



Helping to Connect Coastal Regional Queensland



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Outline of Presentation



- Powerlink Queensland Overview
- Operational Telecommunications – needs, strategy and network
- Helping to Connect Regional Queensland
- Partnering with Queensland's Universities

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About Powerlink

- Own, develop, operate and maintain Queensland's electricity transmission grid
- Don't buy or sell electricity - transport power from generators to distributors and major energy users
- Monopoly regulated by the Australian Energy Regulator
- Must extend the transmission network to reliably meet Queensland's growing needs at the lowest cost to customers



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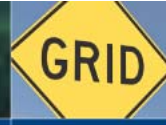
Our Transmission Grid

- Transmission grid runs 1,700km from Cairns to NSW (half of Australia's eastern seaboard)
- Assets valued at \$5.2 billion
- Network dimensions
 - > 13,000 kms of lines
 - > 109 high voltage substations
- Transmit power about three times as far as other states



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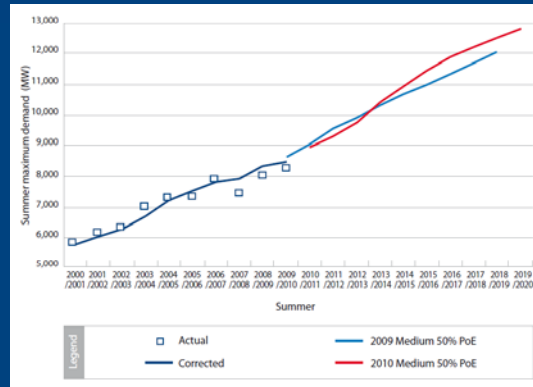
Queensland's Growing Electricity Needs



Significant peak demand growth over the past 5 years:

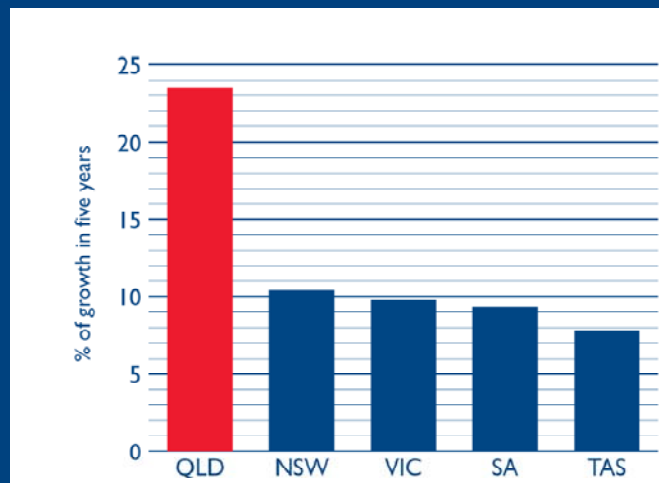
- **18% State-wide**
- **23% in SEQ**

Underpinned by population growth, growing economy and energy resources sector



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Queensland's Growth vs. Other States



Source: Powerlink 2009 Annual Planning Report and AEMO's 2009 Electricity Statement of Opportunities

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Coal and Gas Mining Expansions



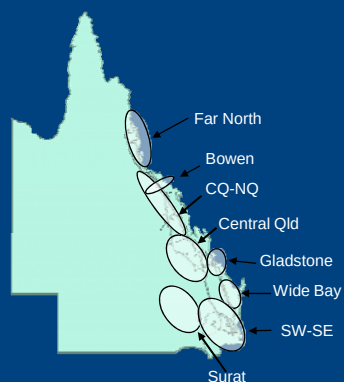
- Coal mining and LNG projects are being actively investigated
- Associated rail and port expansions are also being progressed
- Powerlink's transmission network will need to support these projects
- We are working with project proponents to plan and progress necessary transmission upgrades

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Record Capital Works Program



- Powerlink is undertaking Australia's largest transmission capital works program
- Key drivers are the long-term growth in peak demand and replacing assets at end of life
- The AER expects Powerlink to invest around \$3 billion in the current five years period
- Includes more than 1,500kms of new transmission lines across the state
- Requires new transmission lines between most major centres in coastal Queensland



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Telecommunications Needs Primary Driver - Security of Electricity Supply

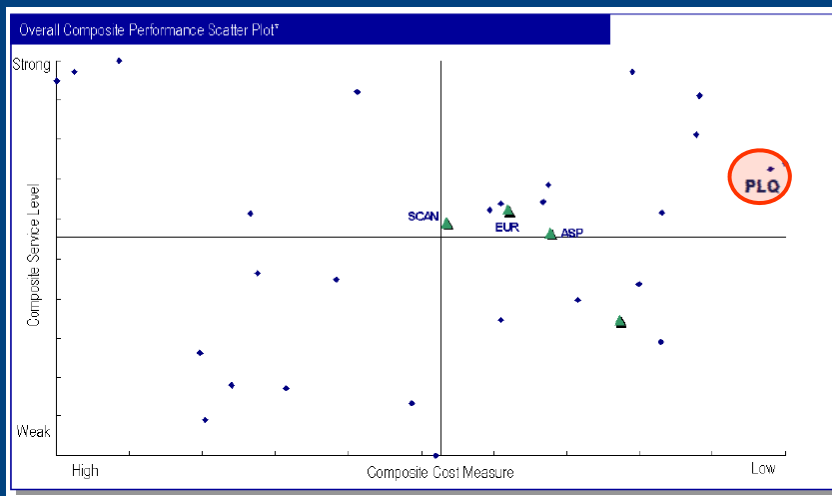


- Electricity is a critical service underpinning other essential services, the economy, and the community
- Transmission is the critical link between generation and distribution – security is crucial
- Telecommunications network and IT systems fundamental to the security of transmission networks worldwide



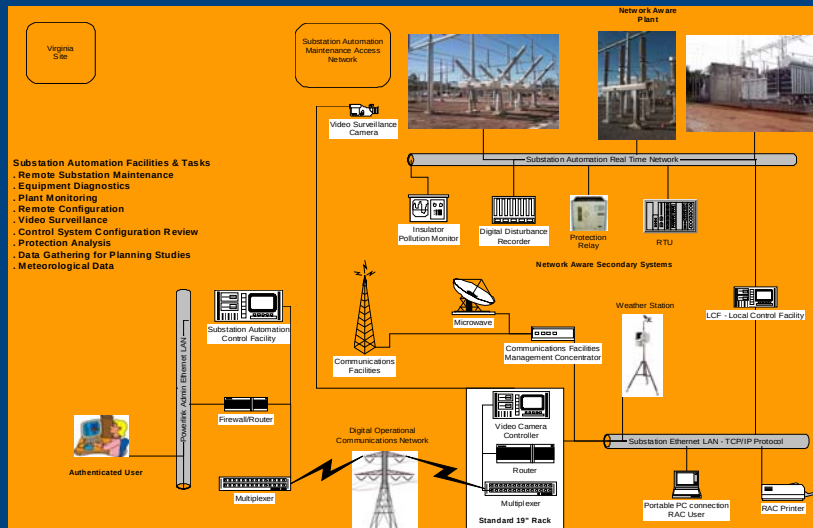
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Secondary Driver is Business Efficiency Powerlink Sets International Benchmarks



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Powerlink – World Leader in Applying Information Technology to Deliver Better Business Outcomes



Leveraging Internet Protocol Technology

- Use of IP WANs and LANs has enabled remote access to substations:
 - Access to intelligent devices enables rapid response to issues
 - Installation of IP cameras to view plant in the substation
 - Automated data collection
 - Access by staff in substations to corporate IT applications
- IP WANs used for SCADA
 - Between industry control centres
 - Between substations and control centres
- IP Technology enabling new International Standard (IEC61850)
 - Utilises available IP based standards
 - Inter-operability between manufacturers' equipment
 - Faster and cheaper substation construction and commissioning

Operational Needs for Telecommunications



- Protection and control of all lines and substation equipment
- State-wide monitoring and control centre
- Remote asset monitoring and fault diagnosis
- Used by Market Operator to dispatch power stations

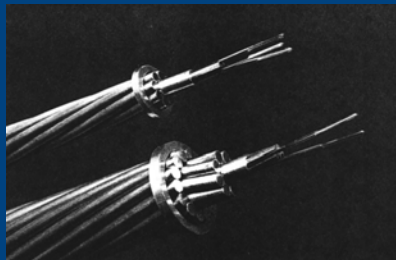


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Telecommunications Network Strategy

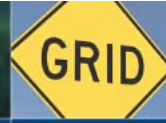


- Private network to ensure security and response
- Duplicated diverse path for high reliability
- High bandwidth – and high speed
- Optic fibre network best technical fit
- Progressively install fibre with each new transmission line built

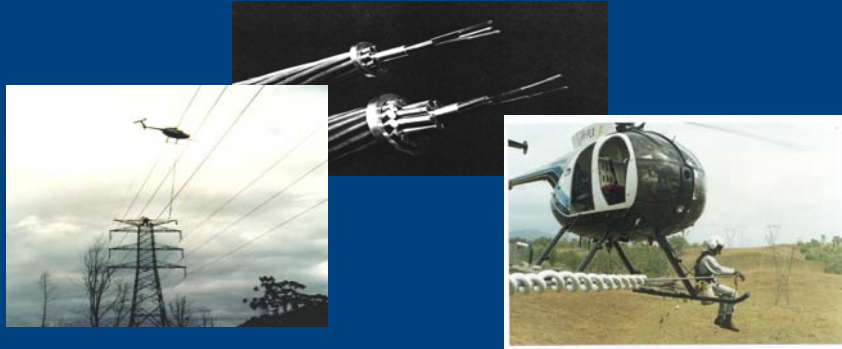


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Powerlink's Optic Fibre Network



- Powerlink has an extensive optic fibre network located in the ground wires (OPGW) that protect transmission lines from lightning strikes
- Embedment in steel above the HV conductors provides high reliability and security but requires access by Powerlink only

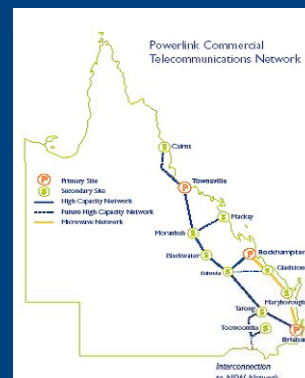


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Leveraging Optic Fibre Network

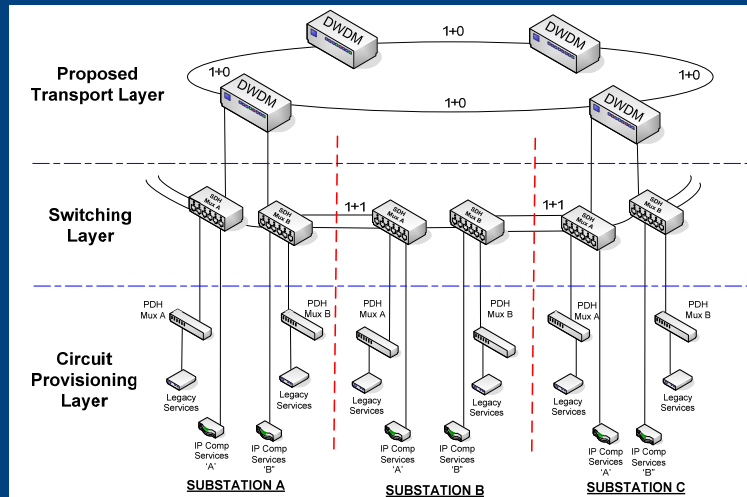
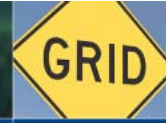


- Already have state-wide very high capacity optic network with expansion plans to provide diverse path dual redundant routes from Cairns to Gold Coast and to NSW
- Fibre locations and numbers are determined by Powerlink's operational requirements - there are no spare fibres for third party use
- DWDM network established to maximise the available capacity across the fibres – multiple wavelengths of backhaul can be provided to telecommunication carriers



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Change in System Architecture – Inclusion of a Transport Layer



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Service Connections to Carriers

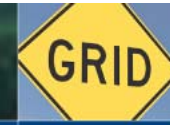


- Powerlink has established Points of Presence (POP's) at substations
- Carriers connect their dark fibre to a termination kiosk outside substation
- Carrier does not need to enter the substation or require power or air conditioning for their equipment
- Powerlink provides the laser drivers to light Carrier's fibre
 - Carrier's telecommunication hub can be located at convenient location

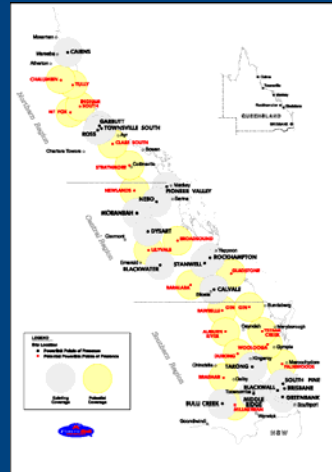


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Potential Coverage of Powerlink's Network



- Powerlink provides competitive backhaul services to Carriers between Brisbane and Cairns - successfully
- Can offer carriers multiple 10 Gigabit wavelengths
- Covers coastal regional Queensland from Cairns to Gold Coast:
 - POP's at main regional centres
 - Plans to extend to other areas

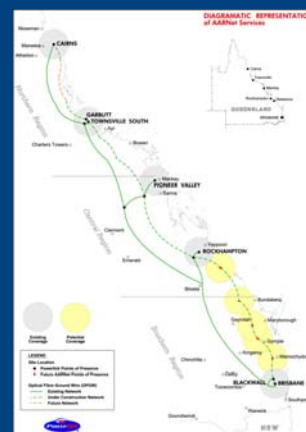


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Working with AARNET



- Powerlink is pleased to have AARNET as a foundation customer
- Powerlink has contracted to deliver 10 gigabit wavelength services to AARNET in four stages
 - Stage 1 - Brisbane, Rockhampton, Mackay, Townsville and Cairns
 - Stage 2 - Palmwoods, Tee Bar, Gin Gin, Gladstone including path diversity between Brisbane and Rockhampton
 - Stage 3 - Path diversity Rocky to Townsville
 - Stage 4 - Path diversity Townsville to Cairns
- Powerlink will continue to work with AARNET to expand their connectivity in QLD



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Conclusions



- Powerlink has an extensive high capacity telecommunication network throughout coastal regional Queensland with expansion plans in place to most centres with diverse paths
- Already providing competitive and successful back haul services to major telecommunications carriers under an “open-access” arrangement
- Working closely with AARNet to provide telecommunications backhaul for Queensland universities
- Now extending network to provide substantially increased capacity and resilience to AARNet

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