

# OCTOFAN / Black Deck

Outnumbering AND outgunning



OCTOFAN is currently working on an "eVTOL" type platform (Vertical Takeoff and Landing with an entirely electric propulsion chain), powered by hydrogen, capable of reaching speeds of the order of 360 km/h, carrying interchangeable nacelles of 6 tons and 10m long, to travel (in cruising speed at 190km/h) distances of more than 3000 km, automatable, for a unit price of less than []. Designed for a wide spectrum of civilian applications, it has proven to have capabilities that can radically change armies, due to the following key points:

- #1 As a **common platform** that can be used - with the change of the nacelle - on a large number of missions (including troop transport, flying platform launching air/air and air/ground missiles, tanker, ground support, airborne RADAR), it naturally induces significant savings by standardizing the fleet. From a tactical point of view, the possible reassignment of units during operations increases their tactical value.
- #2 Its dual civilian and military use, coupled with the fact that all units will be subservient to our "FaaS" (Fly as a Service) IT infrastructure, allows the rapid mobilization of large quantities of units in the event of major events, even when the military did not have to bear the cost of acquiring and maintaining them. This makes it possible to overwhelm the targets, but also to reinvest the savings generated in ammunitions in order to guarantee a decisive outgunning multiple compared to the opposing firepower.
- #3 The new propulsion chains - initially designed for New Clean Mobility- offer very substantial tactical advantages: unparalleled availability rate (bi-turbo helicopter at 60% vs OCTOFAN at 98%), quick start without ground assistance, silent, low thermal signature, rugged, high number of units allowing virtually limitless redundancy, etc.



- #4** The mobility of heavy weapons is crucial in order to be able to strike without being destroyed in return (cf. HIMARS). Current VTOLs (Vertical Takeoff and Landing) (cf. Tiger) are limited by their cost and availability. By radically correcting these two limitations, eVTOLs pave the way for an army capable of taking up position anywhere but also of moving particularly quickly.
- #5** Virtual independence from ground infrastructures makes such an army more resilient: the destruction of tracks, bridges, rails, roads is no longer a problem. Units can be dispersed over large areas, therefore more difficult to destroy by force. Positioning is simplified in the field.
- #6** The fact of being based on an electric propulsion chain also makes it possible to dedicate a very significant on-board electrical power (3.5MW available in cruising flight, i.e. approximately the power of the RADAR of a Nimitz class carrier battle group) to electromagnetic components of high power (jamming, directed laser/microwave energy, phased array antennas), which are set to become the new backbone of high-tech warfare.
- #7** The eVTOLs are - in addition to their tactical application - ideal in terms of supply chain because ultimately not subservient to any infrastructure (which can be destroyed) and will allow in the near future movements disproportionate to the current movement of armies.



-> **OCTOFAN vs NON-OCTOFAN**: We try to assess the result of a high-intensity conflict between an Octofan early-adopter nation (**#OCT**) vs another one with modern yet classical army (**#NOCT**).

-> **ON PAR ECONOMY**: We assume no difference of wealth and military spendings between both contenders, in order to focus only on strategic advantage procured by Octofan. We also assume that similar equipments cost the same on both side.

-> **CONTINENTAL BATTLES ONLY**: for the sake of simplicity Navy not taken into account (Octofan could perform equally well with Navy taken into account – but exceeds the scope of this simple presentation)

-> **CONVENTIONAL WEAPONS ONLY**: while fierce, engaged units are supposed to be rely only on conventional weapons (for the sake of simplicity)



## CONTEXT / ECONOMY STRUCTURE

Assume armed conflict between two countries, each having GDP of 2T\$ and military spending of 2% of GDP (resulting in military budget of 40 G\$)

	#NOCT	#OCT
ECONOMY	GDP : <b>2T\$</b>	GDP : <b>2T\$</b>
TECHNOLOGY involved for <b>civilian domestic</b> transportation	Light Trucks (Freighters) : <b>300 000</b> units Heavy Trucks (Freighters) : <b>300 000</b> units Octofan (used as Freighter): <b>0</b> units	Light Trucks (Freighters) : <b>250 000</b> units Heavy Trucks (Freighters) : <b>180 000</b> units Octofan (used as Freighter): <b>30 000</b> units
	(1)	→
	Suburbs Trains (Passengers) : <b>2000</b> units Octofan (used as Shuttle): <b>0</b> units	Suburbs Trains (Passengers) : <b>1000</b> units Octofan (used as Shuttle) : <b>6000</b> units
	(2)	→
		+36 000 Octofan

(1) : Service ratio of Octofan vs truck is roughly a 4x service ratio (

- Cruising speed is 200 km/h vs 90km/h => ~2.2x faster;
- Straight sky routes vs road graph => ~1.3x shorter route
- Nb of working hours a day (20h/d vs 10h/d) => ~2x nb of hours worked a day
- => Bottom line 1 Octofan roughly translate to 5.7 trucks, downgraded at 4 trucks)
- TRANSPORTATION COST FALLS when transitioning to Octofan, so no economic penalty

(1) : Octofan passengers per cabin is roughly 32 and rotation speed compared to Commuting shuttle is roughly x4.

- 1 suburb train is roughly 800 passengers
- So 1 train is worth  $800 / 32 / 4 = 6.25$  Octofans.
- Removing 500 trains is equivalent to add 3125 Octofans,
- Transportation costs is lower (when including infrasrtcture CAPEX and OPEX) for Octofan. So transitionning to Octofan is actually a benefit froma an economic point of view

To sum-up: #OCT have a civilian base of 36k units ready to fly and fully-operative, 30% (=10 000 units) of which that can be summoned through FaaS (Fly-as-a-Service unit/flight allocation platform = i.e. servers) for military purposes for 15 days –with limited impact on the economy- in a matter of hours (just drop civ. Payload and pick military one). eVTOL enables units dispatching through all military air fields simultaneously and loading concurrently all military pods (assuming they have previously dispatch and staff is trained for rapid mounting).





## CONTEXT / MISSILES TAXONOMY (1/2)

For the sake of simplicity we lump all existing missiles into 4 standard categories with typical (averaged from actual) properties

		Range	Velocity	Price	Weight	Notes
<b>S</b>	<b>SHORT RANGE "JAVLIN"</b>	<b>4 km</b>	<b>Mach 0.5</b>	<b>50k\$ /unit</b>	<b>12 kg /unit</b>	Examples: MMP, Akeron, etc.
<b>M</b>	<b>MEDIUM RANGE "MAVERICK"</b>	<b>25 km</b>	<b>Mach 3.4</b>	<b>200k\$ /unit</b>	<b>250 kg /unit</b>	Examples: Maverick
<b>L</b>	<b>LONG RANGE "MICA"</b>	<b>80 km</b>	<b>Mach 4</b>	<b>500k\$ /unit</b>	<b>125 kg /unit</b>	Examples: Mica
<b>C</b>	<b>CRUISE RANGE "SCALP"</b>	<b>500 km</b>	<b>Mach 0.8</b>	<b>1M\$ /unit</b>	<b>1250 kg /unit</b>	Examples: SCALP, Storm Shadow
<b>X</b>	<b>CRUISE RANGE "BRAHMOS"</b>	<b>1000 km</b>	<b>Mach 3.0</b>	<b>4M\$ /unit</b>	<b>2500 kg /unit</b>	Examples: BrahMos



## CONTEXT / PLATFORMS TAXONOMY (2/2)

	COST <sup>(2)</sup>	WEAPONS	LOGISTICS	SUPPORT
<b>FJ</b> : FIGHTER JETS	<b>60 M\$ /unit</b>	4 x <b>C</b> / 14 x <b>L</b>		
<b>SC</b> : STRATEGIC CARRIERS (+ air tankers)	<b>150 M\$ /unit</b>	(Logistics)		<b>130 ton /unit</b>
<b>TC</b> : TACTICAL CARRIERS	<b>100 M\$ /unit</b>	(Logistics)		<b>40 ton /unit</b>
<b>AR</b> : AIRBORNE RADAR	<b>35 M\$ /unit</b>	(Support)		
<b>AH</b> : ATTACK HELICOPTER	<b>20 M\$ /unit</b>	4 x <b>L</b> + 4 x <b>M</b> / 4 x <b>M</b> + 40 x <b>S</b>		
<b>TH</b> : TRANSPORT HELICOPTER	<b>30 M\$ /unit</b>	(Logistics)		<b>6 ton /unit</b>
<b>TK</b> : TANKS	<b>5 M\$ /unit</b>	(Swarmed)		
<b>WV</b> : WHEEL ARMOURED VEHICLE	<b>1 M\$ /unit</b>	(Swarmed)		
<b>CA</b> : CANNON ARTILLERY	<b>5 M\$ /unit</b>	(Swarmed)		
<b>RA</b> : ROCKET ARTILLERY (Multiple Launch Rocket Sys.)	<b>5 M\$ /unit</b>	1 x <b>C</b> / 6 x <b>L</b> / 6 x <b>M</b> , 60 x <b>S</b>		
<b>GD</b> : PROP/GLIDER DRONES	<b>5 M\$ /unit</b>	2 x <b>L</b> / 2 x <b>M</b>		
<b>8D</b> : OCTOFAN DRONES	<b>12 M\$ /unit</b>	4 x <b>C</b> , 36 x <b>L</b> / 20 x <b>M</b> / 160 x <b>S</b>		<b>5 ton /unit</b>

(2): Acquisition cost of platform only. Multiply by x1.6 to get it fully equipped with sensors, EW, etc. Total Maintenance cost is taken equal to 15% of equipped cost per year



# CONTEXT / ALLOCATING

## ECONOMY

### #NOCT

GDP : **2T\$**

Military spending: **2% of GDP**

Military budget: **40 G\$**

### #OCT

GDP : **2T\$**

Military spending: **2% of GDP**

Military budget: **40 G\$**

For the record

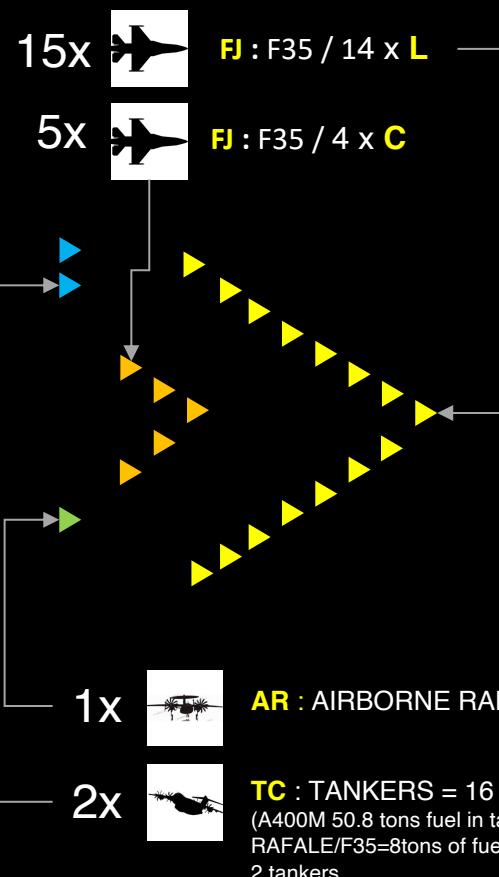
		RU		FR
Military budget:	61.7 billion \$		52.7 billion \$	
Percent of GDP:	4.3%		2.1%	

		#NOCT	#OCT
	<b>FJ : FIGHTER JETS</b>	<b>209</b> Aircrafts	<b>29</b> Aircrafts
	<b>SC : STRATEGIC CARRIERS</b> (+ air tankers)	<b>26</b> Aircrafts	<b>2</b> Aircrafts
	<b>TC : TACTICAL CARRIERS</b>	<b>54</b> Aircrafts	<b>5</b> Aircrafts
	<b>AR : AIRBORNE RADAR</b>	<b>4</b> Aircrafts	<b>1</b> Aircrafts
	<b>AH : ATTACK HELICOPTER</b>	<b>100</b> Aircrafts	<b>10</b> Aircrafts
	<b>TH : TRANSPORT HELICOPTER</b>	<b>192</b> Aircrafts	<b>20</b> Aircrafts
	<b>TK : TANKS</b>	<b>222</b> Units	<b>22</b> Units
	<b>WV : WHEEL ARMOURED VEHICLE</b>	<b>267</b> Units	<b>26</b> Units
	<b>CA : CANNON ARTILLERY</b>	<b>115</b> Units	<b>12</b> Units
	<b>RA : ROCKET ARTILLERY</b> (Multiple Launch Rocket Sys.)	<b>13</b> Units	<b>2</b> Units
	<b>GD : PROP/GLIDER DRONES</b>	<b>4</b> Units	<b>1</b> Units
	<b>8D : OCTOFAN DRONES</b>	<b>0</b> Units	<b>2386</b> dedicated Units (+ <b>36000</b> additional units available within 24h).
		<b>33.7G\$</b>	<b>33.7G\$</b>



## ARRANGEMENT / BASE SQUADRON for AIR SUPERIORITY & AIRSTRIKE (1/2)

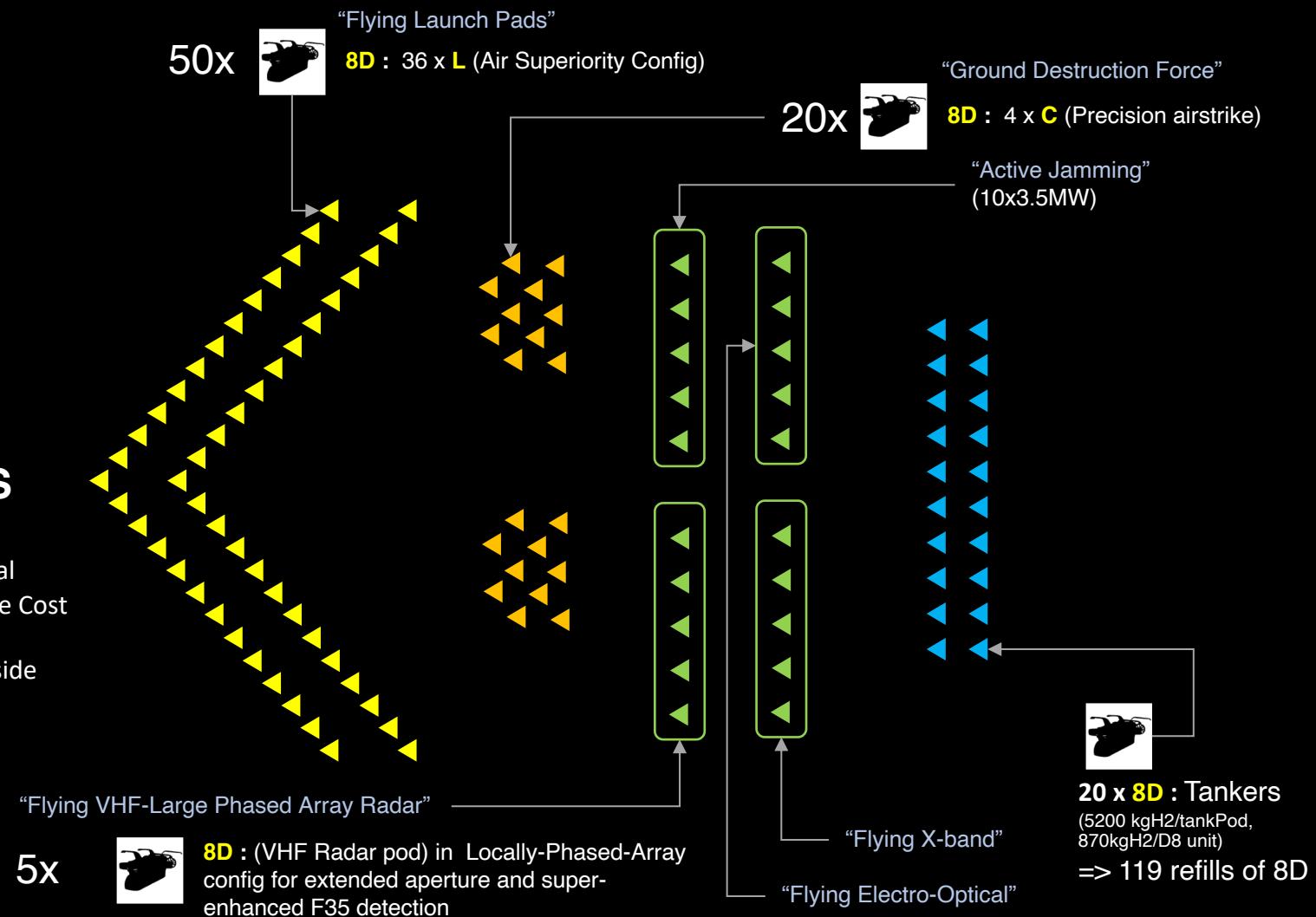
### #NOCT BASE SQUADRON (10 squadrons engaged)



VS

Equal  
Platform Cost  
on  
Both side

### #OCT BASE SQUADRON (98 squadrons engaged)



Outcome : #OCT will destroy all #NOCT squadrons thanks to a blend of early detection, overpowered jamming, massive firepower advantages and better endurance (See details next).



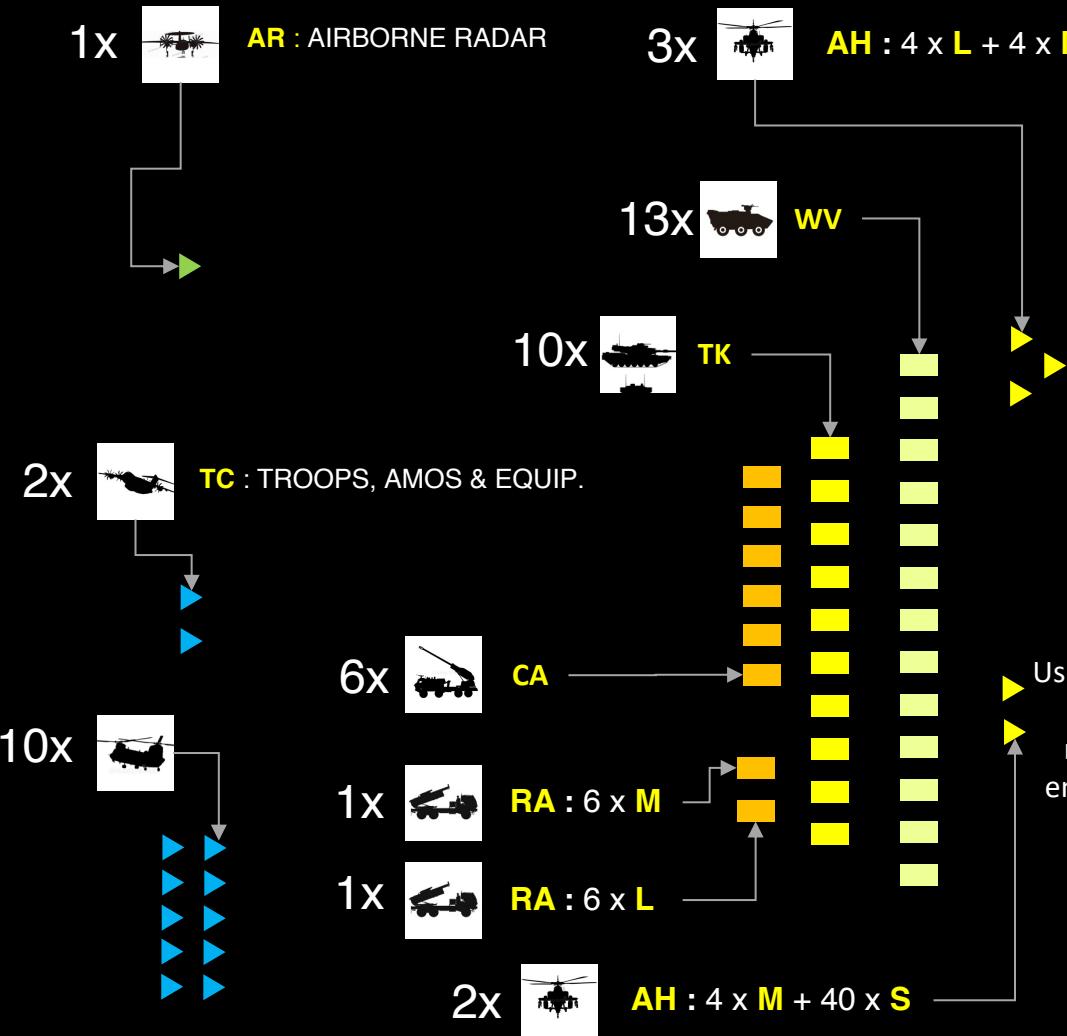
### Outcomes:

- Base (platform only) Cost of #NOCT squadron is ~1.4G\$ vs #OCT squadron around ~1.3G€...
  - ... But since #OCT-squadron platforms come from drafting, they are virtually free!
- With FighterJet availability at around 55% vs 90% for Octofan (and virtually 100% since drafting), fire power is even more disbalanced.
- #NOCT is able to engage 10 such squadrons, #OCT is able to engage 98 ones.
- Flying Phased Arrays radar of #OCT-squadron allows high energy beam and massively increase detection capability (sensitivity), range (Beam+altitude), survivability (5 units). Allow to minimize/suppress Stealth/Low Observability advantages of #NOCT squadrons. Octofan drone, being an eVTOL, carries a massive 5MW power plant inboard, ¾ of it being idle while cruising. Therefore 3.5MW power can be made available through an entire hour (as a comparaison, Nimitz class carrier group main radar AN/SPY-1 has max power of 4MW) – for **EACH UNIT**. Radar max power is  $5 \times 3.5 = 17.5\text{MW}$ . Radar is so powerful that it can be used as a directed energy long range weapon. And #OCT squadron has 4 such radar.
- Think what happens when under fire of a phased-array jamming system at 17.5 MW.
- At some point, F35 jet fighters of #NOCT-squadron will have to open their bays... (and will become visible)
- Missiles are not that stealth and #OCT squadron can detect (if not earlier of course) F35 when they will engage.
- Refills capabilities are equal on both side **BUT #OCT-squadron can refill 5x times faster!** (more units means more concurrent refills)
- #OCT squadron Air-to-Air combat fire power is 1800 L (Long Range Air-Air Guided Missiles) vs 210 => more than 8 times outgun ratio.
- Regarding Air Strike capabilities, with have 4x outgun factor.

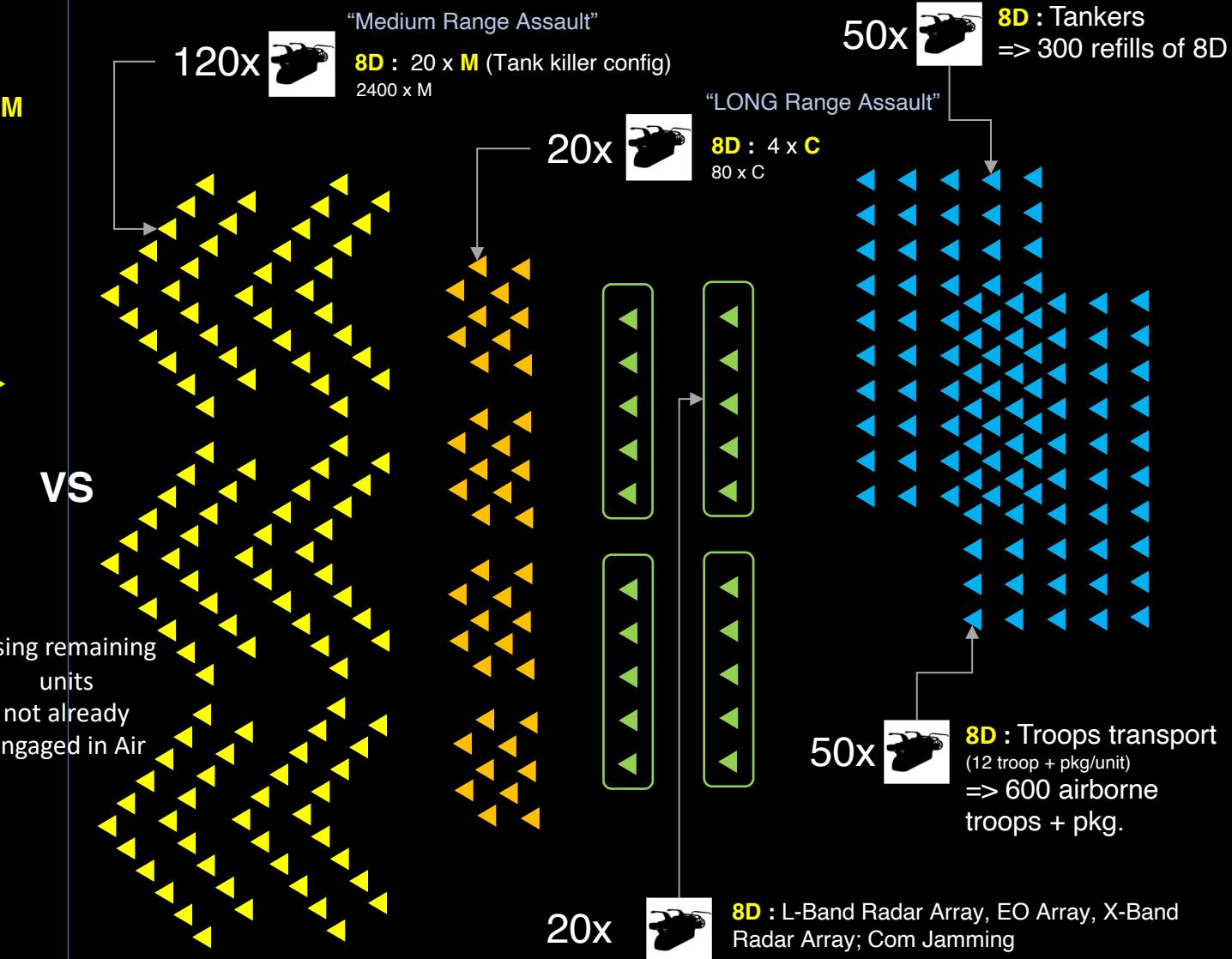


## ARRANGEMENT / BASE BATTALION for GROUND AND LOW ALTITUDE (1/2)

### #NOCT BASE BATTALION (20 battalions engaged)



### #OCT BASE BATTALION (60 battalions engaged)



Outcome : #OCT will destroy all #NOCT battalions thanks to a blend of massive firepower advantages, fully mobile units (swarming + stricke evasion), and massive rear logistics



## ARRANGEMENT / BASE SQUADRON for AIR SUPERIORITY & AIRSTRIKE (2/2)

### Outcomes:

- Basically 10 M-missiles per land vehicles. Total destruction almost certain.
- Fighting-back almost impossible since all #NOCT units are mobile AND moving (airborne, VTOL can pause on any land re-take-off often, electrical prop enables frequent take-off/landing with no impact on turbine lifespan/availability).
- Massive refill capabilities enables deep territory penetration.
- Land locking through landing of massive troops.
- Still carries its own AIR-squadrons protection EM capabilities
- Many variants are possible with such a number of units
- #OCT battalions **DON'T CARE** of destroyed roads, bridges, railroads, air fields, muddy fields. Untouched or entirely wiped out infrastructure make no difference for speed of attack and logistics.
- Battalions can be assembled from as far as 1000 km away from front line while being able to strike 4h later. #OCT battalions are ALWAYS here (since they can swarm the front line quite fast) but NEVER there (they can be withdraw from front line to evade any counter-strike).
- In the event of enemy battalions destructions, #OCT battalions can be converted quickly to equipment deployment air bridge.