business grade in 2009
- First business only network built in Sydney, NSW
- Coverage in most major population centres across Australia.
- Strictly wholesale/channel
  - Layer 2
  - Internet
  - Private links
- Residential network now decommissioned

Taking Control of the NOC – Challenges

- **Changing business model**
  - Residential customers declining
  - Business customers increasing
- **Limited budget available**
- **Tension between business and residential**
  - Need to evolve operational culture
  - Processes and procedures not mature
  - Were learning about the business grade market
- **Now completely business grade**

- **Inadequate Systems**
  - Basic monitoring tools & systems
  - IP & VLANs managed on a spreadsheet
  - Paper understanding of service levels
- **Challenging network conditions**
- **A lot of technical debt**
- **Aged hardware**
- **Mixed architecture**
  - OSPF/MPLS
  - xSTP
- **Limited redundancy/diversity**
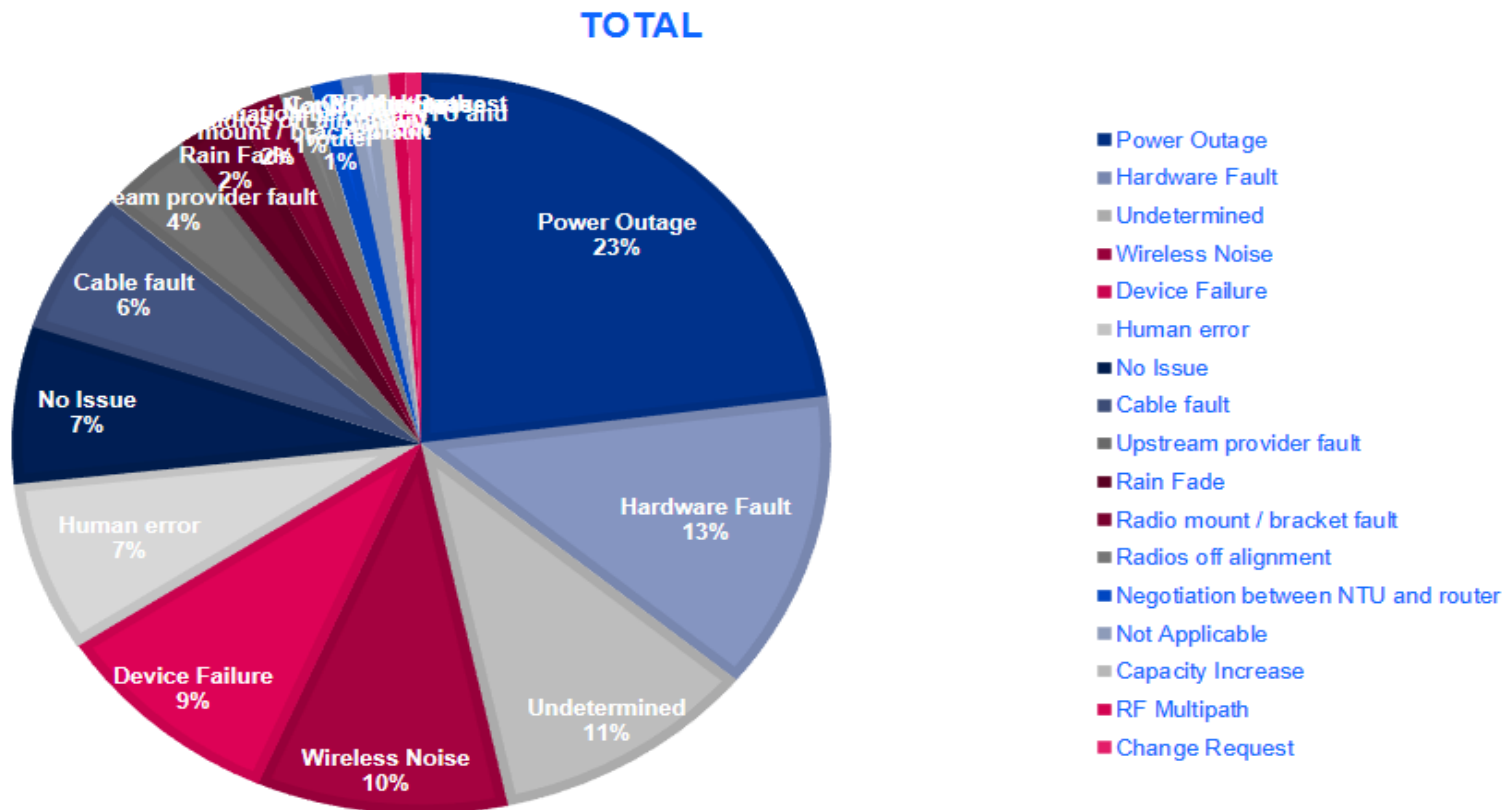
Taking Control of the NOC - Challenges

- Coverage limits pushed
  - Numerous single points of failure
  - Multiple hops between transmission sites
  - Long last mile links
- Site Build/Install quality
  - No real control
- Resource Challenges
- Small NOC team
  - 24x7 coverage…
- Small number of field technicians
- Reliant on contractors

Improving Redundancy & Resiliency

- Identified quick wins!
  - Deployed redundant links where possible
  - Deployed diverse core infrastructure
  - Provision diverse 3rd party links in key locations
- Commenced site acquisition programme
  - Provide redundant paths
  - Improve last mile coverage
  - Acquire more 3rd party fibre POPs
- Got a cash injection to move things along quicker
- Upgraded back haul to improve capacity & quality
- Started upgrading hardware (R&S, UPS, etc.)

Improving Redundancy & Resiliency

- **More fibre POPs!**
  - Dark fibre where possible
  - Carrier diversity (where possible)
  - Built network to get to fibre
  - Purchase from the source! (where possible)
- Path diversity isn't always possible
- Implemented multiple back haul along same path
- Device level redundancy
- Spectral diversity
- Increased capacity

Keeping the Lights on - Challenges

- **Is expensive!**
  - More expensive if you don't!
- **Maintenance is a challenge**
  - Small teams
  - It's Disruptive
  - More focused on new build & install
- **Wireless is a harsh environment**
  - Dust
  - Heat
  - Moisture
  - ESD
  - Lightning

- Site access & maintenance
  - Towers are a pain!
  - High rise buildings
  - Industrial/commercial locations
  - Accurate information
- Power
  - Mains supply outages
  - Breaker trips
  - UPS failures
  - Building maintenance

Keeping the Lights On

TOTAL

Legend:
- Power Outage
- Hardware Fault
- Undetermined
- Wireless Noise
- Device Failure
- Human error
- No Issue
- Cable fault
- Upstream provider fault
- Rain Fade
- Radio mount / bracket fault
- Radios off alignment
- Negotiation between NTU and router
- Not Applicable
- Capacity Increase
- RF Multipath
- Change Request

Pie chart values:
- Power Outage 23%
- Hardware Fault 13%
- Undetermined 11%
- Wireless Noise 10%
- Device Failure 9%
- Human error 7%
- No Issue 7%
- Cable fault 6%
- Upstream provider fault 4%
- Rain Fade 2%
- Radio mount / bracket fault 2%
- 1%

The effect of lightning

- Electro Static Discharge (ESD)
  - Is difficult to identify
  - More-so when rapidly upgrading a network
  - Land/Tower owners don't care so you're on your own
  - Surge arrestors are often problematic
- UPS
  - Designed for enterprise environments
  - Expensive
  - Short run-times
  - Take up a lot of space!

Keeping the Lights On

- Active maintenance programme
  - Redundancy has made it easier & less disruptive
- Environmental
  - Improved design & engineering
- ESD & Lightning
  - Earthing
  - Surge Arrestors (Top & Bottom of cable)
- Power
  - Scope run-times accordingly
  - Shift to 48VDC telco power system
  - Industrial hardened power system

- Wireless networks are distributed
  - Metro rings too hard to manage (MRP, REP)
  - L2 back to aggregation point reduces diversity
- Mixed architecture
  - Spanned VLANs
  - Broken OSPF architecture
- Routed to the edge (Complexity & Scale)
- Mixed technology
  - Inter-operability issues
  - MTU varied
- Lots of change creates problems

- Committed to a mesh(able) architecture
  - Customers circuits are edge to edge/core
  - Change is now easy
  - New site integration is cut & copy
  - Customers can connect to multiple transmission sites
- Stuck to the plan
  - Worked through removing spanned VLAN segments
  - Kept pushing on (slowly)
- Continued rollout of OSPF/MPLS architecture
- Distributed functions to the edge
- Audited for MTU
  - Actively worked to remove bottlenecks

Business Continuity

- July 2014 Experienced a DDoS across the core
- Created an LSA storm at the edge
- Took ~3 days to fully recover
- Disasters always highlight shortcomings!
- Systems and processes had been outgrown
  - Communications channels
  - Process not designed for large scale, long duration incidents

Improving Business Continuity

- Already well versed in incident management
- Asked ourselves a lot of questions!
- Created a plan
- Got a 3rd party to validate & audit
- Implemented quick wins & high risk items
- Shared our remediation with our customers
- Redesigned our OSS platforms
- Implemented a major & critical incident process
  - Fully integrated into our ERP
  - Heightened awareness across business
  - Improved customer communication

What's in the tool bag?

- We don't use big commercial NMS!
  - Nagios, Observium, Graylog, etc.
  - Ansible/Rundeck
  - Oxidized (Config backups)
  - Pager Duty
  - In-house NMS to augment off the shelf tools
- Most tools aren't smart, you have to make them smart
- In-house Dev is worth every dollar!
- Integrate everything!
  - Inventory
  - Monitoring
  - Alerting, Notifications & Communications
- If it doesn't exist, build it!
  - Power grid monitor
  - Quality analytics

What's in the tool bag?

- Dealing with alert fatigue
  - Re-built our NMS from scratch
  - Looked at what really matters
  - If you're not going to deal with it, don't alert on it!
  - Implement tiered alerts
    - Critical alerts to senior tech/management
  - Implemented time of day alert tiers
  - Automated some fault management

Wireless has matured

- Have adopted some "big telco" techniques
  - "Small cell" coverage
  - 48VDC Power
- Built a culture of quality
- Maintained agility
- Mature systems & process

- Merchant silicon & virtualization for us
- Cost savings
- Massive performance gains
- Hardware consolidation
  - Initially in the core
  - Likely to spread further to the edge
  - Smaller physical foot print
- Lower power consumption
  - Improved UPS run-times

Raising the service levels

- Redundancy everywhere!
  - Core, back haul, last mile
  - Power
  - Routing & switching
  - 3rd Party Ethernet
- Excessive UPS run-time
  - Current base for new sites is 10 hours
- More transmission sites
  - Introduces more redundancy
  - Shorter last mile links
  - Diverse upstream for customers

- ## Implemented quality analytics tool
  - Measures ~10 KPIs per service
  - Creates a score out of 10
  - Enables a pro-active QA programme
- ## QA guides new site acquisition programme

Closing Comments
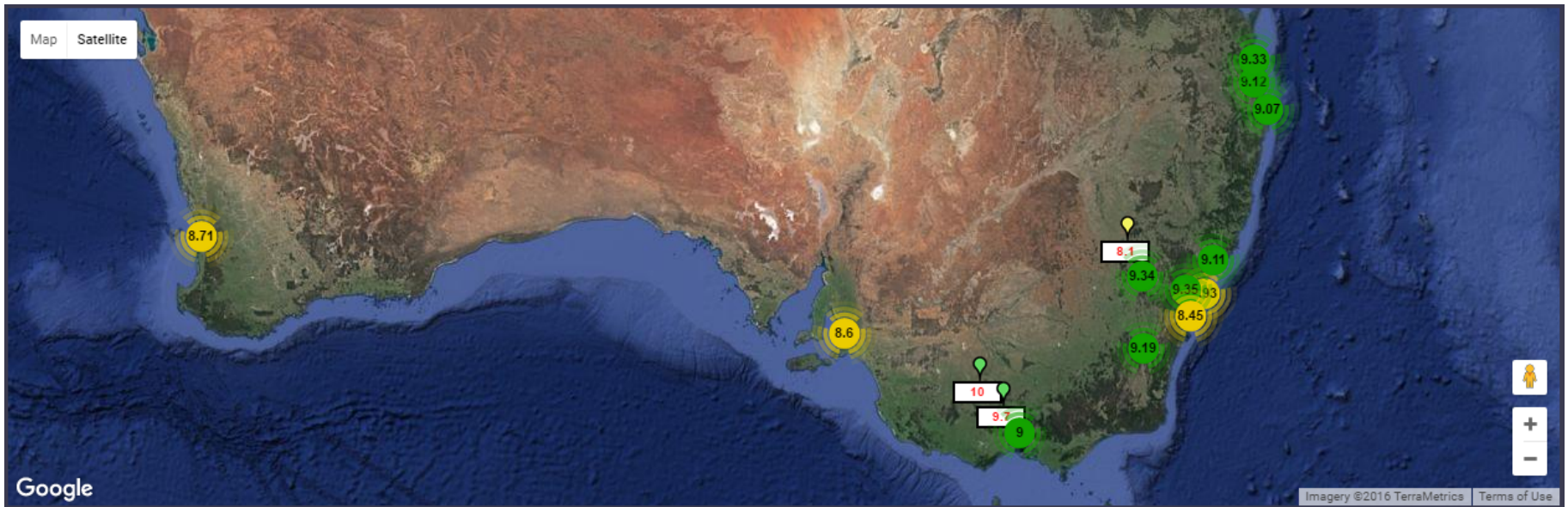
- The medium matters less and less
  - Wireless is low latency
  - Agile/Flexible
  - Already capable of 10Gb
- Don't rely on the big vendors
  - Slow
  - Expensive
  - Support
  - Not at the cutting edge

Questions?

Dylan Chidgey

Dylan@cirruscomms.com.au

www.cirruscomms.com.au