Topics Discussed (Quantum Networking Protocols)

- Promote quantum networking applications to a separate section?

- What service should quantum networking provide?

- Need to point out classical support beyond classical internet (e.g,. phase synchronization)

- Layered design: physical layer, link layer, network layer (controler & management)

- Learn from classical network community, while identifying distinctions between quantum & classical networking
(e.g., different capacity with 2-way classical signaling v.s. 1-way classical signaling)

Topics Discussed

- What are the good models for quantum networks (include quantum & classical channels; quantum memory resources; …)
- [Open Questions] What is the network policy for fault conditions? Not just how does work, but how does it fail?
- [Open Question] Feasibility of tomography of quantum network?
- [Open Question] Shall we only assume classical control layer (or more general quantum control layer)?
- Architecture of quantum network [for tomorrow]

Quantum Network Protocol

- Structure of Quantum Network Protocol Section:
  - [Service of quantum network] Provide a backbone support for various applications consuming quantum entanglement
  - [Physical layer] Quantum memory (entanglement generation, encoding, different nodes)
  - [Link layer] Quantum repeater protocals
  - [Network layer] Quantum network routing
    - Controller
    - Management
  - [Performance metrics & resources]

Performance metric & resources

➢ Perforamance Metrics:
   ➢ Rates & Fidelity (bandwidth)
   ➢ Latency
   ➢ Authentication (?)
   ➢ Might be helpful to differenciate between intermediate & end nodes (better storage?)
➢ Resources:
   ➢ Temporal resources (1/rate, latency)
   ➢ Physical resources (quantum memory, quantum gates,
   ➢ Classical/Quantum channel bandwidth