1 THE NUMBER OF STATES LOCATED AT EACH LAYER IN PROTOCOLS FOR EXPERIMENTS

The fourth column in Tables 1–2 shows the number of states located at each layer starting from depth zero up to the depth bound for each protocol, which is a list of natural numbers separated by commas. If the last value in the list is X, it means that there are X states located at the depth bound. Especially, if X is zero, it means that there is no state for the layer. If the last value in the list is of the form $X + Y$, it means that there are $X + Y$ states located at the depth bound while Y is the number of initial states (counterexamples).

Table 1. The number of states located at each layer.

Protocol	Attack State	Depth	States located at layers (0, ..., i)
1. Symmetric Key Protocols			
Amended Needham Schroeder	0	7	1, 2, 4, 9, 26, 62, 152, 365 + 1
Carlsen Secret Key Initiator	0	5	1, 3, 8, 17, 40, 79 + 1
Denning Sacco	0	11	1, 1, 2, 3, 5, 7, 6, 5, 4, 3, 1, 0
Diffie Hellman	0	11	1, 4, 5, 9, 13, 18, 20, 22, 17, 12, 10, 5 + 1
	1	12	1, 6, 10, 11, 16, 20, 20, 21, 13, 9, 6, 3, 1 + 2
	2	13	1, 4, 6, 6, 7, 5, 3, 1, 0
ISO-5 Pass Authentication	0	5	1, 4, 4, 12, 23, 39 + 1
Kao-Chow RA	0	4	1, 3, 8, 17, 34 + 1
Kao-Chow RAHK	0	4	1, 1, 1, 2, 1, 0 + 1
Kao-Chow RAT	0	4	1, 2, 4, 14, 40 + 1
Otway-Rees	0	4	1, 2, 6, 15, 44 + 1
Secret 06	0	2	1, 2, 2 + 1
Secret 07	0	4	1, 4, 2, 1, 0 + 1
Wide Mouthed Frog	0	3	1, 5, 13, 26 + 1
Woo and Lam Authentication	0	4	1, 2, 2, 2, 0 + 2
Yahalom	0	4	1, 2, 8, 19, 30 + 1
2. Homomorphism Protocols			
Needham Schroeder Lowe ECB	0	7	1, 4, 9, 10, 5, 8, 14, 10 + 1
3. Exclusive OR Protocols			
Needham Schroeder Lowe XOR	0	8	1, 1, 2, 3, 3, 3, 2, 2, 2 + 1
SK3	0	3	1, 2, 1, 0
TMN ltv-F-tmn-asy	0	5	1, 4, 7, 8, 8, 6 + 1
WIRED ltv-C-wep-asy	0	5	1, 2, 1, 1, 1, 0
WIRED ltv-C-wep-variant	0	5	1, 2, 1, 1, 1, 0
4. API Protocols			
YubiKey	0	9	1, 1, 1, 2, 2, 1, 1, 1, 1, 0 + 1
	1	7	1, 4, 4, 9, 21, 88, 160, 0
	21	8	1, 4, 7, 16, 14, 2, 2, 5, 0
	3	7	1, 4, 4, 6, 18, 55, 80, 0
YubiHSM attack(d)	0	9	1, 1, 2, 3, 4, 7, 13, 24, 40, 75 + 1

Table 2. The number of states located at each layer.

Protocol	Attack State	Depth	States located at layers (0, ..., i)
5. PKCS Protocols			
PKCS11 a1-noComp	0	4	1, 3, 5, 7, 9 + 1
PKCS11 a2-noComp	0	6	1, 2, 2, 4, 11, 11, 4 + 1
PKCS11 a3-noComp	0	6	1, 3, 6, 13, 20, 21, 12 + 1
PKCS11 a4-noComp	0	7	1, 3, 7, 10, 10, 8, 6, 3 + 1
PKCS11 a5-noComp	0	9	1, 4, 11, 22, 31, 31, 15, 9, 5, 1 + 1
6. Choice Protocols			
encryption mode	0	4	1, 1, 1, 2, 3 + 1
	1	4	1, 2, 4, 8, 9 + 1
	2	10	1, 4, 9, 12, 15, 16, 13, 10, 6, 2, 0
	3	11	1, 4, 10, 18, 22, 24, 21, 18, 14, 8, 2, 0
rock paper scissors	0	9	1, 8, 16, 24, 27, 24, 18, 9, 3, 0
	1	1	1, 0
	2	2	1, 5, 0
TLS regular	0	3	1, 1, 1, 0 + 1
TLS attack	0	11	1, 4, 7, 10, 14, 18, 20, 24, 29, 35, 46, 69
7. Distance-Bounding Protocols			
brands chaum	1	4	1, 2, 3, 2, 0
	2	6	1, 3, 4, 3, 1, 1, 0 + 1
CRCS	1	9	1, 3, 8, 16, 26, 35, 28, 14, 4, 0
	2	8	1, 3, 3, 3, 6, 6, 3, 1, 0 + 1
H&K	1	5	1, 2, 4, 5, 2, 0
	2	2	1, 1, 0
MAD	1	9	1, 3, 7, 10, 10, 8, 5, 3, 1, 0
	2	6	1, 5, 10, 14, 18, 27, 40 + 1
Meadows v1-DH	1	4	1, 1, 1, 1, 0
	2	8	1, 2, 2, 3, 3, 3, 3, 1, 0
Meadows v2-DH	1	4	1, 1, 1, 1, 0
	2	3	1, 1, 1, 0 + 1
Munilla	1	7	1, 4, 7, 12, 22, 25, 10, 0
	2	4	1, 2, 2, 1, 0
Swiss Knife	1	4	1, 2, 3, 2, 0
	2	4	1, 4, 5, 2, 0
TREAD	1	4	1, 2, 3, 2, 0
	2	4	1, 3, 2, 1, 0 + 1