A COMPARATIVE STUDY ON SIGNATURE SCHEMES FOR IOT DEVICES

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1. Motivation

- 8.74 billion Internet of things (IoT) devices [1]
- Used in hospitals, transport and houses, thus containing sensitive data
- Personal identifiable information
- IoT device authentication/ identification for secure communication = signature schemes
- Authentication and message integrity
- Small hardware area, less computational power and space

2. Research question

How do IoT signature schemes compare in performance to each other and what is a possible improvement?

- What is the current state of signature schemes in IoT?
- Comparison between schemes
- Suitability for IoT
- What are the shortcomings of the current schemes?
- **How could these flaws be solved**

3. Method

- Literature study
- Find flaws and suggest improvement

4. Comparison criteria

The schemes are compared on these scheme characteristics.

- Key size & signature size
- Computation costs
- Security level

5. Results

Table 1. Security level and their RSA, DSA and ECC key sizes in bits [28]

Security level	RSA key size	DSA key size	ECC key size
80	1024	p=1024, q=160	160-223
112	2048	p=2048, q=224	224-255
128	3072	p=3072, q=256	256-383
192	7680	p=7680, q=384	384-511
256	15360	p=15360, q=512	>512

Table 2. Signature sizes in bits for security level 80.

RSA	SCDSA	ECC CLS
1024	320	328

- SCDSA [3], ECC CLS [4] suitable candidates.
- Breakable by Shor's algorithm [5] in the future
- Quantum computing resistant schemes

Table 3. W-OTS schemes comparison [6][7][8]

Scheme	n	w	signature size	Signing cost	Security level
W-OTS+	128	21	992	1,302s	113*
W-OTS	256	455	992	14,105	128
W-OTS^{prf}	128	8	1440	0,720s	100

- W-OTS variants, XMSS [9] as suitable candidates

6. Conclusion

- SCDSA, ECC CLS currently suitable
- Future proof
- Post-quantum
- W-OTS+, XMSS

7. Future Work

- Hybrid schemes
- Other security reduction

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