

# Thoughts over a data acquisition system for reading out KM3NeT Optical Modules

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# Data Communication

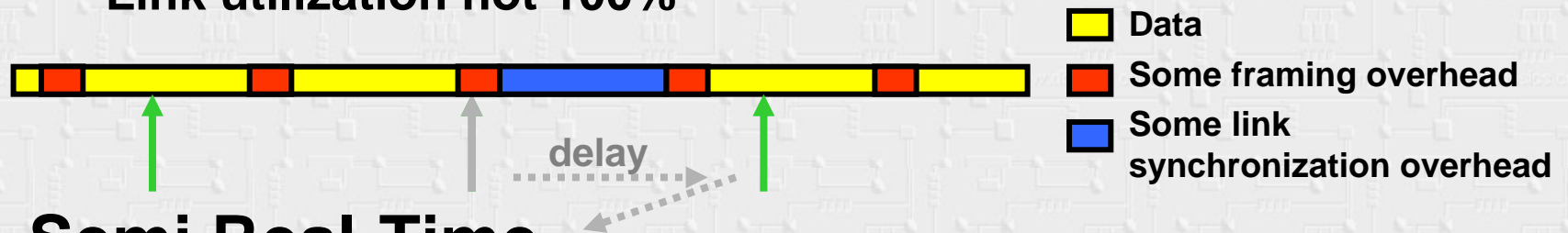
- **Real-Time**

- **Need High Bandwidth**

10 Gbps  $\Rightarrow$  100 ps/bit  $\Rightarrow$  10 PMTs in a 1 ns slot

More than 10 PMTs  $\Rightarrow$  determine priority and accept that you sometimes loose data

- **Link utilization not 100%**



- **Semi Real-Time**

- **Postpone a transmission and code the delay in the data**

Data can be smeared over time  $\Rightarrow$  lower bandwidth  $\Rightarrow$  less power

- **Need some electronics (FPGA)**

- **Store and forward**

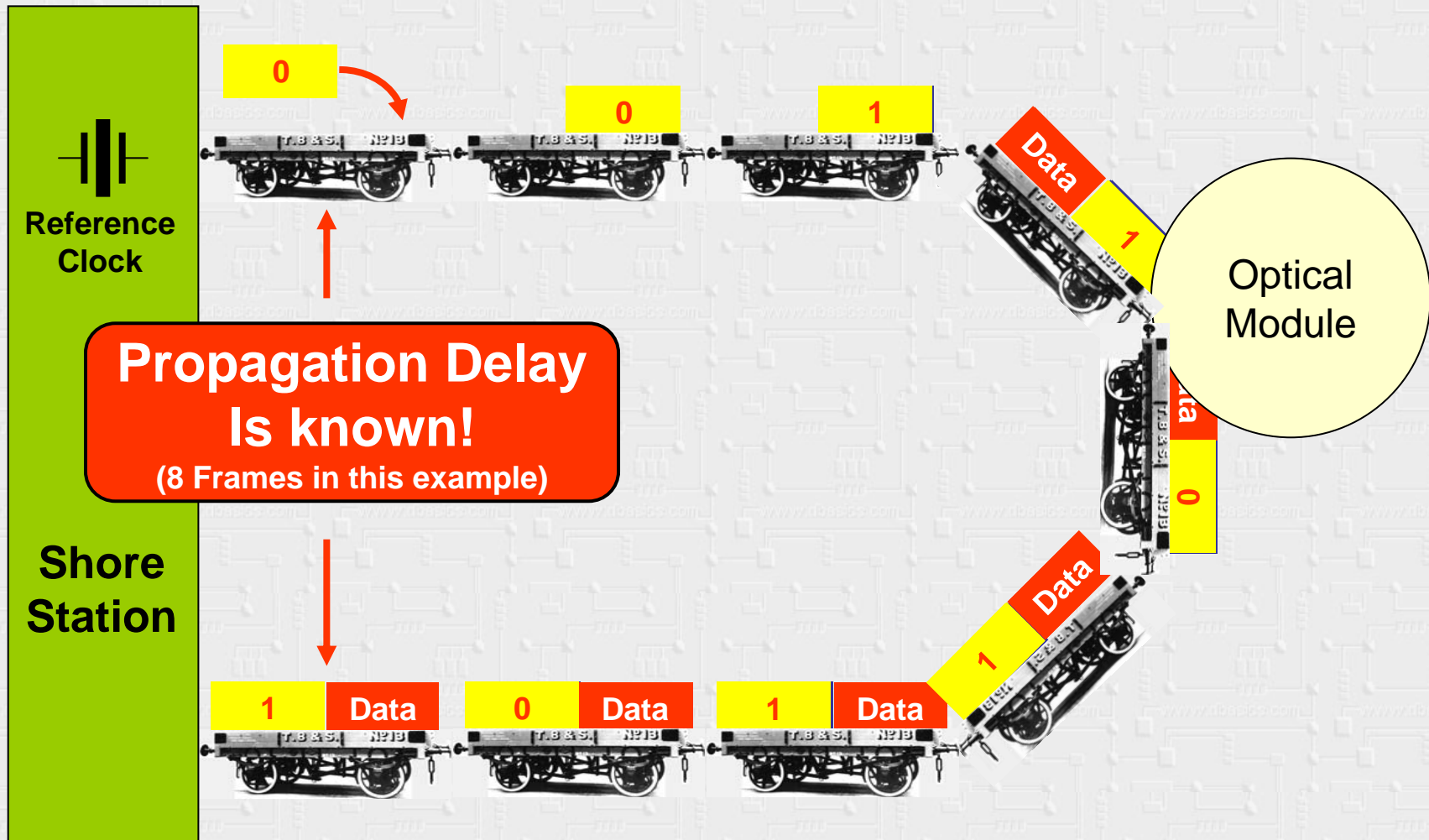
- **The same electronics could timestamp events**

Timing transfer over data-link phase-locks and calibrates the Local Clock

- **Low bandwidth**

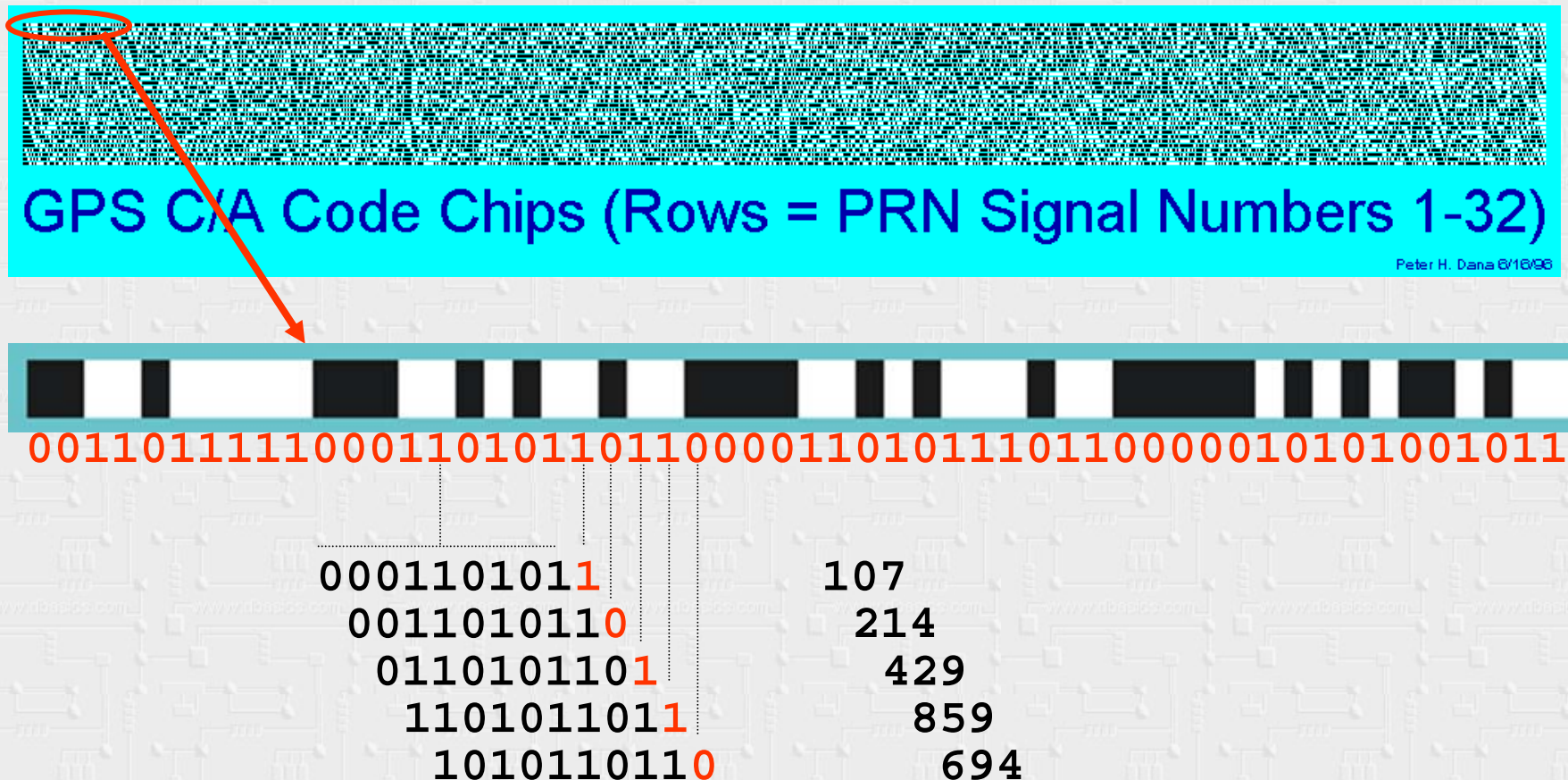
- **On shore data is already pre-formatted**

# Frame Numbering and Calibration



# Frame numbering

- Use a Pseudo Random Bit Stream (PRBS)





# Conclusion

- All Receivers (in Optical Modules **and** in Shore Station) are phase locked to the Shore Station Transmitter Clock.
- Calibration is done automatically and constantly. Data can be corrected on the fly.
- Frames can be numbered with a 1-bit overhead.
- This proposal fits both “Semi Real-Time” and “Store and Forward” concepts.

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