Requirements of Computing in Network

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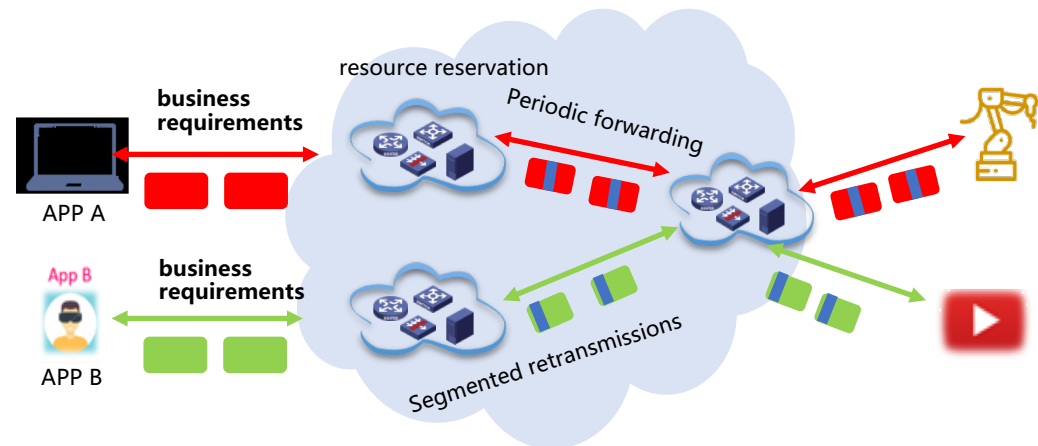
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Background

Computing in network becomes a new trend to meeting the needs of emerging business. What needs to be computed, and why? Several problems need to be considered:

- Traditional network protocols only optimize traffic
- Centralization of computing resources is not efficient
- Little interaction among users, applications and networks

- Some work has begun to consider these issues, but more requirements worth to be considered about the converge of computing and network

Requirement 1-deterministic network capabilities

- **Latency**: "In Time" to "On Time", the latency is not necessarily the lower the better

- **Packet loss rate:**
  - Time-varying routing, found the link time-varying regularity based on AI, predicting the network performance trend
  - Segmented retransmissions, the transmission content is cached and enhanced to achieve segmented retransmissions


resource reservation

business requirements

Periodic forwarding

APP A

business requirements

APP B

Segmented retransmissions

Requirement 2-computing aware scheduling

•According to business requests, dynamic computing power matching is carried out based on network status and performance of computing resources to achieve optimal user experience, and network utilization.

    •Computing is seen as "link state"

    •Computing resource information is exposed

Requirement 3-function based addressing
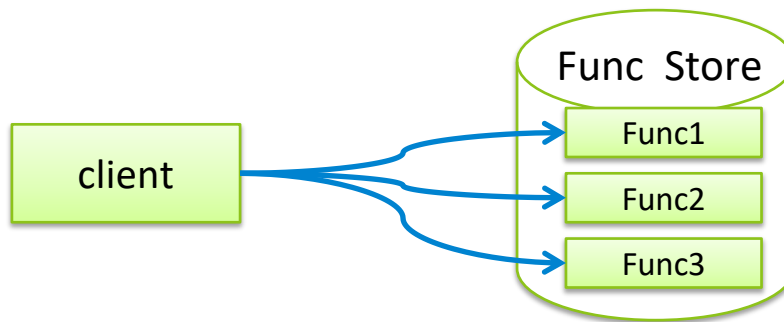
•The application components deconstructed on the server side are distributed on the cloud platform, and the business logic in the server is transferred to the client side.

•Client only needs to care about the computing function itself, not about the computing resources such as server, virtual machine, container and so on, so as to realize the function as a service.

Requirement 4- network programmability
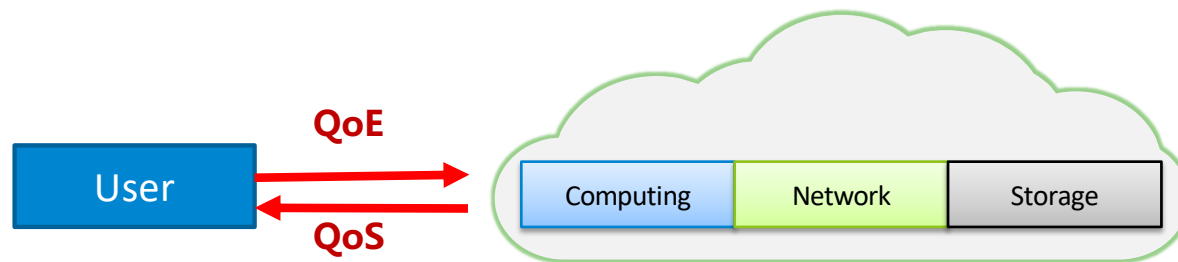
Information transmitted by network to users
Network resources (topology, path, link quality, etc.)
Computing resources (CPU/GPU, storage, memory, etc.)

Information transmitted by users to network
Network requirements (bandwidth, latency, jitter)
Computing Requirements (CPU/GPU, Storage, Memory)

- The network can configure parameters according to users' needs, and users can transfer requirements based on network capabilities, which could effectively support future application.

Next steps

- More requirements to be analyzed considering computing capability
- Off-line discussion about related technologies

Comments?