

# CENIC & Research Opportunities

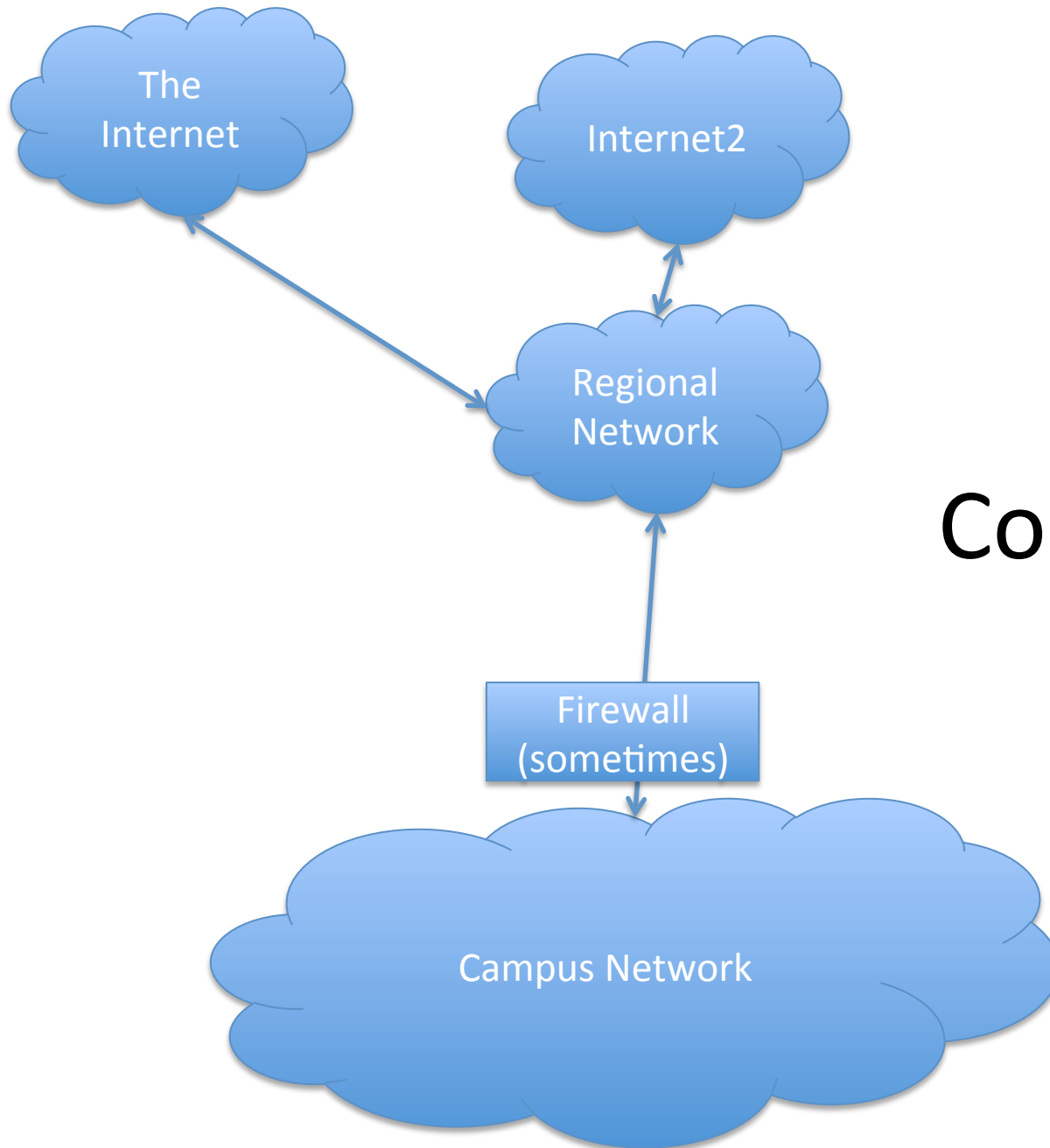
Cliff Frost

[cfrost@cenic.org](mailto:cfrost@cenic.org)

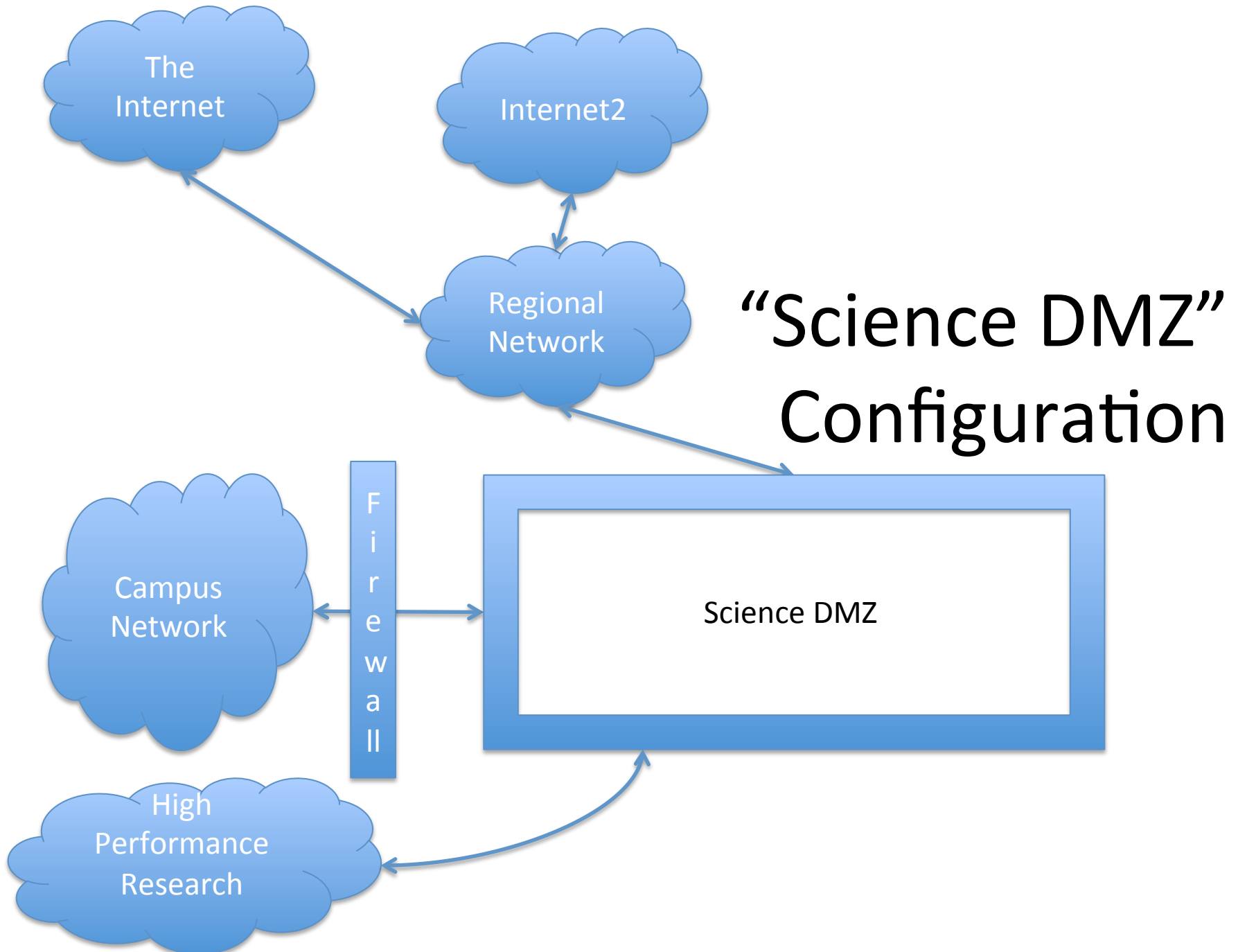
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# Researchers

- Researchers Are Few
- Notoriously hard to reach
- Collaborations are all about *Relationships*
- Labor Intensive, one individual at a time
- Typical CC\*{N,I}E Interface to CENIC (Regional Network)



**“Standard”  
Configuration**



# What is in Science DMZ?

- Defined and Described by ESNNet
  - <https://fasterdata.es.net/science-dmz/>
- “Simple” High Speed (10G, 40G, 100G) bypass of Campus Network
  - L2 (VLAN) connectivity
  - L1 (lambda or dark fiber) connectivity
- Data Transfer Node
- Perfsonar Box
- OpenFlow Switch/Router

# What are Known Unknowns?

- “Simple” High Speed (10G, 40G, 100G) bypass of Campus Network
  - For campuses with Firewalls, fairly big concerns—how to keep networks separate?

# What are Known Unknowns?

- Data Transfer Node
  - Almost (or exactly) “Store and Forward” networking
    - Clunky
  - Big issue is reaching & teaching researchers/staff

# What are Known Unknowns?

- Perfsonar Box
  - Non-trivial, especially at high speed (40G or 100G)
  - Frequent updates



# What are Known Unknowns?

- OpenFlow Switch/Router
  - OpenFlow reasonably well understood for on-campus use, but...
  - What Hardware to use?
    - Brocade most popular as of this minute
    - Arista, Juniper, HP, Pica8 also being used
  - Multi-domain uses are totally research
    - Outside GENI or Oscars, really tough
  - What Controller???
    - OpenDaylight current “favorite”

# Simple Concept

## Two Real Examples

Q&A