WAN Design With Frame Relay

By
David Horton
CST-443

Overview of Frame Relay

- Used for Wide Area Networking.
- Operates at Layer-2 in the OSI model.
- Uses telecommunications infrastructure.
- Speeds from 56k (DS0) to 43Mbps (DS3) depending on service provider.

Frame Relay Terms

- CIR – Committed Information Rate
- DCE – Data Circuit-terminating Equipment
- DTE – Data Terminal Equipment
- DLCI – Data Link Connection Identifier

Frame Relay Terms (continued)

- HDLC – High-level Data Link Control protocol
- LMI – Line Management Interface
- PPP – Point-to-Point Protocol
- PVC – Private Virtual Circuit

Basic Concepts

- Purchase service from a frame relay provider.
- Attach point-to-point links (DTE to DCE) from customer sites to frame cloud.
- Set up PVC's between customer sites.
- PVC endpoints are identified with a DLCI.
- Monitoring is done using LMI.

Sample Design

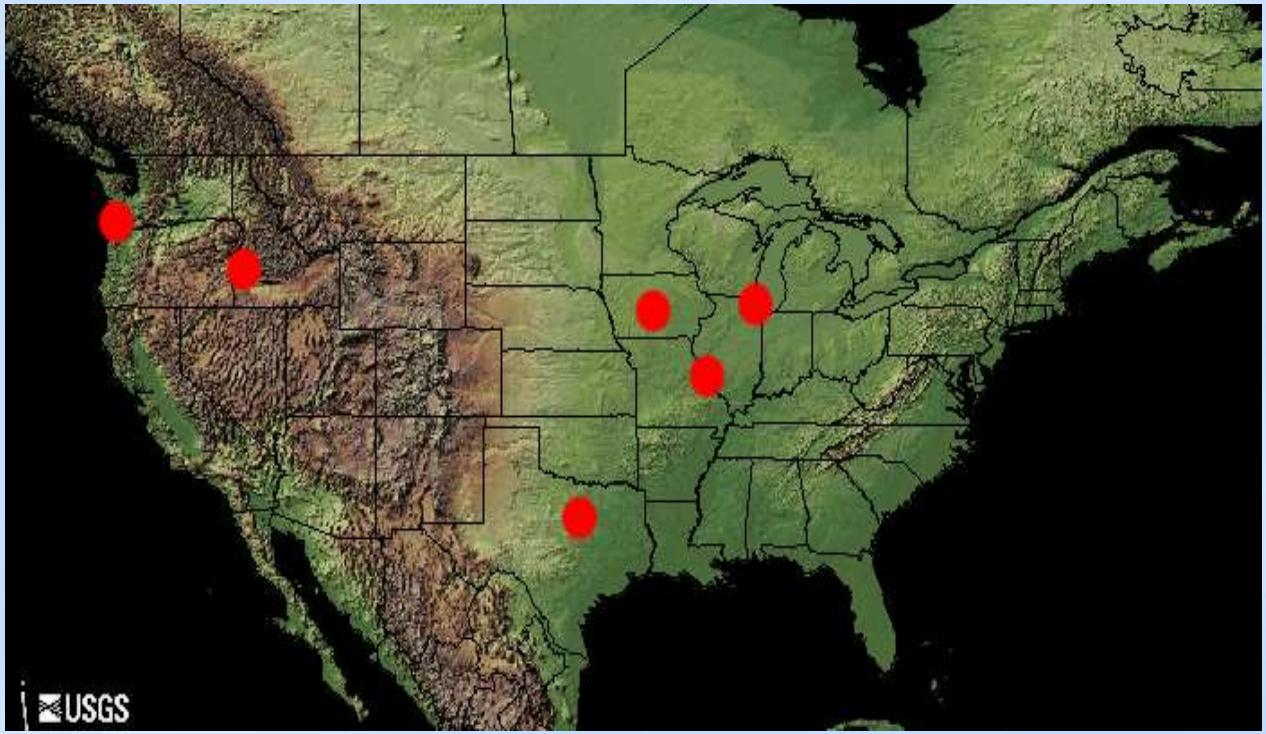
Zippy's Chips

Purveyor of fine snacks™

Vend-O-Land®

Snack delivery specialists since 1962

Geographic Locations



Frame Relay Provider

Fat Data Pipe, Inc.

FDP, we're all over it dude.™

Advantages and Disadvantages

- Cheaper than point-to-point links over long distances.
- Congestion on provider's network can degrade throughput.
- Difficult to ensure quality of service (QoS) compared to other protocols.

Mitigating Disadvantages

- Determine present needs and plan for growth.
- Check service level agreements, CIR.
- Carefully examine service provider contracts.
- Examine alternatives.

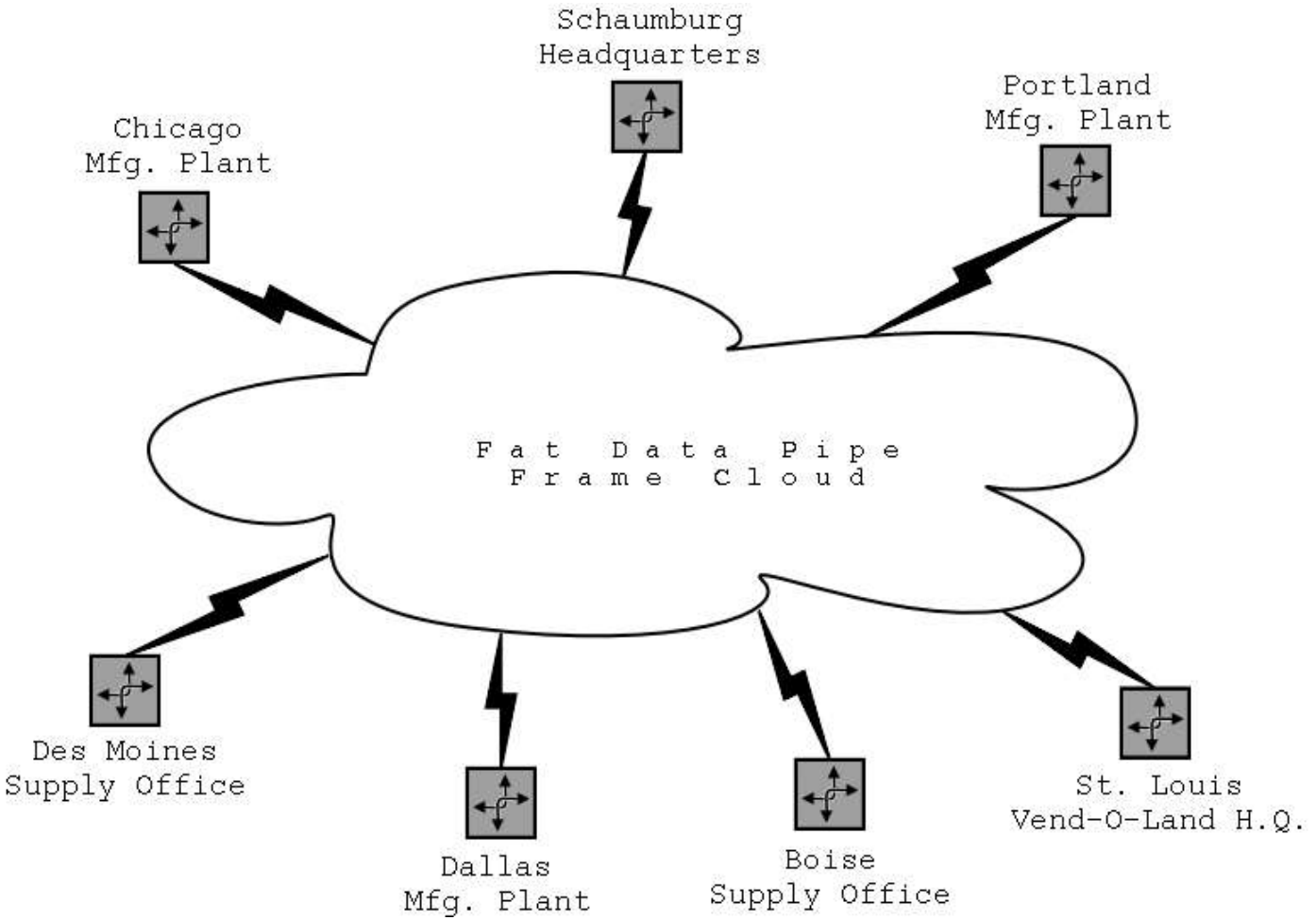
Alternatives

- X.25 – older protocol designed for analog links.
- ATM – Fixed-length cells give good, predictable quality of service.
- Make the decision based on needs, availability and price.

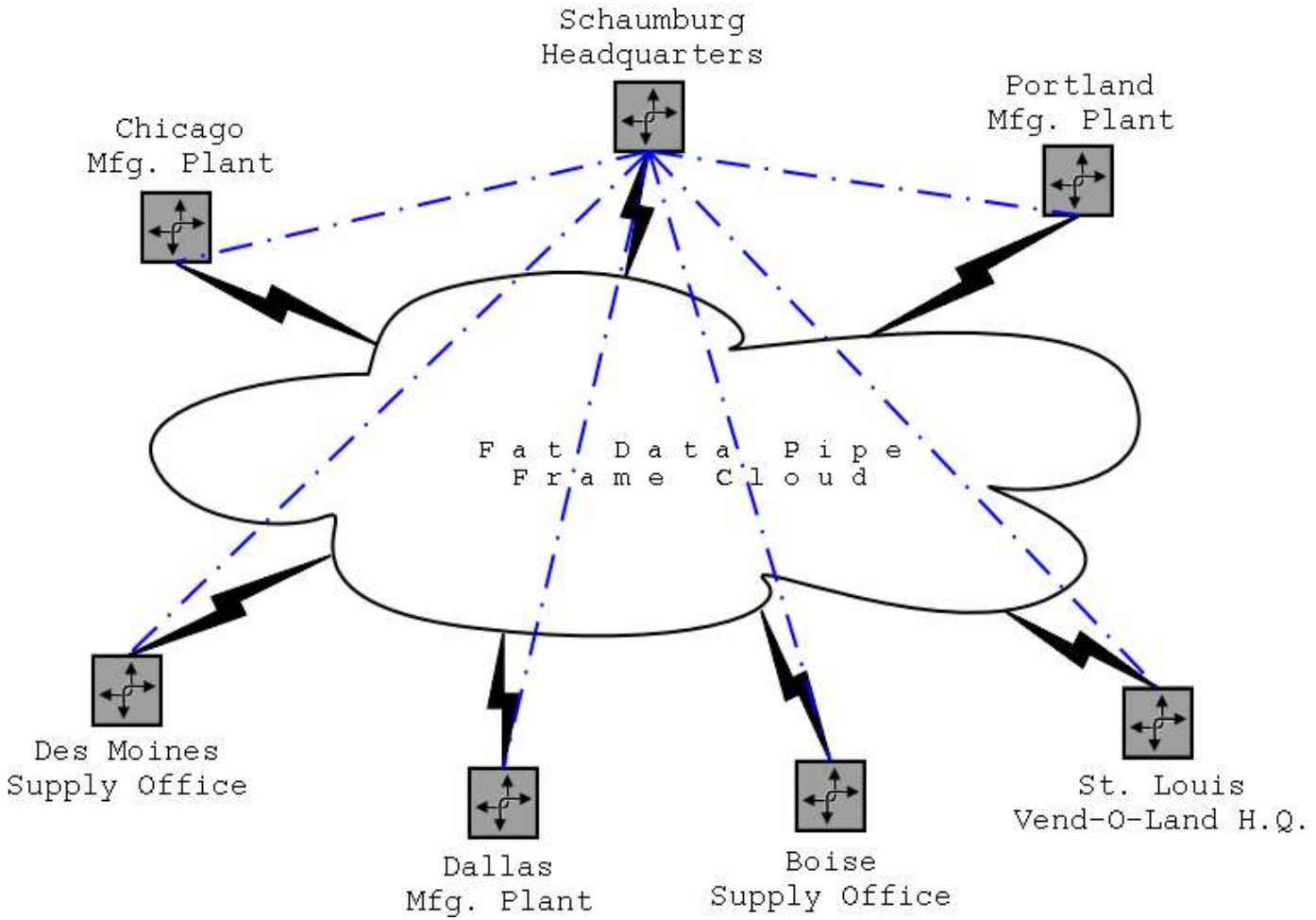
Zippy's WAN Design

Step-by-Step Construction

Connections To The Cloud



Basic Hub And Spoke Design



Aliens Attack Schaumburg!

What happens if there is a disaster at the hub?

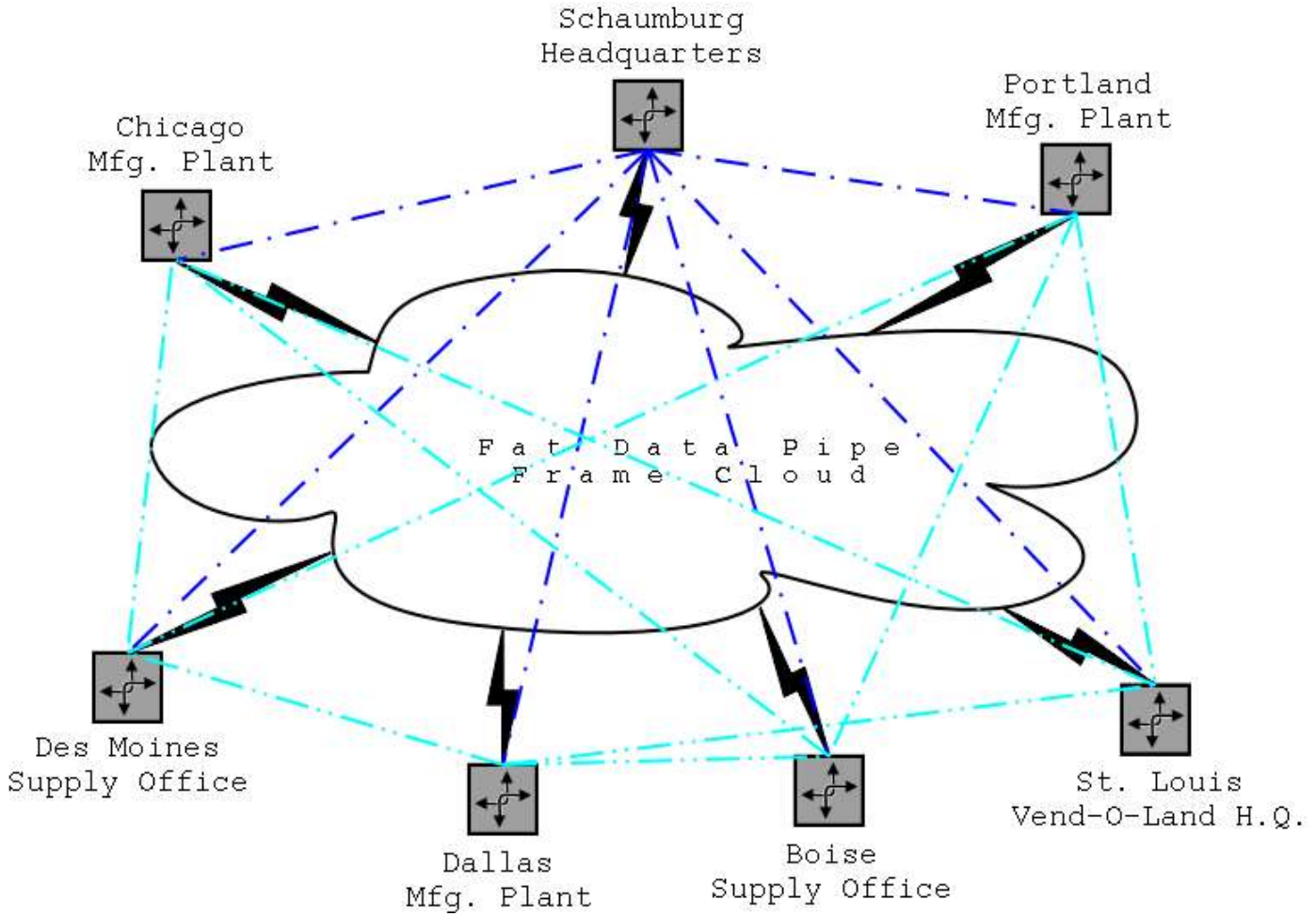
Fire! Flood! Locusts!

How do we keep the network running?

Redundant Links

- Alternative paths that do not rely on the Schaumburg site.
- Full mesh offers the most redundancy but is often too complex to manage.
- Partial mesh is a good trade-off between redundancy and manageability.
- Examine business requirements to determine the best setup.

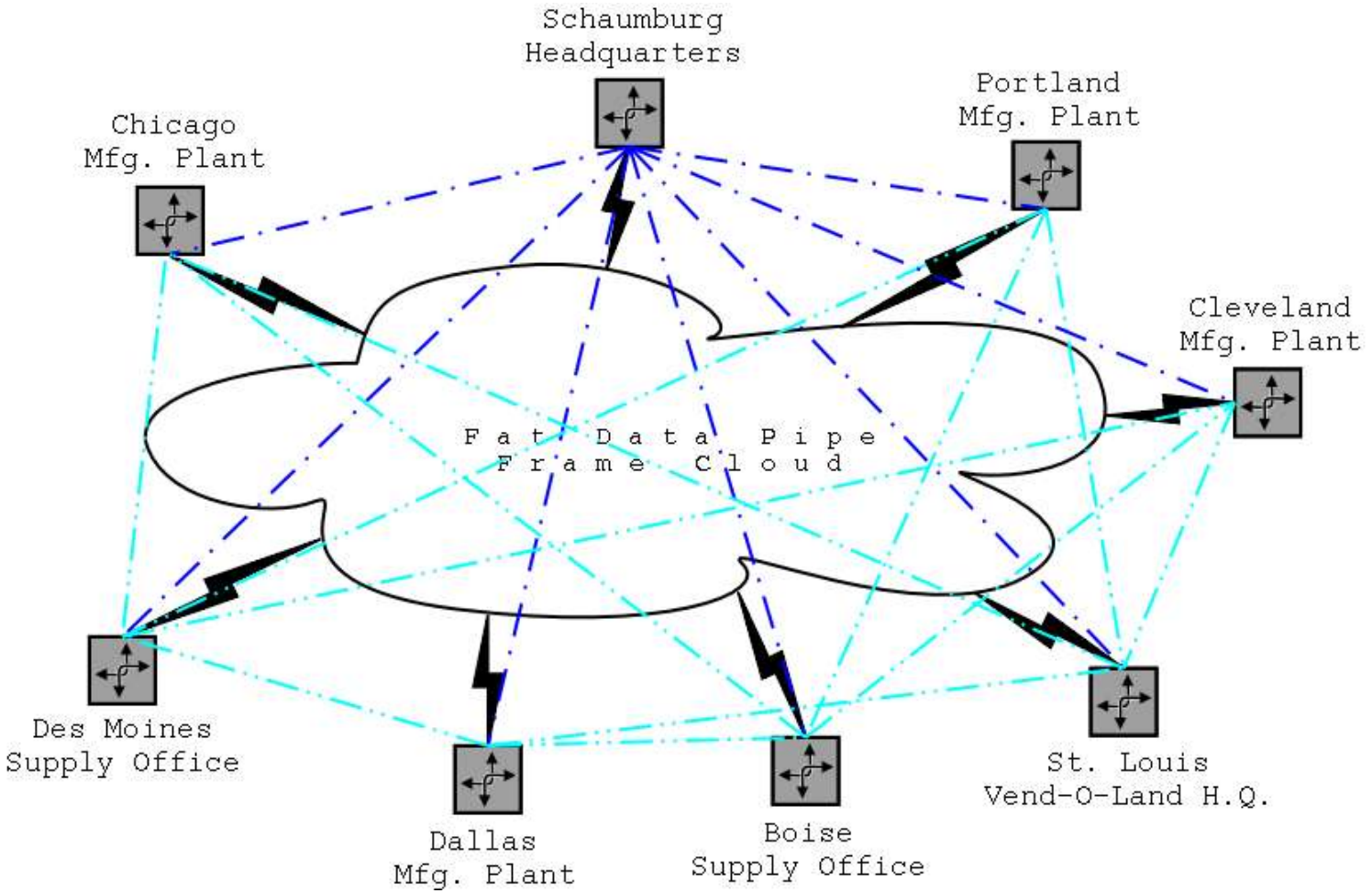
Redundant Links



Scaling The Network

Zippy's is expanding and opening a new manufacturing plant in Cleveland, Ohio.

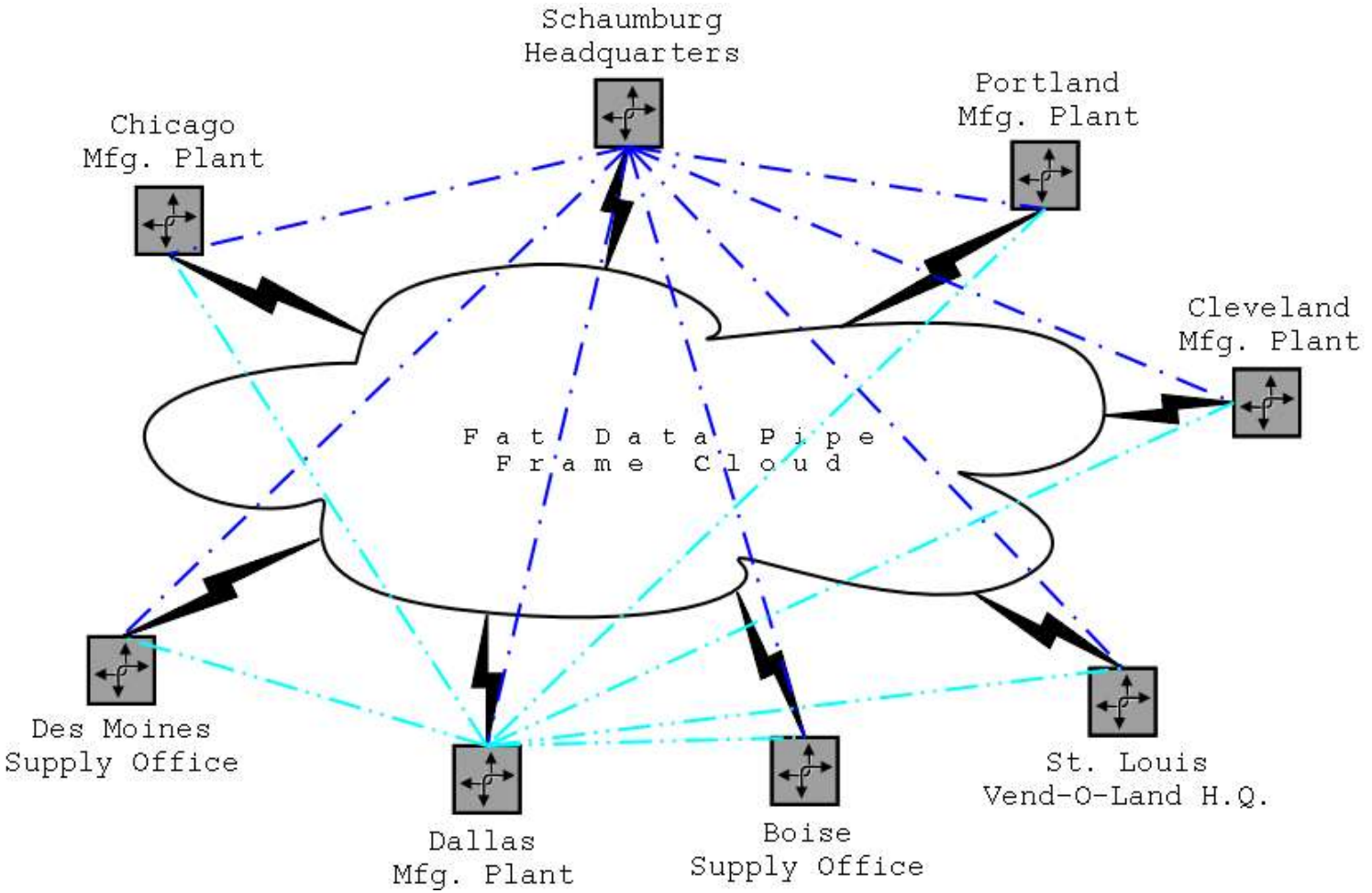
Scaling The Network



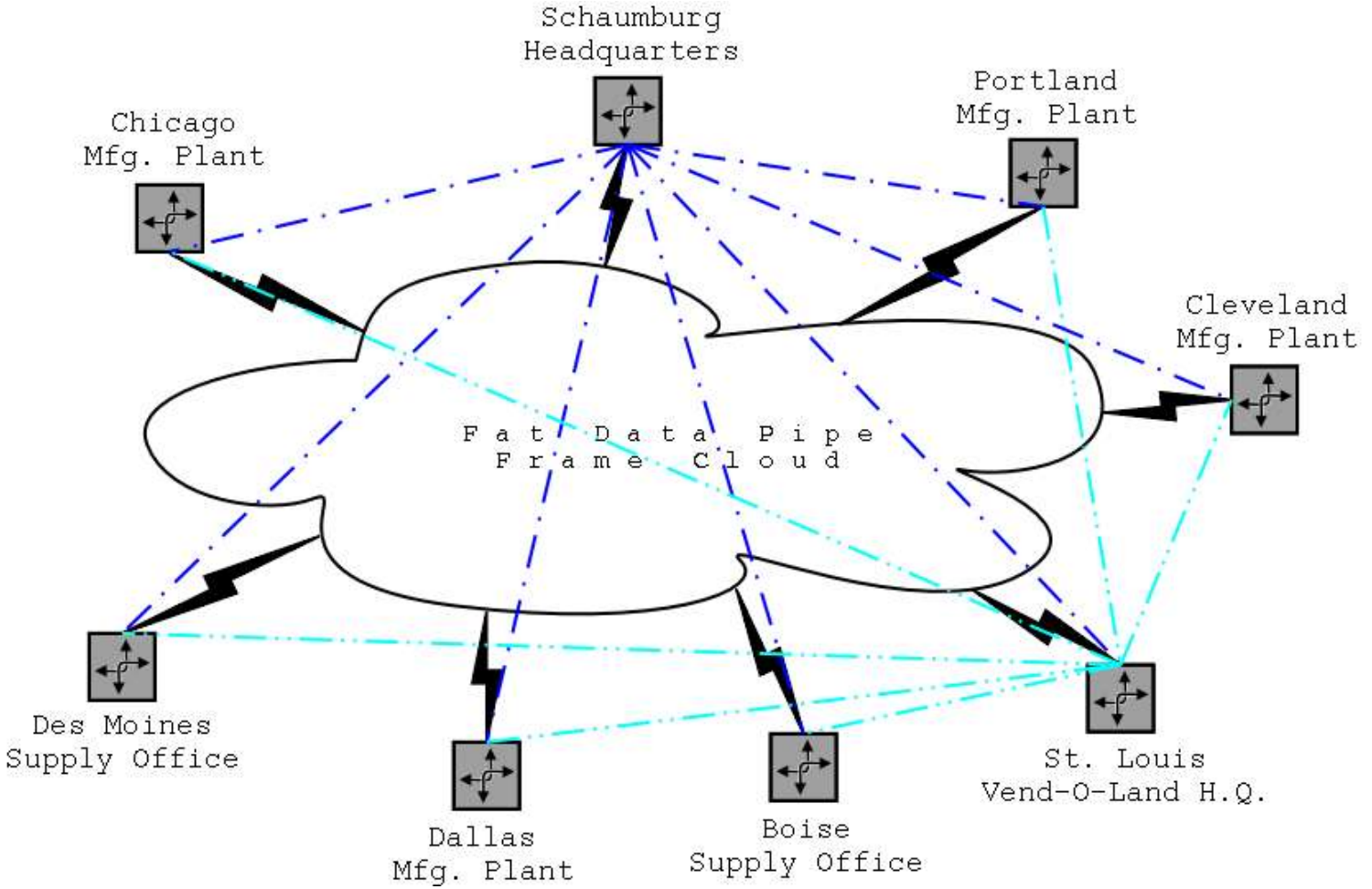
Growth And Complexity

The mesh is starting to look like a mess.

Alternative Dual-Hub Design



Alternative Co-location Design



The End

Any Questions?