

“Tasmanian Electricity Networks to suit the Customer”

Presented to the
Electricity Industry Expert Panel
Hobart

By
David Asten
MIEAust, Chartered Professional Engineer
DA Electricity

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Synopsis

The network business boundary between Transend and Aurora is inappropriate today.

The Distribution Operator has to ask the Transmission Operator:

- To pass on alarm and fault data from circuit breakers that are the key control devices for the distribution network.
- To adjust distribution control settings many times each day.

Transmission Operators are distracted from their core work.

Delays cause higher costs , and customers receive poorer service.

The current business boundary is an impediment to introducing “Smart Network” technologies to Tasmania.

Tasmanian Electricity System

Generators



Basslink

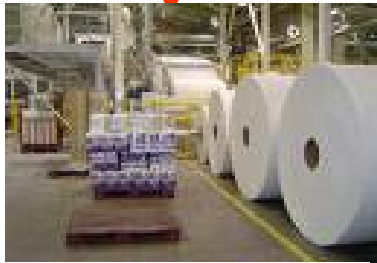
Transmission

Transmission Substations



110kV

220kV



Major Industry

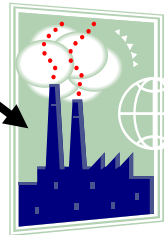
Distribution



Zone substations

11kV, 22kV

Distribution feeders



Transmission/Distribution "Today"

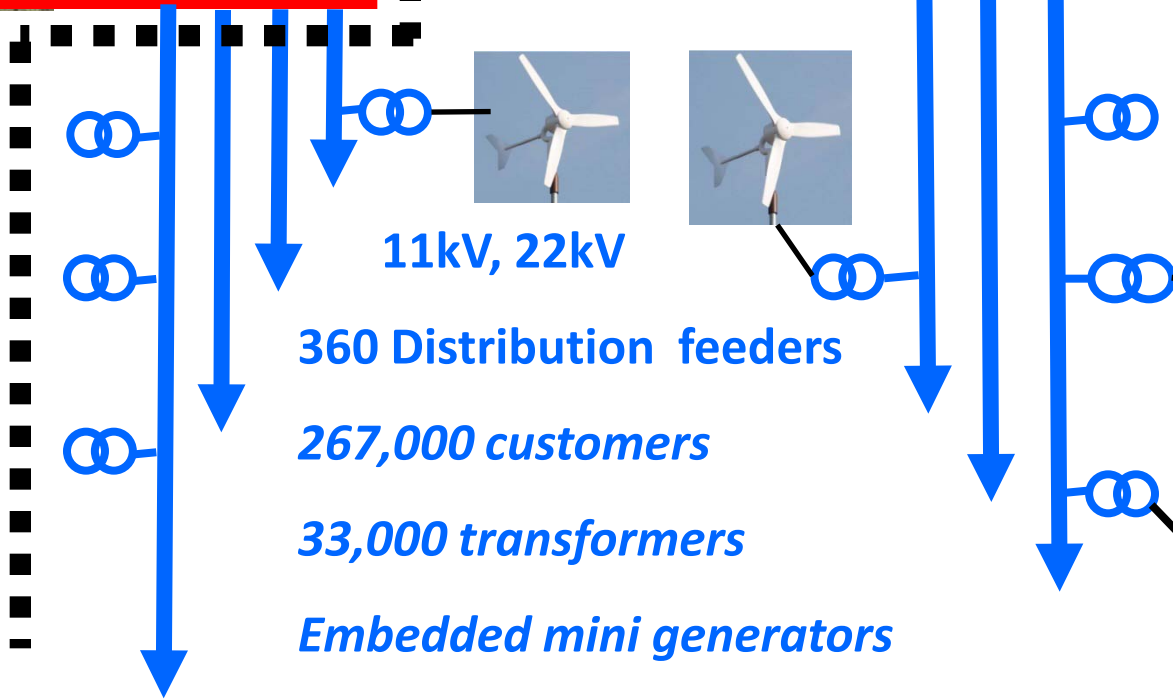
Subtransmission

Transmission

Substation

Distribution

Zone substation



11kV, 22kV

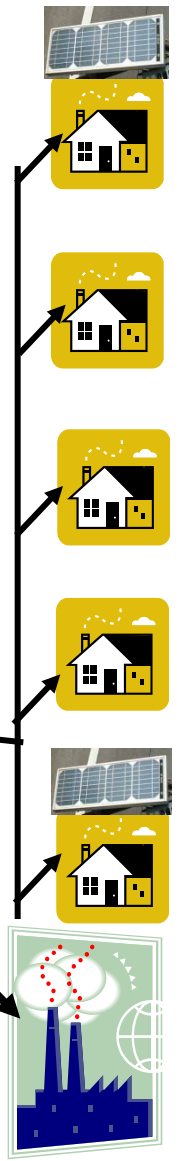
360 Distribution feeders

267,000 customers

33,000 transformers

Embedded mini generators

Business boundary



Electricity Customer expectations:

- **Electricity interruptions minimised**
- **Interruption durations are minimised**
- **Costs are minimised**
- **Tasmanian ESI will be ready for future technology**
 - e.g. Smart Networks**

Distribution Interruptions

Unplanned Interruptions

- Caused by birds, possums, tree branches.
- Caused by storms, bushfire, vehicle accidents
- Equipment failure

Planned Interruptions

- Maintenance
- Routine work, new connections
- Load transfers.

Distribution Network Solutions:

- **“Auto-reclose”** to cover transient faults
- **“Live-line working”**, with no switching off
- **Vegetation clearance**, with no switching off
- **Feeder remote control** and seamless load transfers
- **Smart network features**
e.g. Loop automation (reduces outages to 60 secs)

Distribution Line work



1990's

- HV conductors switched off.
- Customer Supplies interrupted

2000's

- Live-line
- No customer supply interruption.

Live line working – safety precautions



Preparation requires access to Feeder Circuit Breaker:

1. Switch off “auto-reclose”
2. Adjust protection settings
3. Issue work permits.
- 4. Perform work.**
5. Cancel work permits
6. Restore protection settings
7. Switch on “auto-reclose”

Vegetation Management

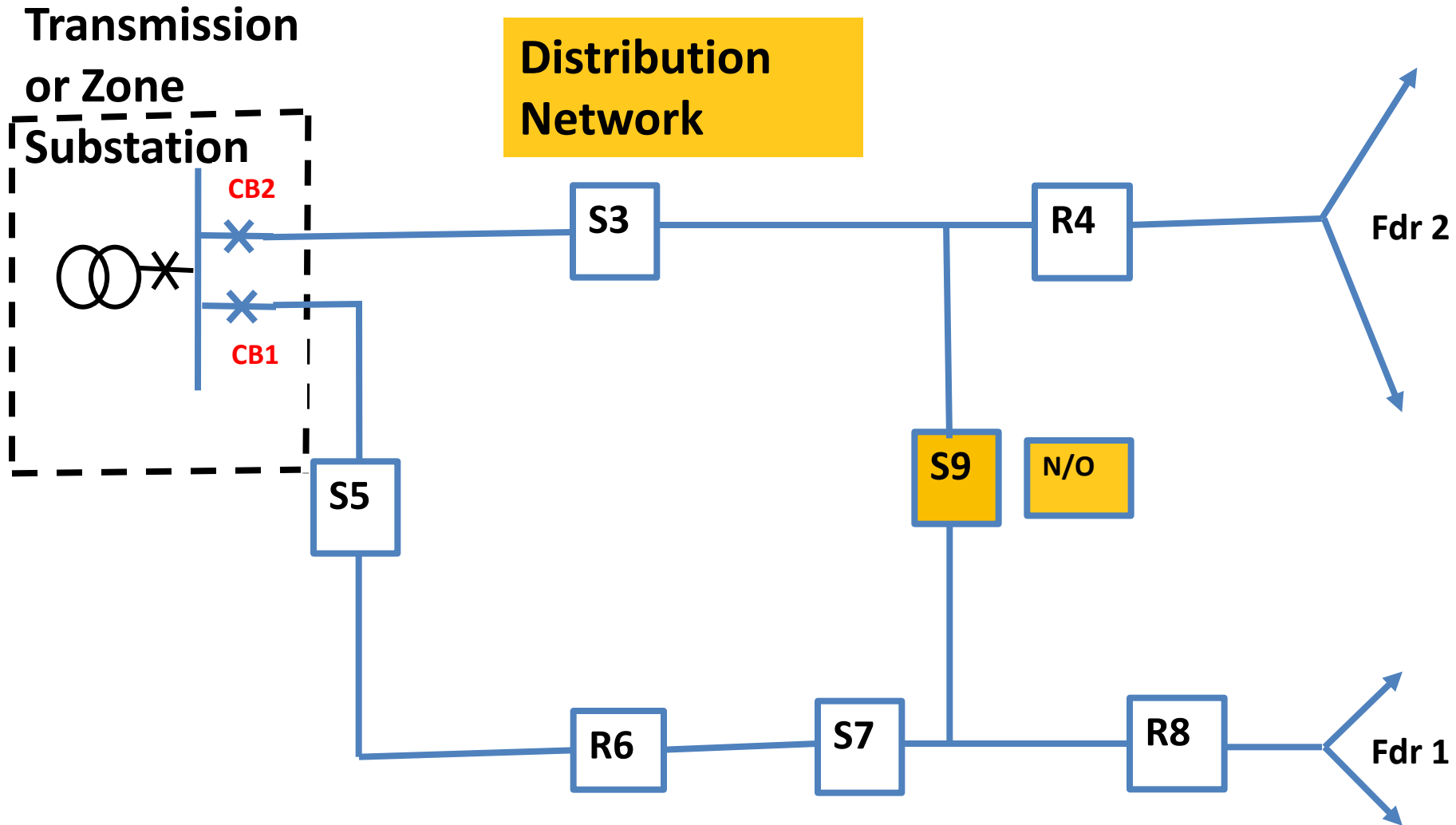


Live-line & precautions.

Preparation requires access to Feeder Circuit Breaker.

1. Switch off “auto-reclose”
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5. Cancel work permits
6. Restore protection settings
7. Switch on “auto-reclose”.

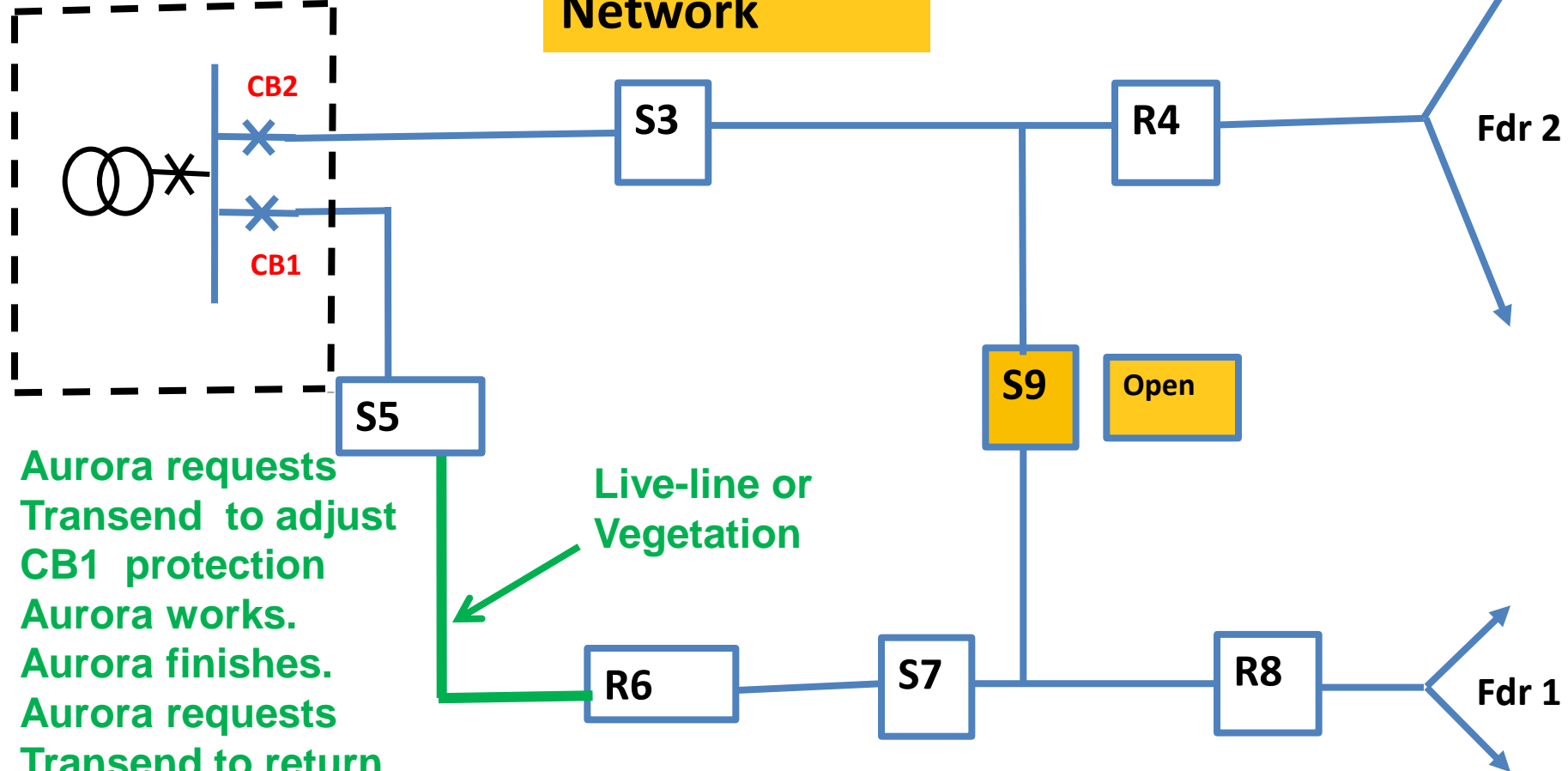
Distribution network – normal state



Distribution network – Live-line safety

Transmission
Substation

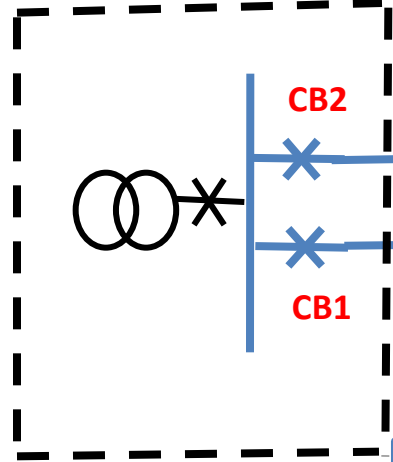
Distribution
Network



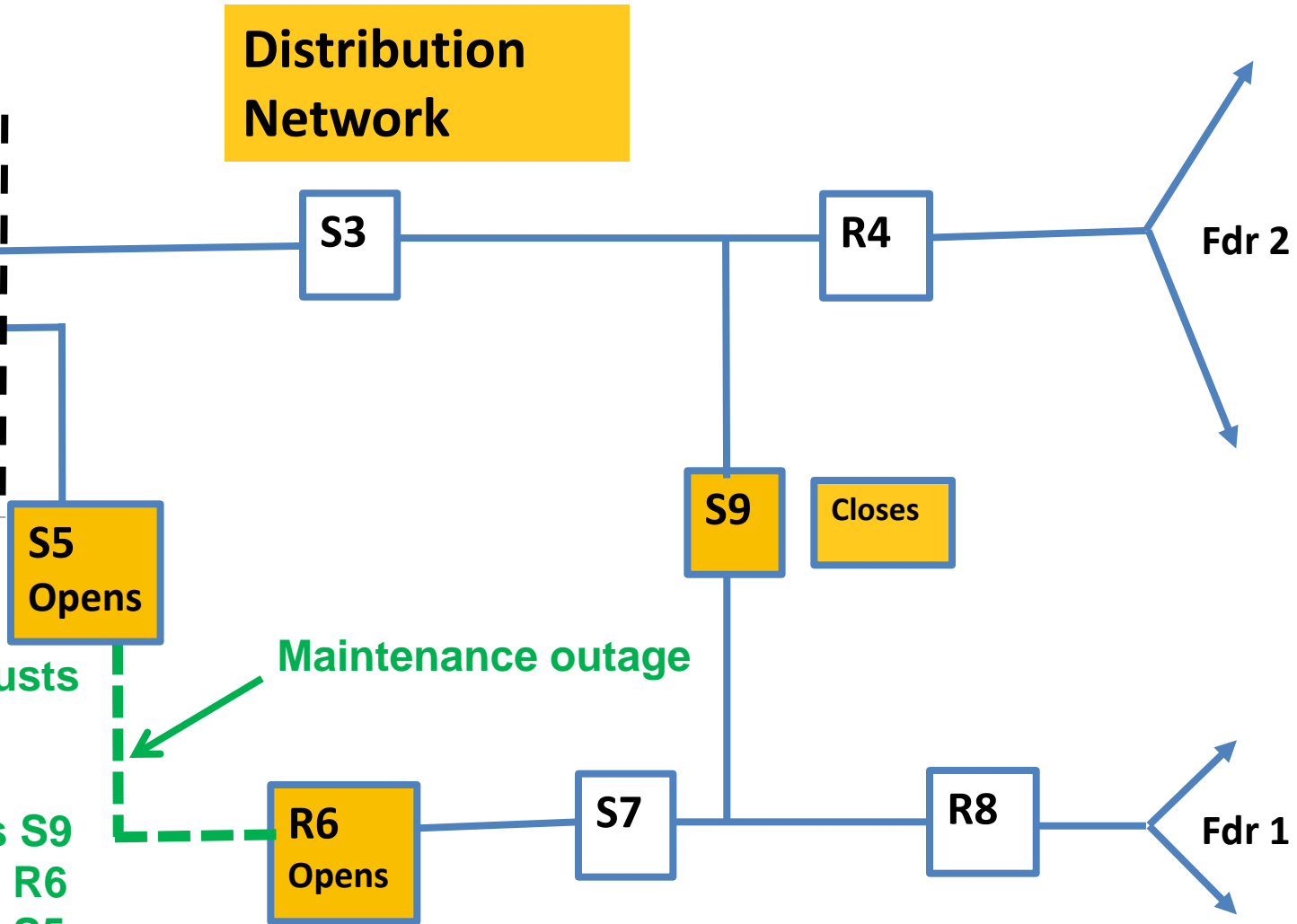
1. Aurora requests Transend to adjust CB1 protection
2. Aurora works.
3. Aurora finishes.
4. Aurora requests Transend to return CB1 to normal

Distribution network – transferred load

Transmission
Substation



Distribution
Network

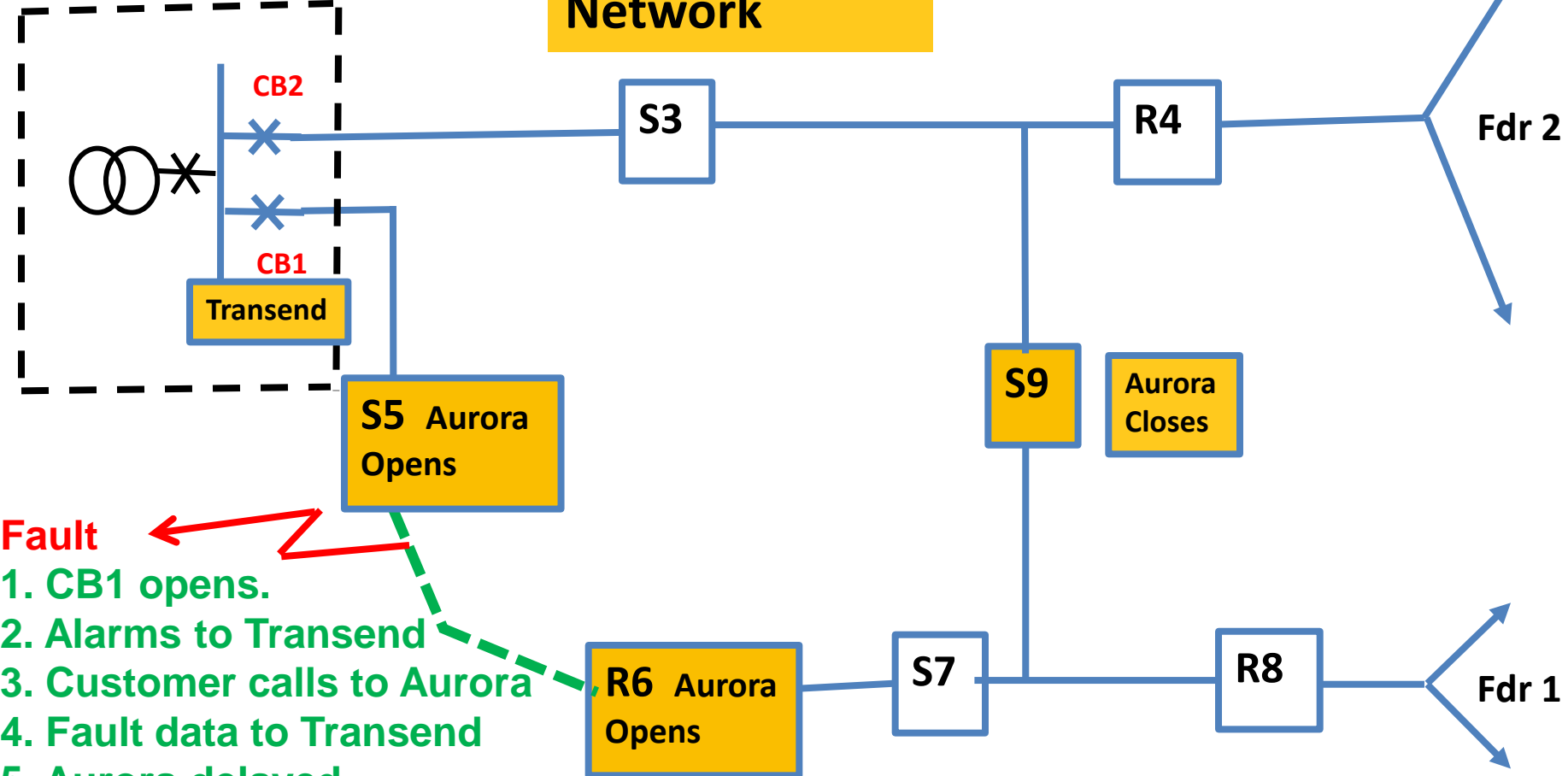


1. Transend adjusts CB1 & CB2 protection
2. Aurora Closes S9
3. Aurora Opens R6
4. Aurora Opens S5
5. Aurora maintenance

Distribution network – fault recovery

Transmission
Substation

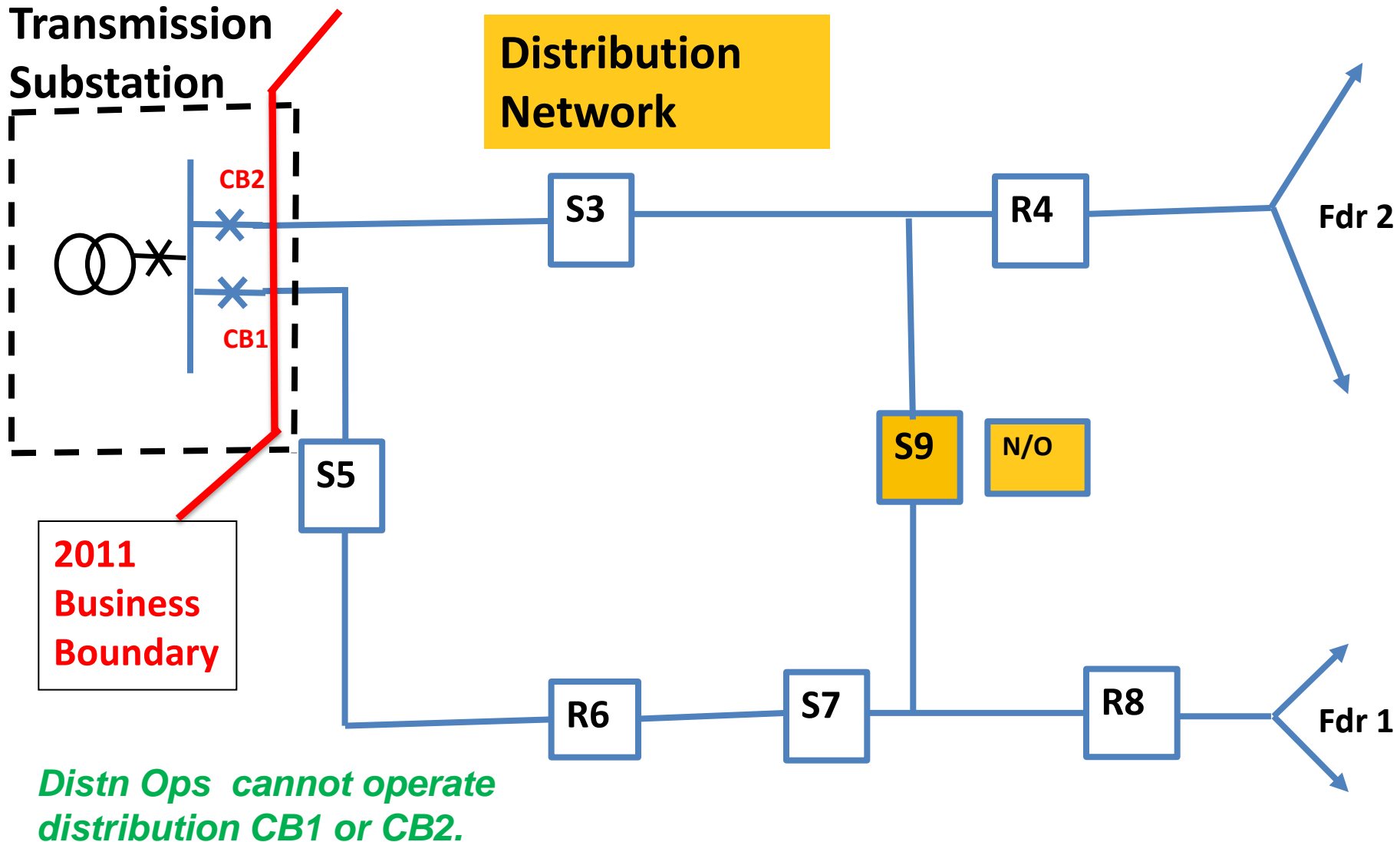
Distribution
Network



Fault

1. CB1 opens.
2. Alarms to Transend
3. Customer calls to Aurora
4. Fault data to Transend
5. Aurora delayed.
6. **Slow supply restoration**

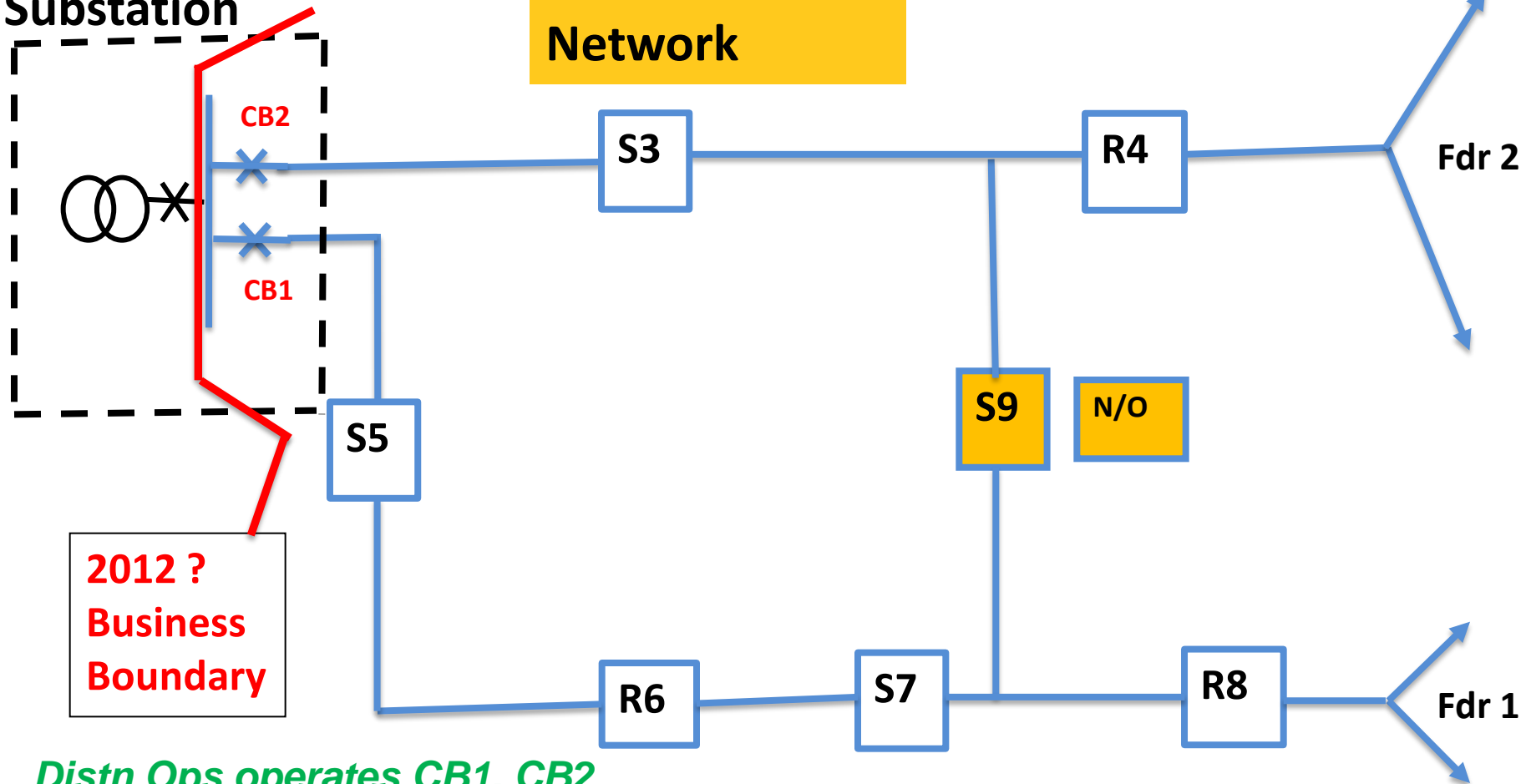
Dysfunctional Business Boundary



New Functional Business Boundary

Transmission
Substation

Distribution
Network



*Distn Ops operates CB1, CB2
and all distribution devices.*

Transmission Distractions

- Standard distribution work practises (Live-line, etc) increase involvement of Transmission operators in Tas.
- National Electricity Grid requires Transmission to focus on the bigger picture – 220kV, 110kV, Power Stations, Wind farms, Basslink, major customers.
- Transmission operators rightly treat distribution matters as lower priority, but 11kV & 22kV critical to customers

Solution – remove transmission distractions.

- Transfer control of distribution CBs and relays to Distribution Operator (as already in all other states).

Smart Networks

Dr Perry Sioshansi (USA consultant) in Hobart October 2010.

Engineers Australia “Sustainable electricity” Hobart April 2011.

- **Smart networks will:**
 - Provide Dist. Ops. with immediate fault data
 - Facilitate recovery from faults by automating some distribution network switchings.
 - Provide distribution load data and voltage quality measurements directly to Dist Ops.
 - Facilitate inputs from distributed generation – small wind turbines, solar cells, landfill gas, mini-hydro.
- **Smart networks must have inputs from Dist CBs too.**

Transmission/Distribution "Tomorrow"

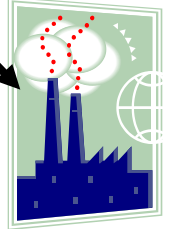
Subtransmission

Transmission Substation



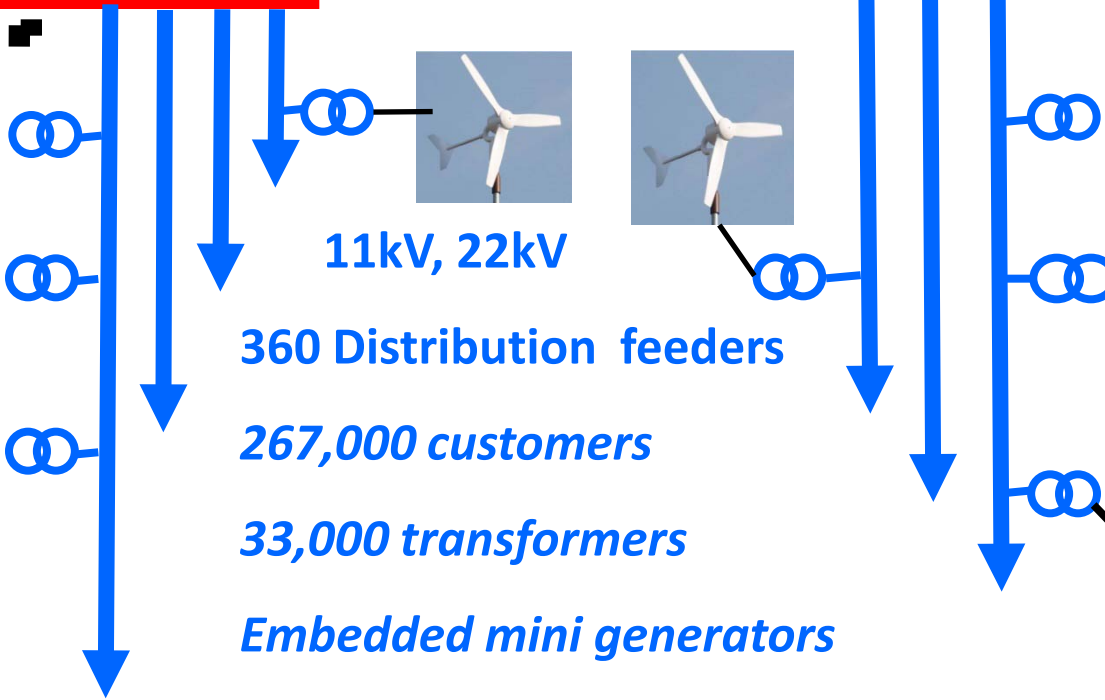
Distribution

Zone substation



Tomorrow's
Business
boundary

To suit
Customers



11kV, 22kV

360 Distribution feeders

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Summary

The network business boundary between Transend and Aurora is inappropriate today.

There is an opportunity to:

- Improve Distribution operational efficiency**
- Improve Transmission operator efficiency**
- Deliver better service to Tasmanian customers**
- Position Tasmania to benefit from
“Smart Network” technology.**

Change the business boundary to enable Transend and Aurora to perform more efficiently, to meet customer and Regulatory expectations.