China's Order of Battle:
Ground-Based Lasers

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Table 1: # of Ground-Based Lasers

Year	Fixed Low-Power Satellite Laser Ranging Stations	Mobile Low-Power Satellite Laser Ranging Stations	Fixed High-Power Laser Bases	Mobile High-Power Laser Systems
2021 (Current)	5	2	5	0
2027 (Conflict)	6	3	6	2
2029 (Conflict)	7	4	7	4

Basis for Our Projection:

1. Current low-power lasers of 3-60 watt (pp. 495, 496) have up to ~0.3% chance of damaging a sensor or filter of a satellite in low-earth orbit, based on extrapolation from Yousaf Butt's calculations (p. 12).
2. Current high-power lasers of 50-100 kilowatt can damage satellite sensors if the beam can reach a satellite sensor or filter.
3. Defense Intelligence Agency (p. 20) warns that by the mid-to-late 2020s China may field higher power systems that could damage the exterior structures of optical and non-optical satellites. Solar-panels are the most vulnerable exterior elements, and as such even relatively weak high-power lasers could damage them.
4. Chinese demand for fixed ground-based lasers is likely to be relatively stable regardless of what countermeasures the U.S. adopts. This is because they will be useful no matter what the U.S. does, but are also expensive and difficult to produce. This contrasts sharply with rendezvous spacecraft, which are comparatively cheap and easy to produce but may become unattractive as ASATs in the face of the proper countermeasures. While low-power satellite laser ranging stations are relatively easy and inexpensive, they are of little value in degrading our satellites. High-power lasers are far more threatening, especially when they attain sufficient power to damage the exterior structures including solar panels. Blinding or damaging sensors requires a direct angle so as not to be deflected by the casing, meaning that a satellite is only vulnerable for a brief window of time while overhead and only if pointed toward the general area in which the laser is housed. The ability to damage external structures loosens this constraint, and also expands the potential target set to include non-optical satellites, resulting in a capability to disable a meaningful number of satellites in orbit relatively quickly, from almost any angle, and

with minimal debris. Fortunately, such high-power lasers are expensive and require difficult adaptive optics and beam control to be effective (p. 4). Additionally, these fixed but soft laser complexes are large and easily visible from orbit, meaning that their locations are known and that they are highly vulnerable to missile strikes and other means of disablement or destruction.

5. Mobile high-power lasers are the most technically challenging to produce, especially due to the power supply requirements involved, but they are also the most threatening. Mobility makes them more survivable, as they become harder to track and strike. It also greatly increases the likelihood of successful attacks on sensors, because mobile lasers could be physically and unexpectedly positioned near a site that the U.S. will need to image, ensuring the right angle for surprise damage to our limited number of highest-resolution sensors or even their satellites.
6. The estimated ground-based laser totals for 2027 and 2029 are a best-guess based on the known current quantities with a realistic level of incremental growth.