Measurement support for performance and diagnostics

- Measurement is not optional
  - Part of motivating at the beginning, evaluating at the end
- Measurement guides policy, investment, deployment
  - Is 5G successful, improving experience?
  - Was gigabit to the home broadband initiative worthwhile?
  - Plan capacity, but must provision for variable load
- Complexity is expanding, faults are harder to isolate, systems harder to simulate

Goals

- Design the Measurement Architecture
  - What should the interfaces and instrumentation look like
  - What can be enabled by programmable devices
  - What should be exported by tiny devices, 5G, canbus,
- Address challenges of modern systems
  - Containers, isolation, parallelism, heterogeneous workloads
  - Spectrum, adaptive protocols, diverse hardware, embedded devices
- Build the benchmarks, datasets that drive better systems
  - Embed researchers in industry or campus network, use foreign connections
- Consider both collection and analysis with different collaborators
  - Different skill sets, insights

Collaborations with and techniques from other research, but applied to systems and network problems

- Knowledge discovery via interactive exploration of data
- Stochastic modeling and analysis for parallel, cloud, multi-application systems
- Extreme value theory, large deviations, fluid theory to extrapolate from very little data about bad events.
- Programming languages and databases techniques for embedding query processing logic in increasingly programmable hardware
- Measurement data privacy, preventing deanonymization while enabling collaboration

Challenges of collecting, sharing Data

Cloud providers will take note of promising results on their data, need such results to get access to that data.

Consider seeking data and collaborations from campus IT (closer, but managing fewer services in-house), access networks, internet exchanges, or from hardware vendors. Use “GOALI.”

Tension between designing broadly useful measurement for posterity vs. narrowly designed for a specific question.

Want better general interfaces, better clarity on what must, should, and should not be shared