To Catch A Vibe: Identifying covert drone clones through transmitter wireless frequency bands

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Executive summary:

Da-Jiang Innovations, most commonly known as DJI, is a Chinese hardware manufacturer based out of Shenzhen that holds more than 70% of the worldwide drone market-share. (https://blog.bccresearch.com/top-10-companies-leading-the-drone-technology-market)

Its product lines include consumer cinema drones, agricultural drones, professional high grade movie production drones, FPV (First Person View) racing drones, action cameras, mechanically stabilized cameras and gimbals, video and audio transmission systems, robot vacuums, LIDAR sensors, electric bikes, and more.

DJI drones are used by security/military forces and law enforcement departments globally due to strong retail availability, ease of use, decent feature set and competitive pricing options. The use of hardware made by Chinese companies poses a threat to end users of the products, especially when conducting sensitive operations that require operational security (OPSEC). Chinese companies have to adhere to China's National Security Law (https://www.cna.org/quick-looks/2023/chinas-national-security-laws-implications-beyond-borders).

This law would force DJI to "report to and cooperate with PRC authorities, and they must assist with state-directed intelligence and counterintelligence efforts" if the CCP felt the need to weaponize DJI's vast data trove and/or existing hardware fleet deployed around the world.

The US government considers DJI to be a military company (https://media.defense.gov/2022/Oct/05/2003091659/-1/-1/0/1260HCOMPANIES.PDF) since 2021. Both the Department of Defense (https://www.defenseone.com/technology/2017/08/us-army-just-ordered-soldiers-stop-using-drones-chinas-dji/139999) and the Department of Interior (https://www.commercialuavnews.com/security/dji-drones-grounded-department-of-the-interior) have banned the use of DJI drones.

The US Customs and Border Protection agency is turning away shipments of DJI equipment due to the Uyghur Forced Labor Prevention Act (https://www.airsight.com/en/news/dji-customs-labor-compliance).

DJI also faces a complete ban in the US, the FCC might revoke their wireless spectrum licenses and therefore no newer DJI equipment would be able to be registered for potential sales in the US.

Against this backdrop of scrutiny and potential of losing the one of the world's biggest markets for drones DJI has taken a curious approach to ensure their dominant foothold isn't chipped away by competitors and sales continue uninterrupted in the United States.

DJI has spun up a network of front companies, that on the surface look like independent hardware OEMs, but in reality act as a vessel for selling DJI equipment.

Little Green Drones:

The first DJI shell companies to be deployed are Cogito Tech and Anzu Robotics.

Cogito carried the Specta Air and Specta Mini. Specta Air is a whitelabelled DJI Mavic Air 3 and the Specta Mini seemed to be a white label variant of the DJI Mini 4K / Mini2.
Anzu carries a clone of the DJI Mavic 3 Enterprise dubbed the Raptor. An in depth analysis (https://github.com/MAVProxyUser/BizarreActorPoutsOn) confirms that the DJI roots are not just cosmetic, rather they extend to the core of these white label attempts all the way down to the software level. DJI's entire cryptographically signed software "module" infrastructure is used by these white labels making them impossible to exist without DJI approval.

image source: https://www.anzurobotics.com/

DJI drones stand apart from the rest of commercial grade drones due to their use of proprietary in-house built communications hardware. Whereas other companies might use PX4 or similar open source software relying on MAVLink and off-the-shelf radio kits, DJI has developed their own radio comms chipsets and hardware for use in their products, and these chips are not available for sale to other companies or to end users. DJI is the sole user and manufacturer of OcuSync (https://fpvwiki.co.uk/dji-ocusync-p1-soc) transmission systems, and does sometimes do tech transfers/licensing deals of the technology to approved partners such as Caddx, this is how the Caddx Vista (https://oscarliang.com/caddx-vista-vtx/) FPV transmission system unit is able to pair to DJI FPV goggles.

The OcuSync chips are peculiar in the use of the RF spectrum, whereas other chips would use high bandwidth in approved ISM frequencies, eg: 2400 - 2500 MHz, since DJI designs the chips they've also thought about which frequency bands to use and how to best employ the available RF spectrum space, and optimize their hardware for it, meaning the antennas and chips are designed at the lowest level to play best with specific preselected frequencies.

DJI OcuSync frequencies, especially those used by the DJI Mavic3 drone, are well known in Ukrainian radio reconnaissance circles. You can literally detect if the 2.4 Ghz/5.7-8 GHz emissions is coming out of a Mavic using a <400 USD spectrum analyzer + inexpensive LNA

Every RF-capable device that is available for sale in most of the world has passed through a government certification. The body that is responsible for managing this certification process

in the United States is the Federal Communications Commission (FCC). The FCC allows consumers to check whether a device they have bought is compliant with US laws by serving an online portal where one can input the make and model of the device and check the corresponding certification documents.

There are third party aggregators that index such documents and allow for querying the FCC database in a user friendly way. One such portal is fccid.io .

On March 23, 2024 I came across Cogito thanks to Half Chrome (https://www.halfchrome.com/cotigo-specta-air/) (hat tip to Kevin Finisterre!). This posed some interesting questions: Cogito is clearly linked to DJI because the drone they're selling is a DJI Mavic Air 3. How many other drone clones are currently on sale in the US? Is this a strategy to bypass a ban? Are they seeding dormant shells for activating them later on? How many "not DJI" drones are out there?

The Cogito Specta drones were made in Malaysia and sold exclusively in the US. See the difference in certification logos between the Air 3 and the Cogito Specta Air:

image source: [fcc.gov](fcc.gov)

It made sense to probe the FCC for equipment which uses known DJI OcuSync frequency high/low pairs, and filter out drones registered by DJI.
Because of DJI's use of specific frequencies in the development of OcuSync hardware, it's possible to build a fingerprinting system to query the FCC for all drones which use OcuSync chipsets.

One such frequency pair is:
lower_freq = 5745.5
upper_freq = 5829.5

Registered in the FCC as having an allowed maximum power output of 688.7 mW (https://fccid.io/2BBYS-RAPTOR), this frequency pair is used by many of DJI's aerial products and a suitable candidate for finding DJI hardware in the FCC databases.

In 2024, I used the fccid.io portal to query for hits, using a simple Python script which scraped the results from the resulting HTML output.

Snippet cleaned up, annotated, and adapted from:
https://github.com/KonradIT/dji-front-companies/blob/main/dji-shells.py

```
# Known DJI frequency band pair, only used by DJI OcuSync devices.
lower = "5745.5"
upper = "5829.5"

# Company names belonging to DJI.
known_dji_entities = [
        "SZ DJI TECHNOLOGY CO., LTD",
        "SZ DJI Osmo Technology Co.,Ltd."
]

response = requests.get(
        f"https://fccid.io/frequency.php?lower={lower}&upper={upper}&exact",
        cookies=browserstorage.get("fccid.io").get("cookies"),
        headers=browserstorage.get("fccid.io").get("headers")
)
html_content = response.text
soup = BeautifulSoup(html_content, 'lxml')
data = []

def process(table_column):
        # snipped for brevity

for row in soup.select("table tr")[1:]:  # skipping the header row with [1:]
        cols = row.select("td")
        if len(cols) > 0 and (cols[0].contents[2].text.strip() not in known_dji_entities):
                data.append(process(cols))
```

The issue with the fccid.io aggregator is it's slow to gather data. Querying the FCC.gov site would yield results just as those have been processed by the system and the delay in finding new DJI shell companies would be minimal.

For the time being, in 2024, Anzu and Cogito were the only two shells registered. DJI seemed to be testing the waters for how to deploy new shells, only starting with a few.
DJI also registered drones with "WiFi Enhanced" (not OcuSync) frequencies, such as Specta Mini. Those are not shown on the github list yet.

Blueprint Supreme:

Anzu Robotics registered their Raptor drone on 28th December 2023, shortly after Cogito, which registered their Specta Air on 25th October 2023. This would be the first public attempt at bypassing future US government restrictions by a Chinese company.

The blueprint, extremely simple in nature and easy to replicate by other Chinese companies in hot water, would not be deployed by DJI just to sell three consumer-grade drone models in the United States. Anzu Robotics has an air of legitimacy around it. Founded by ex DJI/Autel employee Randall Warnas, with an office in the US and with factories in Malaysia, it's DJI's "clean" way to pass their drones under scrutiny.
Anzu Robotics CEO said to the NYTimes (https://www.nytimes.com/2024/05/24/business/china-drones-anzu-dji.html):

Their goal, he said, "was to somehow cleanse the Chinese-ness from their technology to make it so that there was still an avenue" for sales in the United States.

The only problem is, the "Chinese-ness" is very much still there. Andreas Makris, jcase and Kevin Finisterre demonstrated it in the paper titled "Anzu Raptor Drone, RC and App - A quick analysis" (https://think-awesome.com/Anzu_quick_analysis.pdf).

Fast forward to 2025, DJI has kicked into high gear and began spinning up new shell companies and registering drone clones in the FCC.

Each shell company consists of:

- US/Hong Kong company
- 2x FCC registrations, one for the aircraft and one for the controller
- Android app
- Apple iOS app
- Website
- USB vendor ID registration
- MAC address vendor ID registration

In 2025 I decided to revamp my automated FCC lookup script, which until then lived in a Raspberry Pi 4 computer sitting in my closet, to something which alerted me and whoever is interested wherever new results appeared.

The first step was to query the FCC.gov site directly. Then the script needed to output the results somewhere public, and with some sort of auditable traceability.
GitHub Actions, configured to run every day, would run the script and git commit the changes done to a file where all shells would be written into.
The resulting script, much more complex, lives here:
https://github.com/KonradIT/dji-front-companies/blob/main/main.py
And the resulting list of shell companies:
https://github.com/KonradIT/dji-front-companies?tab=readme-ov-file#drones-submitted-to-the-fcc-by-dji-shell-companies

The Hunt for Reds in October:

As of late October 2025, this is how DJI's network of shell companies looks like:

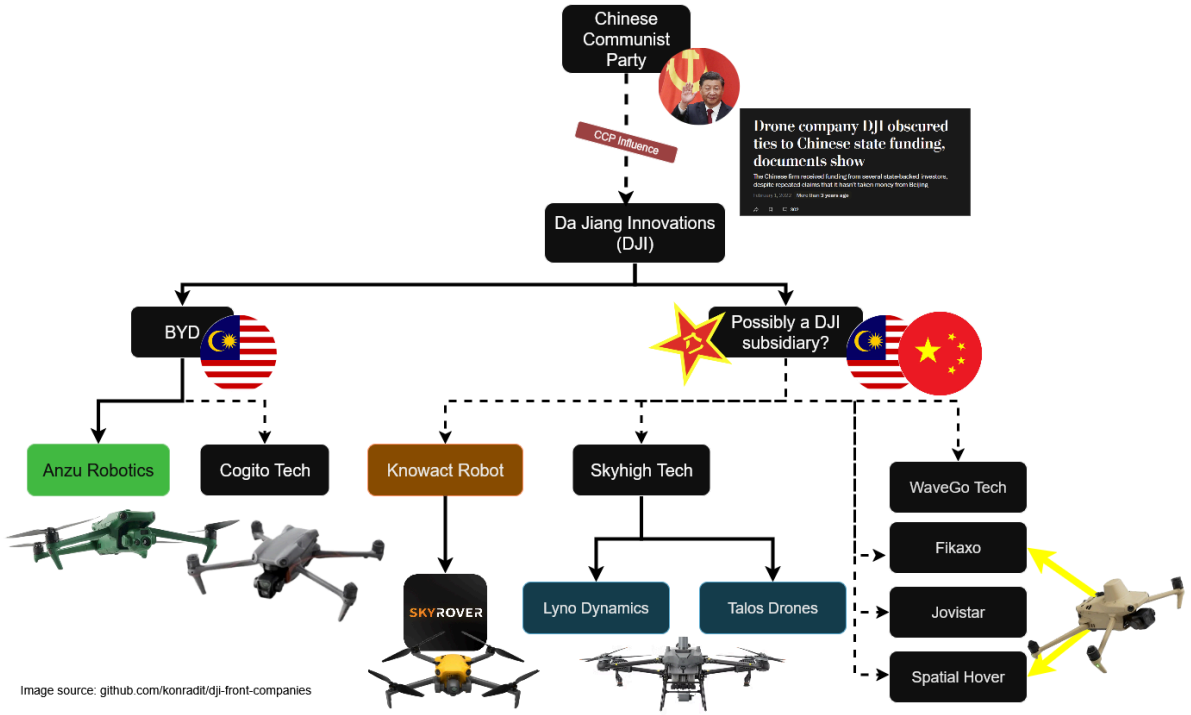


image source: view the latest at
https://github.com/KonradIT/dji-front-companies/blob/main/house-of-dji.png

Every single one of these shell companies is tied directly to DJI because these are a front for selling soon-to-be banned hardware, identical in every way to DJI's own offerings.
Due to the way OcuSync is built, it's not feasible to change the operating frequencies of the antennas, chips and other hardware, so each shell company has to legally specify the frequencies used by the hardware, which are exactly the same ones as the DJI drones they're trying to pass as their own.
The script currently on GitHub uses:

```
FrequencyPair("5745.5", "5829.5")
```

The same frequency band that is used by the DJI Mavic 3, as well as their clones Anzu Robotics Raptor, Cogito drones, etc…

By January 2026 DJI could be banned if the US government deems DJI to "pose an unacceptable risk to the national security of the United States". Or, if no competent agency takes up the task of probing DJI's internals, it will be automatically banned.

There was an uptick in FCC registrations leading up to October in anticipation of a ban.

Applicant Name	FCC ID	Registration Date
SPATIAL HOVER INC	2BQAI-S3T	2025-09-30
Lyno Dynamics LLC	2BQ98-LD220RC	2025-09-29
Jovistar Inc.	2BRGW-FKAWZJO	2025-09-25
FIKAXO TECHNOLOGY INC	2BRQB-FKABZFI	2025-09-19

Due to the ongoing Trump administration's government shutdown, DJI is unable to register more drones under shell companies in the FCC.

DJI is not yet on the FCC Covered List (https://www.fcc.gov/supplychain/coveredlist) but a potential vote could render DJI's shell company game useless: the FCC is due to vote whether companies using tech from companies in the covered list would be able to continue to sell devices or not. DJI's strategy hinged on a paragraph seen in all FCC filings:

1. [xxxx] certifies that the equipment for which authorization is sought is not "covered" equipment prohibited from receiving an equipment authorization pursuant to section 2.903 of the FCC rules.
2. [xxxx] certifies that, as of the date of the filing of the application, the applicant is not identified on the Covered List as an entity producing "covered" equipment and is not an affiliate or subsidiary of an entity identified on the Covered List

source: https://fcc.report/FCC-ID/2BCHV-TQFDUB1/7129851.pdf

Several lawmakers have used research materials outlined here to advance their agendas.

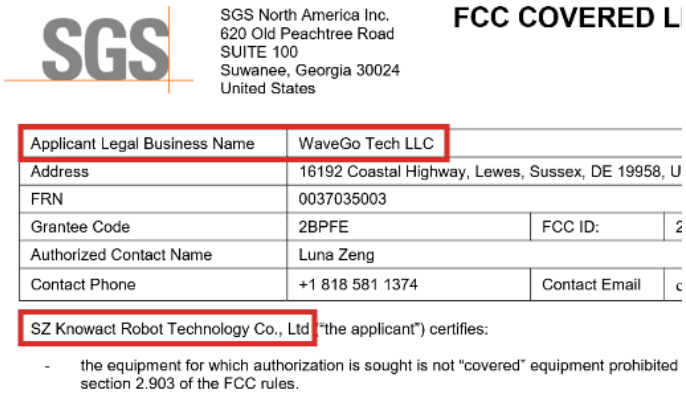
- Select Committee On The CCP: https://selectcommitteeontheccp.house.gov/sites/evo-subsites/selectcommitteeontheccp.house.gov/files/evo-media-document/2024-08-20%20-%20DOC%20Anzu%20%2B%20Cogito%20Letter.pdf
- Rick Scott letter: https://www.rickscott.senate.gov/services/files/C95A5BB2-512D-4FCA-AB32-7419A9968D18

It is unclear whether this strategy is being deployed by other Chinese companies.
The script continues to work albeit with no data to poke at due to government shutdown.
Several DJI shell companies appear dormant with a "coming soon" landing page in place.

Vibe shifts:

There is evidence that suggests two or more shell companies are directly run by the same group of people, or are in close coordination.

The FCC filing for the WaveGo drone accidentally copy-pasted a document from SZ Knowact, an existing and known DJI shell company.
https://github.com/KonradIT/dji-front-companies/blob/main/2bpfe-dd001-covered-list.pdf



SGS North America Inc.
620 Old Peachtree Road
SUITE 100
Suwanee, Georgia 30024
United States

FCC COVERED L

Applicant Legal Business Name	WaveGo Tech LLC		
Address	16192 Coastal Highway, Lewes, Sussex, DE 19958, U		
FRN	0037035003		
Grantee Code	2BPFE	FCC ID:	2
Authorized Contact Name	Luna Zeng		
Contact Phone	+1 818 581 1374	Contact Email	c

SZ Knowact Robot Technology Co., Ltd ("the applicant") certifies:

- the equipment for which authorization is sought is not "covered" equipment prohibited section 2.903 of the FCC rules.

In another case, the website for Fikaxo displayed a drone model that would later turn up in Spatial Hover's website.

Fikaxo's T1 drone, archived: https://archive.is/n5So9
Spatial Hover: https://spatialhover.com/

DJI controls the source code, firmware, firmware OTA distribution, mobile apps, webservers and pretty much all infra tied to these shell companies.

Shouts:

- DJI OGs: Kevin "d0tslash" Finisterre, Andreas "bin4ry" Makris, Jon "jcase"' Sawyer
- Sean Hoyt "Deadman_Android"
- [redacted], Armed Forces of Ukraine

Browse the shell company list:
https://github.com/KonradIT/dji-front-companies