A High Quality Wireless Video Streaming Module for Drones

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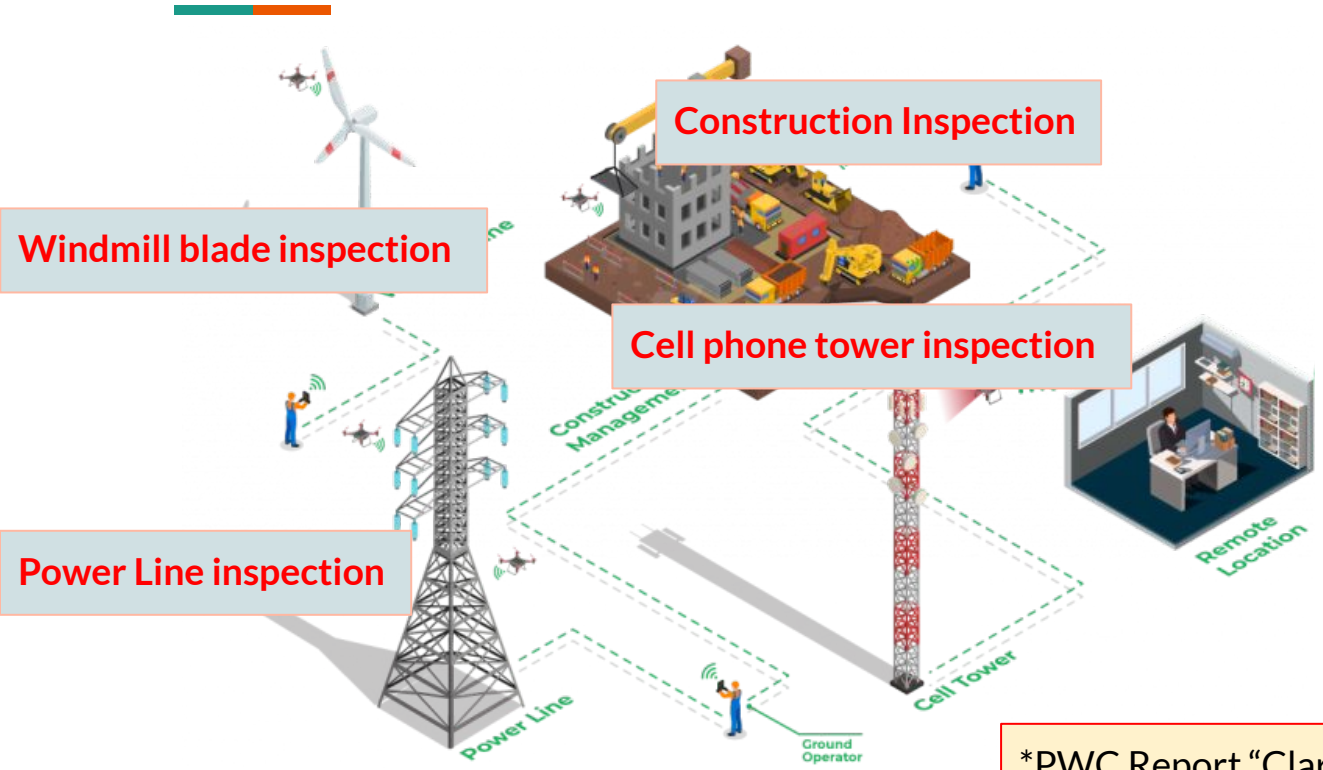
About AeroStream+

An end to end wireless high quality video transmission and reception solution targeted at the commercial drone industry

Key Features

- Supports 4K / 8K resolution
- Supports HDR (High Dynamic Range) video for low light photography
- Supports latest video codecs to efficiently use RF spectrum
- Long Range
- Resilient to High Mobility environments
- Geofencing based video obfuscation
- Encryption and Privacy Preservation

High Quality Video Applications I



- Using a drone cuts the cost of windmill blade inspection by around 50% to $750 *
- Avoids redundant inspections of cell towers by personnels driving vehicles and climbing towers.

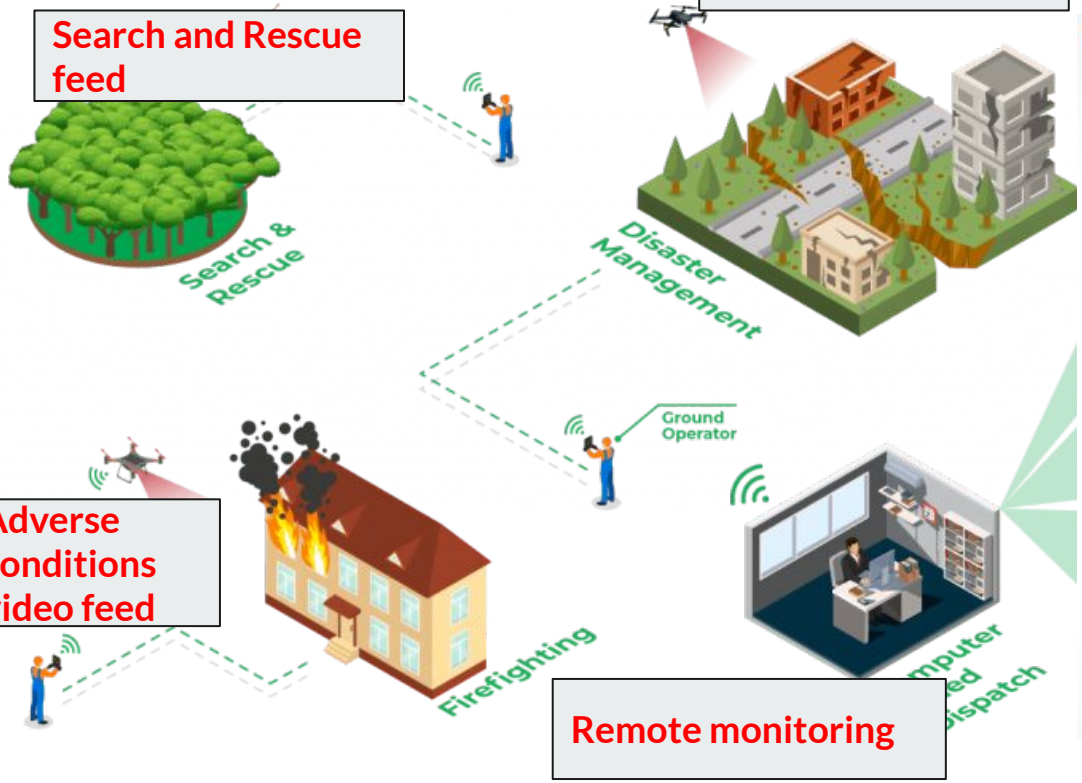
*PWC Report “Clarity from above” 2020

High Quality Video Applications II

Video journalism

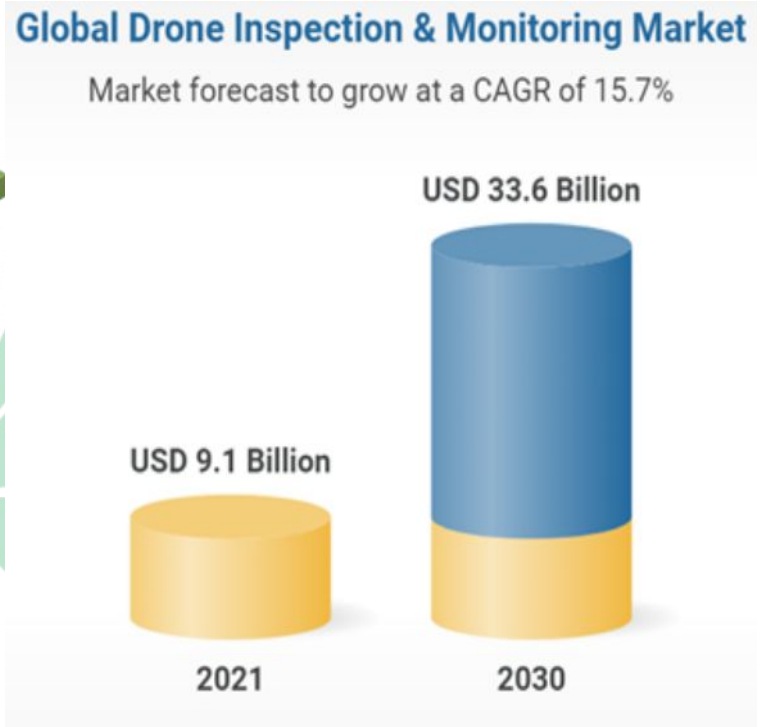
-> Ukraine crisis

Search and Rescue feed



Adverse conditions video feed

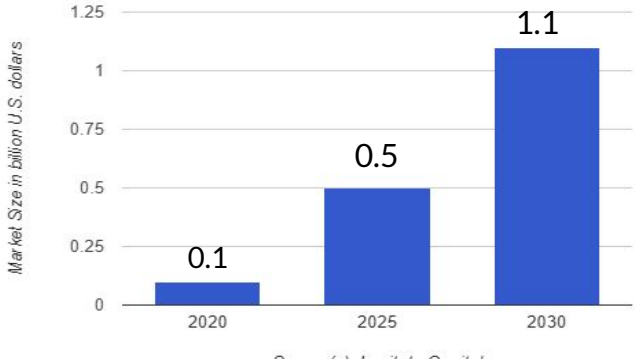
Remote monitoring



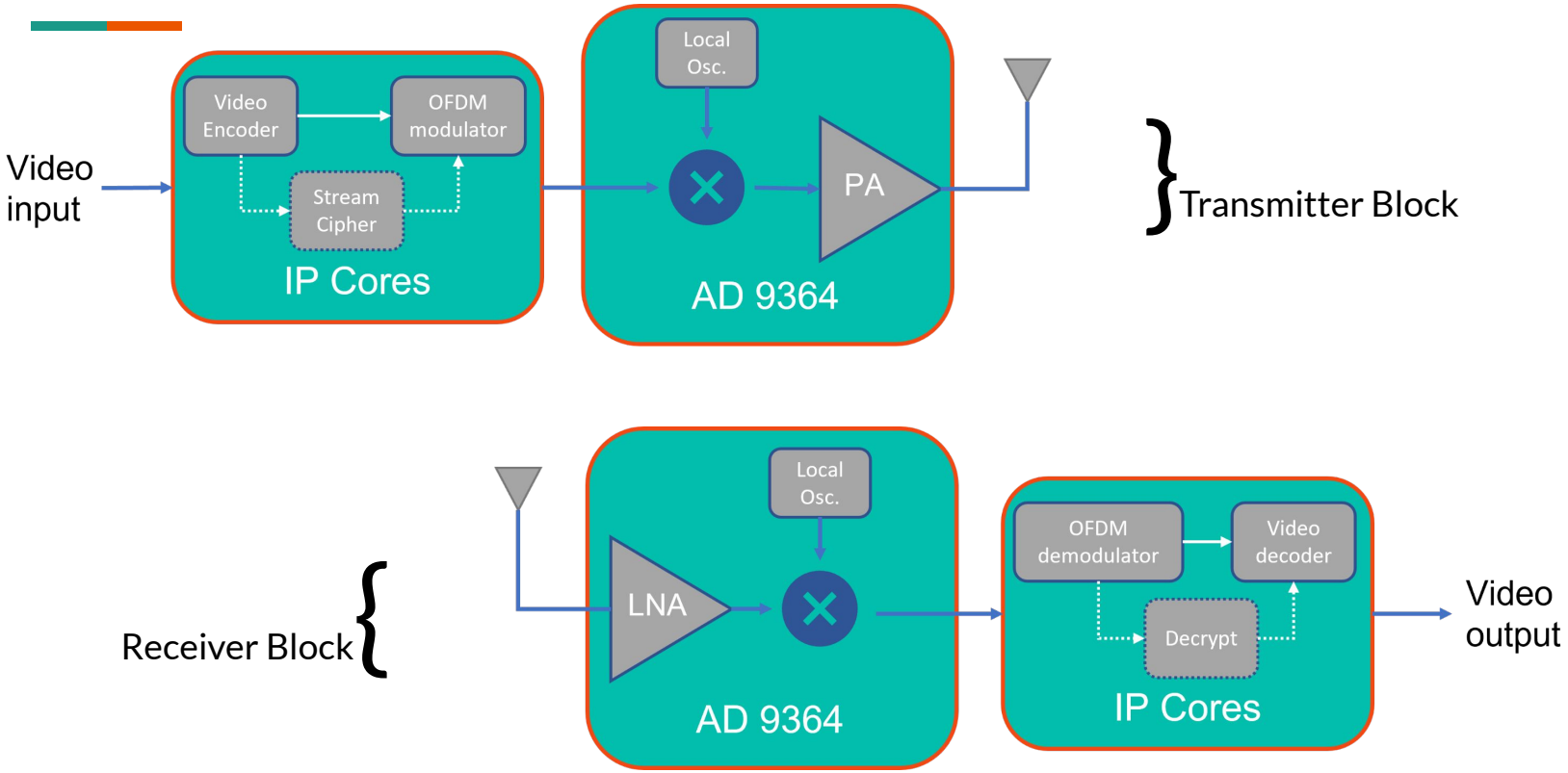
Cinematography

- Provide better views from multiple angles
- Drones are cheaper to fly than Helicopters
- Can film in small and concise spaces where helicopters can't reach (Eg: Between 2 buildings)
- Capture fast moving & adventurous shots
- Sochi Olympics 2018 was covered using drones

Cinematography drone market size projections (in Billions of Dollars)



System Design



Video Codec Comparison

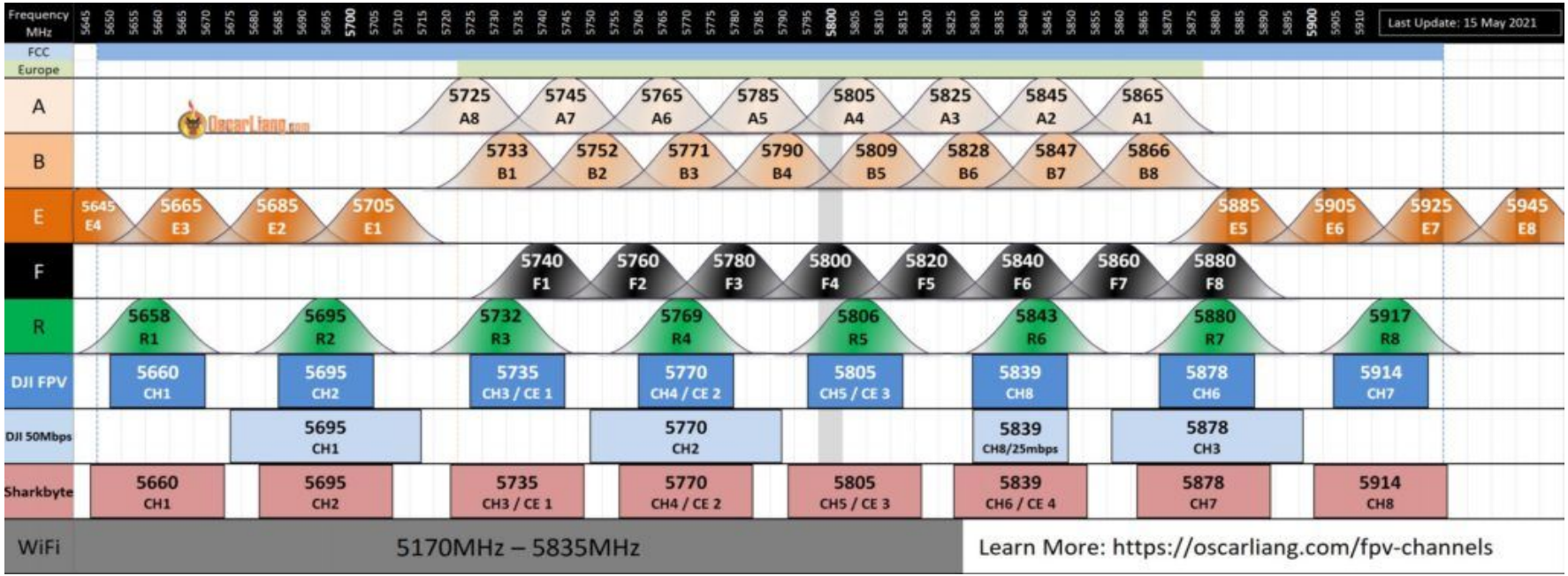
Codec Standard	License	Publisher	Year	Compression ratio	RF Bandwidth (using rrc a = 0.3)
H264/MPEG-4 AVC	Patented	ISO, IEC, ITU-T	2003	200	13.5 MHz
H265/HEVC	Patented	ISO, IEC, ITU-T	2013	400	6.75 MHz
VP9	Open-source	Google	2013	400	6.75 MHz
AV1	Open-source	AOMedia	2018	540	5 MHz

RF Bandwidth Calculation

Field	Value
Uncompressed bitrate	12000 Mbps
Compression ratio	540
Compressed bitrate	22 Mbps
Modulation order	64 QAM
Symbol rate	3.6 Msps
RF bandwidth (using rrc and α = 0.36)	5MHz

The compression ratio offered by AV1 is 2.7 times higher than H264 which leads to the RF bandwidth of 5 MHz and 13.5 MHz respectively

RF Spectrum Efficiency



Video Codec	AV1	H.265	VP9	H.264
Users Supported	18	16	16	8

Tackling high mobility environment challenges

For an expected Max Doppler of 1000 Hz at 5.8 GHz, the subcarrier spacing is chosen to be 10 Khz

Security Features

- Geofencing
  - Drone controller interface
  - Automatic video obfuscation
- Encryption
  - Stream cipher (e.g., ChaCha20[9] or Simon[10])
  - Trade-off: Lower resolution and fps
- Privacy
  - Videos are not locally stored
  - Stealing drone does not reveal user's videos

Market competition

Name	Live Stream	Codec	Multiplexing Technology	Range (km)	Latency (ms)	Geofencing
DJI Phantom 4 Pro v2.0[5]	1080p at 30 fps	H.265	TDM	10	170	✔
DJI Inspire 2[5]	1080p at 30 fps	H.264	TDM	7	220	✔
PowerVision Powereye[6]	N/A	H.264	N/A	5	300	✘
Autel EVO II[8]	1080p at 30 fps	H.264/ H.265	N/A	5.2	240	✔
HD Zero[17]	720p at 60 fps	✘	OFDM	7.3	25	✘
Our product	4K at 60 fps	AV1	OFDM	~10	~100	✔*

*Automatic video obfuscation

Product Development cost

Personnel Cost

- Operations manager: $110,000[3]
- PCB designer: $92,000[1]
- Embedded System Engineer: $90,000 [1]
- Chip designer: $81,000[2]

One time cost

- IP licensing (agency)
- Prototype fabrication (MPW service provider)[4]

Type of cost	Amount (USD)
Payroll per annum	373,000
IP Core purchase cost	250,000
Chip fabrication	300,000
Manufacturing cost	500,000
Marketing (reach: 600,000+)	20,000
Equipment cost	100,000
Operating cost	50,000

Timeline

Time Frame	Goals	Associated Cost (USD)	Total Cost (USD)	Revenue (USD)	Net Profit (USD)
Year 1	Chip fabrication	Payroll (373,000) IP Core (250,000) Fabrication (300,000)	923,000	0	0
Year 2	Prototype Testing & certification Production and Sales	Payroll (373,000) Manufacturing (500,000) Equipment cost (100,000) Operating Cost (50,000) Marketing cost (20,000) = Total (1.043 Million)	2.14 Million	349/unit x10,000 units = $3.49 Million	1.35 million

Total cost / unit = $ 214

Proposed selling price / unit = $ 349

Our Business Plan

- Direct to consumer
- Partnership

- Per unit MSRP: $349
- Profit margin: 38.6%
- Initial funding: $800K for 13% stake in the company

- Initial Public Offering (IPO)
- Asset acquisition

Conclusion

- AeroStream+ is a high quality video streaming module for drones
- Features: 4K/8K at 60 fps with HDR, spectral efficiency, resilient, secure
- Aerostream+ is a uniquely placed product in a fast growing market
- Profitable in 2 years
- Asking for initial funding of $800K at 13% stake

Sources

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