Use Cases for Power-Aware Networks

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Background Power Consumption

- Network devices consume a high level (for routers, >80%) 'background' power even no load is being carried.
- IOW: power consumption of network devices is not proportional to traffic load.
- Idle devices should be put into low power mode (e.g., sleeping state) to save energy consumption.

Power Consumption of Line-Cards

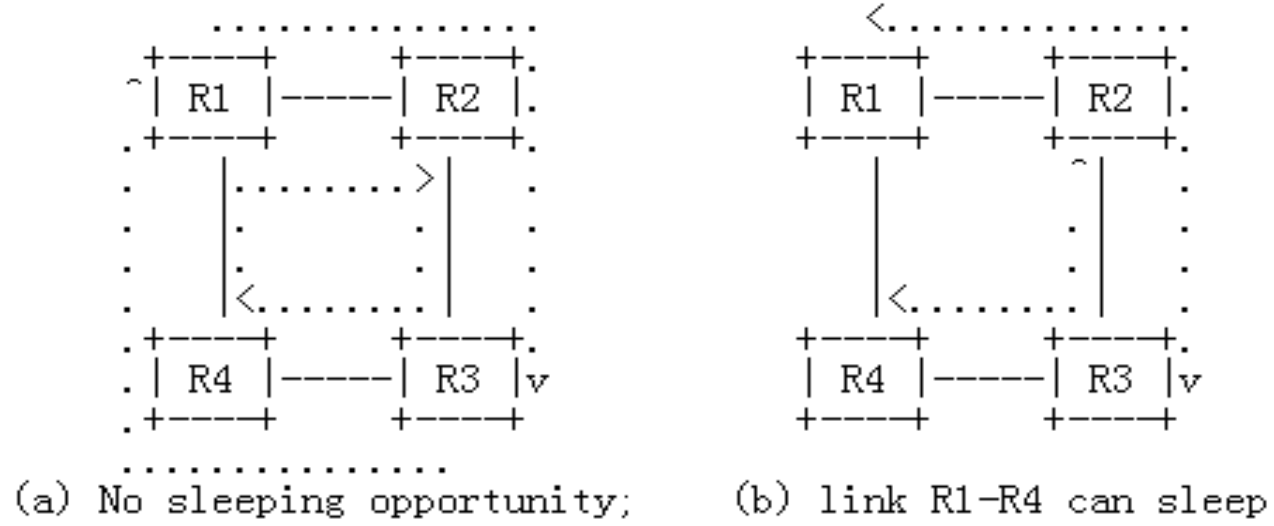
- Line-cards are the most power-hungry part for high-end routers and switches.
- E.g., with chassis fully loaded with line cards, an EX8208 Switch can consume 5200 Watts, while nearly 70% is from the line-cards!
  - (chassis watts) + 8 (8-port SFP+ line card watts)=(1600 W + 8 (450 W)) =1600W +3600W=5200W
  - This means 3600/5200=70%

L2 Sleeping Links

- Energy Efficient Ethernet (IEEE 802.3az)
  - Transceivers connecting an Ethernet link can enter Low Power Idle mode during the intervals of data streams.
  - Kind of opportunistic “sleeping”

L3 Sleeping Links

- Traffic can be aggregated on to part of links through Traffic Engineering.
- Therefore, idle links are 'scheduled' to go asleep to save energy consumption for ISPs.



Awareness of Sleeping State at L3

- We propose to add a new adjacency to represent sleeping links.
- L3 devices build an extended LSDB for sleeping links just as they build a regular LSDB.
- In this way, those sleeping links are “remembered”. In a proper time, it can be waken up.

L2 & L3 Coordination

- Different from the opportunistic sleeping, the L3 sleeping links can be planned and the sleeping period can be much longer.
- PHYs is probable to negotiate a longer time to enter LPI (deep sleeping modes).

Composite Links

- Composite links are widely deployed by ISPs.
- When the traffic load is lower than the overall bandwidth of a composite link, some component links can be put into sleeping state without cutting off the entire link.
- Advantage: the connectivity is preserved.

Thanks!