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**Project description**

This project is required to address the end of life and unsupported PDH assets, by migrating all services except protection off the PDH network, and using the redundant and recovered PDH equipment to maintain performance and service level standards for protection signalling services.

This project shall also set up a parallel field test environment (including relays), across all regions at a minimum of one transmission line per region, to test the operation of protection signals over the MPLS network and compare it to the performance of the live relays operating over the PDH network. It is anticipated that this will allow for the full decommissioning of the PDH network in the 2023-2028 reset period.

PDH equipment is now end of life and the last major manufacturer of PDH equipment has ceased production and support (Dec 2014).

In order to lower the risk profile of PDH assets and maintain asset performance and service level standards, services should progressively be migrated over to an MPLS based network.

This project will continue the migration of all services (except protection services), returning further spares to the network to manage the performance of the protection service until such time it is ready to be operated on an IP/MPLS network.

## Project options

<b>Base case</b>	Only reactive capital expenditure with business as usual costs escalating to maintain aging assets and account for escalating risk
<b>Option 1</b>	Build a Native IP Network; this option involved a complete replacement of the existing TDM network, at a significant upfront cost, and would also require significant asset write-offs, and significant risk to the network.
<b>Option 2</b>	This option builds and overlay IP network, and migrates services in a staged, methodical manner. This also allows for the continued use of the legacy TDM equipment until the end of its useful life (required for protection signalling), whilst moving services onto the IP network from other networks (such as OPSWAN). Undertaking this option will result in deferral of significant capital augmentation projects as detailed within the scope.

## Key modelling assumptions

Financial year runs from 1 July to 30 June.

Real 2014 \$ are used for all monetary values unless otherwise stated.

## Inputs to the model

Parameter/Input	Description	Source
Inflation rate	Rate of inflation.	Reserve Bank of Australia
Discount rate	Real pre-tax discount rate.	ElectraNet estimate
First year of analysis	Year to start analysis.	ElectraNet
Base financial year for analysis	Base year of dollar used in inputs tab.	ElectraNet
Time horizon	Length of time under consideration.	ElectraNet
Capital costs	Amount of capital investment in real terms for each project option.	ElectraNet project budgets and estimates
Useful life	Length of time capital investments are expected to provide service.	ElectraNet project budgets and estimates
Operational expenditure	Annual amount of estimated maintenance in real terms	Detailed cost expenditure
Transitional expenditure	Annual amount of estimated transitional costs in real terms	Detailed cost expenditure
Reduction in faults and hardware expenditure	Annual benefit of reducing faults and hardware costs	Reduction in Faults and Hardware costs tab

**10 Inputs**

User provided parameters and inputs to the model

**Inputs**

**General parameter inputs**

Parameter	Unit	Value	Source	Sensitivities		
				Low	Medium	High
Inflation rate	Percentage	2.00%	RBA	1.50%	2.00%	3.00%
Discount rate (real, pre-tax): estimate	Percentage	6.00%	ElectraNet estimate	4.50%	6.00%	8.50%
Discount rate (real, pre-tax): lower bound	Percentage	4.50%	ElectraNet estimate			
First year of analysis	Year	2014	Current financial year			
Base financial year for analysis	Year	2014	Base year			
Time horizon	Years	20	ElectraNet			

**Capital cost**

Sensitivities	Medium	High	Comment
Low	100%	130%	Standard sensitivities used

Option	Asset	Amount	Start year	End year	Commission Year	Asset life
Option 1	Native IP network	1,000,000	2014	2014	2019	10
Option 1	Native IP network	3,000,000	2015	2015	2019	10
Option 1	Native IP network	10,000,000	2016	2016	2019	10
Option 1	Native IP network	10,000,000	2017	2017	2019	10
Option 1	Native IP network	12,000,000	2018	2018	2019	10
Option 2	Overlay IP network A	792,614	2014	2014	2019	10
Option 2	Overlay IP network A	1,091,925	2015	2015	2019	10
Option 2	Overlay IP network A	4,817,706	2016	2016	2019	10
Option 2	Overlay IP network A	2,081,059	2017	2017	2019	10
Option 2	Overlay IP network A	1,218,837	2018	2018	2019	10
Option 2	Overlay IP network A	3,000,000	2019	2019	2021	10
Option 2	Overlay IP network A	3,000,000	2020	2020	2021	10
Base case	Reactive replacement	1,680,000	2019	2019	2020	10
Base case	Reactive replacement	1,680,000	2020	2020	2021	10
Base case	Reactive replacement	1,680,000	2021	2021	2022	10
Base case	Reactive replacement	1,680,000	2022	2022	2023	10
Base case	Reactive replacement	1,680,000	2023	2023	2024	10

**Costs inputs**

Cost type	Cash/Non-cash	Low	Medium	High	Comment
Operational expenditure	Cash	70%	100%	130%	Standard sensitivities used
Transitional expenditure	Cash	70%	100%	130%	

Financial year	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Comment	
<b>Operational expenditure</b>																		
Base case	2014 \$	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	Both normal and emergency corrective. 5 year emergency program should clear out
Option 1	2014 \$	120,000	120,000	120,000	120,000	120,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000 most remainin Mux's
Option 2	2014 \$	120,000	120,000	120,000	120,000	120,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000

Financial year	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Comment
<b>Transitional expenditure</b>																	
Base case	2014 \$	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Option 1	2014 \$	0	0	0	0	0	120,000	120,000	120,000	0	0	0	0	0	0	0	0
Option 2	2014 \$	0	0	0	0	0	120,000	120,000	120,000	120,000	120,000	0	0	0	0	0	0

**Benefit inputs**

Benefit type	Cash/Non-cash	Low	Medium	High	Comment
Reduction in Faults	Cash	70%	100%	130%	

Financial year	Units	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	Comment	
<b>Reduction in Faults</b>																		
Base case	2014 \$	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Benefits begin to occur in the last year of the project as the hardware installation on
Option 1	2014 \$	0	0	0	0	0	0	1,005,144	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	the network is due to be finalised half way through 2020 as per the schedule.
Option 2	2014 \$	0	0	0	0	0	0	1,005,144	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	2,010,288	Limitations for faults will continue to occur for the base case and option 1.

## R0 CBA Results

Sensitivities, results and rankings

### Input Summary

#### Parameter selection for sensitivity analysis

Capital cost

Scenario parameters		Capital cost scenario		
	Units	Low	Medium	High
Assumed scenario weighting	% weighting	33%	33%	33%
Discount rate	% real, pre-tax	6.00%	6.00%	6.00%
Capital cost	% of estimate	70%	100%	130%

#### Cost selection for sensitivity analysis

Operational expenditure

Scenario cost inputs		Operational expenditure scenario		
	Units	Low	Medium	High
Operational expenditure	% of estimate	70.0%	100.0%	130.0%
Transitional expenditure	% of estimate	100.0%	100.0%	100.0%

#### Benefit selection for sensitivity analysis

Reduction in Faults

Scenario benefit inputs		Reduction in Faults scenario		
	Units	Low	Medium	High
Reduction in Faults	% of estimate	70.0%	100.0%	130.0%

### Cost Benefit Analysis Results (Quantitative)

#### Output summary Net present value of benefits

NPV results		Scenario			Weighted NPV
Option	Units	Low	Medium	High	
Option 1	2014 \$	-11,605,725	-16,470,719	-21,335,713	-16,470,719
Option 2	2014 \$	464,084	834,574	1,205,063	834,574

#### Output summary Ranking of options

Ranking of options		Scenario			Weighted ranking
Option	Units	Low	Medium	High	
Option 1	2014 \$	2	2	2	2
Option 2	2014 \$	1	1	1	1