

NAS Storage survey for CYGNO

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- Requirements:
 - Number of cameras: 18
 - Event rate: 1~10 Hz
 - Image resolution: $2304 \times 2304 \times 16 \text{ bits} \approx 10 \text{ MB}$
- The following calculations do not take into account any technique to reduce the raw images size, like:
 - Regions of Interest (RoI)
 - Reduction of resolution

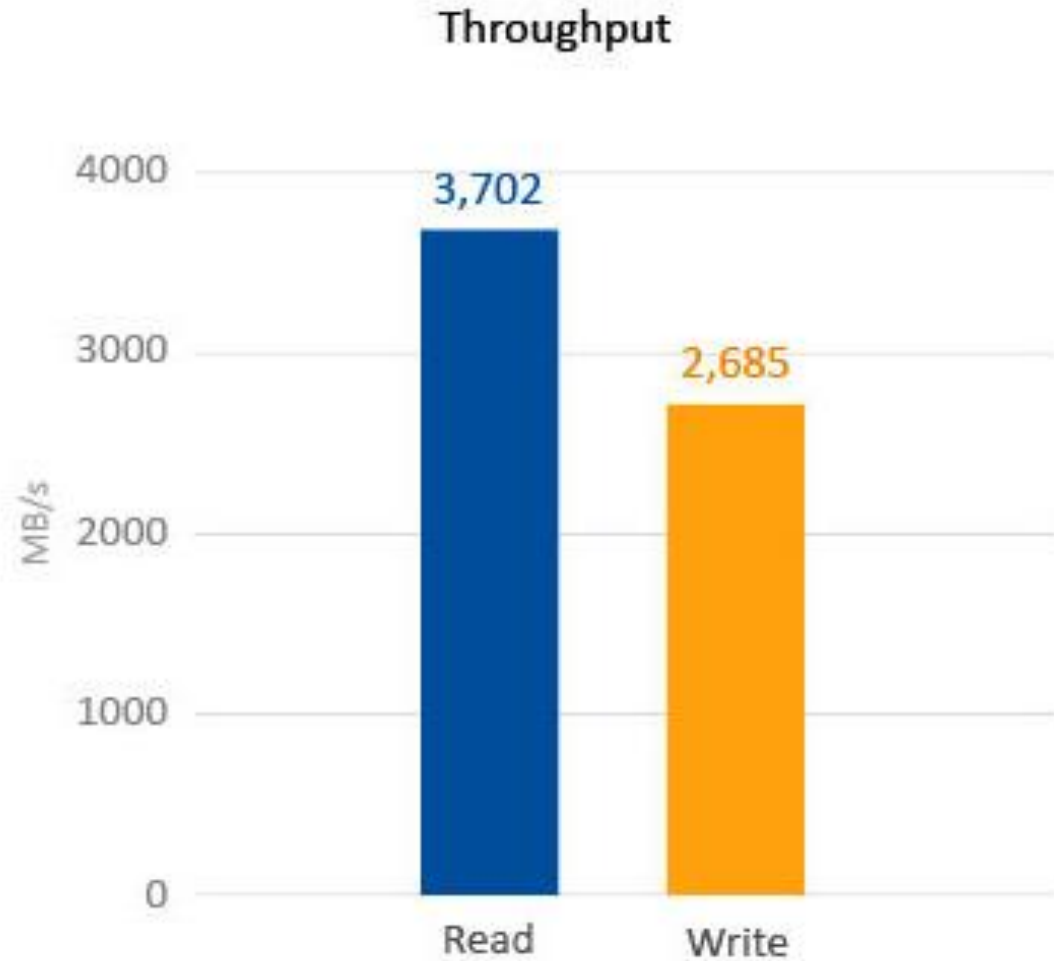
Calculation of storage required for 1 year

- The calculations consider the minimum rate of events (1Hz).
- Daily storage required: $10\text{MB} \times 18 \times 86400\text{s} \approx 16\text{TB} / \text{day}$
- Annual storage required: $16\text{TB} \times 365 \approx \mathbf{5840\text{TB} / \text{year}}$

- Among the NAS models surveyed, the one that supports the calculated amount of storage is the TS-EC2480U-RP model from Qnap manufacturer. It has storage capacity of 192TB, which can be expanded to 1.2PB of gross capacity (scalable structure)
- Expansion cards of the SAS type are used to increase storage limits.



- **CPU:** Intel Xeon E3-1200 v3 3.4 GHz Quad Core processor
- **LAN Ports:** 4 x Gigabit RJ-45 Ethernet port *Expandable up to 8 1Gb or 4 Gigabit ports + 4 10GbE ports by installing dual-port LAN cards
- **System memory:** System memory: 4 GB DDR3 ECC RAM; Pre-installed memory module: 1x 4 GB; Total memory slots: 4; Memory expandable to: 32 GB (8 GB x4); Note: When upgrading RAM to 32GB, the original 4GB RAM modules must be removed
- **Flash memory:** 512MB DOM
- **Bays:** 24 x 3.5 inch SATA 6Gbps/3Gbps hard drive or 2.5 inch SATA, 6Gbps/3Gbps hard drive SSD hard drive
- **USB:** 4x USB 3.0 (rear); 4x USB 2.0 (rear)
- **Format:** 2U, rack mount
- **PCIe Slot:** 2 (1*PCIe Gen3 x8, 1*PCIe Gen3 x4)



10 Gigabit LAN port X4

- Cost per NAS unit (no discs)
 - Approximately US\$ 16k
(<https://www.fourserv.com.br/nas-qnap-tvs-ec2480u-sas-rp-24-baias-iscsi-mpn-tvs-ec2480u-rp-16g-r2/>)
- For 1-year storage (considering 1Hz event rate):
 - Five NAS units: (up to 6000TB)
 - Total cost = US\$ 80k

* For the values above, the current dollar rate used is US\$1 = R\$5.63

- The quote in previous slide refers to Storage NAS, without disks.
- To consider the NAS with the disks already installed, an approximate cost of US\$330 (one 8TB disk) should be considered. For a single NAS, it would increase the amount of approximately US\$ 50k (150 x 8TB disk).
- TOTAL price for 5 NAS: 80k (5 NAS) + (5x50k) = **US\$ 330k**

* Quote link: <https://www.kabum.com.br/produto/112689/hd-seagate-ironwolf-nas-8tb-sata-t8000vn004>