The Abdus Salam International Centre for Theoretical Physics

IAEA International Atomic Energy Agency

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STINT

Ultra Low-Power DTN Framework for LoRaWAN®

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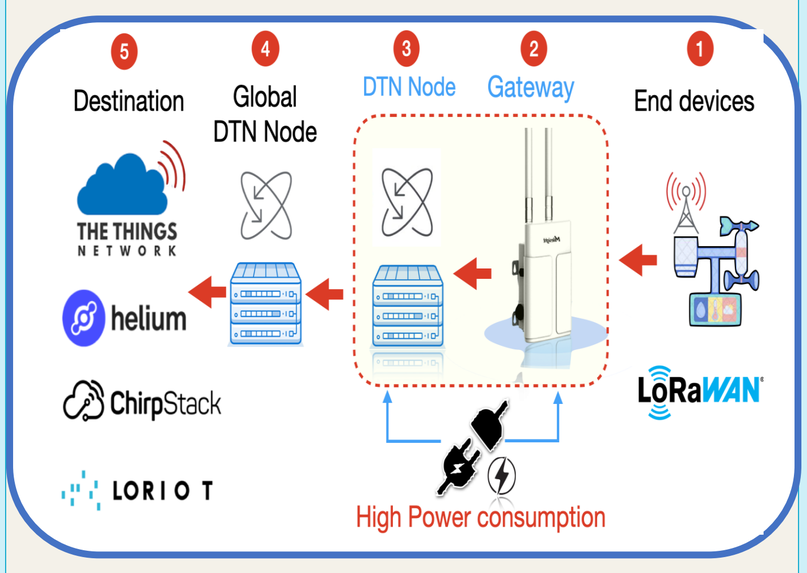
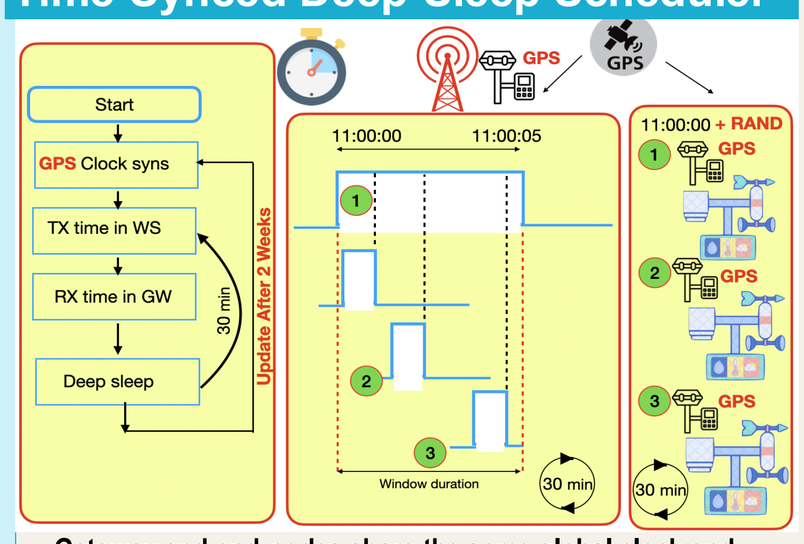
Main issue and proposed solution

Integrated DTN Node within LoRaWAN Gateway Chain and highlights the power-hungry stages.



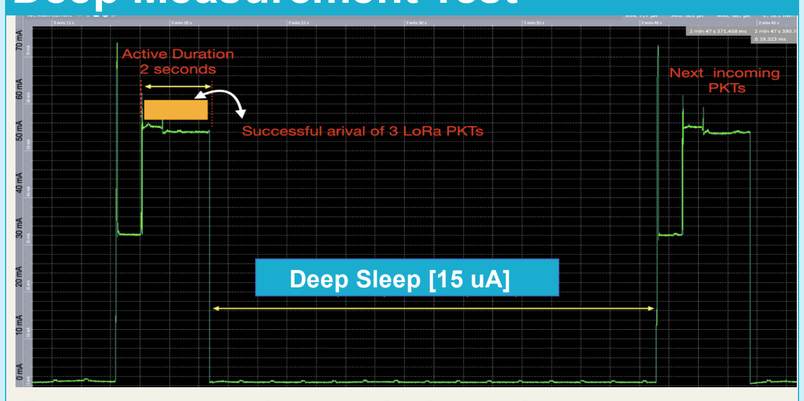
- Ultra-Low-Power Framework:
- Custom DTN Bundle Architecture
- Novel Power Reduction Algorithms
- Low-Power LoRaWAN Architecture
- Machine Learning-Driven Power Optimization.

Time-Synced Deep-Sleep Scheduler



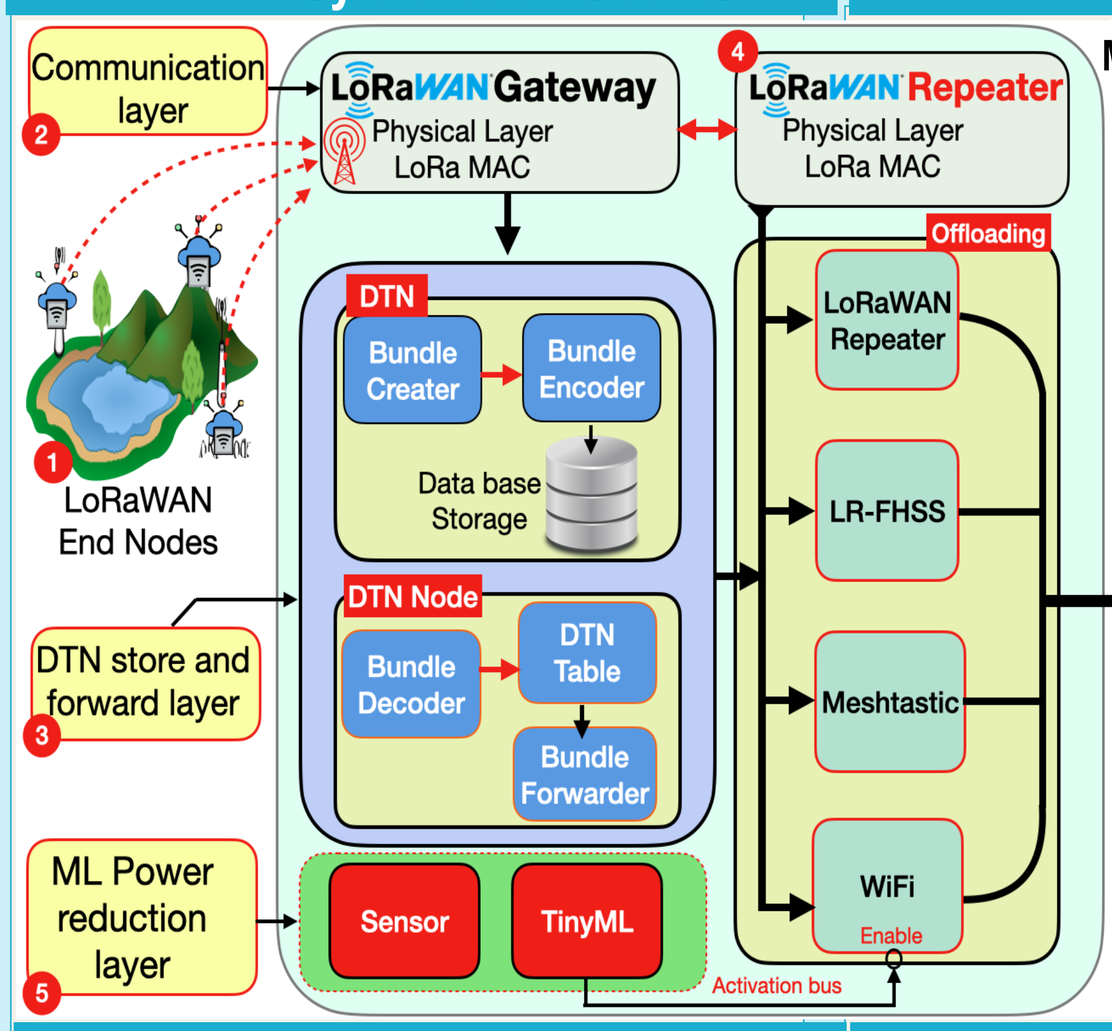
- Gateway and end-nodes share the same global clock and
- time-table for sleep and wake up
- Gateway opens the communication window at the exact
- scheduled time.
- End-nodes wake at the same window and send their pkts
- Both of gateway and end nods goes to deep sleep and so on,

Deep Measurement Test

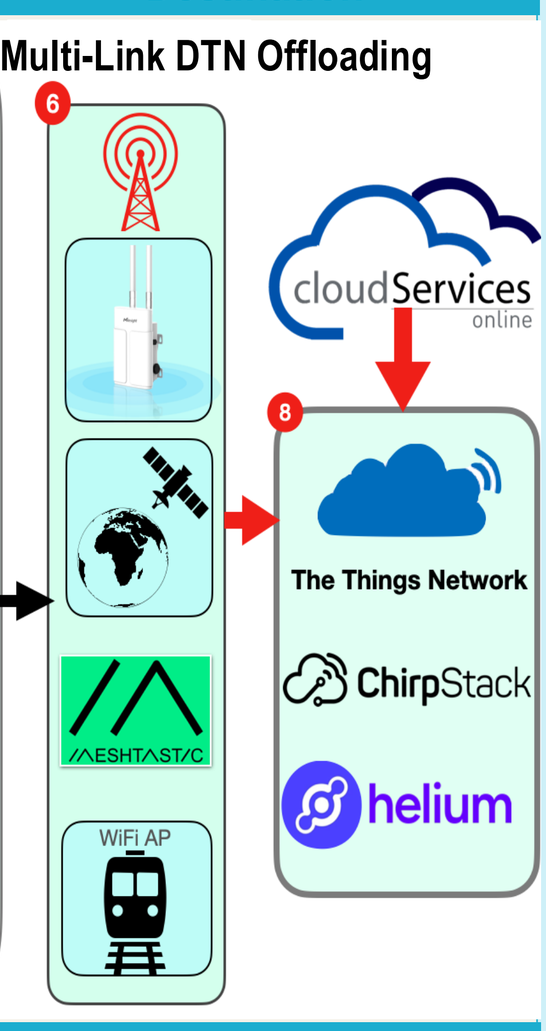


Power consumption result shows the system can woks for ~ 5 years with tiny 3.6v, 19 Ah battery

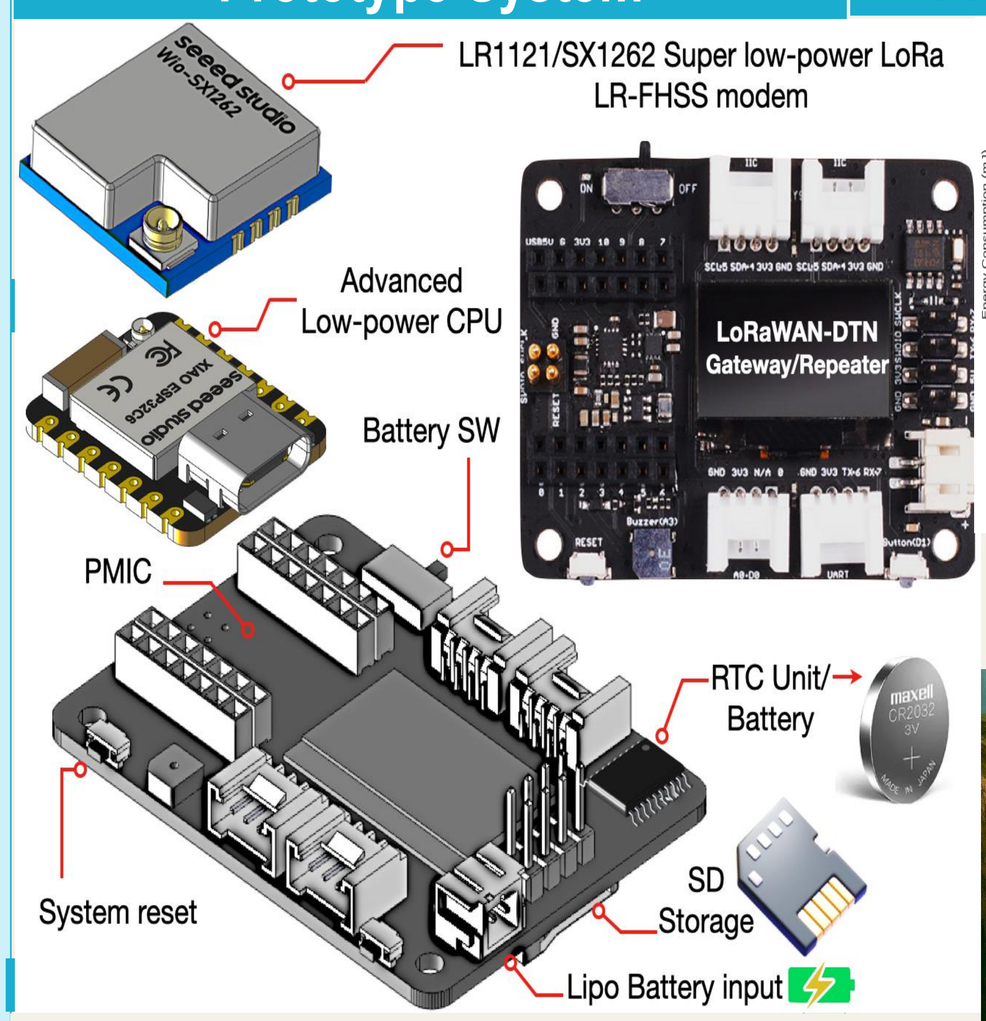
System Architecture



Destination

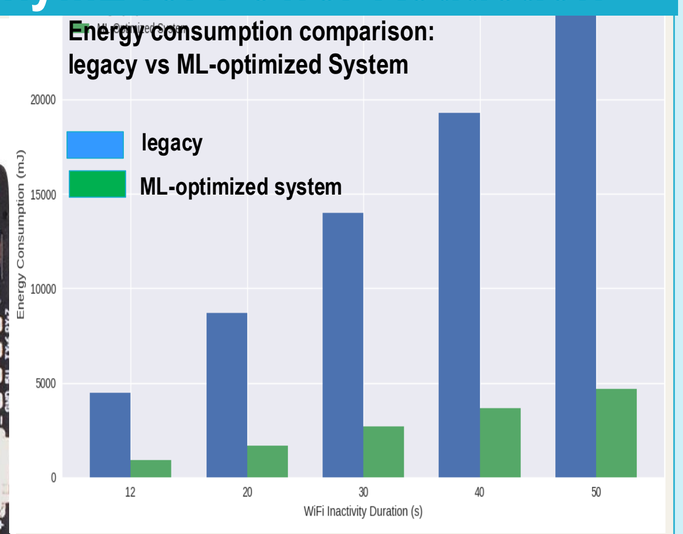


Prototype System

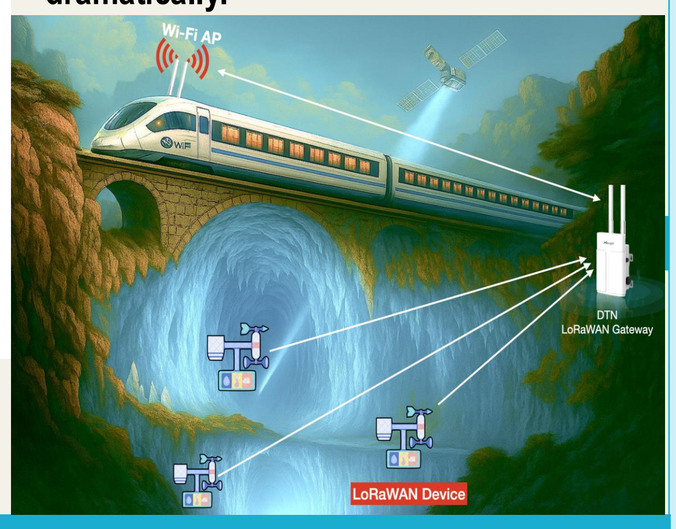


Ultra-low power hardware CPU and Communication Modem designed to operate on tiny battery.

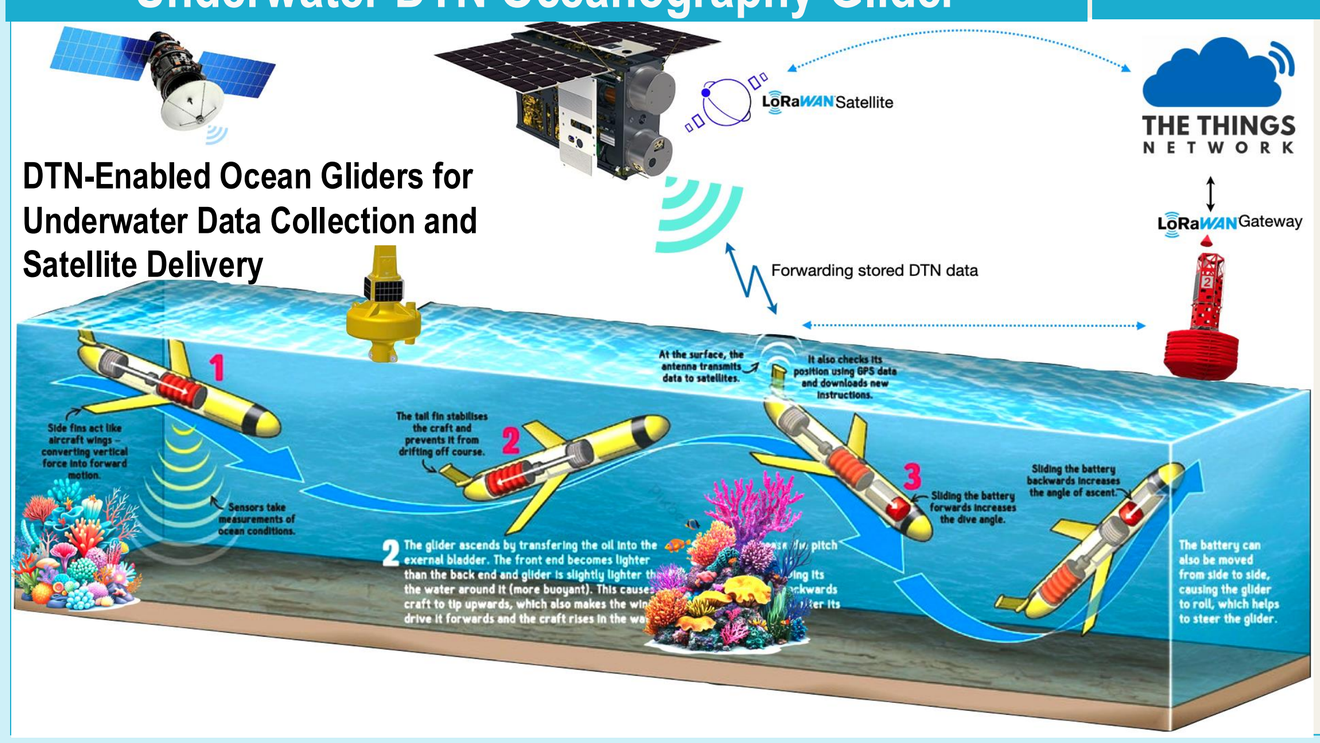
TinyML for Power Reduction



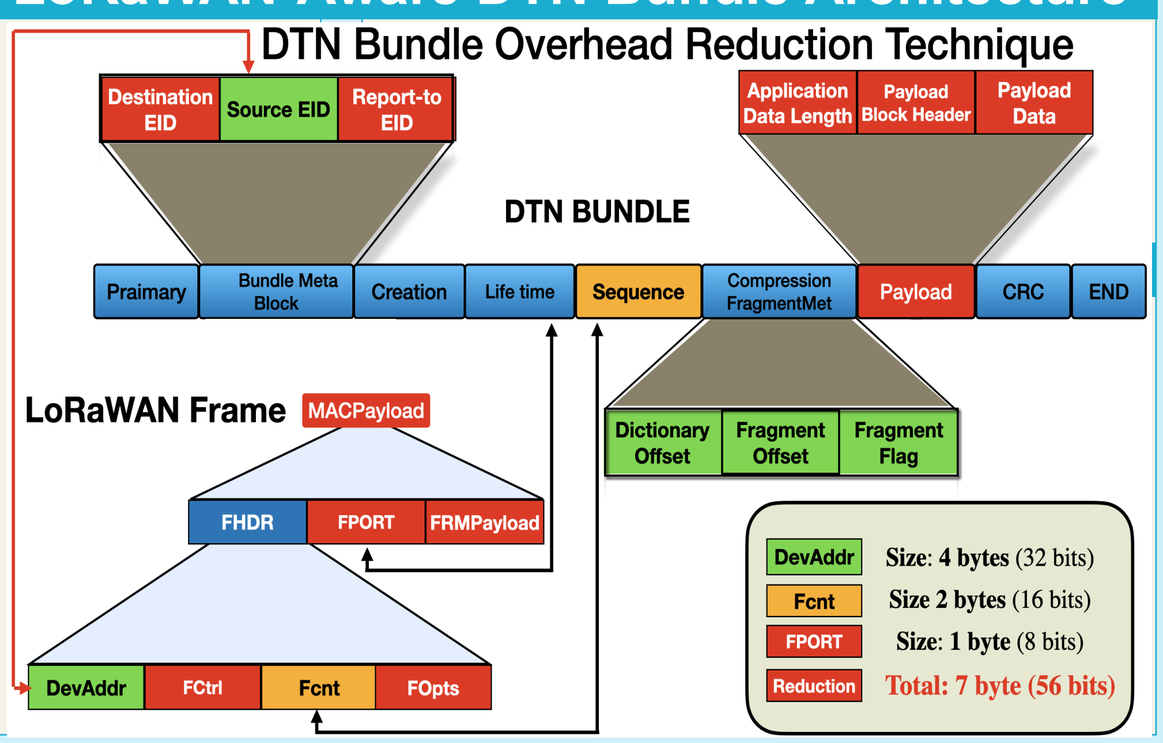
TinyML activates WiFi only when needed, reducing power consumption dramatically.



Underwater DTN Oceanography Glider



LoRaWAN-Aware DTN Bundle Architecture



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