

Supplementary Materials

S1. Radial topology

Table S1-1 CPT for T8 & T9

States of Child (C)	States of Parents			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	0
C=1	0	0	0	1

Note: U1 = X1 or X11. U2 = X4 or X14.

C = T8 or T9

Table S1-2 CPT for T6 & T7

States of Child (C)	States of Parents			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	0	0	0
C=1	0	1	1	0
C=2	0	0	0	1

Note: U1 = X12 or X15. U2 = T8 or T9.

C = T6 or T7

Table S1-3 CPT for T4 & T5

States of Child (C)	States of Parents			
	U3=0			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	0	1	0
C=1	0	1	0	1
C=2	0	0	0	0
C=3	0	0	0	0

Note: U1 = X13 or X16. U2 = X2 or X5. U3 = T6 or T7

C = T6 or T7

Table S1-3 CPT for T4 & T5 (continued)

States of Child (C)	States of Parents			
	U3=1			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	0	1	0
C=1	0	1	0	0
C=2	0	0	0	1

C=3	0	0	0	0
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Note: U1 = X13 or X16. U2 = X2 or X5. U3 = T6 or T7

C = T6 or T7

Table S1-3 CPT for T4 & T5 (continued)

States of Child (C)	States of Parents			
	U3=2			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	0	1	0
C=1	0	1	0	0
C=2	0	0	0	0
C=3	0	0	0	1

Note: U1 = X13 or X16. U2 = X2 or X5. U3 = T6 or T7

C = T6 or T7

Table S1-4 CPT for T2 & T3

States of Child (C)	States of Parents			
	U3=0			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	1
C=1	0	0	0	0
C=2	0	0	0	0
C=3	0	0	0	0

Note: U1 = X17 or X18. U2 = X3 or X6. U3 = T4 or T5

C = T2 or T3

Table S1-4 CPT for T2 & T3 (continued)

States of Child (C)	States of Parents			
	U3=1			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	0
C=1	0	0	0	1
C=2	0	0	0	0
C=3	0	0	0	0

Note: U1 = X17 or X18. U2 = X3 or X6. U3 = T4 or T5

C = T2 or T3

Table S1-4 CPT for T2 & T3 (continued)

States of Child (C)	States of Parents			
	U3=2			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	0
C=1	0	0	0	0
C=2	0	0	0	1
C=3	0	0	0	0

Note: U1 = X17 or X18. U2 = X3 or X6. U3 = T4 or T5

C = T2 or T3

Table S1-4 CPT for T2 & T3 (continued)

States of Child (C)	States of Parents			
	U3=3			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	0
C=1	0	0	0	0
C=2	0	0	0	0
C=3	0	0	0	1

Note: U1 = X17 or X18. U2 = X3 or X6. U3 = T4 or T5

C = T2 or T3

Table S1-5 CPT for T1

States of Child (C)	States of Parents							
	U2=0				U2=1			
	U1=0	U1=1	U1=2	U1=3	U1=0	U1=1	U1=2	U1=3
C=0	1	0	0	0	0	0	0	0
C=1	0	1	0	0	1	0	0	0
C=2	0	0	1	0	0	1	0	0
C=3	0	0	0	1	0	0	1	0
C=4	0	0	0	0	0	0	0	1
C=5	0	0	0	0	0	0	0	0
C=6	0	0	0	0	0	0	0	0

Note: U1 = T2. U2 = T3

C = T1

Table S1-5 CPT for T1 (continued)

States of Child (C)	States of Parents							
	U2=2				U2=3			
	U1=0	U1=1	U1=2	U1=3	U1=0	U1=1	U1=2	U1=3

C=0	0	0	0	0	0	0	0	0
C=1	0	0	0	0	0	0	0	0
C=2	1	0	0	0	0	0	0	0
C=3	0	1	0	0	1	0	0	0
C=4	0	0	1	0	0	1	0	0
C=5	0	0	0	1	0	0	1	0
C=6	0	0	0	0	0	0	0	1

Note: U1 = T2. U2 = T3

C = T1

Table S1-6 CPT for T0

State s of Child (C)	States of Parents															
	U4=0								U4=1							
	U3=0				U3=1				U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1		U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
C=1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
C=2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U1 = X19. U2 = X20. U3 = X21. U4=T1.

C = T1

Table S1-6 CPT for T0 (continued)

State s of Child (C)	States of Parents															
	U4=2								U4=3							
	U3=0				U3=1				U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1		U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
C=1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
C=3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
C=4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U1 = X19. U2 = X20. U3 = X21. U4=T1.

C = T1

Table S1-6 CPT for T0 (continued)

State s of Child (C)	States of Parents															
	U4=4								U4=5							
	U3=0				U3=1				U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1		U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
C=1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
C=5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
C=6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U1 = X19. U2 = X20. U3 = X21. U4=T1.

C = T1

Table S1-6 CPT for T0 (continued)

States of Child (C)	States of Parents							
	U4=6							
	U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	1	1	1	1	0
C=1	0	0	0	0	0	0	0	0
C=2	0	0	0	0	0	0	0	0
C=3	0	0	0	0	0	0	0	0
C=4	0	0	0	0	0	0	0	0
C=5	0	0	0	0	0	0	0	0
C=6	0	0	0	0	0	0	0	1

Note: U1 = X19. U2 = X20. U3 = X21. U4=T1.

C = T1S2 Star topology

Table S2-1 CPT for T6, T7, T8 T9 T10 & T11

States of Child (C)	States of Parents			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	0
C=1	0	0	0	1

Note: U1 = X1, X2, X3, X4, X5 or X6. U2 = X11, X12, X13, X14, X15 or X16.

C = T6, T7, T8, T9, T10 or T11

Table S2-2 CPT for T4 & T5

States of Child (C)	States of Parents							
	U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
C=0	1	0	0	0	0	0	0	0
C=1	0	1	1	0	1	0	0	0
C=2	0	0	0	1	0	1	1	0
C=3	0	0	0	0	0	0	0	1

Note: U1 = T6 or T9. U2 = T7 or T10. U3 = T8 or T11.

C = T4 or T5

Table S2-3 CPT for T2 & T3

State of Child (C)	States of Parents															
	U4=0								U4=1							
	U3=0				U3=1				U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1		U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
C=1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
C=2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U1 = X7 or X8. U2 = X17 or X18. U3 = X21 or X22. U4 = T4 or T5. C = T2 or T3

Table S2-3 CPT for T2 & T3 (continued)

State of Child (C)	States of Parents															
	U4=2								U4=4							
	U3=0				U3=1				U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1		U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
C=1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
C=3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Note: U1 = X7 or X8. U2 = X17 or X18. U3 = X21 or X22. U4 = T4 or T5

C = T2 or T3

Table S2-4 CPT for T1

State s of Child (C)	States of Parents															
	U2=0				U2=1				U2=2				U2=3			
	U1= 0	U1= 1	U1= 2	U1= 3	U1= 0	U1= 1	U1= 2	U1= 3	U1= 0	U1= 1	U1= 2	U1= 3	U1= 0	U1= 1	U1= 2	U1= 3
C=0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
C=2	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0
C=3	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0
C=4	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0
C=5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
C=6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Note: U1 = T2. U2 = T3.

C = T1

[illegible]
$$C = T0$$
[illegible]

C=5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: $U1 = X19$ $U2 = X20$ $U3 = X23$ $U4 = T1$

$C = T0$

Table S2-5 CPT for T0 (continued)

States of Child (C)	States of Parents															
	U4=4								U4=5							
	U3=0				U3=1				U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1		U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
C=1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
C=5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
C=6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: $U1 = X19$ $U2 = X20$ $U3 = X23$ $U4 = T1$

$C = T0$

Table S2-5 CPT for T0 (continued)

States of Child (C)	States of Parents							
	U4=6							
	U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	1	1	1	1	0
C=1	0	0	0	0	0	0	0	0
C=2	0	0	0	0	0	0	0	0
C=3	0	0	0	0	0	0	0	0
C=4	0	0	0	0	0	0	0	0
C=5	0	0	0	0	0	0	0	0
C=6	0	0	0	0	0	0	0	1

Note: U1 = X19 U2 = X20 U3 = X23 U4 = T1

C = T0

S3. Direct topology

Table A3-1 CPT for T1, T2, T3, T4, T5 & T6

States of Child (C)	States of Parents			
	U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1
C=0	1	1	1	0
C=1	0	0	0	1

Note: U1 = X11, X12, X13, X14, X15 or X16. U2 = X21, X22, X23, X24, X25 or X26.

C = T1, T2, T3, T4, T5 & T6

[illegible]
$$C = T0$$
[illegible]

C=0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=2	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0
C=3	0	0	0	1	0	1	1	0	0	1	1	0	1	0	0	0
C=4	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0
C=5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
C=6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U1 = T1. U2 = T2. U3 = T3. U4 = T4. U5 = T5. U6 = T6.

C = T0

Table S3-2 CPT for T0 (continued)

States of Child (C)	States of Parents															
	U6=1															
	U5=0															
	U4=0								U4=1							
	U3=0				U3=1				U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1		U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
	C=0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=2	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0
C=3	0	0	0	1	0	1	1	0	0	1	1	0	1	0	0	0
C=4	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0
C=5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
C=6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: U1 = T1. U2 = T2. U3 = T3. U4 = T4. U5 = T5. U6 = T6. C = T0

Table S3-2 CPT for T0 (continued)

States of Child (C)	States of Parents															
	U6=1															
	U5=1															
	U4=0								U4=1							
	U3=0				U3=1				U3=0				U3=1			
	U2=0		U2=1		U2=0		U2=1		U2=0		U2=1		U2=0		U2=1	
	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1	U1=0	U1=1
	C=0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C=3	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0
C=4	0	0	0	1	0	1	1	0	0	1	1	0	1	0	0	0
C=5	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0
C=6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Note: U1 = T1. U2 = T2. U3 = T3. U4 = T4. U5 = T5. U6 = T6.

C = T0

S4. CPTs for the repair node

Table S4-1 CPT for repair node – Decision Rule 1

States of Child (C)	States of Parents						
	T0=0	T0=1	T0=2	T0=3	T0=4	T0=5	T0=6
C=0	0	0	0	0	0	0	1
C=1	1	1	1	1	1	1	0

Note: 'C=0' represents no repair. 'C=1' represents repair

Table S4-2 CPT for repair node – Decision Rule 2

States of Child (C)	States of Parents						
	T0=0	T0=1	T0=2	T0=3	T0=4	T0=5	T0=6
C=0	0	0	0	0	0	1	1
C=1	1	1	1	1	1	0	0

Note: 'C=0' represents no repair. 'C=1' represents repair

Table S4-3 CPT for repair node – Decision Rule 3

States of Child (C)	States of Parents						
	T0=0	T0=1	T0=2	T0=3	T0=4	T0=5	T0=6
C=0	0	0	0	0	1	1	1
C=1	1	1	1	1	0	0	0

Note: 'C=0' represents no repair. 'C=1' represents repair

Table S4-4 CPT for repair node – Decision Rule 4

States of Child (C)	States of Parents						
	T0=0	T0=1	T0=2	T0=3	T0=4	T0=5	T0=6
C=0	0	0	0	1	1	1	1
C=1	1	1	1	0	0	0	0

Note: 'C=0' represents no repair. 'C=1' represents repair

Table S4-5 CPT for repair node – Decision Rule 5

States of Child (C)	States of Parents						
	T0=0	T0=1	T0=2	T0=3	T0=4	T0=5	T0=6
C=0	0	0	1	1	1	1	1
C=1	1	1	0	0	0	0	0

Note: 'C=0' represents no repair. 'C=1' represents repair

Table S4-6 CPT for repair node – Decision Rule 6

States of Child (C)	States of Parents						
	T0=0	T0=1	T0=2	T0=3	T0=4	T0=5	T0=6
C=0	0	1	1	1	1	1	1
C=1	1	0	0	0	0	0	0

Note: 'C=0' represents no repair. 'C=1' represents repair