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Ukraine – Missed Opportunities and Expectations vs. Reality

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As the world watches the deeply troubling images of war in Eastern Europe, it is natural to wonder what caused this tragedy and what might have prevented such a dark series of events. In this white paper we outline one such missed opportunity.

In early 2021, CubeCab was asked to put together a proposal for the Ukrainian government to replace a geostationary telecommunications satellite project that was hijacked by Russia¹. CubeCab is an early-stage satellite launch company based in Silicon Valley with a mission to make small launch capability accessible to anyone, from universities to friendly nations which lack the wealth of economic superpowers.

Our proposal was to partner with a LEO-based private label internet-from-orbit solution, combined with a move to Television-over-IP on a widespread basis. This would have the effect of “lighting up” all of Ukraine with satellite-based high-speed internet (20-40mbps average on any given client). The proposed solution was broadly similar to the Starlink concept, but our plan was to use a higher density of smaller (5kg) satellites, providing more granularity and, a much higher density of concurrent users. The plan quickly evolved as follows:

1. Core plan involving ~300 satellites in multiple planes to provide high fidelity coverage throughout Ukraine.
2. Split into 2 stages:
 - Stage 1: build and fly 30-35 satellites to provide satellite-based communication/data/IMINT for Ukrainian government. To be delivered and operational by Feb 1, 2022.
 - Stage 2: build and fly a 300-satellite commercial network as outline above.
3. We subsequently identified teaming/partnership possibilities with:
 - (a) US Alaskan Indian tribal corporations (for rural broadband provisioning in Alaska – orbital planes line up quite nicely to cover most of the state).
 - (b) Turkish, Israeli, Egyptian, and East African providers for similar partnership opportunities.
 - (c) Maritime/shipping partners for both satellite and wireless data coverage of the Red Sea/Gulf of Aden region for maritime security purposes.

¹ <https://www.broadbandtvnews.com/2020/10/09/spacecom-eyeing-ukrainian-satellite/> for light background + the geostationary solution

The Stage 1 component quickly grew to include training and deployment not just of satellite based uplinks, but also full-range wireless/VOIP comms capabilities down to the platoon/company level, plus assorted C4I capabilities. The command-and-control capabilities and intelligence sharing capabilities that were envisioned do not come near those of the US Army's Blue Force Tracker², but shared environment applications and terminals could be layered onto the basic networking environment relatively easily.

After an initial rush of excitement, Ukrainian defense officials, and their US interlocutors, unfortunately stopped engaging in a meaningful way. In July of 2021, we were reapproached and asked, "if we throw lots of money at this, can you do it in six months?" That was not realistic, as the 12-month timeline we had outlined was about as tight as we could pull off, barring a 9-digit budget with which to work. The initial proposal we had put forward had both 12 and 24 month development plans, with the 24-month budgeted at about \$18M through initial demonstration, and an estimated \$50M for the 12-month plan with initial 35 satellite tranche.

In August 2021, you may recall that there were significant protests in Havana, Cuba. In response, the Cuban government cut off internet access³. This led to calls for rapid-deployment solutions for open-access internet, which were later codified in a proposal to the US Congress (H.R. 5123, "American Freedom and Internet Access Act of 2021"⁴, aka Operation Starfall⁵). Given what we had designed for the Ukrainians, the extra capability was a trivial ask, mostly involving provisioning additional downlink and crosslink capacity to spread a higher expected traffic load and opening access on a public basis. This was very doable, and easily deployed over almost any place that a bad actor would want to choke their own people off from the internet.

Moreover, there were a few "weaponization" options we put forward, at least one of which would have been useful in the current circumstance (Rods From the Gods (RFG)⁶, a smart kinetic strike implementation).

Capabilities which would have been live on Feb 14th, 2022

Base minimum capability:

- Testing completed and flying satellite-based IP network, with multiple redundant global downlinks, providing a secure, end-to-end encrypted network; 30 satellites across two planes covering all core areas currently being attacked in Ukraine. This would have been integrated into the Ukrainian command-and-control network, providing much deeper/higher fidelity C3I than currently exists.

² https://en.wikipedia.org/wiki/Blue_force_tracking for overview

³ <https://abcnews.go.com/Technology/wireStory/cubas-internet-cutoff-tactic-global-despots-78804049>

⁴ <https://www.congress.gov/bill/117th-congress/house-bill/5123>

⁵ <https://salazar.house.gov/media/press-releases/rep-maria-elvira-salazar-launches-operation-starfall>

⁶ https://en.wikipedia.org/wiki/Kinetic_bombardment

- Note that Starlink has shipped their ground terminal in and lit up service for free, but there is no integration nor C3I attached to that effort. This is helpful for civilian applications, but not as much for warfighting capabilities.
- Minimum five real-time high-resolution video satellites embedded into those constellations, providing near-continuous reconnaissance of Russian capabilities and positioning (this to some extent duplicates existing NRO and commercial capabilities, but in a Ukrainian-owned structure). Replacements/supplements flyable on 24-48 hours notice. This would have provided real-time, full discrimination satellite intelligence, rather than the obfuscated information being provided by US and German analysts. One option for this would have been customized versions of Planet Labs' Dove satellites, which are already flight-proven, tailored to specific Ukrainian requirements.⁷
 - "In Washington and Germany, intelligence officials race to merge satellite photographs with electronic intercepts of Russian military units, strip them of hints of how they were gathered, and beam them to Ukrainian military units within an hour or two."⁸

The above was not an aspirational goal, but rather was contractually achievable.

In addition, we would have been able to achieve end-to-end testing for the kinetic strike option prior to 2/14/2022 and roll immediately into production/use if the tests went well. Following successful testing, we would have then had 15-20 articles in hand by 2/24/2022 (since we could pre-produce many of the pieces, and then move directly to final assembly, incorporating any necessary changes at that stage). It is our considered opinion this would have allowed significant disruption of the Russian amphibious assault on Mariupol, and attacks on 5-8 other key targets that might otherwise be range/capability limited (ex: S-400 fire control centers and radars, opening strike corridors to Russian air and missile bases; cutting the Crimean Bridge across the Kerch Strait; a direct attack on the Russian cruiser Moskva⁹, which has been acting as a primary air defense node near Crimea). The primary hurdle at that point would be to bolster production: we estimate that we would have produced around 1/day unless funding was dramatically ramped up.

Perhaps more importantly, courtesy of the high-polar orbital planes we would have been working with, our internet capability would significantly negate Russia's ability to block their own populace from hearing the truth regarding events in Ukraine, which they have been doing as a means to control information access¹⁰. Their internal propaganda has been focused on portraying this as a limited operation in Donbass/Luhansk, which is obviously not the case to anyone with independent access to reports or satellite imagery. There are multiple documented cases of Russian troops calling home and reporting what was really going on, to the surprise and

⁷ <http://content.satimagingcorp.com.s3.amazonaws.com/media/pdf/Dove-PDF-Download>

⁸ <https://www.nytimes.com/2022/03/06/us/politics/us-ukraine-weapons.html>

⁹ https://en.wikipedia.org/wiki/Russian_cruiser_Moskva

¹⁰ <https://www.cnn.com/2022/03/07/tech/russia-internet-facebook-block-iron-curtain/index.html>

alarm of their relatives who only had access to Russian propaganda¹¹. Increasing access to information will undoubtedly lessen the support of everyday Russians.

Moving Forward

CubeCab is a young and nimble company. We are very anxious to contribute to the fight against totalitarianism and global terrorism. We are hopeful that we do not see a repeat of what has transpired in Ukraine in places such as Saudi Arabia, Taiwan, Cuba, South Korea and other places. Often technology is far ahead of policy, and this is true here. Our goal is to get ahead of the future fight, not be reacting to past events.

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¹¹ <https://www.military.com/daily-news/2022/03/01/captured-russian-troops-call-home-while-filmed-ukrainian-officials-raising-geneva-convention.html>