Debugging Report of SWARD Antenna

Customer name:Estone Technology LTD.,

Project name: MD-150

Date: May.20, 2022

Project introduction

1. Brief description of the project

Number of antennas	Machine type
Wifi 2.4G & BT	Tablet
Wifi AUX	Tablet
The back shell is metallic and the front shell is plastic with LCD and TP.	

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Project introduction

2. Brief description of antenna

Antenna number	Name	Working frequency band /MHZ	Material/structure
1	WIFI&BT&5Gwifi	2400MHz/2500MHz&5.8GHz	PCB
2	WIFI&BT&5Gwifi	2400MHz/2500MHz&5.8GHz	PCB

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Antenna layout

Wifi main antenna

Wifi AUX antenna

WIFI&BT Main antenna S11

| 1 | Active Ch/Trace | 2 Response | 3 Stimulus | 4 Mkr/Analysis | 5 Instr State |

Tr1 S22 Log Mag 5.000dB/ Ref 0.000dB [M]

1	2.4000000 GHz	-14.432 dB
2	2.4500000 GHz	-23.469 dB
3	2.5000000 GHz	-9.2781 dB
4	1.5754200 GHz	-2.0295 dB
5	4.8000000 GHz	-11.815 dB
6	5.2000000 GHz	-8.4465 dB
7	5.5000000 GHz	-11.169 dB
>8	5.8000000 GHz	-19.858 dB

1 Start 1 GHz   IFBW 70 kHz   Stop 6.2 GHz

Meas Stop ExtRef Ready Svc 2021-10-08 04:08

Display
Allocate Channels
Num of Traces 1
Allocate Traces
Display Mem
Data -> Mem
Data Math OFF
Equation Editor...
Equation OFF
Edit Title Label

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WIFI&BT Aux antenna S11

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WIFI Antenna active data

机型编号	信道	b模式（11MHz）		g模式（54MHz）		n模式（MCS7）		a模式（54MHz）	
		TRP	TIS	TRP	TIS	TRP	TIS	TRP	TIS
1	1	8.12	-78.83	7.81	-65.82	8.71	-63.32	NA	NA
	7	8.84	-78.3	8.77	-66.25	10.81	-62.9	NA	NA
	13	8.65	-81.55	7.62	-65.35	8.26	-65.48	NA	NA
	36	NA	NA	NA	NA	13.07	-73.66	12.17	-71.12
	100	NA	NA	NA	NA	15.66	-72.47	12.13	-75.47
	165	NA	NA	NA	NA	16.05	-72.17	16.25	-75.65

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BT Antenna Measured Distance & Active Data

Measured effect	
Model number	1
testing environment	SWARD research and development center
testing equipment	Huawei AM08
Test distance	15m ≥

Active data			
Model number	channel		
		TRP	TIS
1	0	5.76	−85.48
	39	5.84	−85.67
	78	5.62	−85.72

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WiFi main antenna efficiency

Passive Test For 2.4G-WiFi-BT										
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)	irectivit (dBi)	Beamwidth (3dB)
2400	40.16	-3.96	2.54	0.39	12.654	27.51	2.54	-13.84	6.5	0
2410	41.25	-3.85	2.64	0.49	12.845	28.403	2.64	-14.3	6.48	0
2420	41.9	-3.78	2.83	0.68	12.875	29.027	2.83	-14.61	6.61	0
2430	41.28	-3.84	2.99	0.84	12.268	29.011	2.99	-15.57	6.84	0
2440	42.82	-3.68	3.1	0.95	12.435	30.385	3.1	-16.66	6.79	0
2450	44.42	-3.52	3.32	1.17	12.597	31.82	3.32	-17.67	6.85	0
2460	44.71	-3.5	3.15	1	12.654	32.054	3.15	-18.47	6.65	0
2470	44.36	-3.53	3.15	1	12.526	31.83	3.15	-18.96	6.68	0
2480	44.3	-3.54	3.02	0.87	12.66	31.636	3.02	-18.15	6.55	0
2490	45.32	-3.44	3.21	1.06	13.018	32.301	3.21	-17.02	6.65	0
2500	43.02	-3.66	2.93	0.78	12.571	30.448	2.93	-16.52	6.59	0

2400.000MHz
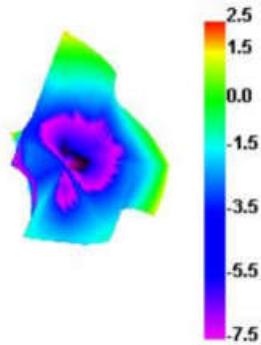
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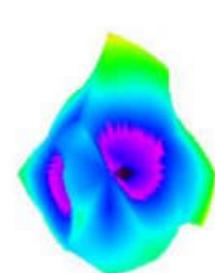
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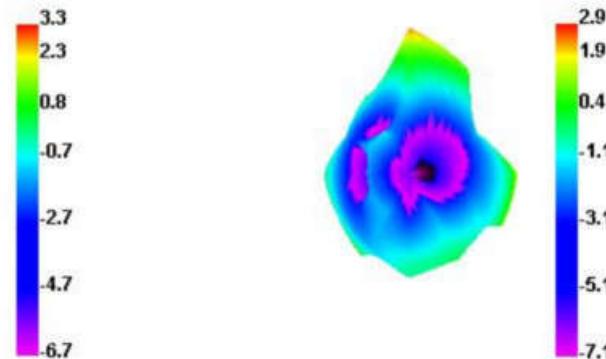
5G wifi Main antenna efficiency

Passive Test For 5G-WiFi										
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)	Directivit (dBi)	Beamwidth (3dB)
5000	46.41	-3.33	5.63	3.48	16.685	29.728	5.63	-23.73	8.96	180
5100	44.22	-3.54	6.08	3.93	14.798	29.423	6.08	-25.12	9.63	30
5200	45.03	-3.46	5.73	3.58	15.618	29.415	5.73	-26.99	9.19	30
5300	38.83	-4.11	4.01	1.86	13.806	25.028	4.01	-23.29	8.12	60
5400	52.31	-2.81	4.73	2.58	18.443	33.87	4.73	-22.11	7.55	0
5500	48.61	-3.13	4.49	2.34	17.582	31.03	4.49	-21.28	7.62	0
5600	45.98	-3.37	4.03	1.88	16.899	29.077	4.03	-22.5	7.41	120
5700	55.37	-2.57	5.05	2.9	20.535	34.839	5.05	-31.45	7.62	60
5800	57.21	-2.43	5.31	3.16	20.64	36.566	5.31	-19.8	7.73	0
5900	55.19	-2.58	4.87	2.72	21.623	33.567	4.87	-22.53	7.46	0
6000	62.04	-2.07	5.55	3.4	25.416	36.629	5.55	-17.58	7.63	0

5000.000MHz

5500.000MHz

6000.000MHz

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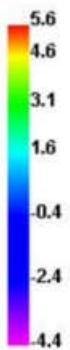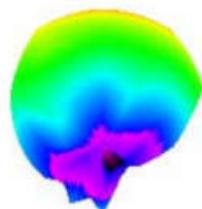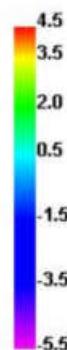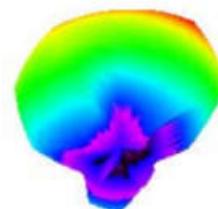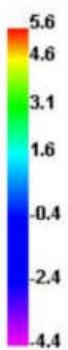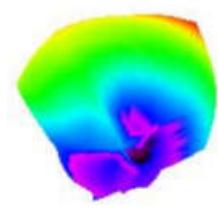
BT AUX antenna efficiency

Passive Test For 2.4G-WiFi-BT									
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)	irectivit (dBi)	Beamwidth (3dB)
2400	43.64	-3.6	4.38	2.23	10.737	32.905	4.38	-17.26	7.98	30
2410	42.79	-3.69	4.29	2.14	10.86	31.935	4.29	-17.52	7.97	30
2420	42.29	-3.74	4.17	2.02	10.989	31.301	4.17	-18.54	7.91	30
2430	40.9	-3.88	4.09	1.94	10.851	30.053	4.09	-19.54	7.98	30
2440	40.97	-3.88	4.1	1.95	10.983	29.987	4.1	-20.74	7.98	30
2450	40.51	-3.92	4.2	2.05	11.021	29.486	4.2	-21.54	8.12	30
2460	38.24	-4.17	4.12	1.97	10.457	27.786	4.12	-22.78	8.3	60
2470	38.76	-4.47	4.03	1.88	9.868	25.892	4.03	-22.42	8.5	60
2480	38.43	-4.76	4.06	1.91	9.237	24.192	4.06	-20.93	8.82	60
2490	38.43	-4.89	4.04	1.89	9.055	23.376	4.04	-18.67	8.94	60
2500	38.44	-5.31	3.87	1.72	8.272	21.169	3.87	-18.7	9.18	60

2400.000MHz
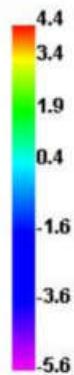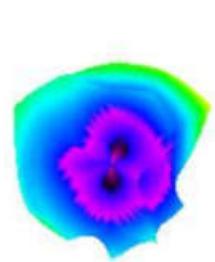
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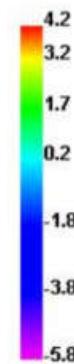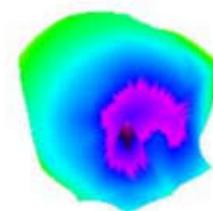
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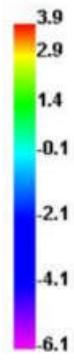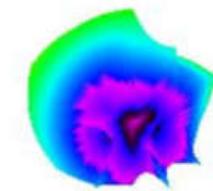
5G wifi AUX antenna efficiency

Passive Test For 5G-WiFi									
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)	irectivit (dBi)	Beamwidth (3dB)
5000	33.52	-4.75	4.52	2.37	8.219	25.298	4.52	-22.55	9.27	0
5100	35.62	-4.48	5.34	3.19	8.175	27.447	5.34	-20.12	9.83	120
5200	38.83	-4.11	4.84	2.69	8.577	30.251	4.84	-28.56	8.95	0
5300	37.13	-4.3	4.54	2.39	7.033	30.102	4.54	-24.13	8.84	60
5400	50.17	-3	7.49	5.34	8.068	42.103	7.49	-21.96	10.49	60
5500	50.53	-2.96	7.97	5.82	8.215	42.314	7.97	-22.16	10.93	90
5600	52.07	-2.83	6.88	4.73	9.852	42.223	6.88	-20.96	9.72	0
5700	63.38	-1.98	7.44	5.29	11.666	51.709	7.44	-20.6	9.42	0
5800	61.11	-2.14	7.26	5.11	12.964	48.151	7.26	-22.98	9.39	0
5900	57.62	-2.39	7.2	5.05	12.502	45.114	7.2	-19.8	9.59	0
6000	62.91	-2.01	6.68	4.53	15.827	47.079	6.68	-22.41	8.69	0

5100.000MHz
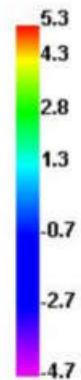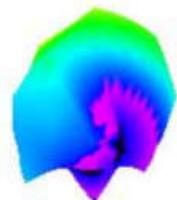
5500.000MHz
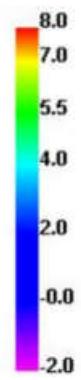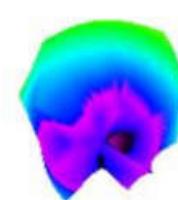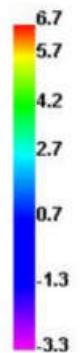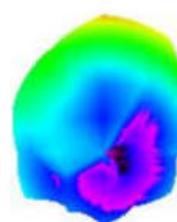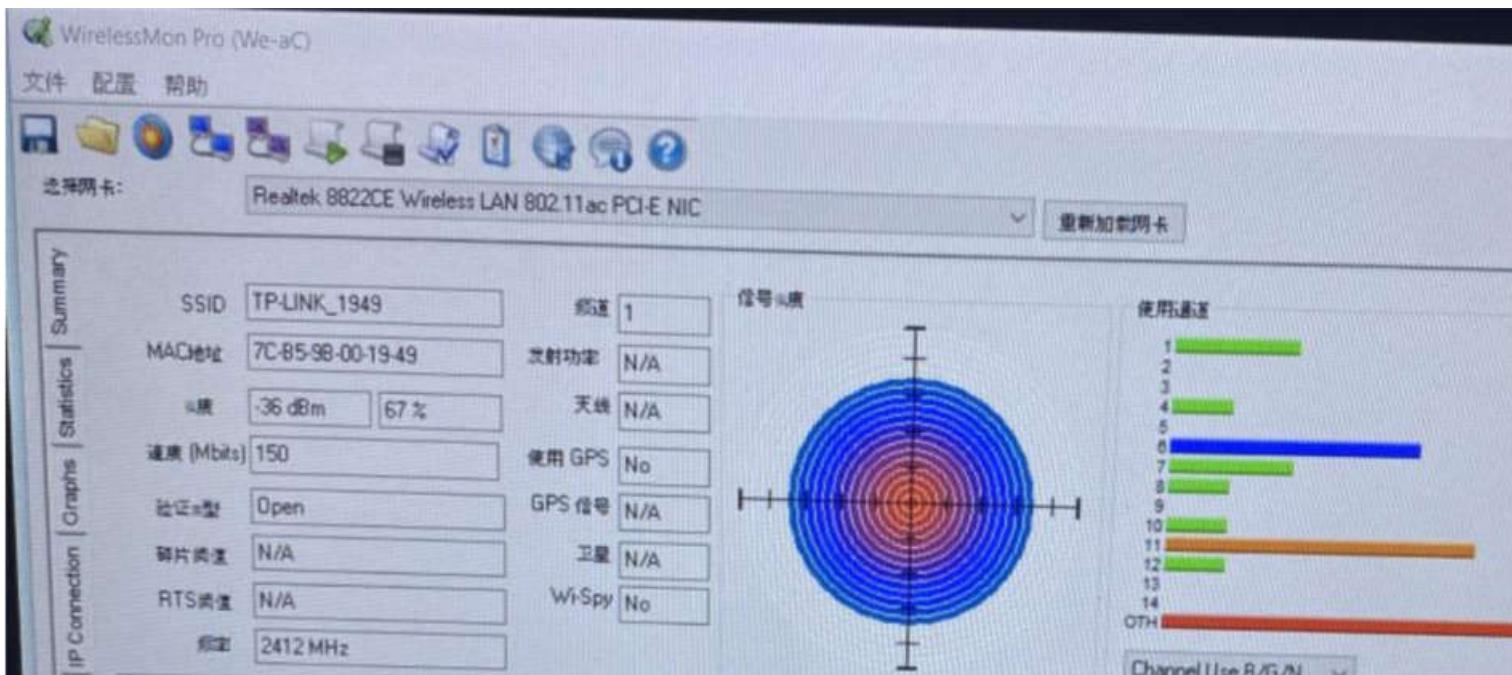
6000.000MHz

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Wifi Antenna signal strength measured pictures (data)

Test location: R & D Office of our company
Test time: 14:00-14:30
Test distance: 10m-15m
Signal strength: - 36dbm to - 40dbm
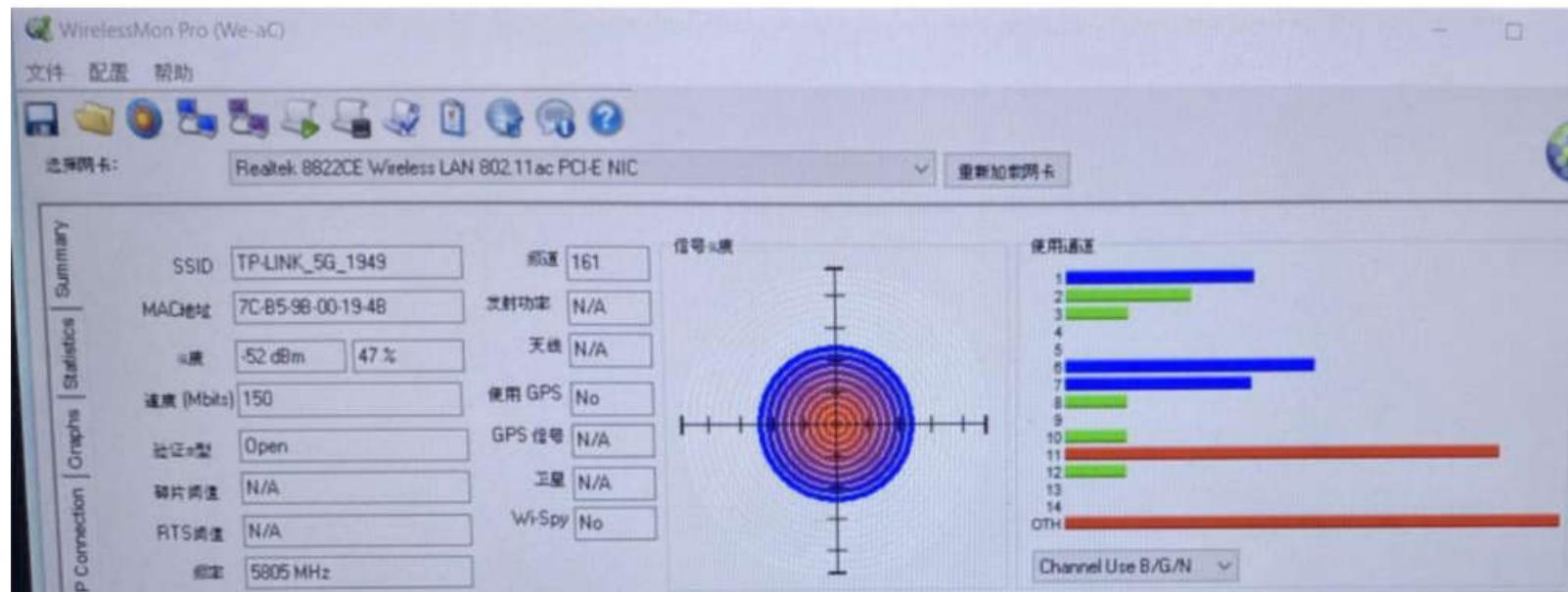
SWARD

Wifi Antenna signal strength measured pictures (data)

Test location: R & D Office of our company
Test time: 14:00-14:30
Test distance: 10m-15m
Signal strength: − 52dbm to − 56dbm

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Environmental treatment and assembly instructions
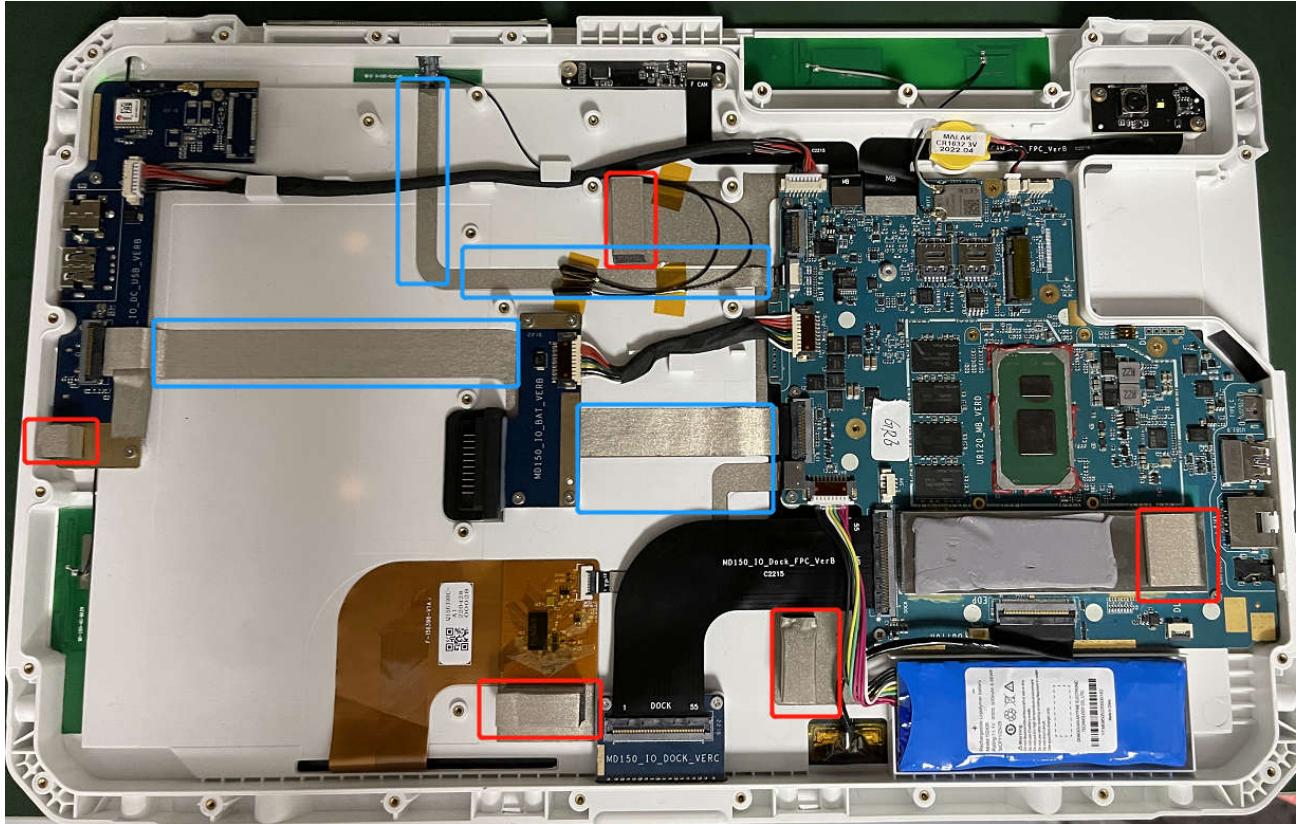
*The red frame is grounded handling with the back shell with conductive foam
*All the blue models are shielded with conductive cloth

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Note: 1.This report is based on the actual debugging and testing of prototype, including environmental treatment, antenna position and the assembly position of each device can not be changed at random;

    2. If there is any change in the materials used in the prototype, it is necessary to feed back to our company for re-verification in time;

    3. List of sensitive components:

TP (material, coating, wiring, etc.)

Screen (amplifying circuit, led, layout design, etc.)

Shell material (antenna assembly mode, structure interference, shell material, antenna position, height and area, etc.)

Main board (main board conduction, RF circuit matching, PA, Duplexer, filter, LNA, power circuit, etc.)

Camera, battery, motor, MIC, fingerprint identification module, etc

    4. Due to the small quantity or only one sample during debugging machine, some probability problems can not be completely found out. It is suggested to conduct small batch trial production before mass production to find out the problem (such as flashing screen and crashing screen, horn noise, TP jump point, black screen crash, signal diving, etc.)

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