Real-Time Infrastructure

in support of “Internet of Things”

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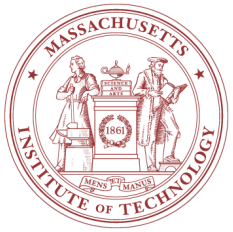
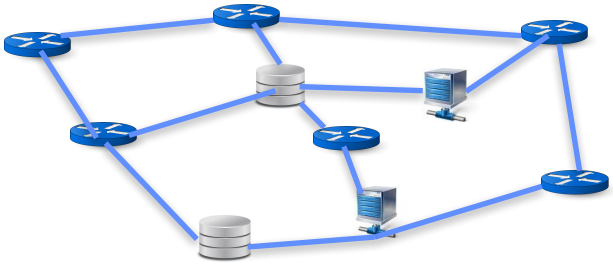


"The Network"

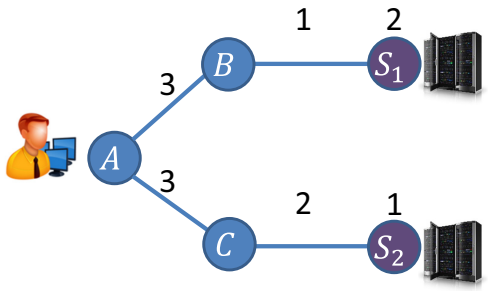
- No longer just switches and routers
  - Communication, Computation, Storage



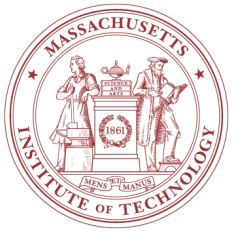
- Network services are no longer just moving packets from sources to destination
  - Both computation and storage are viewed as part of the network. E.g., internet search
  - What other things should be viewed as part of network?

Smart Network Control

- **Not just packet routing, scheduling…**
- **Need new mechanisms for allocating network resources:**
  - **E.g., joint routing and server allocation in cloud computing**
    Traffic streams have both communication and computation requirements

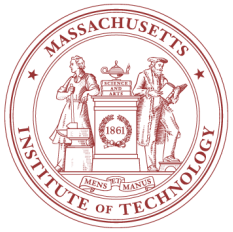


- **Many of these emerging IoT applications are real-time**
- **Need new architectures and mechanisms for supporting ultra-low latency requirements**
  - **New network control algorithms for latency sensitive traffic**
  - **New network architectures in support of real-time applications**
    How is this different from the old "telephone" network



Real-Time Infrastructure
What's New?

- **Ultra-low-latency**
  - **On order of propagation delays**
- **Highly heterogeneous: wireless is integral part**
- **Interaction between communication, computation, sensing**
  - **New Age-of-Information framework**
- **Heterogeneous mix of traffic**
  - **Combination of real-time and non-real-time traffic**



Real-Time Infrastructure Technical Challenges

- **Architecture**
  - **Packets vs circuits vs virtual circuits**
  - **Control plane issues**
  - **Traffic Separation: RT vs non-RT?**
  - **Physical network architecture: Placement of routers, servers, etc.**
- **Learning based protocols and algorithms**
- **Resource allocation schemes**
  - **New kinds of network resources**
  - **Wireless resources**
- **Protocols**
  - **Legacy vs clean slate protocol design?**