Company Profile

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1 COMPANY PROFILE

1.1 THE COMPANY

1.1.1 WHO ARE PULSE NETWORKS LIMITED

Pulse Networks Ltd opened its Auckland office in 1996.

Set-up to service the rapidly deregulating Telecommunications industry, we pride ourselves on being able to provide a complete design and build package from conceptual design through to installation and commissioning**.**

Pulse Networks offers a total quality service from feasibility studies and design through to construction and commissioning of Telecommunications networks. We have designed many types of networks in New Zealand including Cable TV, Telephony, Fibre Optic and Mobile Radio. Our experience in the industry is second to none, and we have provided innovative and cost effective solutions to clients that include all the major telecommunications service providers in New Zealand

As specialists in Fibre Optic networks, Pulse Networks has worked on many large infrastructure projects, including the design and build of fibre optic metro networks in Auckland, Wellington and Christchurch.

1.1.2 DIRECTORS STATEMENT

I, Ian Neary, began in the business as a 17 year old Trainee Linesman for the New Zealand Post Office. I have seen the industry change from a state own monopoly providing little options, to today's deregulated environment where the customer is almost spoilt for choice. In that time technology has evolved from an analogue system utilising mechanical switches and copper cabling to a digital transportation system delivering high speed data over broadband networks. The UFB is now pushing fibre out to the suburbs providing the "pipe" for exciting new services. We at Pulse Networks have been at the forefront offering our clients a wealth of knowledge gained from many years in the Telecommunications industry.

As a company, we are determined to stay abreast of the latest technology, and be able to offer expertise and advice to our clients. Let Pulse Networks know your requirements and we will provide the expertise and resource to make it happen.

Ian Neary NZCE REA

1.1.3 MISSION

To exceed our client's expectations and add value to their business.

1.1.4 COMPANY DETAILS

Name:	Pulse Networks Limited
Incorporation:	AK/914271
Office Address:	15c Douglas Alexander Parade, Albany, Auckland
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Phone:	09 974 4450
Web:	www.pulse.co.nz
Email:	info@pulse.co.nz
Contact:	Ian Neary (email: ineary@pulse.co.nz)

1.2 OUR SERVICES

We service clients in the Telecommunications, Electrical and Building industry**.**

Design

Local Access Telephony	HFC (Cable TV) Networks
Fibre to the Home (FTTH)	Mobile Radio (Cell Site)
Metro Fibre Networks	Technical Software
Cable Rehabilitation Scoping	

Consultancy, Project Management

Planning Reports	Communication Plans
Feasibility Studies	Health & Safety
Tender Evaluation	Public Relations
Resource Consents	Site Supervision

Installation

Telephony (Local Access)	Fibre Optics
HFC (Cable TV)	Residential/Business Connections
Underground & Overhead	Cable Rehabilitation
Cable hauling/blowing	Data/Phone Systems

Survey, General Drafting and CAD Services

GPS & Traditional Survey	Smallworld
As Builds	AMFM
AutoCAD/Microstation	Architectural Drafting
Cable Location	Standover Protection

Products and Training

Microduct & Mini Cable systems	Microduct System Design Training
Fibre Optic Cable and Accessories	Cable and Microduct Blowing Training

1.3 HEALTH AND SAFETY POLICY

Purpose

This Policy states Pulse Networks overarching commitments and requirements for health and safety. Pulse Networks will conduct its business activities in such a way as to protect the health and safety of all our people, our clients, the public and visitors in our work environment.

Pulse Networks is committed to continual and progressive improvement in our health and safety performance. In order to meet this commitment, we will provide sufficient competent resources and effective systems at all levels of the organisation to fulfil our obligations.

Our Policy is to:

a) Provide a safe and healthy work place for all our people, clients, the public and visitors.

b) Ensure health and safety considerations are part of all business decisions.

c) Monitor and continuously improve our health and safety performance.

d) Communicate with our people, customers, and stakeholders on health and safety matters.

e) Operate in a manner that minimises health and safety hazards.

To achieve this we will:

a) As a minimum, meet all relevant legislation, standards and codes of practice for the management of health and safety.

b) Identify, assess and control workplace hazards.

c) Accurately report, record and learn from all incidents and near misses.

d) Consult, support and encourage participation from our people on issues that have the potential to affect their health and safety.

e) Promote our personnel's understanding of their health and safety responsibilities relevant to their roles.

f) Suspend activities if safety would be compromised.

g) Take all practicable steps to minimise hazards to our employees, clients, visitors to our worksites and general public.

All Pulse Networks employees and contractors working for Pulse Networks are responsible for ensuring their own and other's safety by adhering to safe work practices, making appropriate use of plant and equipment (including protective clothing and equipment) and promptly reporting incidents, near misses and hazards.

Ian Neary

Managing Director

Pulse Networks Ltd.

2 March 2017

1.4 QUALITY MANAGEMENT POLICY

Purpose

Pulse Networks believes that its market expects a continually improving service. We aim to continually improve the service we provide to meet our client's requirements and to produce finished work that we can justifiably be proud of.

Aim

Pulse Networks aims to achieve the above by implementing a management system that complies with the international standard of good practice ISO 9001. It also includes a commitment to meet the requirements of our customers, as well as the continual development of the system to ensure it remains relevant and effective.

Only by providing an outstanding service will we achieve our aims of long term success and sustained improvements.

All personnel within Pulse Networks are responsible for the quality of their work. The company provides training and has established systems to assist all personnel to achieve the standards required. While we endeavour to produce work and offer a service that we can be proud of, we have to recognise that we don't always achieve our own standards. When a customer rejects our work, we are committed to investigating the complaint and will do our best to put right all justified complaints.

The policy, organisation and procedures necessary to achieve the required standards are described in our Quality Management System.

Our Managing Director is also our Quality Manager and is responsible for monitoring the quality system. The objectives of Pulse Networks are set out in our Business Plan. Objectives for individual jobs are to carry out the work to the satisfaction of the client and in accordance with the contract as agreed with the client.

Ian Neary
Managing Director
Pulse Networks Ltd.
2 March 2017

2 TECHNICAL CAPABILITIES

2.1 INTRODUCTION

Pulse Networks design capabilities are well known in the New Zealand telecommunication industry. From the earlier days designing Copper Cable infrastructure through to more recent times designing Fibre Optic and Mobile Phone networks, Pulse Networks has continued to develop our skills and knowledge in an evolving and competitive industry.

By utilising a multi-skilled and flexible workforce, Pulse Networks has been able to produce innovative designs to meet tight deadlines. Our aim is to provide our clients with a valued work force to complement their own internal resources.

2.2 FIBRE DESIGN

2.2.1 INTRODUCTION

Pulse Networks has developed a number of design tools and recording methods to streamline the fibre design process. Using both graphical and tabular documentation to plan, design and construct networks to fit the needs of our clients.

2.2.2 DESIGN PLATFORMS

Pulse Networks has used a number of generic systems. These include:

- AutoCAD
- Microstation
- Smallworld
- Lodedata
- Vectorworks
- AMFM

We have also worked with clients to develop software specific to their needs. An example of this is Vodafone's fibre dimensioning software (FIDO) developed to optimize cable routing and sizes.

2.2.3 FIBRE TEMPLATES

Pulse Networks has current design templates and details that can be used directly or adapted to suit clients needs. These include:

Fibre Schematics	Fibre Network Plans
Fibre Splice Diagrams	Fibre Build Plans
Fibre Tray Layouts	Fibre Tube/Ring Serving Area Plans

2.2.4 FIBRE ARCHITECTURE

Pulse Networks can recommend and supply fibre cable types and equipment to meet client requirements. Our innovative network designs are cost effective and provide future flexibility to allow for growth and new requirements. These include:

Microduct Cable Systems	Fibre Cable & Accessories
Fibre to the Home (FTTH)	Metro Fibre Networks
HFC Cable TV Networks	

2.3 CIVILS DESIGN

2.3.1 INTRODUCTION

Pulse Networks produces civils design to complement the fibre design. These designs provide constructors detailed information and instructions that are easy to follow and give no room for unauthorized changes or misinterpretations. All our designers have dual construction and design experience, which results in cost effect designs that require minimal revisions during construction.

2.3.2 DESIGN DETAILS

Pulse Networks holds current design details and specifications that can be used directly or modified as required. These include:

Duct and bends	Joint chambers
Above ground duct installations	Chamber lids
Pull pits	Bridge attachments

2.3.3 CONSTRUCTION

Construction techniques are chosen to provide best progress without compromising safety or the integrity of plant or buildings along the route. These include open trench, thrusting, directional drilling, moleploughing and microtrenching.

2.3.4 DESIGN INNOVATION

Along with local manufacturers, Pulse Networks has worked with our clients and developed ducting systems to provide more flexibility and to reduce costs. Examples of these can be found in Vodafone and Enable and Vector's networks where loose microducts have been used to populate empty ducts. Pulse Networks is responsive and adaptive to clients needs and enjoys the opportunity to think outside the square when confronted with challenges.

2.4 INSTALLATION

2.4.1 INTRODUCTION

Pulse Networks provides a full design and build package; to do this we utilise internal and external resources to build our clients networks. The majority of civils work is built with construction partners and the installation of fibre and commissioning of active equipment completed by Pulse Networks. Over the years we have built up a list of trusted contractors and are able to react quickly to urgent requirements.

2.4.2 PLANT & EQUIPMENT

Pulse Networks has its own office warehouse in Auckland where it holds stock and installation equipment. These include:

PVC & PE Ducting & Microducts including LSZH	Duct Tees, connectors, lubricant, sponges, bullets
Compressor & Blowing machines	Cable handling & Fleeting Equipment
Fibre Splicing Equipment	Trailers, Cones, Barriers

2.4.3 CIVILS CONSTRUCTION

Pulse Networks uses selected Civils contractors to provide this service and Project Manages all parts of the build including consenting and as builds.

2.4.4 FIBRE BLOWING

Pulse Networks has a number of blowing machines ranging in size to fit cables from 1.8mm to 32mm. In addition we have adapter kits for blowing loose bundles of microducts into ducts of up to 63mm in diameter. Pulse Networks has been blowing cables since 2005 when it became Draka's NZ Agent importing and selling microducts and mini cables from The Netherlands.

Pulse Networks also provides training to other contractors or organisations.

2.4.5 INTERNAL CABLING

Pulse Networks has been installing data and fibre cabling for many years and has scoped most of the CBD buildings in Auckland as well as many in Wellington and Christchurch. Our local knowledge and relationships with Buildings Managers allows installs to be carried out quickly and with the least disturbance to other tenants. We have an in-depth knowledge of cabling systems and can recommend the best fit for our clients.

2.4.6 WIFI INSTALLATION

Pulse Networks has experience scoping and building WIFI Access Points on campuses and Office open spaces. We produce signal strength maps and deploy APs to suit.

2.4.7 DATA CENTRES

Pulse Networks works in Data Centres to provision customer circuits; this can involve running and terminating cabling, installing active devices, acceptance testing and remote hands. We also install cabinets, cable racks and tie cabling.

2.4.8 EQUIPMENT INSTALLATION

Pulse Networks installs both active and passive equipment including switches, routers, muxes and media converters. Testing equipment used ranges from Laptops through to Spectrum Analysers.

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2.5 STRATEGIC PARTNERING

We work with our clients to achieve cost effective solutions and foster strategic partnerships to achieve these aims. These can involve the sharing of construction costs as well as the leasing of assets.

3 APPENDECIES

3.1 PROJECT SAMPLES

The following pages are a selection of Pulse Networks projects

CITYLINK AUCKLAND FIBRE NETWORK DESIGN & BUILD

From 2001

Citylink is a Network Operator in Wellington and Auckland and was one of the first to offer Dark Fibre leasing. Begun as a Wellington City Council initiative to provide cheap fibre and broadband services to the business community, Citylink has evolved into a private company whose board of Directors are determined to keep true to its original aims.

Pulse Networks became involved with Citylink while designing Telstra Saturn's fibre network in Auckland; as agreed with the local council our design would incorporate other utilities who wished to take advantage of the open trenches. Citylink was one of these utilities and since then Pulse Networks has taken over the day to day management of Citylink's Auckland Fibre Network. Services provided include:

- Network Planning
- Network Design
- Civils Construction
- Fibre Installation
- Inside Plant Installation
- 24/7 Maintenance

Pulse Networks has built kms of new duct lines and fibre rings, connected up and lit over 100 buildings and provided on call 24/7 support throughout its long association with Citylink. Our local knowledge, experience and quick response has been the key to this successful partnership with Citylink being able to provide short turnaround from sales to delivery.

Extract from Company Reference from client:

" … *Throughout our relationship I have found Pulse Network's staff responsive to our needs and technically competent in all aspects of Telecommunications Engineering. They present a professional image and have become a valued engineering partner to our company"*

– Russell Hailes, Network Engineer, Planning

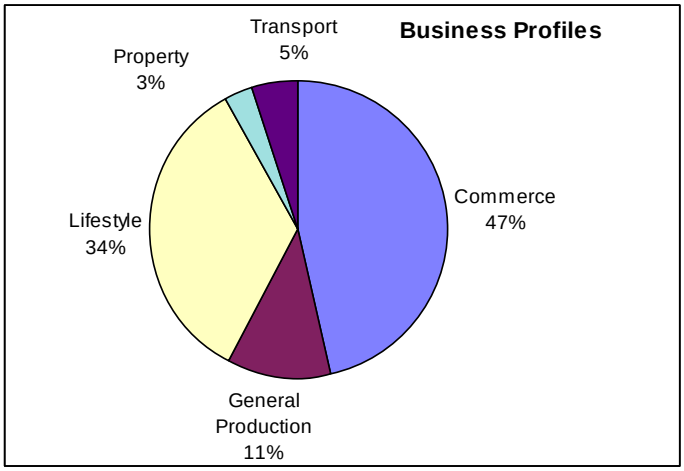
VODAFONE (TELSTRASATURN) CBD FIBRE NETWORK DESIGN

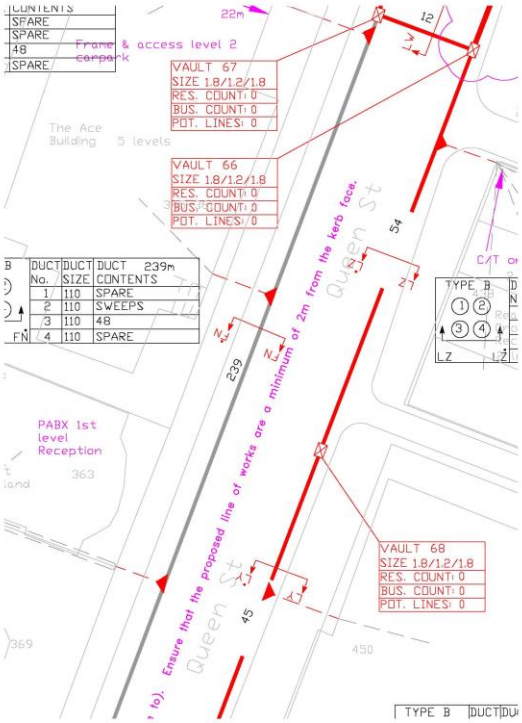
2000 - 2001

TelstraSaturn was born out of an acquisition by Telstra NZ of cable TV operator Saturn Communications. The new entity TelstraSaturn set out with an ambitious plan to build a fibre only network in NZ three largest Cities, being Auckland, Wellington and Christchurch. They chose Pulse Networks to carry out the Planning and Design of the Central Business Districts (CBD) of each of these Cities.

The Network Deployment Plans produced by Pulse Networks were used to develop a strategic plan for the rollout of broadband services by the client. It covered:

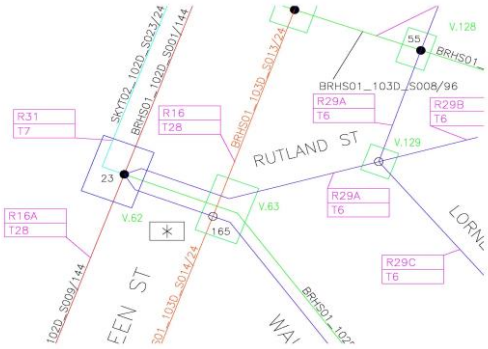
- Demographics
- Design Methodology
- Node Pocketing
- Preliminary Trench Routing
- Competitor Networks
- Stake Holder Inputs





Pulse Networks was required to Design all three CBDs in a relatively short time frame and had staff in different parts of the country feeding walkout data back to its Auckland Office for processing. Every building was scoped with details such as size, tenant list, building manager, duct entry points etc recorded and map onto GIS plans or tabulated in databases to assist the final Design process. The walkout plans provided to field staff included all known information such as building names and addresses, business list, underground services and preliminary trench routes. This meant field staff could scope large amounts of the City in a day having only to check and amend plans and tenant lists as they went. The resultant Civils Design Plans detailed the lay positions and vault locations that had already been sanity checked, meaning changes required by the contractors was kept to a minimum and Project Management became a lot easier.

The Fibre Design process was in-depth and involved the development in consultation with Auckland University of the first Fibre Diversity Optimiser (FIDO) software capable of producing a graphic fibre output in NZ. This was used by Pulse Networks Designers as the template for the detailed fibre design which included fibre schematics, splice plans and tray layouts.



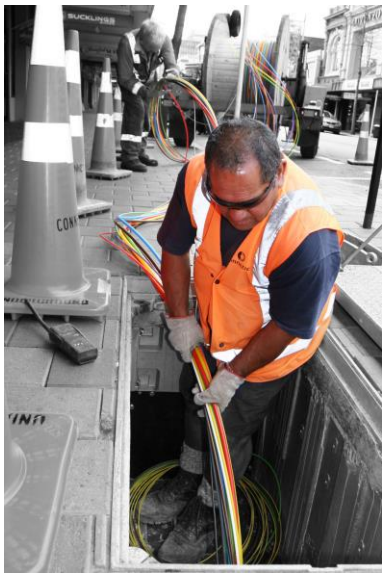
This project was unique in that “Brown Fields” design of existing CBDs with thousands of businesses and potential customers is normally used to augment existing services, not to Design and Build a whole new network. Pulse Networks was involved throughout the life cycle of this project; from conceptual design and planning through to Contract Bid preparation and As Build documentation. Of particular satisfaction was the development of new design tools and CAD drawings and seeing the project through all its phases.

Extract from Company Reference from client:

“ … *Pulse Networks proved themselves as a comprehensive one-stop shop for Planning and Design of fibre and copper networks”* – John Davenport, Planning and Implementation Manager

ENABLE NETWORKS FIBRE NETWORK MATERIAL SUPPLY

From 2007



Enable Networks is a Network Operator in Christchurch, part of the investment arm of Christchurch City Council. Set up initially to provide fibre and broadband services to the business community, Enable Networks is now building out into the suburbs as the successful UFB tenderer for FTTH.

Pulse Networks began its involvement with Enable Networks early on in its $36M network expansion to Christchurch business, universities and schools. As Draka's NZ Agent we demonstrated the new Jetnet Microduct and Mini Cable system, won the supply contract and also provided local technical support and training throughout the project.

The system uses loose bundles of microducts which are hauled through existing and new ducts to provide both distribution and Feeder capacity.

Duct branch-offs to buildings provide a microduct continuous blow path back to fibre distribution nodes and the larger 12mm microducts provide future capacity for more backbone fibre when required.

Extract from Nexst Magazine (Draka Netherlands):

" … *We selected Draka Jetnet after evaluating a wide range of alternative solutions and suppliers. Having a local supplier of the solution, Pulse Networks, allowed us to understand the technologies full potential, resulting in innovations that improved capital efficiencies and service resilience"*

– Steve Fuller, CEO, Enable Networks Ltd

VODAFONE PEGASUS FIBRE TO THE HOME DESIGN & MATERIALS

2008-2016

Pegasus Town in Christchurch is a gated community home to some 5000 residents with its own City Centre, Golf course and amenities. The Developers asked Vodafone for a future proof Telecommunications solution; as one of the leaders in FTTH design and a supplier of the latest technology, Vodafone selected Pulse Networks as its Technology partner.

This project began in 2008 and houses are still being built as each new stage is completed and released. Pulse Networks has supplied the latest microduct technology including pre-loaded ducts and more recently thick-walled microducts with improved breakout method. The microducts provide a continuous path for the mini fibre cables to be blown to each house when service is requested.

As well as the technology, Pulse Networks also supplies the civils and fibre design using AutoCad with intelligent networks elements that can be extracted from the CAD drawings to provide a Bill of Materials (BOM). This quick and easy method means requested changes can be done quickly without holding up the build – Time is Money.

This is the largest single FTTH development in NZ and Pulse Networks is pleased to be involved in such a prestigious project.

VECTOR COMMUNICATIONS MICRODUCT INSTALLATION

From 2007

Vector Communications is the fibre-optic network division of Vector, one of the largest owners and managers of multi-network infrastructure in New Zealand. Being able to lay fibre with all new power installations gives Vector Communications a major advantage over Fibre only companies.

Vector Communications is an innovative company being one of the first to adopt the now widely accepted microduct technology. As well as laying direct buried microduct cables, they are also utilising empty sub ducts originally installed for single cable hauling. Pulse Networks, through Vectors contract partner NorthPower, have used specialist blowing machinery and techniques to install not one microduct but three, to triple the subduct capacity of the 32mm subducts.

Pulse Networks uses a Plumettaz Superjet blowing machine capable of blowing cables up to 32mm in diameter to install 3x10mm microducts each with the ability to take a 96 fibre mini cable. Microduct kits are available to blow various combinations of microducts up to 10 at a time, and SuperJets can be combined to install different size combinations.

The Superjet is a powerful machine and can blow cables up to 32mm in diameter using a hydraulic chain drive and high pressure after cooled air. Conversion to floating (water) can be done to increase achievable section distances up to 5km.

VECTOR 22KV POWER CBD ROUTE DESIGN

2005

Vector Limited required a full route study before beginning a multi million dollar upgrade of Auckland City's power network. Pulse Networks came recommended as a result of detailed planning and construction drawings produced for similar projects. These drawings plotted all services and obstructions and identified lay windows for new power ducts and cable. By having a pre-determined trench route, most consent and construction issues could be addressed before tenders were let, saving in time and money.

Design Components included:

Executive Plans

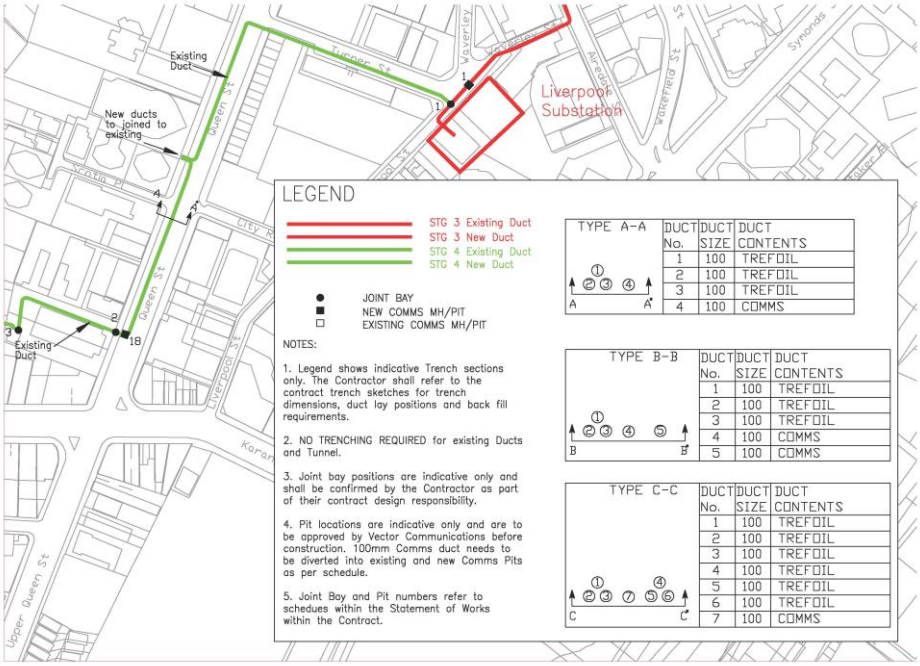
- Indicative cable route
- Building names
- Existing sub stations
- Other significant plant as required

Civil Design

- Duct profiles
- Construction notes
- Hauling schedules
- Piloting Locations

Route Design

- Existing obstructions (other utilities)
- Indicative cable route with running chainage
- Building names
- Existing sub stations
- Concrete Roads
- Trees requiring Resource consent



2DEGREES CELL SITE PLANNING AND DESIGN

2008 - 2009

Two Degrees Mobile Limited (formally known as NZ Communications) was a new entrant to New Zealand's mobile market when Pulse Networks first began working for them. They had to build a new network as quick as possible to meet both customer and revenue targets in a competitive market.

Pulse Networks was asked to tender for planning and design work and was successful against some of the larger multi-disciplined consultancies. Our "point of difference" being our wide knowledge of Telecommunications technologies.

Pulse Networks produced both Planning and Construction drawings by utilising its own in-house resources as well as sub-contract resource from survey, structural engineering and RMA. A team approach and management avoided multiple site visits and maximised data capture and information sharing to produce drawings in the shortest amount of time.

The planning and design process involved:

- Site Survey and Documentation
- RMA Consents
- Geotechnical & Geographical Survey
- Structural Engineering
- Electrical Design
- Drafting (CAD)
- Construction Supervision
- As Building

RF Design was carried out by 2Degrees Engineers.

Comment passed on to Pulse Networks from client:

"… *first drawing I have seen from Pulse and the quality of the drawing was fantastic. Little things that were included on the plans including the surrounding sites, facilities on these sites (and their elevations), vegetation, existing telecommunications facilities on neighbouring sites, the heights and distances of these existing facilities from the proposed NZCL site and having buildings and vegetation included in the elevations made writing the report very easy for us"* - Environmental Planner

CHORUS CABLE REHABILATION PROJECT

1996- 2003

Chorus began a network rehabilitation programme in 1996 to bring their aging copper network up to speed to support ADSL technologies and allow high speed broadband connections in residential areas. At this time there were a number of national patch contractors managing Chorus's network and it was decided to bring in independent companies to inspect the condition of plant and to issue rehab job sheets and monitor the quality of work. Pulse Networks was one of the first companies to come on board with ex Telecom Designers and Planners ideal for this type of work.

The work involved the inspection of underground and overhead plant for potential maintenance problems and the issuing of work schedules to contractors for action. A good knowledge of telecommunications outside plant and equipment, along with construction methods and options was essential. Pulse Networks was also required to carry out Quality Audits to make sure rehab work was being done to standard, and task claims were appropriate.

Pulse Networks staff were required to travel long distances especially in rural areas where land owners needed to be tracked down and challenging terrain negotiated. A rapport with farm animals and dogs also came in handy. In some instances, such as off shore Islands, it was necessary to take accommodation and stay until all the work had been completed.

This work was continuous over a number of years in which time Pulse Networks scoped thousands of 50 pair groups in the greater Auckland and Northland regions.

OUR CLIENTS


CITYLINK


vodafone


Vector


Chorus


VOCUS
communications


ultrafast
FIBRE


BROADSPECTRUM


DownerEDi
Engineering


visionstream


enable
NETWORKS


Northpower


COUNTIESPOWER


compass
communications


Aurora