Meeting the Challenge of Gigatown

Stu Fleming
Wicked Networks, Dunedin

Wicked Networks

- Founded May 2005
- Provider of fixed wireless services.
- City-wide infrastructure of wireless nodes and hotspots.
- Transition to become UFB provider 2013-

Chorus Gigatown

- Year-long competition based on social media.
- Towns across NZ competed to be the first to get 1Gbps residential and business UFB.
- Created a lot of noise.
- Raised a lot of awareness.
- Dunedin announced as winner – Nov 2014.

UFB Infrastructure

- Ultra-Fast Broadband
- Govt-funder public-private partnership
- Reach 75% of NZ customers by 2019
- Based on passive GPON

UFB Infrastructure

Cabinet

Street-level pit

Aerial

Connection Point

External Termination Point

Optical Network Terminator

Gigatown Timeline

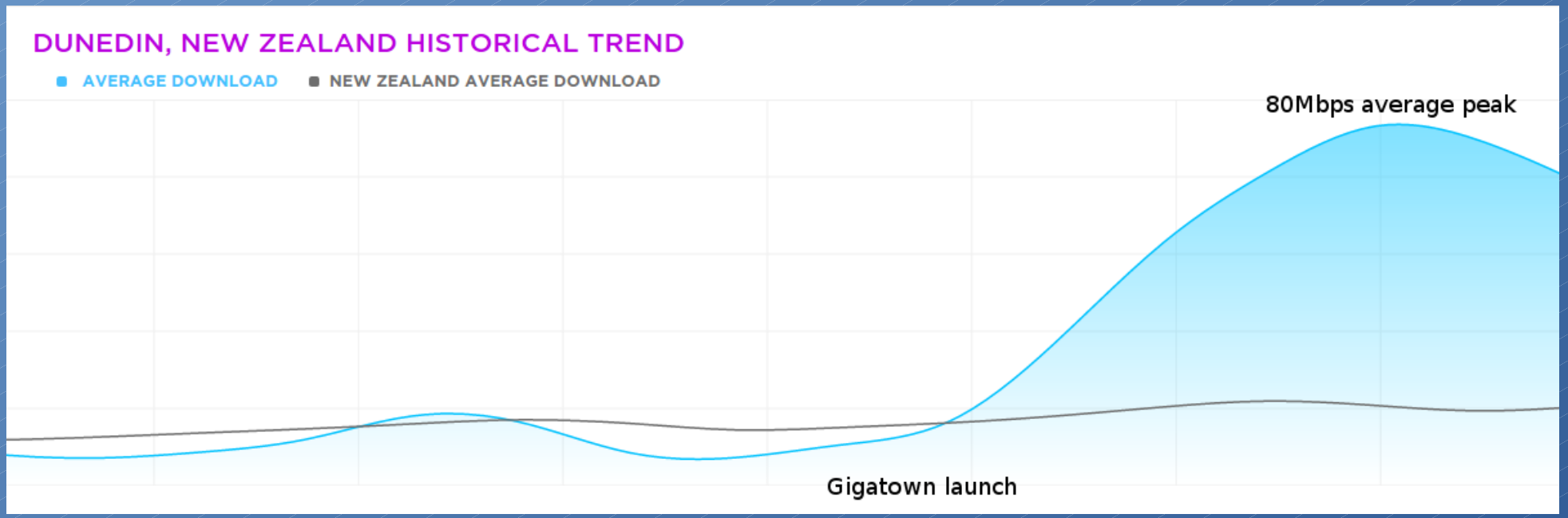
- October 2013 – competition begins
- November 2014 – social media ends
- November 2014 – winner announced
- February 2015 – Gigatown launched

Based on existing Chorus infrastructure – 1Gbps download, 500Mbps upload.

Current Situation

- 500 Gigatown business and residential connections live (February 2015)
- 33% of Dunedin city covered by UFB rollout
- Several ISPs offering Gigatown plans.
- Ookla results now show Dunedin with the highest average upload and download speeds in Australia/NZ.

Initial Impact



- Upload and download speeds greatly increased (Download average peak 80Mbps March 2015)
- Initial impact appears to have declined

The Ethical Challenge

- Even if we accept “speed” as being a good metric of end user value (it isn’t), then the statistics are highly skewed by a few gigabit users. Yet the last megabit per second creates negligible value compared to the first one, meaning these are over-valued.
- Average speed measures mean that the *distribution* of service speed is ignored. I think you would agree that a country with universal 500Mbit/sec broadband is a lot more successful than one which delivers a gigabit to half the population, and nothing to everyone else.

--Martin Geddes, The Ethics of Broadband

The Organizational Challenge

- Gigabits are available, but only to a few.
- Uptake is affected by the rollout process:
  - Users in available areas don't want it
  - Users who want it aren't in areas where it is available
- Utility is affected by user readiness:
  - Users have old devices (not capable of 1Gbps)
  - User habits have not yet changed (no killer app)
- Educating the user for more appropriate expectations

The Organizational Challenge

- UFB is not the same as normal Internet
  - Timeframes are uncertain
  - Coverage is not complete
  - Different proprty types have different install requirements
- Users can easily become frustrated
  - If they can't get UFB at all
  - If it takes a long time to install
  - If key dates and appointments are missed
- RSP is not the infrastructure provider

Rollout

September 2014

A new service pole is installed.

Rollout

December 2014

Notification from Chorus that work will begin January 2015.

Rollout

17th January 2015

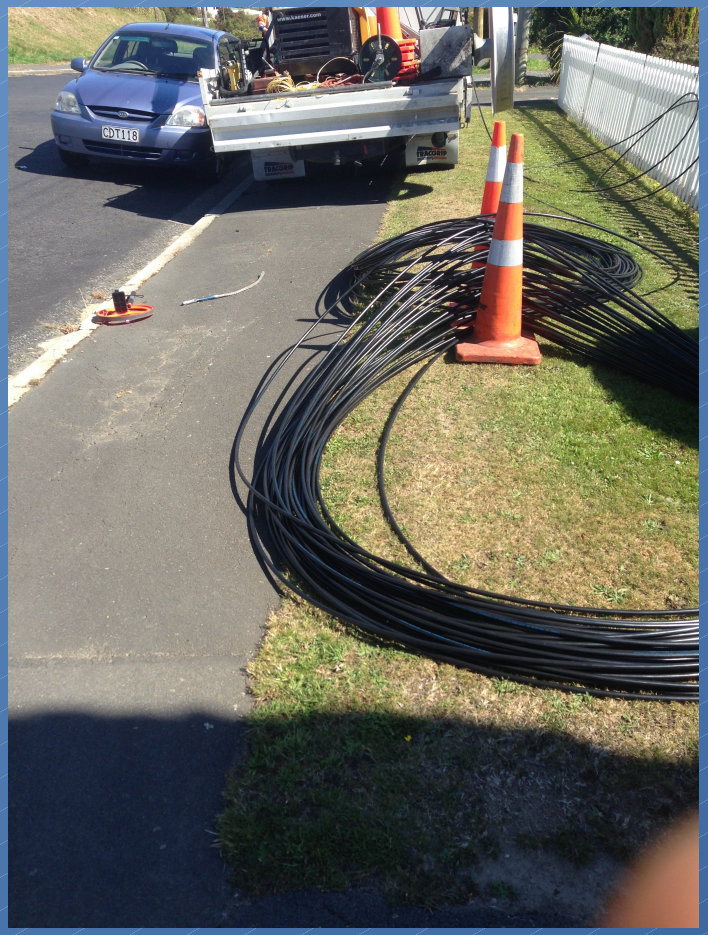
The pole is labelled.

Rollout

1st February 2015

Ducting is rolled out to each service pole.

Rollout



15th February 2015

Fibre blowtubes are rolled out.

Rollout

18th February 2015

Fibre arrives at service pole.

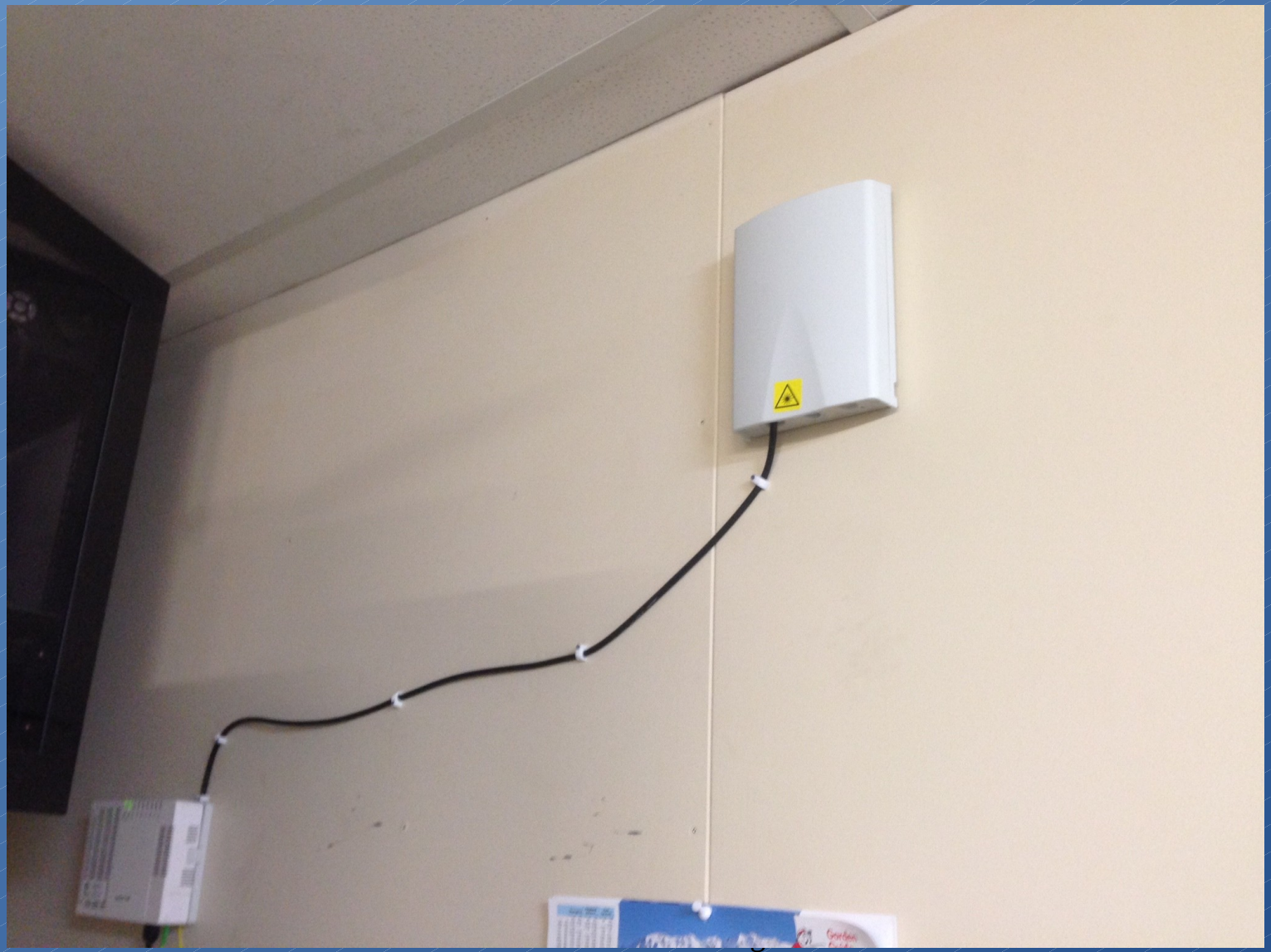
Time passes.

28th April 2015, UFB available to order.

18th May 2015, UFB scoping.

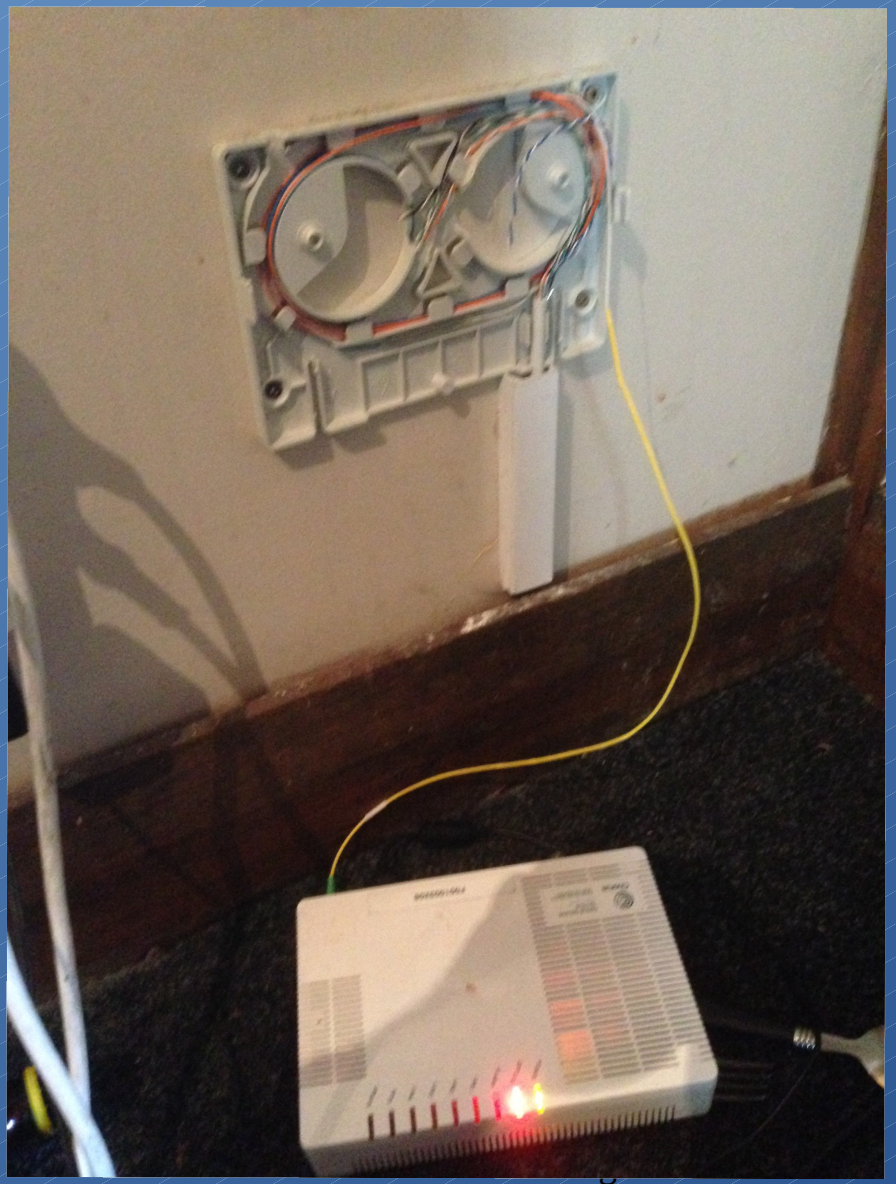
27th May 2015, UFB install.

When Things Go Wrong

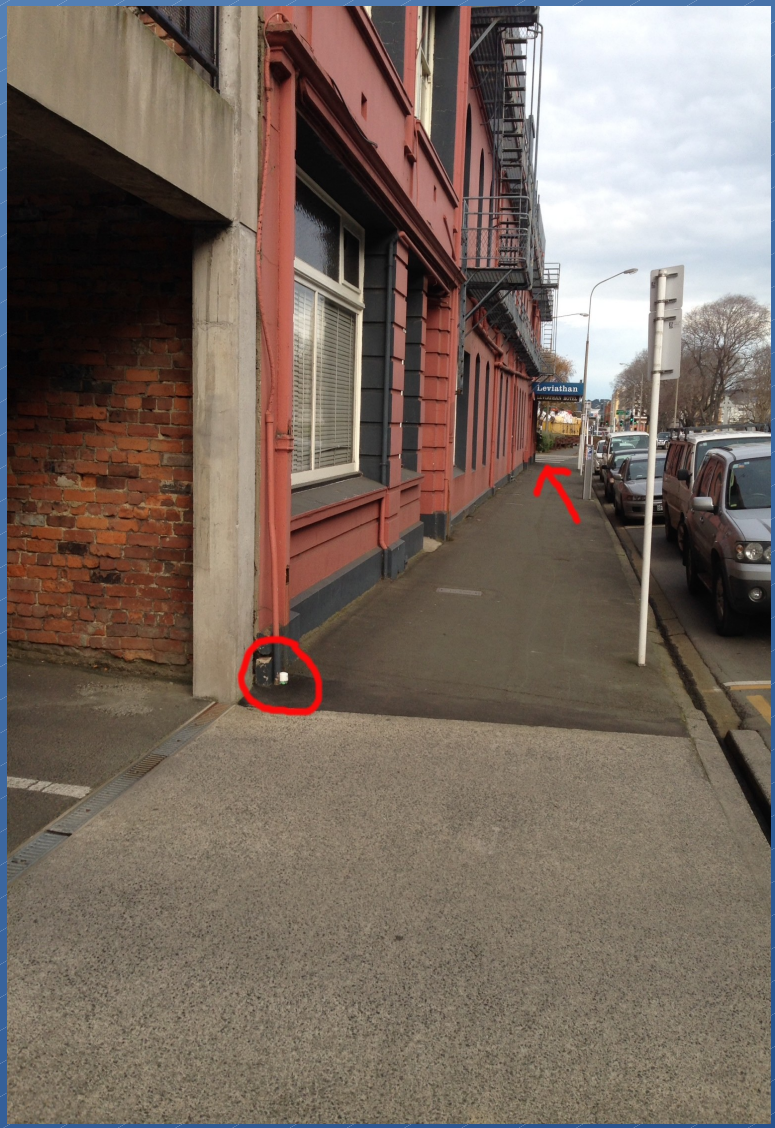


When Things Go Wrong...

“The UFB comes off the wall”



“UFB is available”



“UFB is available”

Technical Challenge - CPE

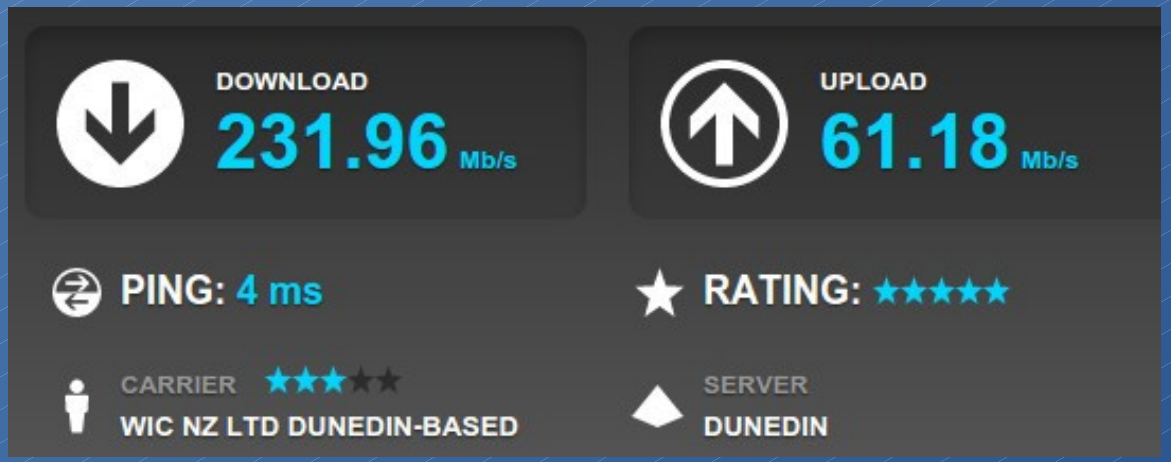
- Dual-core CPU
- Dual-band 3x MIMO 802.11ac wireless
- Price point < $200
- Initially deployed 911G units
  - Performance around 250Mbps on wireless
  - Older user devices (e.g. iPhone 4) could not connect to 5GHz band
  - hAP ideal but not available

<insert name of vendor>

End-user performance

- Real-world speed tests:
  - 700-800Mbps business,
  - 400-500Mbps residential
  - 200-250Mbps 802.11ac wireless
  - 100Mbps 802.11N devices
- Non-speedtest traffic
  - TCP/IP streams peak around 50Mbps
  - End-user connection peak typically 200Mbps max

End-User Performance



Technical Challenge - Handover

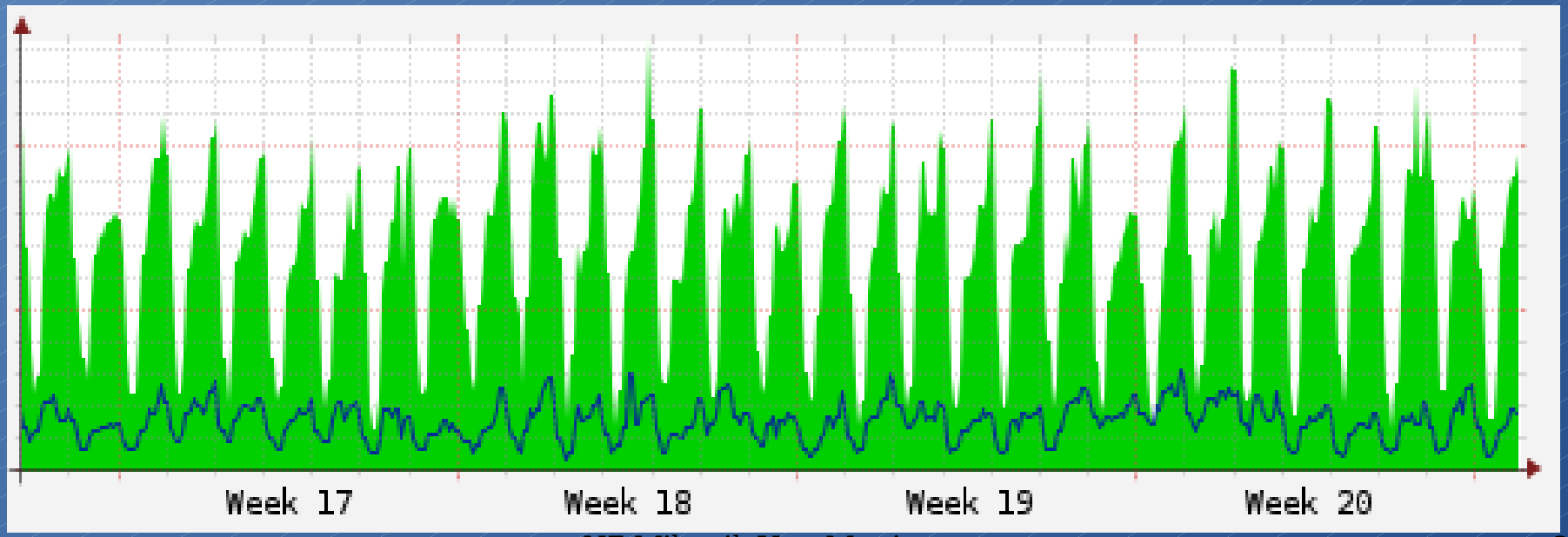
- Chorus UFB handover aggregates all tails
- Single 1Gbps or 10Gbps QinQ delivery
  - 1 SVID per service
  - 1 CVID per customer
- Deploy PPPoE or static IP via DHCP
  - Roughly 20% penalty for PPPoE
- “Right-performing” layer 2 provisioning

Technical Challenge - handover

- Deploy CCR1036
  - 95% idle, even under heaviest peak traffic (80-100K pps)
  - DFAS (bi-d SFP) from POI to RSP core
  - Bridge customer VLANs to PPPoE concentrator
- Recommendations:
  - 10Gbps handover (dual-fibre SFP)
  - CCR1072 (availability?)
- Observations
  - 10% performance drop UDP => TCP
  - Real-world (post-launch) performance < pre-launch testing
    800Mbps max vs 950Mbps max in testing
  - SFP in SFP+ slot issues

Performance observations

- No significant increase in traffic post-Gigatown
- Peak traffic around 500Mbps aggregate
- Significant offloads from domestic and international transit onto peering



The Customer Challenge

- Deliver 1Gbps download, 500Mbps between CPE and ISP core network.

BUT

- Customer expects: “Deliver 1Gbps Internet to my house”

- “Gigabits Everywhere” – Prof Brian Cox, University of Otago 2001.

Make the gig go further

- Layer 2 provisioning ex-Dunedin at >= 1Gbps
- Peering with as many others as possible:
  - Dunedin exchange has relaunched
  - Peer at APE, Megaport, Auckland-IX
  - Seek bilateral peerings for content delivery
- Observation:
  - User habits have not yet changed; users seek streaming video content
- Outcomes:
  - Traffic to/from peered providers within NZ appears to reach gigabit speeds
  - Dedicated bilaterals at 1Gbps smooth content delivery
  - Uncongested network within NZ, low-contention on international

The Organizational Challenge

- Migrating from being an independent wireless provider to becoming a wholesale RSP causes a high degree of friction.
- Processes and timeframes of infrastructure provider are still maturing.
- Rollout of connections – timeframes and geographic areas subject to change and do not match customer demand.
- Process is prone to errors and delays => reduced customer satisfaction.

Organizational Challenge

- The customer does not understand the UFB rollout process
  - Customer perception is “fast internet”
  - RSP reality is “totally new build”
  - Chorus reality is “contracted to the Crown”
- Friction in the ordering process leads to:
  - Loss of customer satisfaction
  - Lost orders
  - Failure to reach critical mass

Current Situation

- **C**ustomers have high expectations.
- **L**ocal focus makes it hard to scale.
- **U**FB rollout is incomplete – no critical mass.
- **S**peedtests don't capture real performance.
- **T**echnical challenges abound.
- **E**ducating users is necessary, but difficult.
- **R**eal-world performance is good.
- **F**ailure to provision correctly is very obvious.
- **U**nable to source preferred vendor CPE.
- **C**ontent delivery hugely important => peering.
- **K**iller app doesn't yet exist.