

Domain-Based System Architecture for Access Control in IOT network

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Full Experiment parameters

Hardware and software specification for Experiment component			
Device	Number of items	Operating system	Processor
Dell laptop	1	Windows 10	Intel Cor i7
Lenovo laptop	1	Windows 10	Intel Cor I5
Switch	1	D-Link UI	-
Raspberry Pi 3 Model B+	2	Debian Linux (Raspbian Stretch with desktop)	1.4GHz 64-bit quad-core (Arm 7)

Blockchain setup Environment	
Ethereum implementation	Geth client
Smart contract development environment	Remix (Compiler version 0.4.25)
Smart contract interconnection	Web3 library (version 1.0.0)
Network difficulty	20
Gas limit	5000000
Provider between web3 and blockchain	WebSocket and http
JavaScript environment	Npm 6.4.1

Experiment Sample data

1. (local contract 1)

Resource id	Resource name	Resource permission	Domain Agent Address
1	"TEMP"	"ALLOW"	0x26f6bf76726ef87ab3b329e3fb242d90045c029d
2	"GAS"	"DENY"	0x26f6bf76726ef87ab3b329e3fb242d90045c029d

2. (local contract 2)

Resource id	Resource name	Resource permission	Domain Agent Address
3	"LIGHT"	"ALLOW"	0x3c8195d260fac96419030c322372020158b7948a
4	"PRESSURE"	"DENY"	0x3c8195d260fac96419030c322372020158b7948a

3. (global Contract)

Method number	Resource ID	Resource name	Resource permission	Domain Agent Address	Subject Domain Agent Address	limit
1	3	"LIGHT"	"ALLOW"	0x3c8195d260fac96419030c322372020158b7948a	0x26f6bf76726ef87ab3b329e3fb242d90045c029d	3
2	4	"PRESSURE"	"DENY"	0x3c8195d260fac96419030c322372020158b7948a	0x26f6bf76726ef87ab3b329e3fb242d90045c029d	4
3	2	"GAS"	"DENY"	0x26f6bf76726ef87ab3b329e3fb242d90045c029d	0x3c8195d260fac96419030c322372020158b7948a	5
4	1	"TEMP"	"ALLOW"	0x26f6bf76726ef87ab3b329e3fb242d90045c029d	0x3c8195d260fac96419030c322372020158b7948a	3

Result of the experiment:

1. Gas usage when using local contract only

Subject resource ID	Object resource ID	Gas usage 1	Gas usage 2	Gas usage 3	Gas usage 4	Gas usage 5
2	1	29943	29943	29943	29943	29943
1	2	26137	26138	26138	26138	26138

2. Gas usage when using local and global contract

Method number	Limit	Gas usage 1	Gas usage 2	Gas usage 3	Gas usage 4	Gas usage 5	Gas usage 6	Gas usage 7
1	3	75272	60034	70197	30337	30337	30337	30337
2	4	75540	60302	60302	107322	31229	31229	31229
3	5	75540	60302	60302	60302	107322	31229	31229
4	3	75272	60034	70857	30337	30337	30337	30337