

GROUND SEGMENT SOLUTION FOR NANOSATELLITES AND CONSTELLATIONS

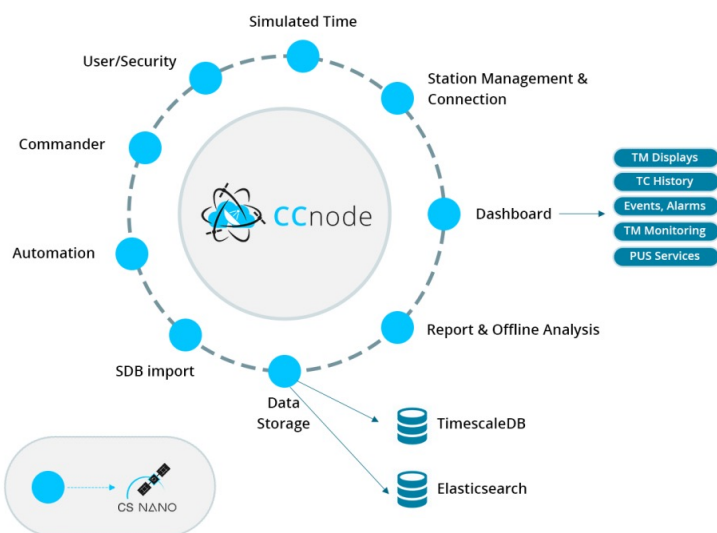
Based on its long-term experience developing and integrating satellite ground segments, CS has built CS NANO, a reusable software suite for Nano satellites missions ground operations, by developing a java-based and micro-services-architected solution, adaptable to every mission needs, portable and easy to deploy. CS NANO takes into account Nanosat and constellations specificities to satisfy cost reduction and shorter planning stakes.




CS GROUP DESIGNS AND DEVELOPS CUSTOMIZED SOLUTIONS BASED ON CS NANO, OFFERS GROUND SEGMENTS INTEGRATION SERVICES AND CONSULTING.

CS NANO OVERVIEW

- ✓ **CS NANO** is a versatile system with the ability to manage any TM/TC description simply by configuration and which offers the main services for command & control operations.



- ✓ **CS NANO** is built on top of CCnode TM/TC kernel developed by CS GROUP

- ✓ **CCnode** is designed and has been tested to handle seamlessly hundreds of satellites in parallel, thanks to its capacity to be deployed on a Cloud-based infrastructure. This enables **CS NANO** managing large constellations efficiently

CS NANO HEART: CCNODE TM/TC KERNEL

CS NANO relies on **CCnode**, a new generation of TM/TC kernel software suitable for large constellation of satellites. Such context requires high levels of automation, resiliency and scalability.

Based on a micro-services architecture, CCnode is therefore highly focused on improving services and operations continuity, thanks to:

- Asynchronous services (event-based),
- Simple and reliable services (stateless),
- High availability,
- Constraint-based services (RESTful).

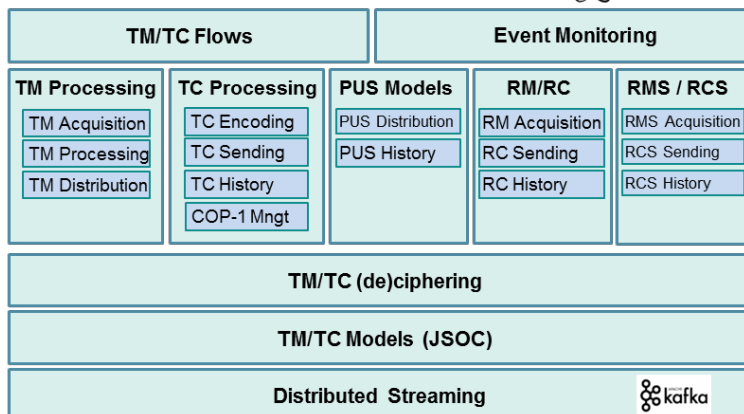
TM and TC processing (including flows management and ciphering) is partitioned for each single satellite for security reasons, but data communication and events Monitoring are handled in a common distributed space.

Micro-services are available through REST APIs, enabling CCnode core functionalities integration into external software.

All accesses to CCnode functions are fully-secured by user policies implemented in a proxy-like boundary, which allows combining high processing performance and security.

CCnode is fully-compliant with CCSDS standards; in particular, it provides a micro-service to manage PUS services history and updates

CCnode is adaptable. Any micro-service may be replaced by a new one corresponding to mission specificities.



KEY POINTS

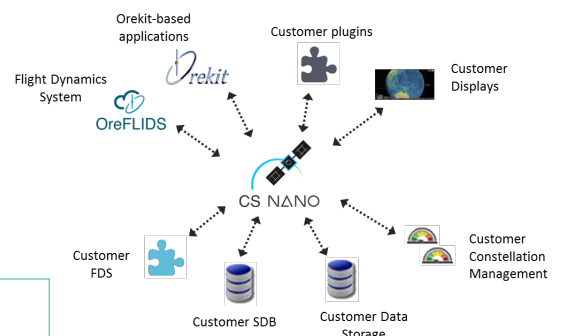
- ✓ CS GROUP recognized experience in the space domain
- ✓ Use of state-of-the-art technologies
- ✓ Use of open-source tools
- ✓ Capacity to customize solutions to specific missions
- ✓ No license fees for solutions based on CS Nano
- ✓ A solid and innovative product roadmap

TECHNOLOGIES



OREFLIDS INTEGRATION WITH CS NANO PRODUCT

- **CS NANO** is designed to easily integrate with external applications, provided that customers legacy applications may access to CS NANO / CCnode REST APIs.
- **CS NANO** is extensible (possibility to add components), scalable (Distributed Architecture, services & components oriented), adapted to NEWSPACE constraints (Constellations, Nanosats/ cubesats, Electrical Propulsion, etc.).



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