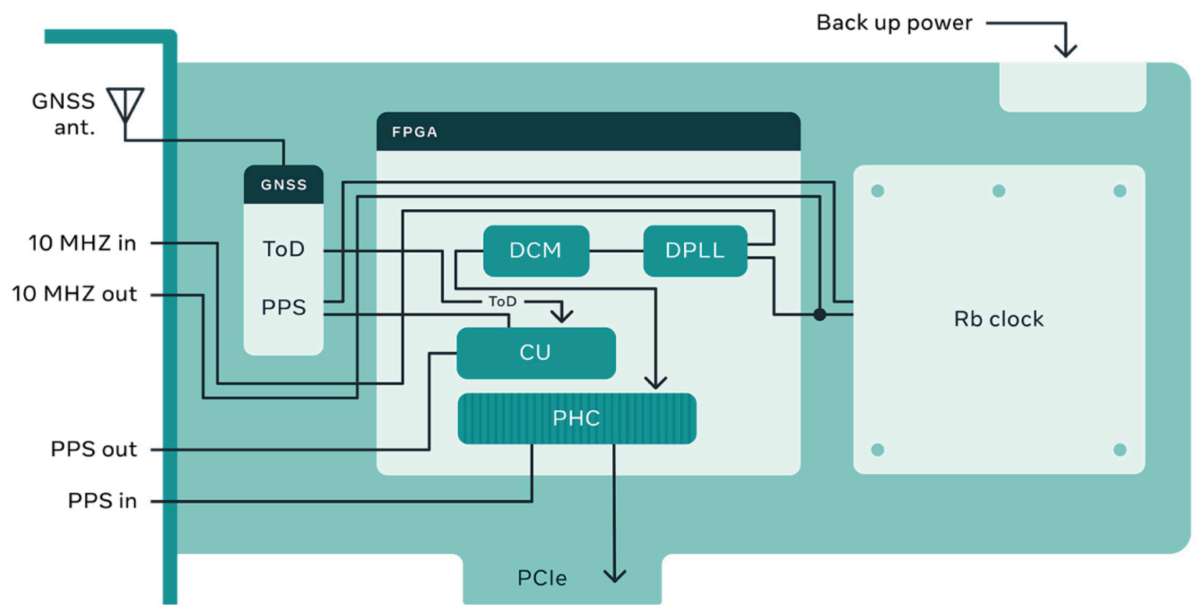
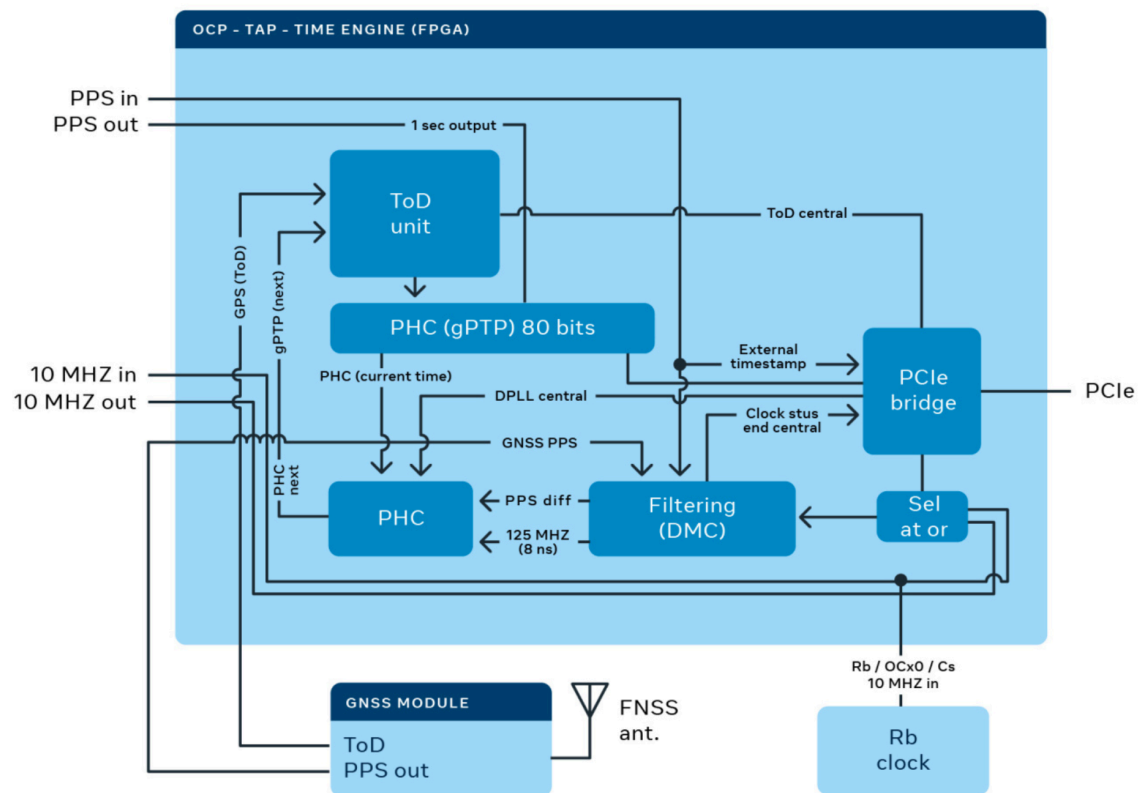


Submit at least 10 ideas for two different functions. Where possible, use graphical representation for each concept - screenshots of sketches, or photos of examples are fine, and written annotations can help to clarify. Please submit as a single pdf file.

1. Communicate with servers from one satellite to another / earth.
 - 1.1. PCIe electrical connection
 - 1.2. SPI/I²C/UART communication within PCIe
 - 1.3. GNSS Receiver
 - 1.4. Within rugged housing that can withstand environmental conditions in satellite in space
 - 1.5. Functioning cooling system to prevent build-up of heat within the module
 - 1.6. Protection devices in order to prevent Spoofing, DDOS and other malicious attacks.
 - 1.7. Follow FCC requirements of not accepting or causing RF interference
 - 1.8. Utilize clock for modulation and demodulation of GNSS and moon protocol signals
 - 1.9. Integration with public access time standard.
 - 1.10. Protection devices for erroneous time, prevent timescale error.
2. Keep accurate time locally while in space.
 - 2.1. Local Oscillator - CSAC provides local oscillator functionality.
 - 2.2. Within rugged housing that can withstand environmental conditions in satellite in space.
 - 2.3. Functioning cooling system to prevent build-up of heat within the module
 - 2.4. 1 GHz clock frequency to achieve ns precision
 - 2.5. Processing system tracking all software/firmware
 - 2.6. Custom programmable logic implementing clock control, edge detection, and stream control.
 - 2.7. PCB interface/auxiliary electronics to provide voltage regulation and control external from cubesat.
 - 2.8. Modulation and Demodulation (Local oscillator provides carrier frequency
 - 2.9. Time kept in UTC / GMT locally.
 - 2.10. Up / Down frequency translation.



Overall system design functional inspiration from [timingcard.com](https://www.timingcard.com).



Time Engine functional inspiration from timingcard.com