

# Energy Efficient Content Distribution

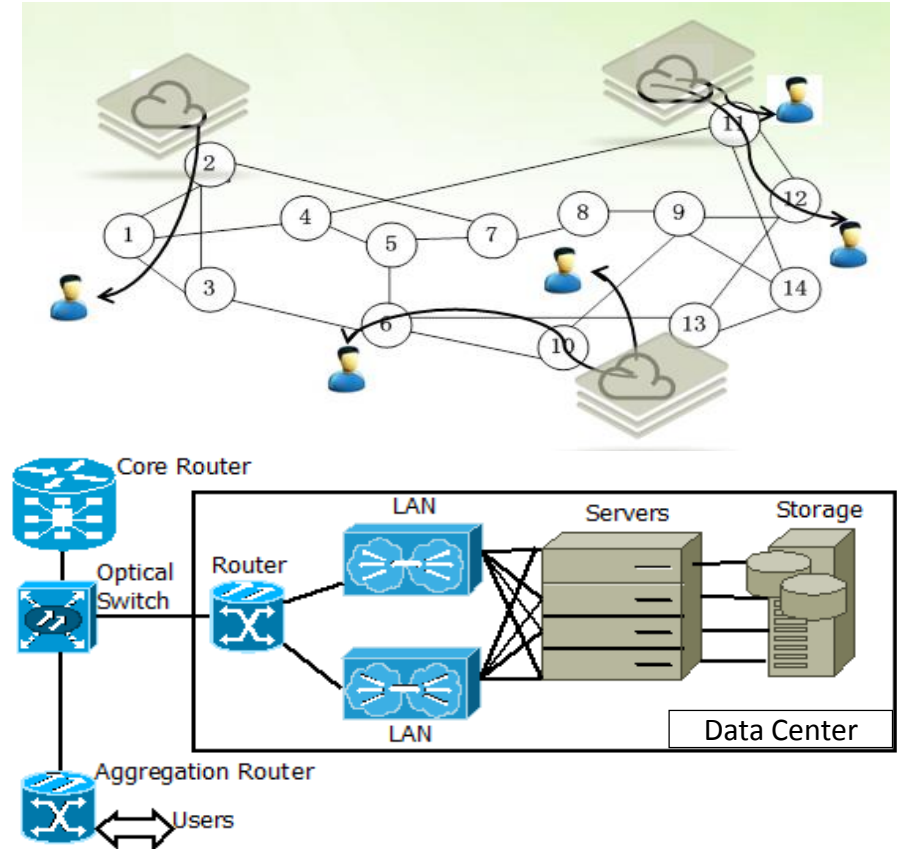




## Distributed Energy Efficient Clouds Over Core Networks

### CHALLENGE AND BREAKTHROUGHS

- Energy consumption not taken into account in conventional content distribution networks
- Challenge is to serve the content and virtualize the functions performed in the network to minimize processing, transmit and storage resources on a global basis
- Determine the optimum number, location and size of data centers and the network connecting them



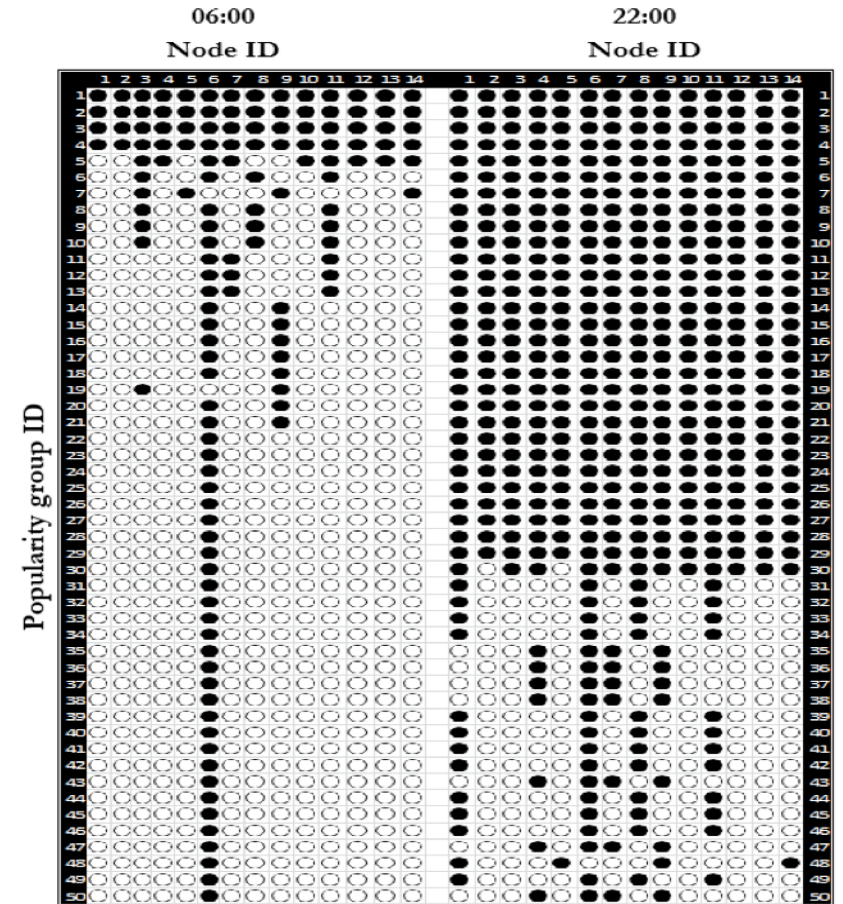
**Centralized vs. Distributed Data Centers for Minimum Network Resource Consumption**



## Distributed Energy Efficient Clouds Over Core Networks

### KEY ACCOMPLISHMENT AND RESULTS

- Mathematical model of end-to-end resource allocation problem
- Network-wide optimization for typical network topologies and content demands
- Developed real-time heuristic algorithms for content placement and network resource allocation based on content popularity
- Performance evaluation via simulations and mathematical optimization



**2.20x Improvement in Core Network Energy Efficiency**

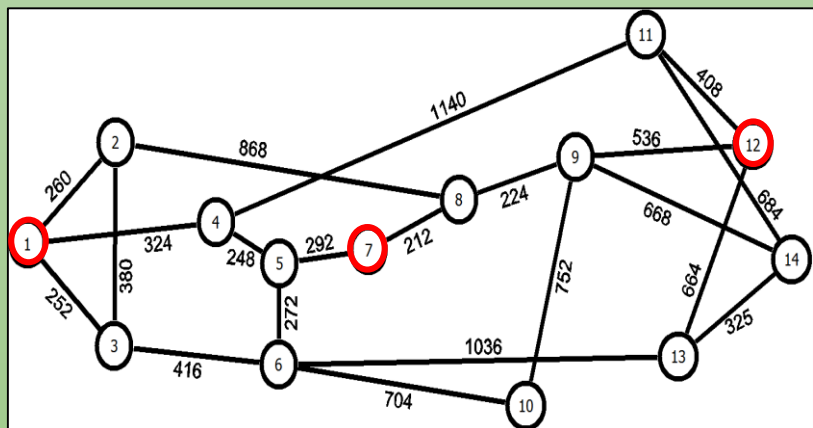




## Distributed Energy Efficient Clouds Over Core Networks

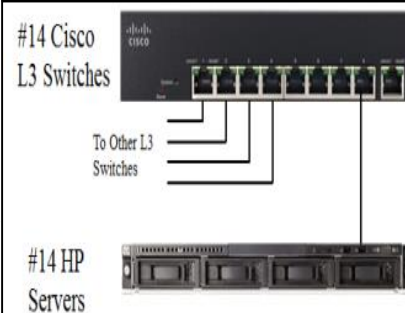
### DEMO DESCRIPTION

- 14 Nodes
- 21 Links

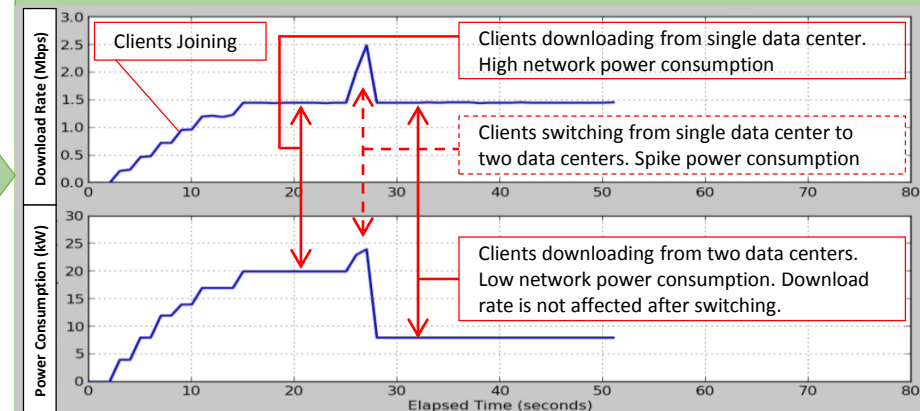


Core IP/WDM Network is Emulated by

### Experimental Demo



### Demo Results



- DCs are in nodes 7(Center), 1(Left), 12(Right)
- Reported power consumption of the demo is estimated, not measured.

**Validate Feasibility and Performance of Content Distribution Algorithms for Minimum Network Energy Consumption**