Path Energy Traffic Ratio API (PETRA)

draft-petra-green-api-00

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Motivation

- Provide visibility about energy consumption in a path
  - Metrics such as power consumption between source and destination (potentially related with throughput)
- Define an API that can provide such information
  - Using well-known architectures and schemas (e.g. YANG)
- This information can be consumed externally (e.g., SD-WAN customers) or internally (e.g., for operator optimization purposes)

- Draft previously presented in PANRG (IETF 118, IETF 120)

Background: Original Rationale

- Assumption-1: energy consumption in devices has a baseline component independent of traffic plus another one dependent of traffic [1].
  - E.g., in an IP device, baseline component is due to processors, fans, cards, etc, while the component due to traffic volume follows some function (lineal, exponential, etc)
- Assumption-2: while in short term actions could maybe affect the component dependent of traffic volume, in the future it might be possible to influence also the baseline component.
  - E.g., by switching-off or moving to sleep mode some of the components such as cards

[1] A. Vishwanath, K. Hinton, R. W. A. Ayre and R. S. Tucker, "Modeling Energy Consumption in High-Capacity Routers and Switches," in IEEE Journal on Selected Areas in Communications, vol. 32, no. 8, pp. 1524-1532, Aug. 2014, doi: 10.1109/JSAC.2014.2335312.

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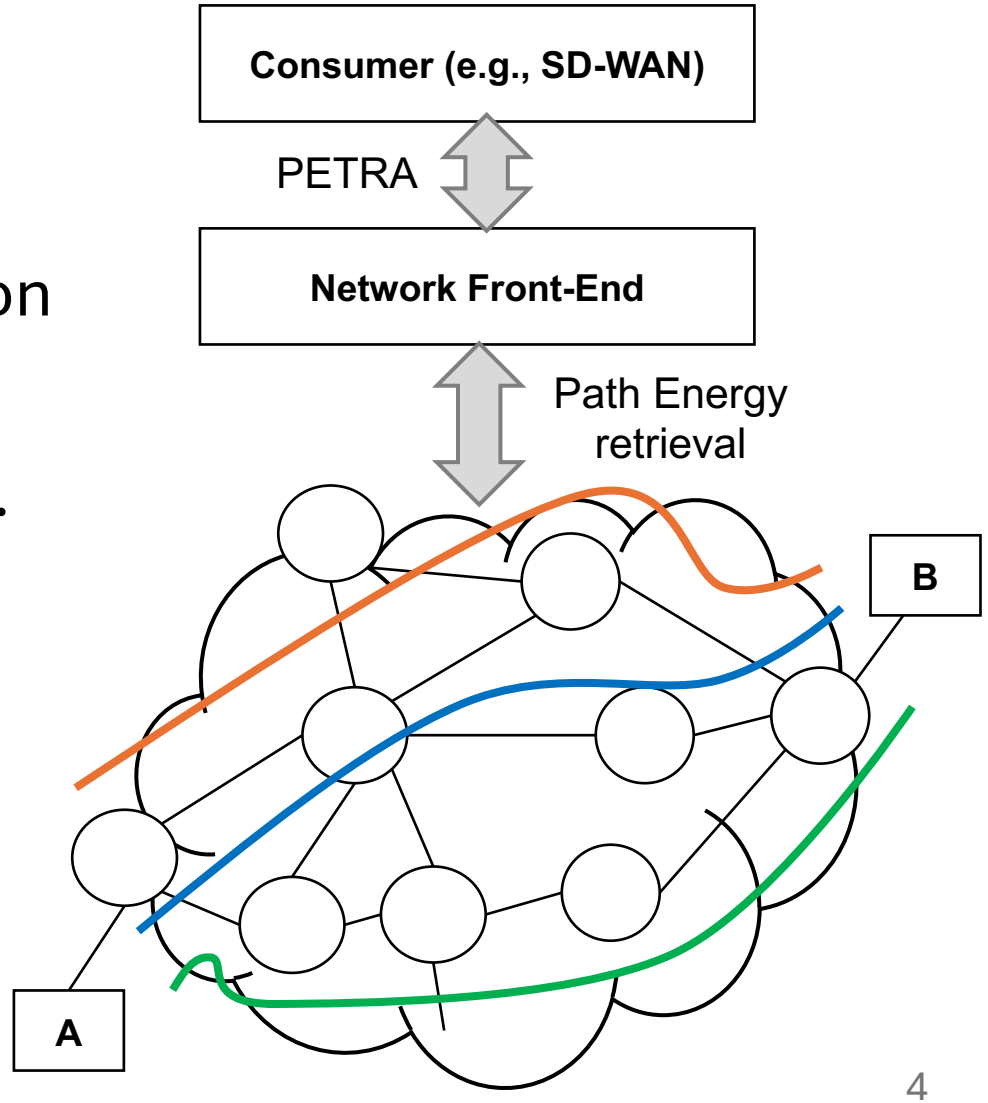
- There can be multiple paths between origin and destination
- Energy consumption might be different on each path: dependent on device characteristics and architecture, transceiver bit rate, number of hops, etc.

- API Query:
  - <src-IP, dst-IP, throughput, …>
- API Response:
  - <watts-per-gigabit, carbon-intensity, …>



Changes from *draft-petra-path-energy-api-02* to *draft-petra-green-api-00*

- Moved to GREEN WG

- Added Appendix with use-cases:
  - SD-WAN
    - Use PETRA to bridge the ‘disconnection’ between overlay and underlay
  - Multilayer Energy Management
    - Use PETRA to aggregate and correlate L1-L3 energy info across a path

Next steps

- Collect feedback from the WG and check interest
- Extend API parameters
- Report on implementation status
- Prepare new version for IETF 122