

# National Fibre Program

Australian Constructors Achievement Award

Technical Paper 2012

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## Technical Paper

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#### Abstract

The National Fibre Program (NFP) is a major telecommunications infrastructure project for the Australian Government, comprising the design, construction and operation of a network of almost 8,000 km of fibre optic cable - an unprecedented construction project encompassing all mainland Australian States and Territories. This extraordinary project was delivered by Nextgen Networks and Visionstream, subsidiaries of Leighton Telecommunications subsequent to contracts awarded in December 2009.

*“A truly national project that overcame the combined challenges of remote locations, extreme weather and geological conditions, environmental, cultural heritage and private and public land-owner issues, to deliver vital communications infrastructure to remote communities on time and on budget.”*

The NFP initiative created significant new national economic infrastructure assets for and - on behalf of - the Commonwealth. These assets represented a significant market intervention to deliver metro-equivalent telecommunications service and pricing outcomes to underserved populations throughout in regional Australia.

#### Project Scope

Leighton Telecommunications, a Division of Leighton Contractors Pty Ltd, has combined engineering expertise, technical excellence and best practice project management to successfully deliver a unique national construction project.

Leighton Telecommunications through its subsidiaries, Nextgen Networks and Visionstream, has designed and constructed a fibre optic cable network of almost 8000 kilometres – an unprecedented construction project encompassing all mainland Australian States and Territories.

The project, known as the National Fibre Program (NFP), involved:

- Some of the longest network routes ever delivered in Australia, including through difficult remote and harsh environments.
- Sophisticated design and complex survey requirements.
- Challenging environmental and cultural heritage issues.
- A massive program of stakeholder interaction, including with Aboriginal traditional land owners.
- A high indigenous workforce.
- The delivery of high bandwidth telecommunications for the first time ever to some of Australia's fastest growing regional areas.

With the project being delivered at multiple locations simultaneously and in the context of an intense public policy debate, the complex construction was completed on time and on budget, with an exceptional safety record across more than one million staff hours.

## **Outcomes achieved against planned targets for key project parameters**

The National Fibre Program combined two Australian Government tenders: the \$250 million Regional Broadband Blackspots Program to construct 4800 kilometres of fibre optic cable and complementary investment with \$200 million contract to construct 3000 kilometres of fibre optic cable.

In one of the major challenges of the project, the key project parameters stipulated that over 100 remote and regional locations were to be connected with high speed broadband services. This comprised 25 locations in Victoria, South Australia, Australia Capital Territory, Northern Territory and Western Australia to be connected in 12 months, and 77 locations between Darwin and Brisbane, Broken Hill and Adelaide and Broken Hill and Melbourne in 18 months.

Through meticulous planning and execution, Leighton Telecommunications developed the route designs and network configuration to meet high technical specifications. The project met and exceeded all key project parameters through innovation and safety leadership, following strict environmental and cultural heritage requirements and within the commonwealth funding and ambitious project phase milestones.



In meeting all planned targets for key project parameters, the National Fibre Program has set new benchmarks for fibre network construction in Australia.

In examples of major outcomes against planned targets:

Complex network route planning scheduled to take five months was completed in three months.

A target of 1000kms of cable to be laid in the first 100 days of construction was met.

A targeted average of 5kms of cable laid per team per day was exceeded. This included a record 38.8km of cable being installed by one team between Alice Springs and Tenant Creek in a single day.

The network was delivered on schedule in WA despite complex environmental approval issues that delayed construction and in Victoria and South Australia one week ahead of schedule despite severe flooding that interrupted construction.

A complex and challenging program for achieving a large number of environmental and land access approvals was met despite lengthy negotiations and multiple cultural heritage issues.

Indigenous employment targets were exceeded.

In one of many acknowledgements of outcomes achieved against planned targets, the Minister for Broadband, Communications and the Digital Economy, Senator Stephen Conroy, said

*“I’d like to thank Nextgen Networks and Visionstream for delivering this infrastructure on time, and on budget. The significance of this infrastructure cannot be underestimated.”*



## **Complexity, difficulty and optimisation of the construction task.**

With a network spanning almost 8,000km and involving simultaneous construction over 10 routes, the National Fibre Program involved construction challenges far beyond those associated with traditional construction projects on a contained and easily controlled site.

Long haul fibre construction in remote areas involves huge risk from weather as well as in safety and land access. Logistics in procurement, mobilising staff and transporting equipment and materials to remote sites also presented significant challenges.

Construction in the Northern Territory, Queensland, Victoria and South Australia coincided with some of the highest rainfalls in 100 years. In some areas, construction works received over four times average rainfall. In Queensland, more than 6,500mm of rain fell during construction.

Construction and development of the fibre optic cable network involved 71 pre-fabricated equipment shelters, deployment of 63 points of intersect (where retail services are connected to the backbone) and the placement of over 20,000 marker posts. Over 6,500 tons of building materials were delivered and installed, with eight million vehicle kilometres and 12 million single passenger kilometres registered. There were over 1400 site inspections and 1,042 toolbox meetings during construction.

Unlike traditional construction projects, the National Fibre Program undertook work in many communities for short periods then moved on. A complex program of proactive community engagement with councils, states, traditional owners, native title organisations, environmental groups and property owners was an essential part of meeting schedule and budget.

A total of 161 Environmental Management plans were issued while 693 cultural heritage sites were encountered. In addition, over 8,250 notices were issued by the land access team raising just 123 objections, all of which were successfully resolved. The project also took on biological monitoring during construction for several endangered species including the Golden Tailed Gecko, Grassland Earless Dragon and the Hairy Nosed Wombat.

With work having been undertaken in all mainland Australian State and Territories, the National Fibre Program has been recognised as one of Australia's most complex construction tasks.



## Leadership and management of the project delivery.

The project involved a complex stakeholder management framework across a wide range of groups. This included participation at the highest levels of two Australian Government agencies, involvement of Ministers in the Australian Government and State Governments, and at the senior levels of Leighton Contractors and parent company Leighton Holdings.

Executives and senior staff from Leighton Telecommunications engaged constantly with Commonwealth Ministers and agencies to provide management oversight through formal reporting, engagement, audit and assurance mechanisms in order to ensure contracted outcomes were being addressed.

The team also facilitated the industry's first Equivalence Undertaking approved by the Commonwealth and the ACCC in order to ensure that wholesale telecommunications services using this asset are provided to the market on a non-discriminatory, open access basis.

A National NFP Project Office was established in Melbourne to co-ordinate design, procurement, safety, governance and construction management. Led by the Project Director, state based Project Managers were empowered to make decisions and charged with providing leadership to deliver excellence.

The management team was remotely able to lead and drive project success using cutting edge, collaborative software tools and communications technology including Active Risk Manager, which aggregated project data and pro-actively identified risks to time, cost, safety and quality management. Videoconferencing and Skype were also used extensively to unite managers and teams located in all states across Australia.

The scale of the project demanded a significant program of skills development, including implementation of a graduate program for students from some of Australia's leading tertiary education institutions, fostering over 30 new careers in the telecommunications industry.

The NFP team also developed a lasting partnership with Ngarda, an Indigenous owned and operated civil contracting business, to implement part of the network in WA. The partnership provided opportunities for cross-skilling of Indigenous and non-Indigenous employees. The overall project



included in excess of 7% per cent Indigenous workforce content, a significant outcome for the construction industry.

The National Fibre Program demonstrated construction and safety innovation which contributed to successful contract deliverables and a lasting legacy to the safety management of remote workers in all areas of construction.

The safety of remote workers was managed through a dedicated Safety First team that developed an award winning personal location and monitoring solution known as LEOTrak. LEOTrak is a GPS-based tracking system which uses motion detection technology to communicate that each worker is safe.

The NFP team adopted the motto “Committed to Zero Harm” and implemented a “Zero Harm Bonus” scheme with contractors whereby works completed without harm to people, the environment or property were recognised and financially rewarded.

Leadership on the project has left a lasting legacy for the telecommunications infrastructure construction industry and its safety innovations for workers in isolation set new benchmarks for all remote construction projects. The NFP project has also delivered resounding success in developing the design, construction and project management skills that will be required to build the NBN.

## Summary

By all metrics, the NFP team has exceeded its core contractual requirements and delivered the Federal Government with key components of its NBN vision. This is evidenced by an outstanding safety record, meeting of all contractual deadlines for completion and keeping costs within available funding. The project management team negotiated enormous complexity in procurement, safety, logistics, cost and time management. The high quality telecommunications infrastructure now in place was delivered through innovation in all areas of the project and has created a template for efficient design, construction and commissioning of long haul communications networks traversing vast areas.

Through its two businesses, Visionstream and Nextgen Networks, Leighton Telecommunications' successful outcomes from this project have been acknowledged through multiple sources, including winning the Best Regional Project category at the 2010 Australian Institute of Project Management (AIPM) Awards.



## Technical Data

### General

Project Cost	\$450m
Total Length of Fibre Optic Cable installed ( <i>km</i> )	8,000
No of Transmission huts installed (CEVs)	77
No of Points of Interconnect (BPols)	63
Materials Transported	

### Workforce Details

Employee No's (peak/average)	350/182
Contractor No's (peak/average)	535/227
Employee Hour's	612,848
Contractor Hours	495,416
<b>Total Hours Worked</b>	<b>1,108,264</b>
<b>Lost Time Incidents</b>	<b>1</b>
No of Toolbox Meetings	1,090
No of Pre-start Meetings	9,480
No of Leadership Visits Completed	378

### Management Systems:

Project Plans in place	73
Project Risk Assessments	62
Project Inductions	517
Environmental Management Plans	161

### Quality:

No of OHSE Field Inspections Completed	1,510
No of OHSE Non Compliances Raised	143
No of OHSE Non Compliances Closed	131
No of Internal Audits Completed	33
No of In-Process Audits Completed	32
No of Quality Inspections	2,030
No of Items Inspected	18,888
No of Items Compliant	18,592

### Design and Documentation:

GPS field files produced	830
Drawing Pages drafted	60,000
GIS data produced ( <i>Gb</i> )	160
Parcels of land identified	10,775





**Indigenous Participation:**

Total indigenous participation (hours)	78,670
Number of groups consulted and directly involved in the project	113
Cultural heritage sites encountered	693

**Community and Stakeholder:**

No of access notices issued to private land owners	8,250
No of access notices issued to Authorities	509

**Distance and Isolation:**

Vehicle kilometres driven	8 million
Single passenger kilometres driven	12 million

**Procurement and Logistics:**

Weight of CEVs delivered & installed	>1,500 T
Weight of materials shipped	>5,000 T