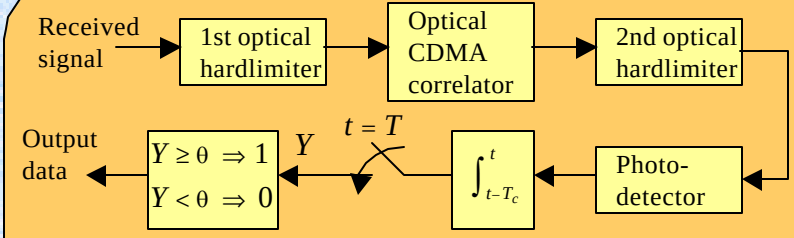
Nanyang Technological University

Network Technology Research Centre

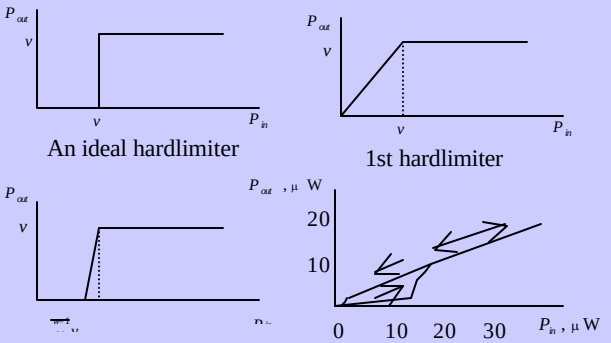
Complexity and Performance Comparisons Between Optical OOK-CDMA Chip-Level Receivers and Double-Optical-Hardlimiters Correlation Receivers

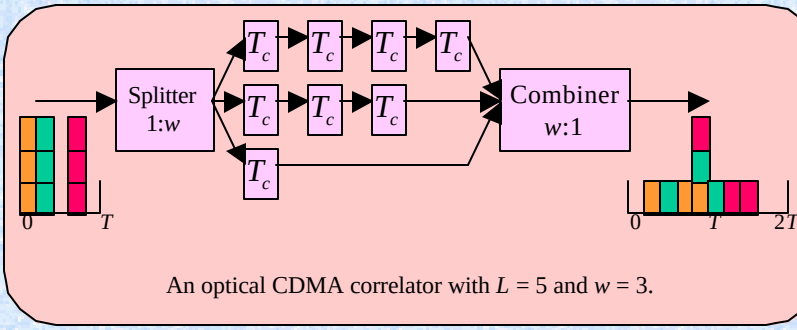
Optical OOK-CDMA Receiver Models and Hardware Complexity.

Optical OOK-CDMA correlation receivers with double optical hardlimiters.



An optical OOK-CDMA correlation receiver with double optical hardlimiters.





An optical CDMA correlator with $L = 5$ and $w = 3$.

- Optical hardlimiters reduce multiple-user interference.
- The input-output characteristic of the ideal hardlimiter is not realizable.
- Sufficient characteristics are shown in the middle figure.
- A practical hardlimiter exhibits:
  1) power loss
  2) two different threshold levels for the set and reset states
  3) dependence of the output power on the input power after switching.
- Three threshold settings are required:
  1) two for the optical hardlimiters
  2) one for the OOK decoder.
- Dynamic thresholds' adaptation is required because of their dependence on:
  1) the received power
  2) the number of simultaneous users.
- Hardlimiters with variable thresholds do not exist in practice.
- Waste of most of the received power due to the splitting process in the CDMA correlator.
- Electronic sampling rate = $1/L$ optical processing rate.