APPENDIX A

LIST OF CONDITIONS FOR IDENTIFYING ALL THE TARGET REGISTERS IN THE LFSR USING A TWO-BYTE MODERATE CONTROL

Table 1. Conditions to confirm all the registers in $S_{byte0}\&S_{byte1}$ are affected by faults.

Target Register	Keystream Condition
s_0	$\delta_{34} = \delta_{38} = 1$
s_1	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $\delta_{64} = \delta_{82} = 1$
s_2	$\delta_{36} = \delta_{40} = 1$
s_3	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $(\delta_{46}, \delta_{50}) \neq (1,1)$, and $\delta_{64} = \delta_{68} = 1$
s_4	$\delta_{38} = \delta_{42} = 1$
s_5	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{64}, \delta_{82}) \neq (1,1)$, and $(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{38}, \delta_{42}) \neq (1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $(\delta_{48}, \delta_{52}) \neq (1,1)$, and $\delta_{68} = \delta_{86} = 1$
s_6	$\delta_{40} = \delta_{44} = 1$
s_7	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{64}, \delta_{82}) \neq (1,1)$, and $(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $\delta_{34} = \delta_{82} = 1$
s_8	$\delta_{42} = \delta_{46} = 1$
s_9	$(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{64}, \delta_{68}) \neq (1,1)$, and $(\delta_{38}, \delta_{42}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $\delta_{36} = \delta_{84} = 1$
s_{10}	$\delta_{44} = \delta_{48} = 1$
s_{11}	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{38}, \delta_{42}) \neq (1,1)$, and $(\delta_{68}, \delta_{86}) \neq (1,1)$, and $(\delta_{40}, \delta_{44}) \neq (1,1)$, and $(\delta_{46}, \delta_{50}) \neq (1,1)$, and $\delta_{38} = \delta_{92} = 1$
s_{12}	$(\delta_{46}, \delta_{50}) = (1,1)$
s_{13}	$(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{40}, \delta_{44}) \neq (1,1)$, and $(\delta_{34}, \delta_{82}) \neq (1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $(\delta_{48}, \delta_{52}) \neq (1,1)$, and $\delta_{40} = \delta_{94} = 1$
s_{14}	$(\delta_{48}, \delta_{52}) = (1,1)$
s_{15}	$(\delta_{38}, \delta_{42}) \neq (1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $(\delta_{36}, \delta_{84}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $\delta_{42} = \delta_{96} = 1$

Table 2. Conditions to confirm all the registers in $S_{byte2}\&S_{byte3}$ are affected by faults.

Target Register	Keystream Condition
s_{16}	$\delta_{50} = \delta_{54} = 1$
s_{17}	$\delta_{44} = \delta_{80} = 1$
s_{18}	$\delta_{52} = \delta_{56} = 1$
s_{19}	$\delta_{46} = \delta_{82} = 1$
s_{20}	$\delta_{54} = \delta_{58} = 1$
s_{21}	$(\delta_{50}, \delta_{54}) \neq (1,1)$, and $\delta_{48} = \delta_{84} = 1$
s_{22}	$\delta_{56} = \delta_{60} = 1$
s_{23}	$(\delta_{50}, \delta_{54}) \neq (1,1)$, and $(\delta_{44}, \delta_{80}) \neq (1,1)$, and $(\delta_{52}, \delta_{56}) \neq (1,1)$, and $(\delta_{58}, \delta_{62}) \neq (1,1)$, and $\delta_{50} = \delta_{98} = 1$
s_{24}	$\delta_{58} = \delta_{62} = 1$
s_{25}	$(\delta_{52}, \delta_{56}) \neq (1,1)$, and $(\delta_{46}, \delta_{82}) \neq (1,1)$, and $(\delta_{54}, \delta_{58}) \neq (1,1)$, and $(\delta_{60}, \delta_{64}) \neq (1,1)$, and $\delta_{52} = \delta_{100} = 1$
s_{26}	$(\delta_{60}, \delta_{64}) = (1,1)$
s_{27}	$(\delta_{50}, \delta_{54}) \neq (1,1)$, and $(\delta_{54}, \delta_{58}) \neq (1,1)$, and $(\delta_{56}, \delta_{60}) \neq (1,1)$, and $(\delta_{62}, \delta_{66}) \neq (1,1)$, and $\delta_{54} = \delta_{108} = 1$
s_{28}	$(\delta_{62}, \delta_{66}) = (1,1)$
s_{29}	$(\delta_{52}, \delta_{56}) \neq (1,1)$, and $(\delta_{56}, \delta_{60}) \neq (1,1)$, and $(\delta_{50}, \delta_{98}) \neq (1,1)$, and $(\delta_{58}, \delta_{62}) \neq (1,1)$, and $(\delta_{64}, \delta_{68}) \neq (1,1)$, and $\delta_{56} = \delta_{110} = 1$
s_{30}	$(\delta_{64}, \delta_{68}) = (1,1)$
s_{31}	$(\delta_{44}, \delta_{80}) \neq (1,1)$, and $(\delta_{54}, \delta_{58}) \neq (1,1)$, and $(\delta_{58}, \delta_{62}) \neq (1,1)$, and $(\delta_{52}, \delta_{100}) \neq (1,1)$, and $(\delta_{60}, \delta_{64}) \neq (1,1)$, and $\delta_{58} = \delta_{112} = 1$

Table 3. Conditions to confirm all the registers in $S_{byte4}\&S_{byte5}$ are affected by faults.

Target Register	Keystream Condition
s_{32}	$(\delta_{66}, \delta_{76}) \neq (1, 1)$, and $\delta_{66} = \delta_{70} = 1$
s_{33}	$\delta_{60} = \delta_{96} = \delta_{88} = 1$
s_{34}	$\delta_{68} = \delta_{72} = \delta_{88} = \delta_{100} = \delta_{104} = \delta_{120} = 1$ (negligible)
s_{35}	$\delta_{62} = \delta_{98} = 1$
s_{36}	$\delta_{70} = \delta_{74} = \delta_{90} = \delta_{102} = \delta_{106} = \delta_{122} = 1$ (negligible)
s_{37}	$\delta_{67} = \delta_{100} = 1$
s_{38}	$\delta_{66} = \delta_{76} = 1$
s_{39}	$\delta_{82} = \delta_{102} = \delta_{114} = \delta_{130} = 1$ (94.34%)
s_{40}	$\delta_{68} = \delta_{78} = 1$
s_{41}	$\delta_{84} = \delta_{104} = \delta_{116} = \delta_{132} = 1$ (negligible)
s_{42}	$\delta_{38} = \delta_{70} = \delta_{76} = \delta_{80} = \delta_{108} = \delta_{112} = 1$
s_{43}	$\delta_{86} = \delta_{106} = \delta_{118} = \delta_{134} = 1$ (51.02%)
s_{44}	$(\delta_{40}, \delta_{82}) = (1, 1)$
s_{45}	$\delta_{88} = \delta_{108} = \delta_{120} = \delta_{136} = 1$ (49.75%)
s_{46}	$(\delta_{42}, \delta_{84}) = (1, 1)$
s_{47}	$\delta_{90} = \delta_{110} = \delta_{122} = \delta_{138} = 1$ (51.81%)

Table 4. Conditions to confirm all the registers in $S_{byte6}\&S_{byte7}$ are affected by faults.

Target Register	Keystream Condition
s_{48}	$\delta_{76} = \delta_{86} = 1$
s_{49}	$\delta_{92} = \delta_{112} = \delta_{124} = \delta_{140} = 1$ (negligible)
s_{50}	$\delta_{78} = \delta_{88} = 1$ (negligible)
s_{51}	$\delta_{94} = \delta_{114} = \delta_{126} = \delta_{142} = 1$
s_{52}	$\delta_{48} = \delta_{80} = \delta_{86} = \delta_{90} = \delta_{118} = \delta_{122} = 1$
s_{53}	$\delta_{96} = \delta_{116} = \delta_{128} = \delta_{144} = 1$ (84.03%)
s_{54}	$\delta_{50} = \delta_{82} = \delta_{88} = \delta_{92} = \delta_{120} = \delta_{124} = 1$
s_{55}	$\delta_{98} = \delta_{118} = \delta_{130} = \delta_{146} = 1$ (89.29%)
s_{56}	$\delta_{52} = \delta_{84} = \delta_{90} = \delta_{94} = \delta_{122} = \delta_{126} = 1$
s_{57}	$\delta_{100} = \delta_{120} = \delta_{132} = \delta_{148} = 1$ (85.47%)
s_{58}	$\delta_{54} = \delta_{86} = \delta_{92} = \delta_{96} = \delta_{124} = \delta_{128} = 1$
s_{59}	$\delta_{102} = \delta_{122} = \delta_{134} = \delta_{150} = 1$ (80%)
s_{60}	$(\delta_{56}, \delta_{98}) = (1, 1)$
s_{61}	$\delta_{104} = \delta_{124} = \delta_{136} = \delta_{152} = 1$ (78.84%)
s_{62}	$(\delta_{58}, \delta_{100}) = (1, 1)$
s_{63}	$\delta_{106} = \delta_{126} = \delta_{138} = \delta_{154} = 1$ (78.74%)

Table 5. Conditions to confirm all the registers in $S_{byte8}\&S_{byte9}$ are affected by faults.

Target Register	Keystream Condition
s_{64}	$\delta_{60} = \delta_{92} = \delta_{98} = \delta_{102} = \delta_{130} = \delta_{134} = 1$
s_{65}	$\delta_{108} = \delta_{128} = \delta_{140} = \delta_{156} = 1$ (40.82%)
s_{66}	$\delta_{62} = \delta_{94} = \delta_{100} = \delta_{104} = \delta_{132} = \delta_{136} = 1$
s_{67}	$\delta_{110} = \delta_{130} = \delta_{142} = \delta_{158} = 1$ (45.05%)
s_{68}	$\delta_{64} = \delta_{96} = \delta_{102} = \delta_{106} = \delta_{134} = \delta_{138} = 1$
s_{69}	$\delta_{112} = \delta_{132} = \delta_{144} = \delta_{160} = 1$ (40.82%)
s_{70}	$\delta_{34} = \delta_{124} = 1$
s_{71}	$\delta_{82} = \delta_{98} = \delta_{114} = \delta_{130} = \delta_{134} = \delta_{152} = 1$
s_{72}	$\delta_{36} = \delta_{126} = 1$
s_{73}	$\delta_{84} = \delta_{100} = \delta_{116} = \delta_{132} = \delta_{136} = \delta_{154} = 1$
s_{74}	$\delta_{38} = \delta_{128} = 1$
s_{75}	$(\delta_{40}, \delta_{103}) \neq (1, 1)$, and $\delta_{86} = \delta_{102} = 1$
s_{76}	$\delta_{40} = \delta_{130} = 1$
s_{77}	$\delta_{88} = \delta_{104} = \delta_{120} = \delta_{136} = \delta_{140} = \delta_{158} = 1$
s_{78}	$\delta_{42} = \delta_{132} = 1$
s_{79}	$\delta_{90} = \delta_{106} = \delta_{122} = \delta_{138} = \delta_{142} = \delta_{160} = 1$

Table 6. Conditions to confirm all the registers in $S_{byte10}\&S_{byte11}$ are affected by faults.

Target Register	Keystream Condition
s_{80}	$(\delta_{40}, \delta_{72}, \delta_{104}, \delta_{114}, \delta_{134}, \delta_{146}, \delta_{162}, \delta_{168}) \neq (1, 1, 1, 1, 1, 1, 1, 1)$, and $\delta_{44} = \delta_{102} = \delta_{114} = \delta_{118} = \delta_{134} = \delta_{146} = \delta_{150} = \delta_{166} = 1$
s_{81}	$\delta_{34} = \delta_{66} = \delta_{98} = \delta_{108} = \delta_{128} = \delta_{140} = \delta_{156} = \delta_{162} = 1$
s_{82}	$\delta_{46} = \delta_{82} = \delta_{104} = \delta_{116} = \delta_{136} = \delta_{148} = \delta_{168} = 1$
s_{83}	$\delta_{36} = \delta_{68} = \delta_{100} = \delta_{110} = \delta_{130} = \delta_{142} = \delta_{158} = \delta_{164} = 1$
s_{84}	$\delta_{48} = \delta_{84} = \delta_{106} = \delta_{118} = \delta_{138} = \delta_{150} = \delta_{170} = 1$
s_{85}	$\delta_{38} = \delta_{70} = \delta_{102} = \delta_{112} = \delta_{132} = \delta_{144} = \delta_{160} = \delta_{166} = 1$
s_{86}	$\delta_{50} = \delta_{86} = \delta_{108} = \delta_{120} = \delta_{140} = \delta_{152} = \delta_{172} = 1$
s_{87}	$\delta_{40} = \delta_{72} = \delta_{104} = \delta_{114} = \delta_{134} = \delta_{146} = \delta_{162} = \delta_{168} = 1$
s_{88}	$\delta_{52} = \delta_{88} = \delta_{110} = \delta_{122} = \delta_{142} = \delta_{154} = \delta_{174} = 1$
s_{89}	$\delta_{42} = \delta_{74} = \delta_{106} = \delta_{116} = \delta_{136} = \delta_{148} = \delta_{164} = \delta_{170} = 1$
s_{90}	$\delta_{54} = \delta_{90} = \delta_{112} = \delta_{124} = \delta_{144} = \delta_{156} = \delta_{176} = 1$
s_{91}	$\delta_{44} = \delta_{76} = \delta_{108} = \delta_{118} = \delta_{138} = \delta_{150} = \delta_{166} = \delta_{172} = 1$
s_{92}	$\delta_{56} = \delta_{92} = \delta_{114} = \delta_{126} = \delta_{146} = \delta_{158} = \delta_{178} = 1$
s_{93}	$\delta_{46} = \delta_{78} = \delta_{110} = \delta_{120} = \delta_{140} = \delta_{152} = \delta_{168} = \delta_{174} = 1$
s_{94}	$\delta_{0} = \delta_{58} = \delta_{94} = \delta_{116} = \delta_{128} = \delta_{148} = \delta_{160} = \delta_{180} = 1$
s_{95}	$\delta_{48} = \delta_{80} = \delta_{112} = \delta_{122} = \delta_{142} = \delta_{154} = \delta_{170} = \delta_{176} = 1$

Table 7. Conditions to confirm all the registers in $S_{byte12}\&S_{byte13}$ are affected by faults.

Target Register	Keystream Condition
s_{96}	$\delta_2 = \delta_{34} = \delta_{60} = \delta_{66} = \delta_{92} = \delta_{96} = \delta_{98} = \delta_{118} = \delta_{124} = \delta_{154} = \delta_{162} = \delta_{182} = 1$
s_{97}	$\delta_{50} = \delta_{114} = \delta_{160} = 1$ (86.21%)
s_{98}	$\delta_4 = \delta_{36} = \delta_{66} = \delta_{68} = \delta_{94} = \delta_{98} = \delta_{100} = \delta_{120} = \delta_{126} = \delta_{156} = \delta_{164} = \delta_{184} = 1$
s_{99}	$\delta_{52} = \delta_{116} = \delta_{162} = 1$
s_{100}	$\delta_6 = \delta_{38} = \delta_{64} = \delta_{70} = \delta_{96} = \delta_{100} = \delta_{102} = \delta_{122} = \delta_{128} = \delta_{158} = \delta_{166} = \delta_{186} = 1$
s_{101}	$\delta_{54} = \delta_{118} = \delta_{164} = 1$ (negligible)
s_{102}	$\delta_8 = \delta_{40} = \delta_{66} = \delta_{72} = \delta_{98} = \delta_{102} = \delta_{104} = \delta_{124} = \delta_{130} = \delta_{160} = \delta_{168} = \delta_{188} = 1$
s_{103}	$\delta_{56} = \delta_{120} = \delta_{166} = 1$
s_{104}	$\delta_{10} = \delta_{42} = \delta_{68} = \delta_{74} = \delta_{100} = \delta_{104} = \delta_{106} = \delta_{126} = \delta_{132} = \delta_{162} = \delta_{170} = \delta_{190} = 1$
s_{105}	$\delta_{58} = \delta_{122} = \delta_{168} = 1$ (negligible)
s_{106}	$\delta_{12} = \delta_{44} = \delta_{70} = \delta_{76} = \delta_{102} = \delta_{106} = \delta_{108} = \delta_{128} = \delta_{134} = \delta_{164} = \delta_{172} = \delta_{192} = 1$
s_{107}	$\delta_{60} = \delta_{124} = \delta_{170} = 1$ (60.98%)
s_{108}	$\delta_{14} = \delta_{46} = \delta_{72} = \delta_{78} = \delta_{104} = \delta_{108} = \delta_{110} = \delta_{130} = \delta_{136} = \delta_{166} = \delta_{174} = \delta_{194} = 1$
s_{109}	$\delta_{62} = \delta_{126} = \delta_{172} = 1$ (61.73%)
s_{110}	$\delta_{16} = \delta_{48} = \delta_{74} = \delta_{80} = \delta_{106} = \delta_{110} = \delta_{112} = \delta_{132} = \delta_{138} = \delta_{168} = \delta_{176} = \delta_{196} = 1$
s_{111}	$\delta_{64} = \delta_{128} = \delta_{174} = 1$ (64.10%)

Table 8. Conditions to confirm all the registers in $S_{byte14}\&S_{byte15}$ are affected by faults.

Target Register	Keystream Condition
s_{112}	$\delta_{18} = \delta_{50} = \delta_{76} = \delta_{82} = \delta_{108} = \delta_{112} = \delta_{114} = \delta_{134} = \delta_{140} = \delta_{170} = \delta_{178} = \delta_{198} = 1$
s_{113}	$\delta_{66} = \delta_{130} = \delta_{176} = 1$ (82.64%)
s_{114}	$\delta_{20} = \delta_{52} = \delta_{78} = \delta_{84} = \delta_{110} = \delta_{114} = \delta_{116} = \delta_{136} = \delta_{142} = \delta_{172} = \delta_{180} = \delta_{200} = 1$
s_{115}	$\delta_{68} = \delta_{178} = 1$
s_{116}	$\delta_{22} = \delta_{54} = \delta_{80} = \delta_{86} = \delta_{112} = \delta_{116} = \delta_{118} = \delta_{138} = \delta_{144} = \delta_{174} = \delta_{182} = \delta_{202} = 1$
s_{117}	$\delta_{70} = \delta_{134} = \delta_{180} = 1$ (negligible)
s_{118}	$\delta_{24} = \delta_{56} = \delta_{82} = \delta_{88} = \delta_{114} = \delta_{118} = \delta_{120} = \delta_{140} = \delta_{146} = \delta_{176} = \delta_{184} = \delta_{204} = 1$
s_{119}	$\delta_{72} = \delta_{136} = \delta_{182} = 1$
s_{120}	$\delta_{26} = \delta_{58} = \delta_{84} = \delta_{90} = \delta_{116} = \delta_{120} = \delta_{122} = \delta_{142} = \delta_{148} = \delta_{178} = \delta_{186} = \delta_{206} = 1$
s_{121}	$\delta_{74} = \delta_{138} = \delta_{184} = 1$
s_{122}	$\delta_{28} = \delta_{60} = \delta_{86} = \delta_{92} = \delta_{118} = \delta_{122} = \delta_{124} = \delta_{144} = \delta_{150} = \delta_{180} = \delta_{188} = \delta_{208} = 1$
s_{123}	$\delta_{76} = \delta_{140} = \delta_{186} = 1$ (61.73%)
s_{124}	$\delta_{30} = \delta_{62} = \delta_{88} = \delta_{94} = \delta_{120} = \delta_{124} = \delta_{126} = \delta_{146} = \delta_{152} = \delta_{182} = \delta_{190} = \delta_{210} = 1$
s_{125}	$\delta_{78} = \delta_{142} = \delta_{188} = 1$
s_{126}	$\delta_{32} = \delta_{64} = \delta_{90} = \delta_{96} = \delta_{122} = \delta_{126} = \delta_{128} = \delta_{148} = \delta_{154} = \delta_{184} = \delta_{192} = \delta_{212} = 1$
s_{127}	$\delta_{80} = \delta_{144} = \delta_{190} = 1$ (63.29%)

APPENDIX B

LIST OF CONDITIONS FOR IDENTIFYING ALL THE TARGET REGISTERS IN THE LFSR USING A FOUR-BYTE MODERATE CONTROL

Table 1. Conditions to confirm all the registers in $S_{byte0}\&S_{byte1}\&S_{byte2}\&S_{byte3}$ are affected by faults.

Target Register	Keystream Condition
s_0	$\delta_{34} = \delta_{38} = 1$
s_1	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $(\delta_{50}, \delta_{54}) \neq (1,1)$, and $\delta_{64} = \delta_{76} = \delta_{82} = 1$
s_2	$\delta_{36} = \delta_{40} = 1$
s_3	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $(\delta_{52}, \delta_{56}) \neq (1,1)$, and $\delta_{66} = \delta_{78} = \delta_{84} = 1$
s_4	$\delta_{38} = \delta_{42} = 1$
s_5	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{38}, \delta_{42}) \neq (1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $\delta_{68} = \delta_{80} = \delta_{86} = 1$
s_6	$\delta_{40} = \delta_{44} = 1$
s_7	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{64}, \delta_{76}, \delta_{82}) \neq (1,1,1)$, and $(\delta_{36}, \delta_{40}) \neq (1,1)$, and $\delta_{34} = \delta_{66} = \delta_{70} = \delta_{82} = \delta_{88} = 1$
s_8	$\delta_{42} = \delta_{46} = 1$
s_9	$(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{38}, \delta_{42}) \neq (1,1)$, and $\delta_{36} = \delta_{68} = \delta_{72} = \delta_{84} = \delta_{90} = 1$
s_{10}	$\delta_{44} = \delta_{48} = 1$
s_{11}	$(\delta_{64}, \delta_{76}, \delta_{82}) \neq (1,1,1)$, and $(\delta_{38}, \delta_{42}) \neq (1,1)$, and $\delta_{38} = \delta_{70} = \delta_{74} = \delta_{86} = \delta_{92} = 1$
s_{12}	$\delta_{46} = \delta_{50} = 1$
s_{13}	$(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{40}, \delta_{44}) \neq (1,1)$, and $(\delta_{34}, \delta_{66}, \delta_{70}, \delta_{82}, \delta_{88}) \neq (1,1,1,1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $\delta_{40} = \delta_{72} = \delta_{76} = \delta_{88} = \delta_{94} = 1$
s_{14}	$\delta_{48} = \delta_{52} = 1$
s_{15}	$(\delta_{38}, \delta_{42}) \neq (1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $\delta_{42} = \delta_{74} = \delta_{78} = \delta_{90} = \delta_{96} = 1$
s_{16}	$\delta_{50} = \delta_{54} = 1$
s_{17}	$(\delta_{40}, \delta_{44}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $(\delta_{38}, \delta_{70}, \delta_{74}, \delta_{86}, \delta_{92}) \neq (1,1,1,1,1)$, and $(\delta_{46}, \delta_{50}) \neq (1,1)$, and $\delta_{44} = \delta_{76} = \delta_{80} = \delta_{92} = \delta_{98} = 1$
s_{18}	$\delta_{52} = \delta_{56} = 1$
s_{19}	$(\delta_{42}, \delta_{46}) \neq (1,1)$, and $(\delta_{46}, \delta_{50}) \neq (1,1)$, and $(\delta_{40}, \delta_{72}, \delta_{76}, \delta_{88}, \delta_{94}) \neq (1,1,1,1,1)$, and $\delta_{46} = \delta_{78} = \delta_{82} = \delta_{94} = \delta_{100} = 1$
s_{20}	$\delta_{54} = \delta_{58} = 1$
s_{21}	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $(\delta_{48}, \delta_{52}) \neq (1,1)$, and $\delta_{46} = \delta_{78} = \delta_{82} = \delta_{94} = \delta_{100} = 1$
s_{22}	$\delta_{56} = \delta_{60} = 1$
s_{23}	$(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{46}, \delta_{50}) \neq (1,1)$, and $(\delta_{50}, \delta_{54}) \neq (1,1)$, and $(\delta_{52}, \delta_{56}) \neq (1,1)$, and $\delta_{50} = \delta_{82} = \delta_{86} = \delta_{98} = \delta_{104} = 1$
s_{24}	$\delta_{58} = \delta_{62} = 1$
s_{25}	$(\delta_{38}, \delta_{42}) \neq (1,1)$, and $(\delta_{48}, \delta_{52}) \neq (1,1)$, and $(\delta_{52}, \delta_{56}) \neq (1,1)$, and $(\delta_{46}, \delta_{78}, \delta_{82}, \delta_{94}, \delta_{100}) \neq (1,1,1,1,1)$, and $\delta_{52} = \delta_{84} = \delta_{88} = \delta_{100} = \delta_{106} = 1$
s_{26}	$(\delta_{60}, \delta_{64}) = (1,1)$
s_{27}	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{40}, \delta_{44}) \neq (1,1)$, and $(\delta_{50}, \delta_{54}) \neq (1,1)$, and $(\delta_{54}, \delta_{58}) \neq (1,1)$, and $(\delta_{52}, \delta_{84}, \delta_{88}, \delta_{100}, \delta_{106}) \neq (1,1,1,1,1)$, and $\delta_{52} = \delta_{84} = \delta_{88} = \delta_{100} = \delta_{106} = 1$
s_{28}	$(\delta_{42}, \delta_{46}) \neq (1,1)$, and$(\delta_{62}, \delta_{66}) = (1,1)$
s_{29}	$(\delta_{36}, \delta_{40}) \neq (1,1)$, and $(\delta_{42}, \delta_{46}) \neq (1,1)$, and $(\delta_{52}, \delta_{56}) \neq (1,1)$, and $(\delta_{56}, \delta_{60}) \neq (1,1)$, and $(\delta_{50}, \delta_{82}, \delta_{86}, \delta_{98}, \delta_{104}) \neq (1,1,1,1,1)$, and $\delta_{56} = \delta_{88} = \delta_{92} = \delta_{104} = \delta_{110} = 1$
s_{30}	$(\delta_{34}, \delta_{38}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $(\delta_{50}, \delta_{54}) \neq (1,1)$, and $(\delta_{60}, \delta_{64}) \neq (1,1)$, and $(\delta_{64}, \delta_{68}) = (1,1)$
s_{31}	$(\delta_{38}, \delta_{42}) \neq (1,1)$, and $(\delta_{44}, \delta_{48}) \neq (1,1)$, and $(\delta_{54}, \delta_{58}) \neq (1,1)$, and $(\delta_{58}, \delta_{62}) \neq (1,1)$, and $(\delta_{52}, \delta_{84}, \delta_{88}, \delta_{100}, \delta_{106}) \neq (1,1,1,1,1)$, and $\delta_{58} = \delta_{90} = \delta_{94} = \delta_{106} = \delta_{112} = 1$

Table 2. Conditions to confirm all the registers in $S_{byte4}\&S_{byte5}\&S_{byte6}\&S_{byte7}$ are affected by faults.

Target Register	Keystream Condition
s_{32}	$(\delta_{66}, \delta_{76}) \neq (1,1)$, and $\delta_{66} = \delta_{70} = 1$
s_{33}	$\delta_{60} = \delta_{96} = 1$
s_{34}	$(\delta_{68}, \delta_{78}) \neq (1,1)$, and $\delta_{68} = \delta_{72} = \delta_{88} = \delta_{100} = \delta_{104} = \delta_{120} = 1$
s_{35}	$\delta_{62} = \delta_{98} = 1$
s_{36}	$(\delta_{38}, \delta_{70}, \delta_{76}, \delta_{80}, \delta_{108}, \delta_{112}) \neq (1,1,1,1,1,1)$, and $\delta_{70} = \delta_{74} = \delta_{90} = \delta_{102} = \delta_{106} = \delta_{122} = 1$
s_{37}	$\delta_{64} = \delta_{96} = \delta_{100} = \delta_{112} = \delta_{118} = 1$
s_{38}	$\delta_{66} = \delta_{76} = 1$
s_{39}	$\delta_{82} = \delta_{102} = \delta_{114} = \delta_{130} = 1$ (68.03%)
s_{40}	$\delta_{68} = \delta_{78} = 1$
s_{41}	$\delta_{84} = \delta_{104} = \delta_{116} = \delta_{132} = 1$ (68.03%)
s_{42}	$\delta_{38} = \delta_{70} = \delta_{76} = \delta_{80} = \delta_{108} = \delta_{112} = 1$
s_{43}	$\delta_{86} = \delta_{106} = \delta_{118} = \delta_{134} = 1$ (43.29%)
s_{44}	$\delta_{40} = \delta_{72} = \delta_{78} = \delta_{82} = \delta_{110} = \delta_{114} = 1$
s_{45}	$\delta_{88} = \delta_{108} = \delta_{120} = \delta_{136} = 1$ (43.86%)
s_{46}	$\delta_{42} = \delta_{74} = \delta_{80} = \delta_{84} = \delta_{112} = \delta_{116} = 1$
s_{47}	$\delta_{90} = \delta_{110} = \delta_{122} = \delta_{138} = 1$ (48.54%)
s_{48}	$\delta_{44} = \delta_{76} = \delta_{82} = \delta_{86} = \delta_{114} = \delta_{118}$
s_{49}	$\delta_{92} = \delta_{112} = \delta_{124} = \delta_{140} = 1$ (80.65%)
s_{50}	$\delta_{46} = \delta_{78} = \delta_{84} = \delta_{88} = \delta_{116} = \delta_{120}$
s_{51}	$\delta_{94} = \delta_{114} = \delta_{126} = \delta_{142} = 1$ (71.94%)
s_{52}	$\delta_{48} = \delta_{80} = \delta_{86} = \delta_{90} = \delta_{118} = \delta_{122} = 1$
s_{53}	$\delta_{96} = \delta_{116} = \delta_{128} = \delta_{144} = 1$ (66.67%)
s_{54}	$\delta_{50} = \delta_{82} = \delta_{88} = \delta_{92} = \delta_{120} = \delta_{124} = 1$
s_{55}	$\delta_{98} = \delta_{118} = \delta_{130} = \delta_{146} = 1$ (54.95%)
s_{56}	$\delta_{52} = \delta_{84} = \delta_{90} = \delta_{94} = \delta_{122} = \delta_{126} = 1$
s_{57}	$\delta_{100} = \delta_{120} = \delta_{132} = \delta_{148} = 1$ (54.35%)
s_{58}	$\delta_{54} = \delta_{86} = \delta_{92} = \delta_{96} = \delta_{124} = \delta_{128} = 1$
s_{59}	$\delta_{102} = \delta_{122} = \delta_{134} = \delta_{150} = 1$ (45.66%)
s_{60}	$\delta_{56}, \delta_{98} = 1$
s_{61}	$\delta_{104} = \delta_{124} = \delta_{136} = \delta_{152} = 1$ (53.76%)
s_{62}	$(\delta_{66}, \delta_{76}) \neq (1,1)$, and $\delta_{58} = \delta_{90} = \delta_{96} = \delta_{100} = \delta_{128} = \delta_{132} = 1$
s_{63}	$\delta_{106} = \delta_{126} = \delta_{138} = \delta_{154} = 1$ (49.26%)

Table 3. Conditions to confirm all the registers in $S_{byte8}\&S_{byte9}\&S_{byte10}\&S_{byte11}$ are affected by faults.

Target Register	Keystream Condition
s_{64}	$\delta_{60} = \delta_{92} = \delta_{98} = \delta_{102} = \delta_{130} = \delta_{134} = 1$
s_{65}	$\delta_{108} = \delta_{128} = \delta_{140} = \delta_{156} = 1$ (26.25%)
s_{66}	$\delta_{62} = \delta_{94} = \delta_{100} = \delta_{104} = \delta_{132} = \delta_{136} = 1$
s_{67}	$\delta_{110} = \delta_{130} = \delta_{142} = \delta_{158} = 1$ (27.70%)
s_{68}	$\delta_{64} = \delta_{96} = \delta_{102} = \delta_{106} = \delta_{134} = \delta_{138} = 1$
s_{69}	$\delta_{112} = \delta_{132} = \delta_{144} = \delta_{160} = 1$ (27.10%)
s_{70}	$\delta_{34} = \delta_{124} = 1$
s_{71}	$(\delta_{36}, \delta_{68}, \delta_{100}, \delta_{110}, \delta_{130}, \delta_{142}, \delta_{158}, \delta_{164}) \neq (1,1,1,1,1,1,1,1)$, and $\delta_{82} = \delta_{98} = \delta_{114} = \delta_{130} = \delta_{134} = \delta_{152} = 1$
s_{72}	$\delta_{36} = \delta_{126} = 1$
s_{73}	$(\delta_{36}, \delta_{68}, \delta_{100}, \delta_{110}, \delta_{130}, \delta_{142}, \delta_{158}, \delta_{164}) \neq (1,1,1,1,1,1,1,1)$, and $\delta_{84} = \delta_{100} = \delta_{116} = \delta_{132} = \delta_{136} = \delta_{154} = 1$
s_{74}	$(\delta_{34}, \delta_{66}, \delta_{98}, \delta_{108}, \delta_{128}, \delta_{140}, \delta_{156}, \delta_{162}) \neq (1,1,1,1,1,1,1,1)$, and $\delta_{38} = \delta_{96} = \delta_{108} = \delta_{112} = \delta_{128} = \delta_{140} = \delta_{144} = \delta_{160} = 1$
s_{75}	$(\delta_{40}, \delta_{98}, \delta_{110}, \delta_{114}, \delta_{130}, \delta_{142}, \delta_{146}, \delta_{162}) \neq (1,1,1,1,1,1,1,1)$, and $(\delta_{40}, \delta_{72}, \delta_{104}, \delta_{114}, \delta_{134}, \delta_{146}, \delta_{162}, \delta_{168}) \neq (1,1,1,1,1,1,1,1)$, and $\delta_{86} = \delta_{102} = \delta_{118} = \delta_{134} = \delta_{138} = \delta_{156} = 1$
s_{76}	$(\delta_{36}, \delta_{68}, \delta_{100}, \delta_{110}, \delta_{130}, \delta_{142}, \delta_{158}, \delta_{164}) \neq (1,1,1,1,1,1,1,1)$, and $\delta_{40} = \delta_{98} = \delta_{110} = \delta_{114} = \delta_{130} = \delta_{142} = \delta_{146} = \delta_{162} = 1$
s_{77}	$(\delta_{42}, \delta_{74}, \delta_{106}, \delta_{116}, \delta_{136}, \delta_{148}, \delta_{164}, \delta_{170}) \neq (1,1,1,1,1,1,1,1)$, and $\delta_{88} = \delta_{104} = \delta_{120} = \delta_{136} = \delta_{140} = \delta_{158} = 1$
s_{78}	$(\delta_{36}, \delta_{68}, \delta_{100}, \delta_{110}, \delta_{130}, \delta_{142}, \delta_{158}, \delta_{164}) \neq (1,1,1,1,1,1,1,1)$, and $\delta_{42} = \delta_{100} = \delta_{112} = \delta_{116} = \delta_{132} = \delta_{144} = \delta_{148} = \delta_{164} = 1$
s_{79}	$(\delta_{44}, \delta_{76}, \delta_{108}, \delta_{118}, \delta_{138}, \delta_{150}, \delta_{166}, \delta_{172}) \neq (1,1,1,1,1,1,1,1)$, and $\delta_{90} = \delta_{106} = \delta_{122} = \delta_{138} = \delta_{142} = \delta_{160} = 1$
s_{80}	$(\delta_{40}, \delta_{72}, \delta_{104}, \delta_{114}, \delta_{134}, \delta_{146}, \delta_{162}, \delta_{168}) \neq (1,1,1,1,1,1,1,1)$, and $\delta_{44} = \delta_{102} = \delta_{114} = \delta_{118} = \delta_{134} = \delta_{146} = \delta_{150} = \delta_{166} = 1$
s_{81}	$\delta_{34} = \delta_{66} = \delta_{98} = \delta_{108} = \delta_{128} = \delta_{140} = \delta_{156} = \delta_{162} = 1$
s_{82}	$\delta_{46} = \delta_{82} = \delta_{104} = \delta_{116} = \delta_{136} = \delta_{148} = \delta_{168} = 1$
s_{83}	$\delta_{36} = \delta_{68} = \delta_{100} = \delta_{110} = \delta_{130} = \delta_{142} = \delta_{158} = \delta_{164} = 1$
s_{84}	$\delta_{48} = \delta_{84} = \delta_{106} = \delta_{118} = \delta_{138} = \delta_{150} = \delta_{170} = 1$
s_{85}	$\delta_{38} = \delta_{70} = \delta_{102} = \delta_{112} = \delta_{132} = \delta_{144} = \delta_{160} = \delta_{166} = 1$
s_{86}	$(\delta_{82}, \delta_{98}, \delta_{114}, \delta_{130}, \delta_{134}, \delta_{152}) \neq (1,1,1,1,1,1)$, and $\delta_{50} = \delta_{86} = \delta_{108} = \delta_{120} = \delta_{140} = \delta_{152} = \delta_{172} = 1$
s_{87}	$\delta_{40} = \delta_{72} = \delta_{104} = \delta_{114} = \delta_{134} = \delta_{146} = \delta_{162} = \delta_{168} = 1$
s_{88}	$(\delta_{84}, \delta_{100}, \delta_{116}, \delta_{132}, \delta_{136}, \delta_{154}) \neq (1,1,1,1,1,1)$, and $\delta_{52} = \delta_{88} = \delta_{110} = \delta_{122} = \delta_{142} = \delta_{154} = \delta_{174} = 1$
s_{89}	$\delta_{42} = \delta_{74} = \delta_{106} = \delta_{116} = \delta_{136} = \delta_{148} = \delta_{164} = \delta_{170} = 1$
s_{90}	$(\delta_{86}, \delta_{102}, \delta_{118}, \delta_{134}, \delta_{138}, \delta_{156}) \neq (1,1,1,1,1,1)$, and $\delta_{54} = \delta_{90} = \delta_{112} = \delta_{124} = \delta_{144} = \delta_{156} = \delta_{176} = 1$
s_{91}	$\delta_{44} = \delta_{76} = \delta_{108} = \delta_{118} = \delta_{138} = \delta_{150} = \delta_{166} = \delta_{172} = 1$
s_{92}	$(\delta_{88}, \delta_{104}, \delta_{120}, \delta_{136}, \delta_{140}, \delta_{158}) \neq (1,1,1,1,1,1)$, and $\delta_{56} = \delta_{92} = \delta_{114} = \delta_{126} = \delta_{146} = \delta_{158} = \delta_{178} = 1$
s_{93}	$\delta_{46} = \delta_{78} = \delta_{110} = \delta_{120} = \delta_{140} = \delta_{152} = \delta_{168} = \delta_{174} = 1$
s_{94}	$\delta_{0} = \delta_{58} = \delta_{94} = \delta_{116} = \delta_{128} = \delta_{148} = \delta_{160} = \delta_{180} = 1$
s_{95}	$\delta_{48} = \delta_{80} = \delta_{112} = \delta_{122} = \delta_{142} = \delta_{154} = \delta_{170} = \delta_{176} = 1$

Table 4. Conditions to confirm all the registers in $S_{byte12}\&S_{byte13}\&S_{byte14}\&S_{byte15}$ are affected by faults.

Target Register	Keystream Condition
s_{96}	$\delta_2 = \delta_{34} = \delta_{60} = \delta_{66} = \delta_{92} = \delta_{96} = \delta_{98} = \delta_{118} = \delta_{124} = \delta_{154} = \delta_{162} = \delta_{182} = 1$
s_{97}	$\delta_{50} = \delta_{114} = \delta_{160} = 1$ (88.50%)
s_{98}	$\delta_4 = \delta_{36} = \delta_{66} = \delta_{68} = \delta_{94} = \delta_{98} = \delta_{100} = \delta_{120} = \delta_{126} = \delta_{156} = \delta_{164} = \delta_{184} = 1$
s_{99}	$\delta_{52} = \delta_{116} = \delta_{162} = 1$ (86.47%)
s_{100}	$\delta_6 = \delta_{38} = \delta_{64} = \delta_{70} = \delta_{96} = \delta_{100} = \delta_{102} = \delta_{122} = \delta_{128} = \delta_{158} = \delta_{166} = \delta_{186} = 1$
s_{101}	$\delta_{54} = \delta_{118} = \delta_{164} = 1$ (88.50%)
s_{102}	$\delta_8 = \delta_{40} = \delta_{66} = \delta_{72} = \delta_{98} = \delta_{102} = \delta_{104} = \delta_{124} = \delta_{130} = \delta_{160} = \delta_{168} = \delta_{188} = 1$
s_{103}	$\delta_{56} = \delta_{120} = \delta_{166} = 1$ (84.03%)
s_{104}	$\delta_{10} = \delta_{42} = \delta_{68} = \delta_{74} = \delta_{100} = \delta_{104} = \delta_{106} = \delta_{126} = \delta_{132} = \delta_{162} = \delta_{170} = \delta_{190} = 1$
s_{105}	$\delta_{58} = \delta_{122} = \delta_{168} = 1$ (86.97%)
s_{106}	$\delta_{12} = \delta_{44} = \delta_{70} = \delta_{76} = \delta_{102} = \delta_{106} = \delta_{108} = \delta_{128} = \delta_{134} = \delta_{164} = \delta_{172} = \delta_{192} = 1$
s_{107}	$\delta_{60} = \delta_{124} = \delta_{170} = 1$ (56.82%)
s_{108}	$\delta_{14} = \delta_{46} = \delta_{72} = \delta_{78} = \delta_{104} = \delta_{108} = \delta_{110} = \delta_{130} = \delta_{136} = \delta_{166} = \delta_{174} = \delta_{194} = 1$
s_{109}	$\delta_{62} = \delta_{126} = \delta_{172} = 1$ (58.14%)
s_{110}	$\delta_{16} = \delta_{48} = \delta_{74} = \delta_{80} = \delta_{106} = \delta_{110} = \delta_{112} = \delta_{132} = \delta_{138} = \delta_{168} = \delta_{176} = \delta_{196} = 1$
s_{111}	$\delta_{64} = \delta_{128} = \delta_{174} = 1$ (59.92%)
s_{112}	$\delta_{18} = \delta_{50} = \delta_{76} = \delta_{82} = \delta_{108} = \delta_{112} = \delta_{114} = \delta_{134} = \delta_{140} = \delta_{170} = \delta_{178} = \delta_{198} = 1$
s_{113}	$\delta_{66} = \delta_{130} = \delta_{176} = 1$ (55.87%)
s_{114}	$\delta_{20} = \delta_{52} = \delta_{78} = \delta_{84} = \delta_{110} = \delta_{114} = \delta_{116} = \delta_{136} = \delta_{142} = \delta_{172} = \delta_{180} = \delta_{200} = 1$
s_{115}	$\delta_{68} = \delta_{178} = 1$ (56.18%)
s_{116}	$\delta_{22} = \delta_{54} = \delta_{80} = \delta_{86} = \delta_{112} = \delta_{116} = \delta_{118} = \delta_{138} = \delta_{144} = \delta_{174} = \delta_{182} = \delta_{202} = 1$
s_{117}	$\delta_{70} = \delta_{134} = \delta_{180} = 1$ (58.82%)
s_{118}	$\delta_{24} = \delta_{56} = \delta_{82} = \delta_{88} = \delta_{114} = \delta_{118} = \delta_{120} = \delta_{140} = \delta_{146} = \delta_{176} = \delta_{184} = \delta_{204} = 1$
s_{119}	$\delta_{72} = \delta_{136} = \delta_{182} = 1$ (56.18%)
s_{120}	$\delta_{26} = \delta_{58} = \delta_{84} = \delta_{90} = \delta_{116} = \delta_{120} = \delta_{122} = \delta_{142} = \delta_{148} = \delta_{178} = \delta_{186} = \delta_{206} = 1$
s_{121}	$\delta_{74} = \delta_{138} = \delta_{184} = 1$ (56.60%)
s_{122}	$\delta_{28} = \delta_{60} = \delta_{86} = \delta_{92} = \delta_{118} = \delta_{122} = \delta_{124} = \delta_{144} = \delta_{150} = \delta_{180} = \delta_{188} = \delta_{208} = 1$
s_{123}	$\delta_{76} = \delta_{140} = \delta_{186} = 1$ (53.48%)
s_{124}	$\delta_{30} = \delta_{62} = \delta_{88} = \delta_{94} = \delta_{120} = \delta_{124} = \delta_{126} = \delta_{146} = \delta_{152} = \delta_{182} = \delta_{190} = \delta_{210} = 1$
s_{125}	$\delta_{78} = \delta_{142} = \delta_{188} = 1$ (53.19%)
s_{126}	$\delta_{32} = \delta_{64} = \delta_{90} = \delta_{96} = \delta_{122} = \delta_{126} = \delta_{128} = \delta_{148} = \delta_{154} = \delta_{184} = \delta_{192} = \delta_{212} = 1$
s_{127}	$\delta_{80} = \delta_{144} = \delta_{190} = 1$ (49.50%)