

# CCN

## **CCNx 1.0 Forwarding Introduction**

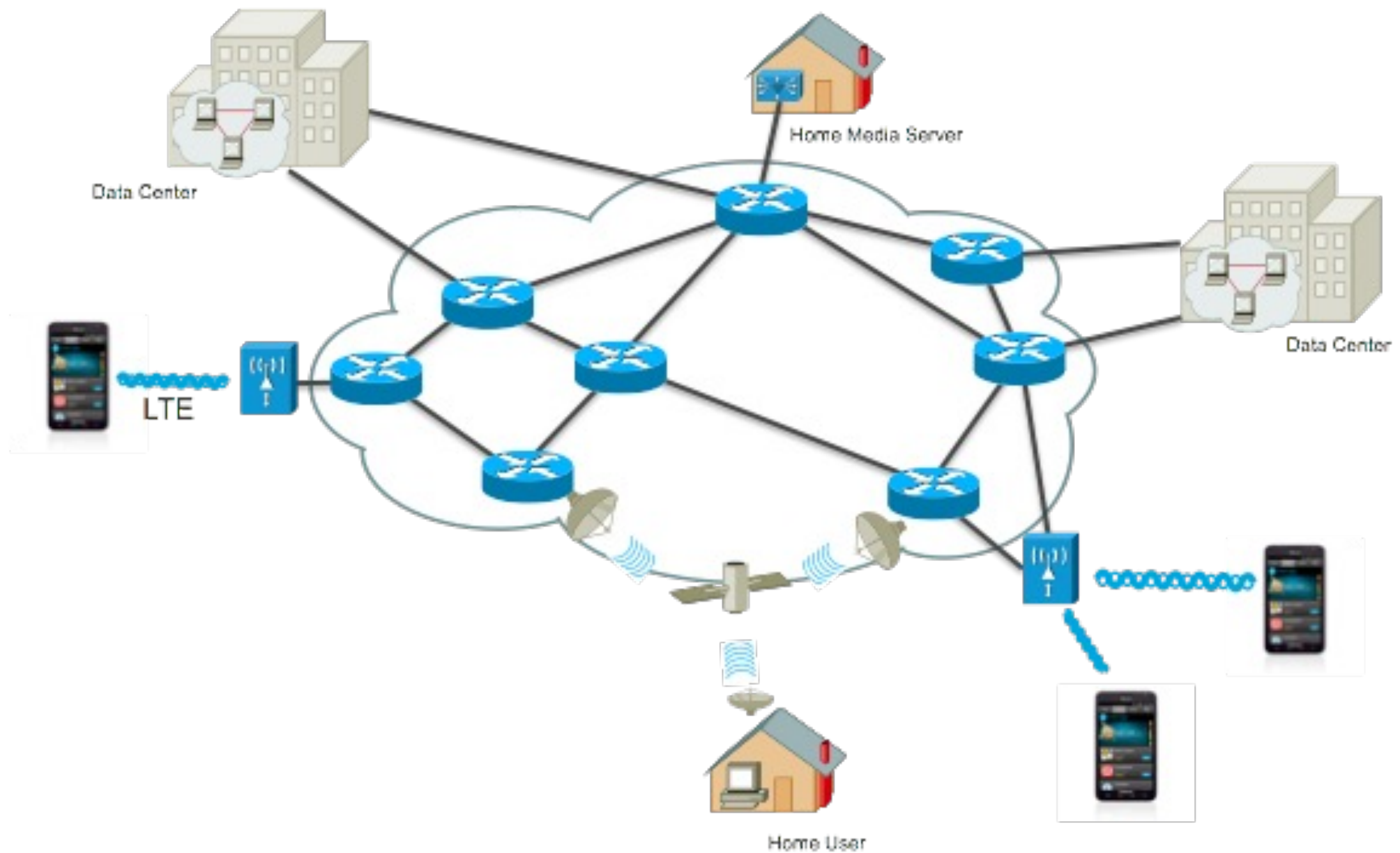
Computer Science Laboratory

Networking & Distributed Systems

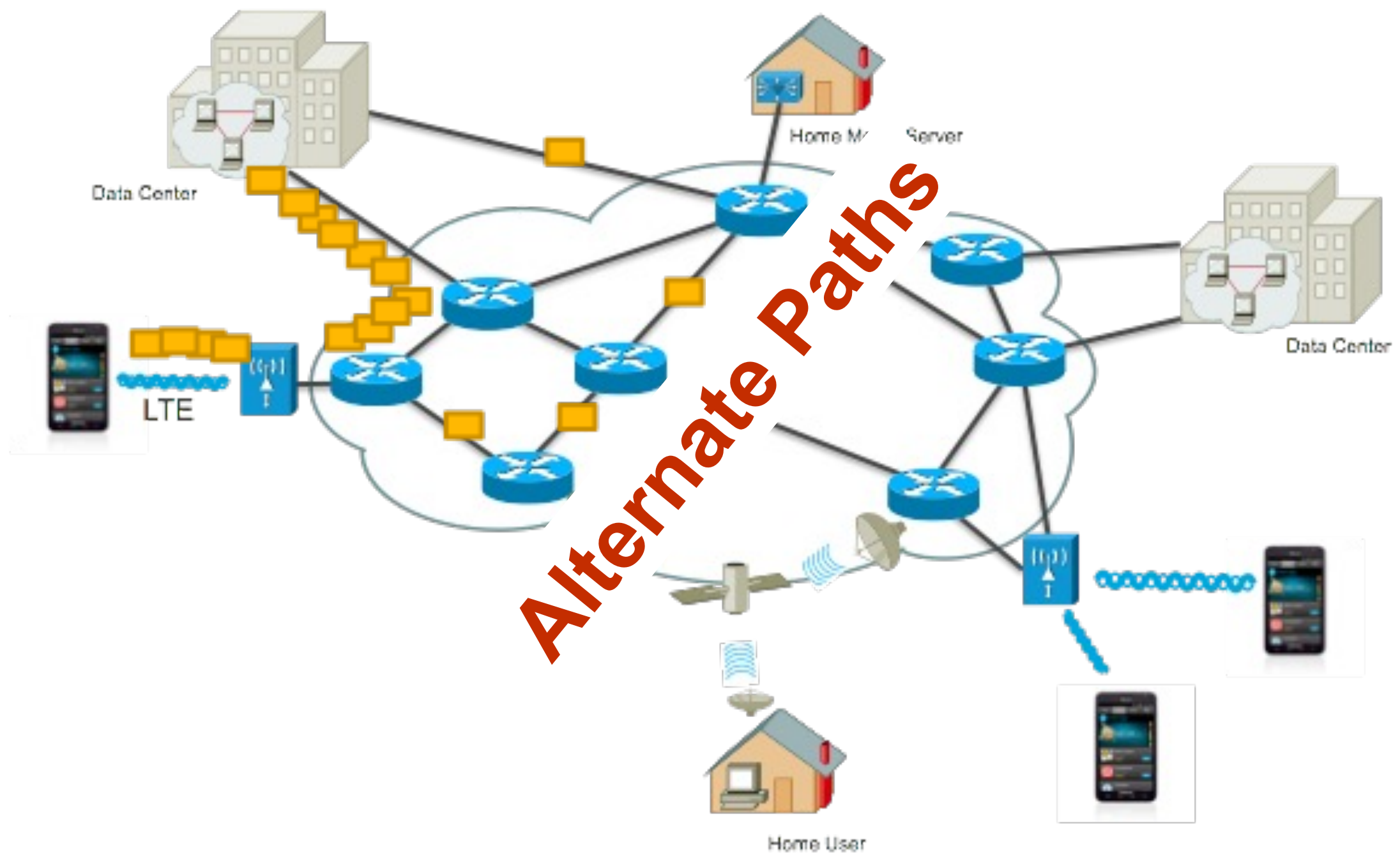
April 2014

# Requirements by Example

# Example Network

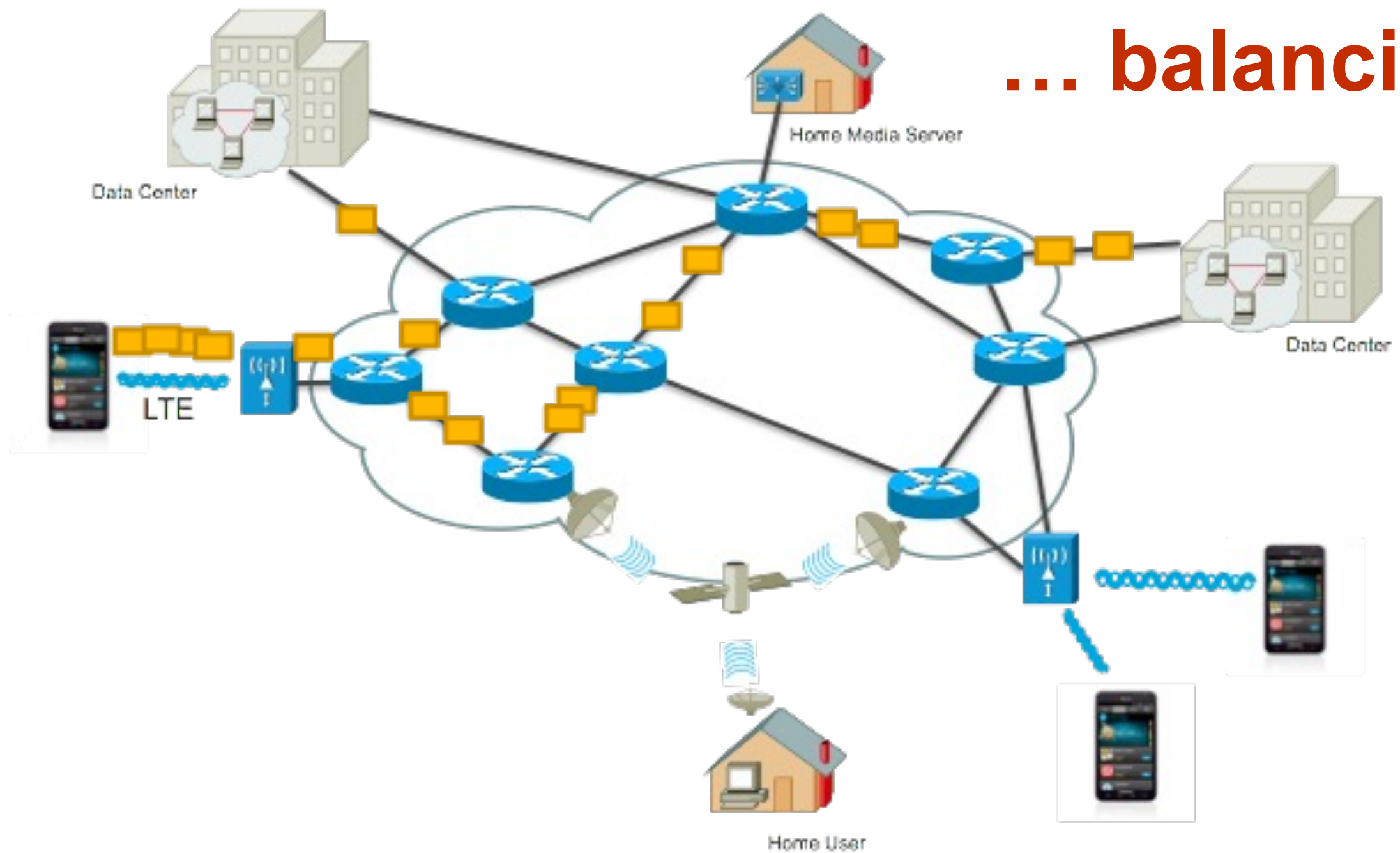




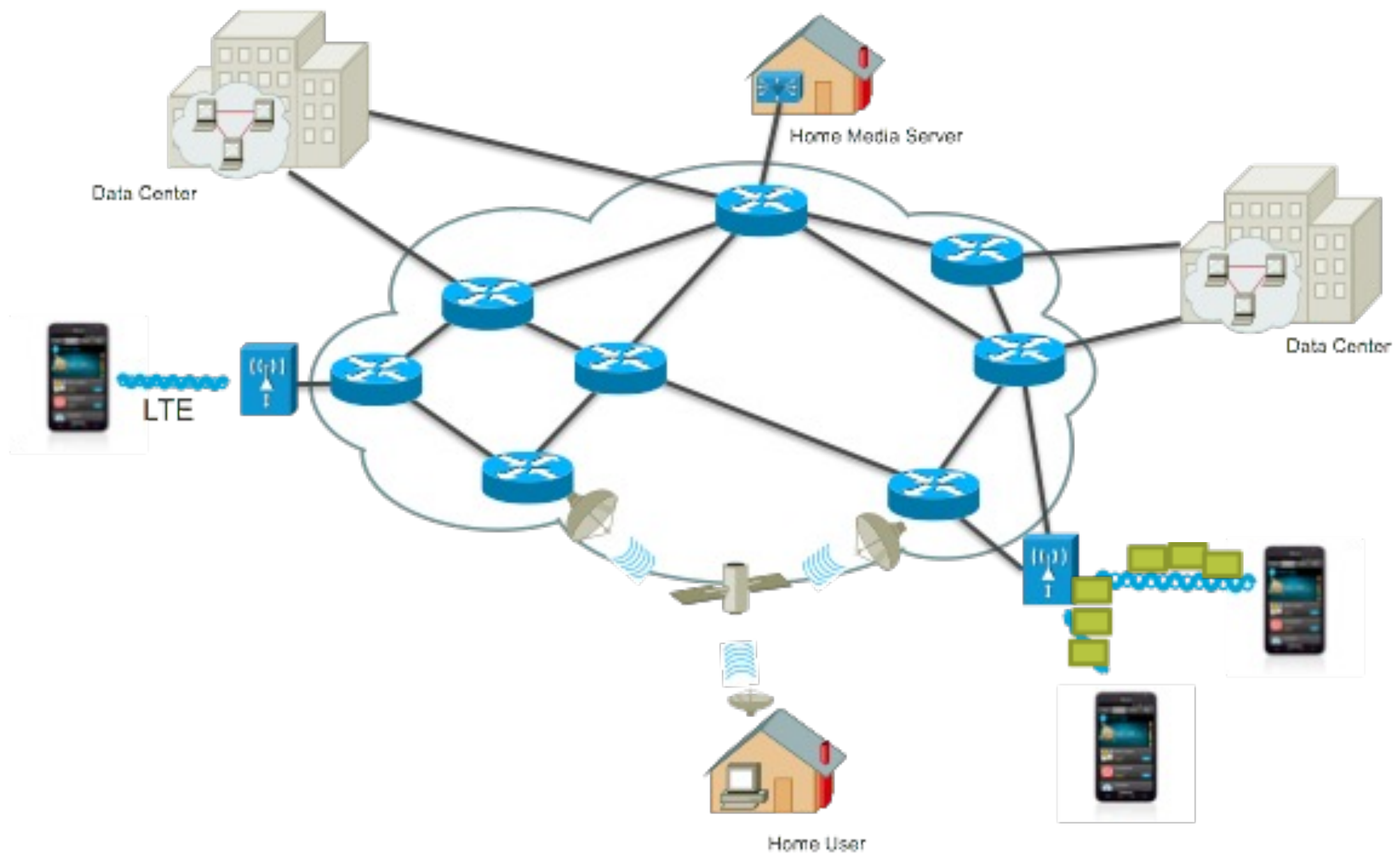


# load ...

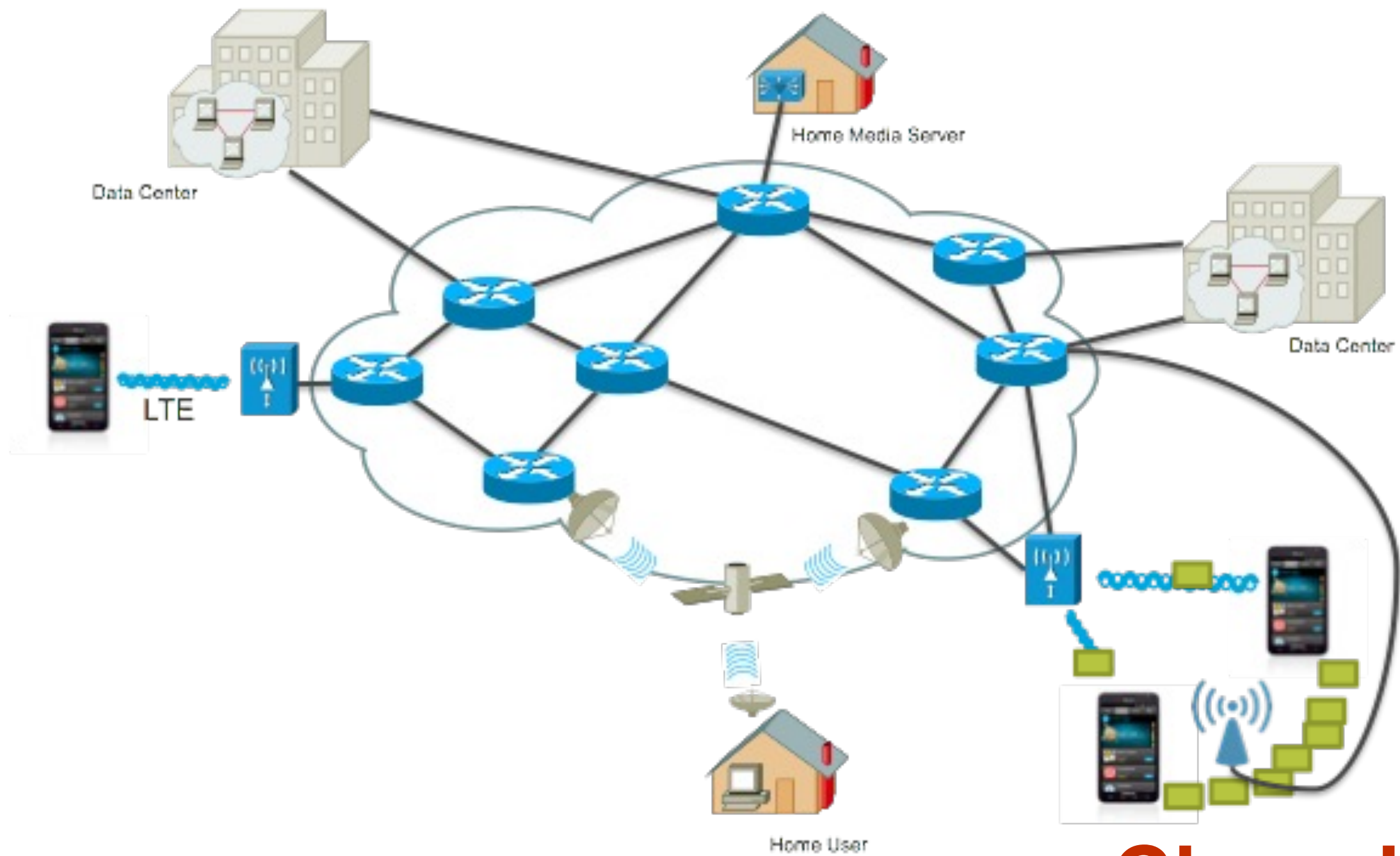
# ... balancing





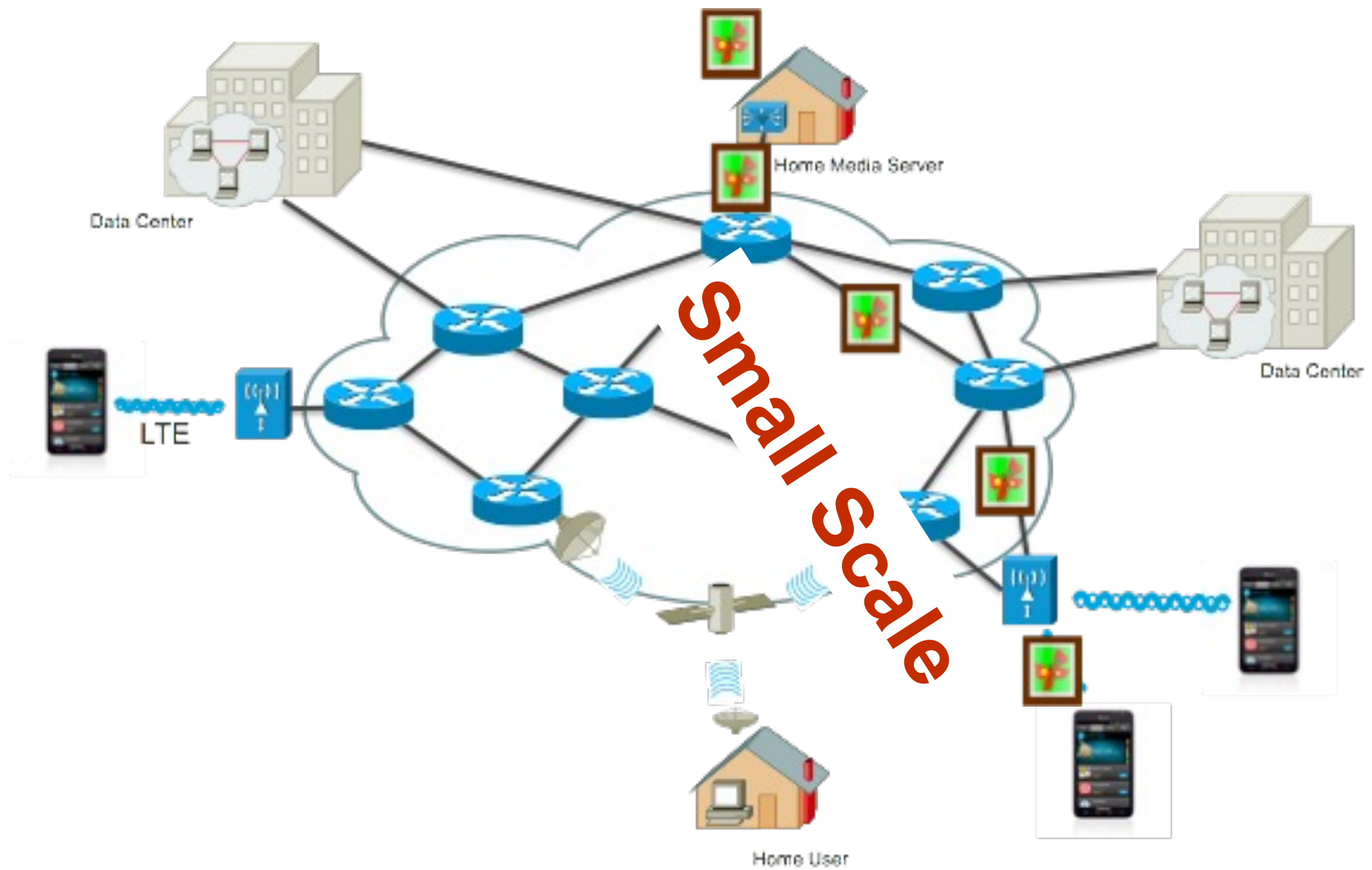


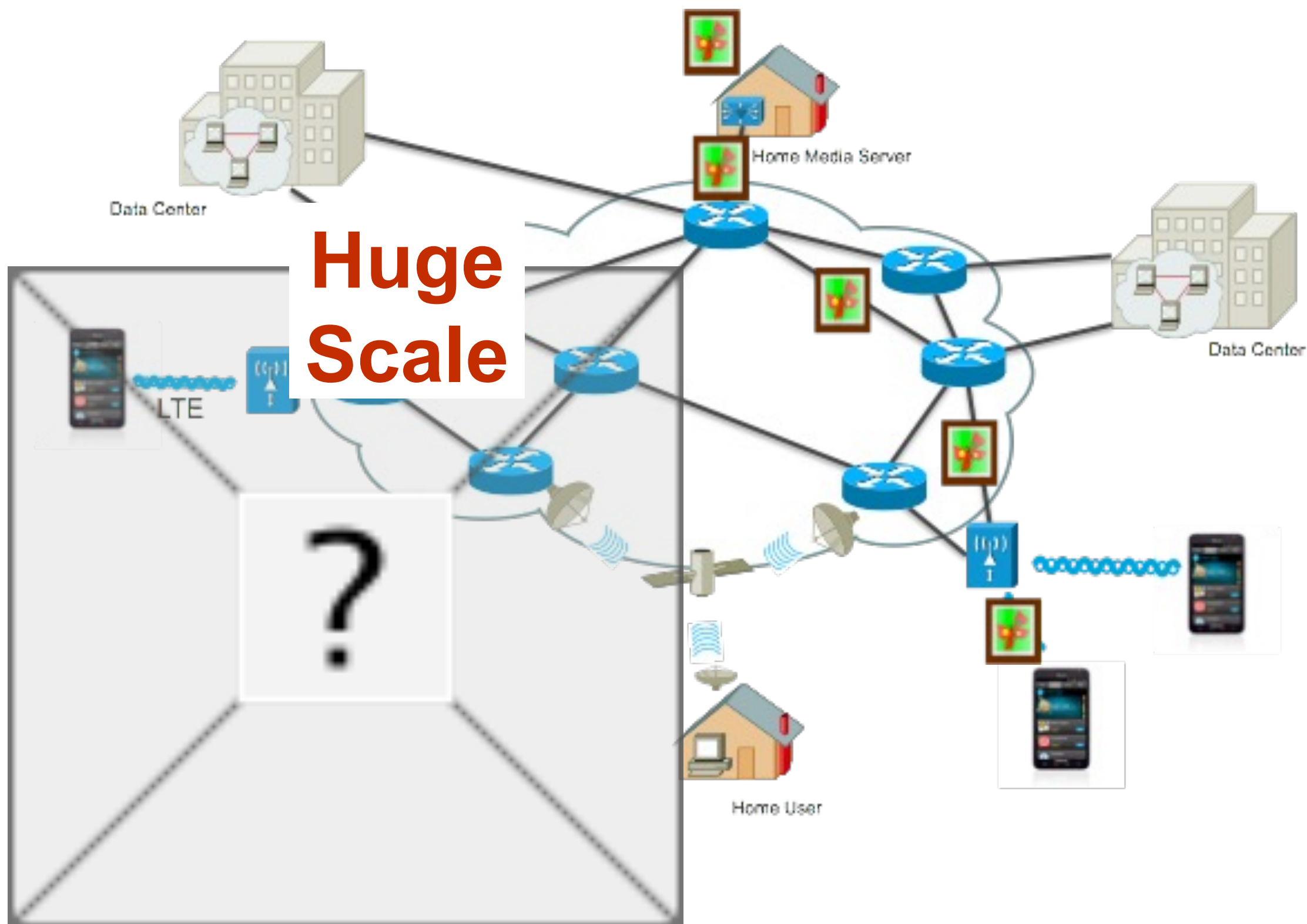
# Peer-To-Peer



**Changing  
connectivity**

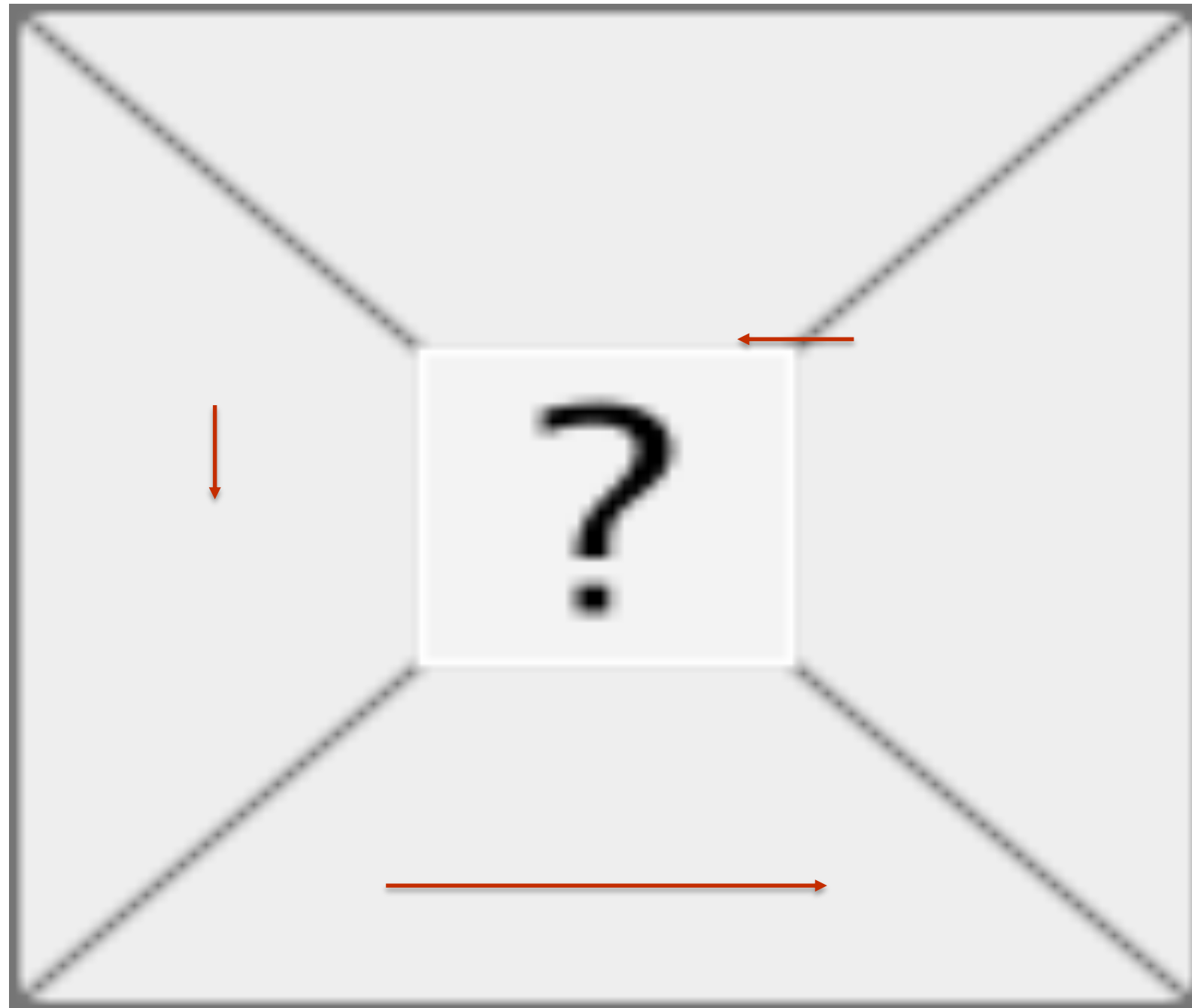




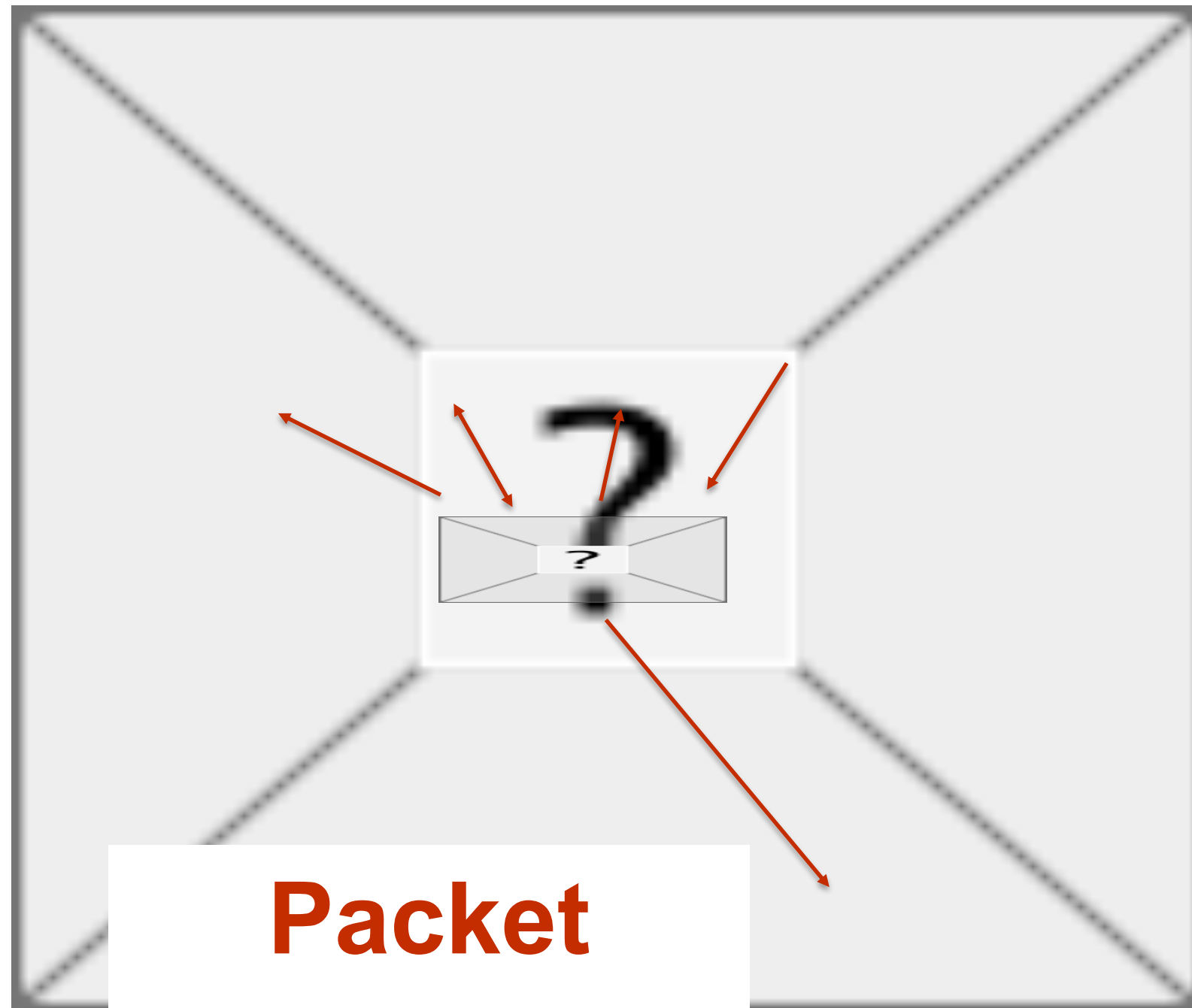


# CCN Forwarder Structure

# Today's Packet Flow



FIB = Forwarding Information Base



**Packet  
memory  
is a cache**

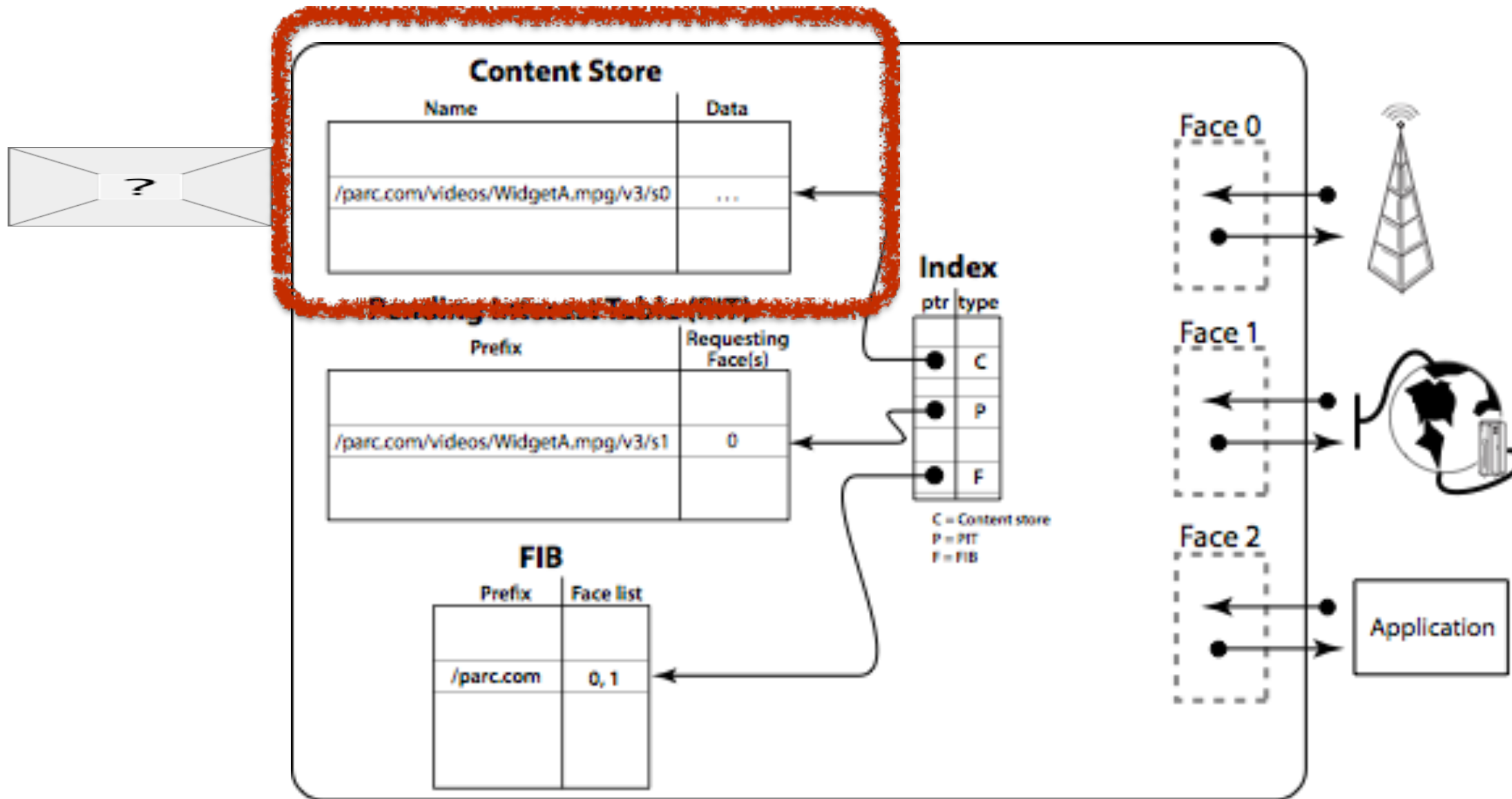


*Routing*      Finding the path alternatives

*Strategy*      How to use the Alternatives

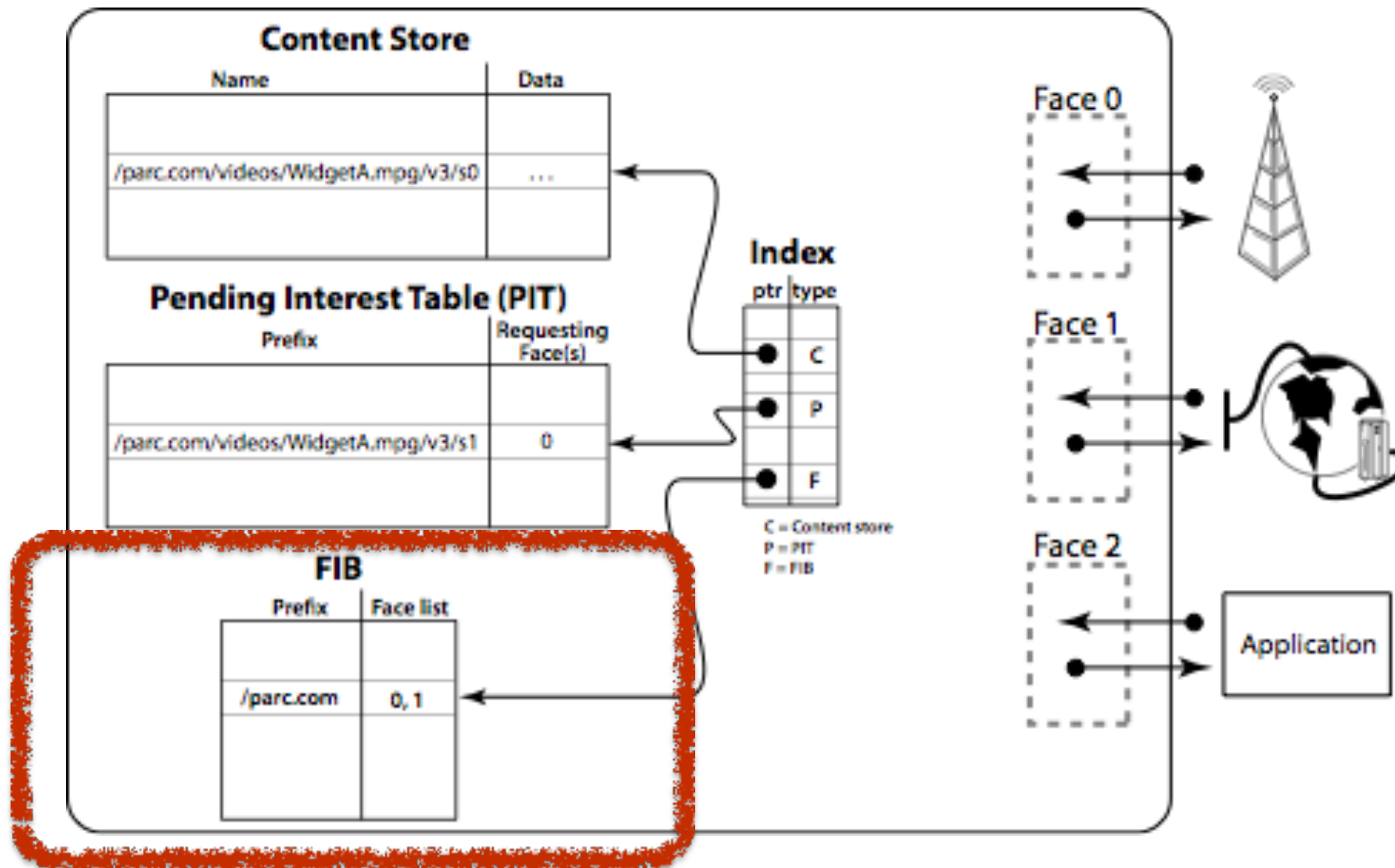
*Forwarding*      Processing a packet based  
on a strategy

# Content Store like long-term packet memory

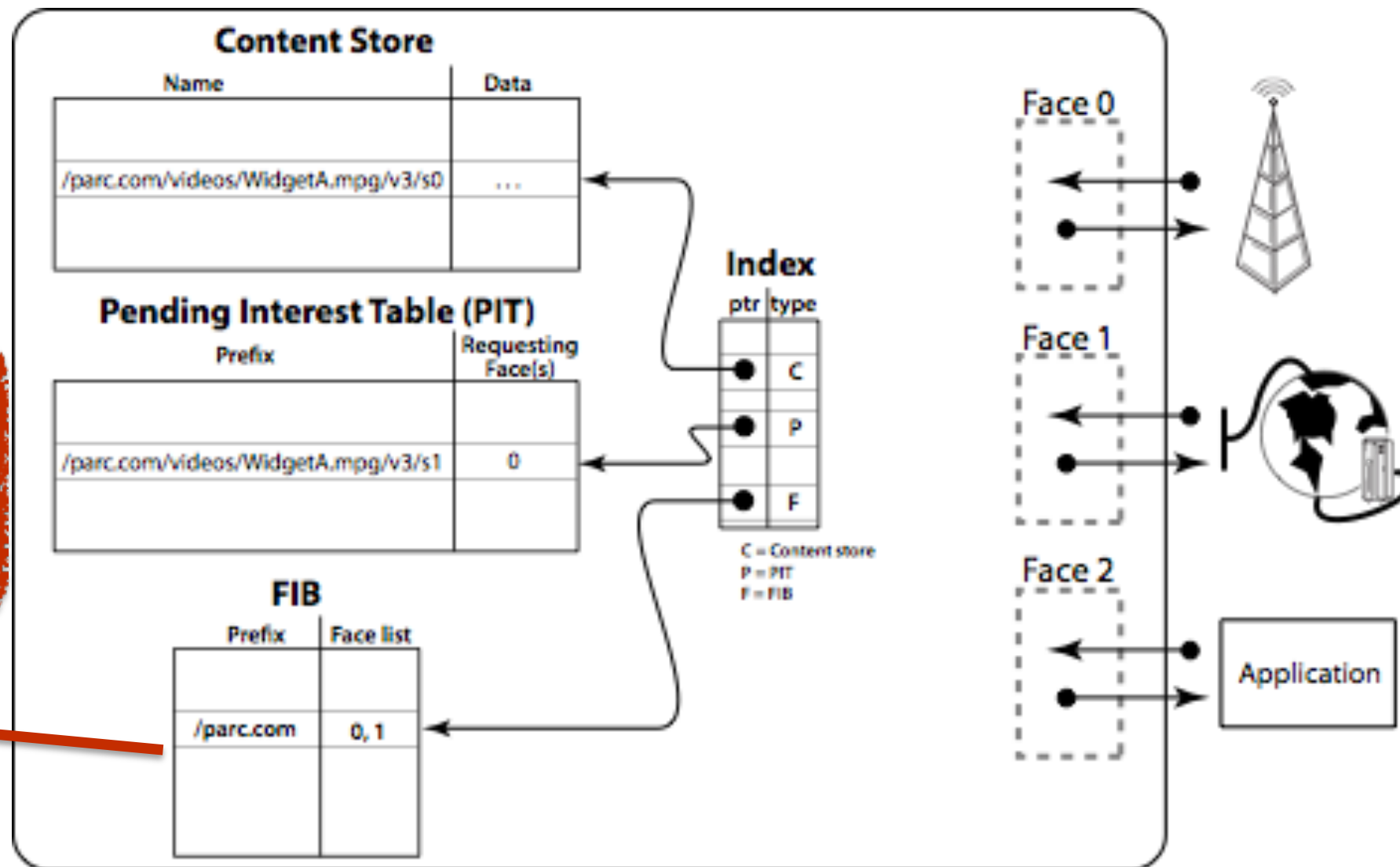


# FIB like today's FIB

## Longest matching prefix on Names

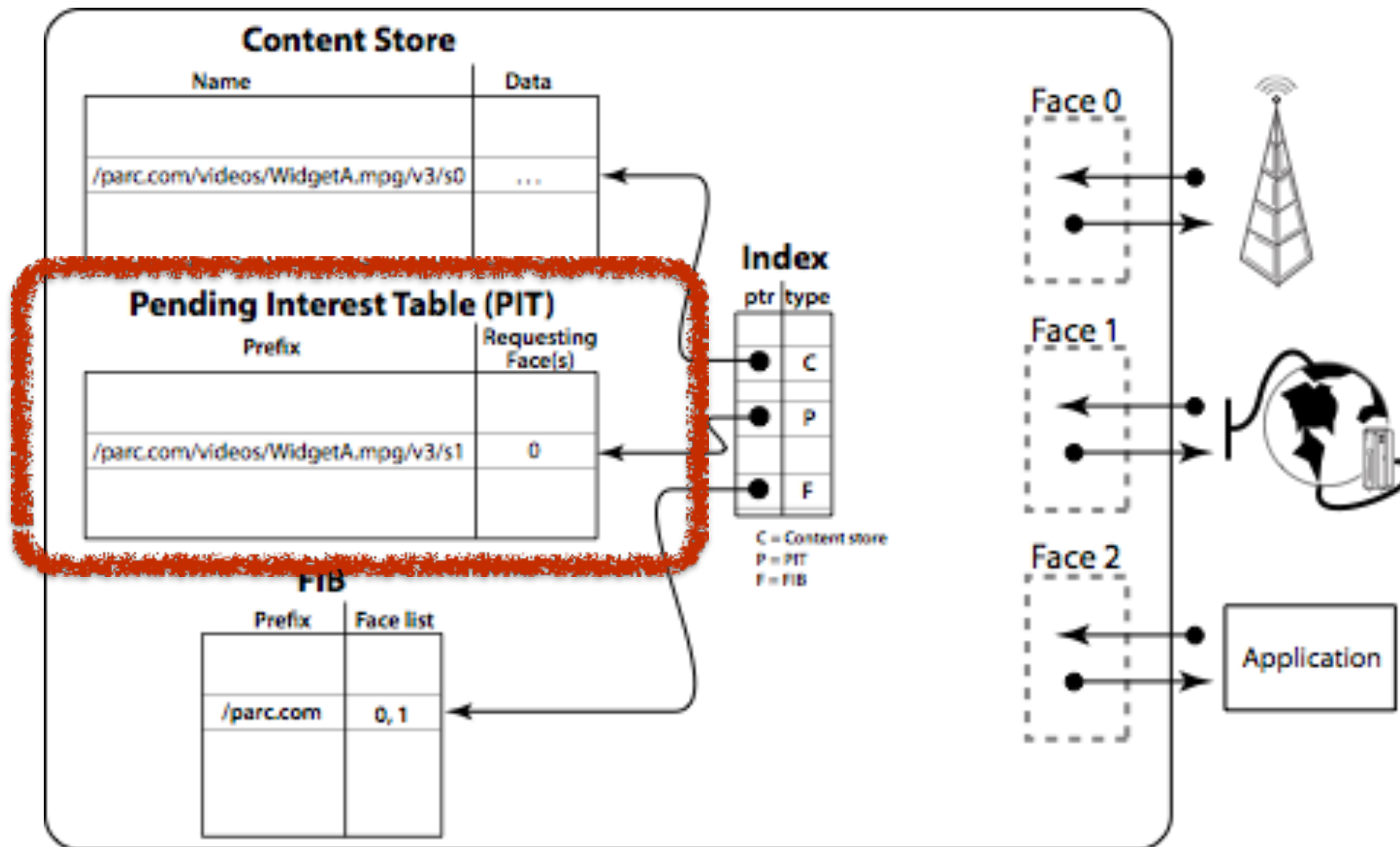


# External routing process Manages the FIB



# Pending Interest Table (PIT)

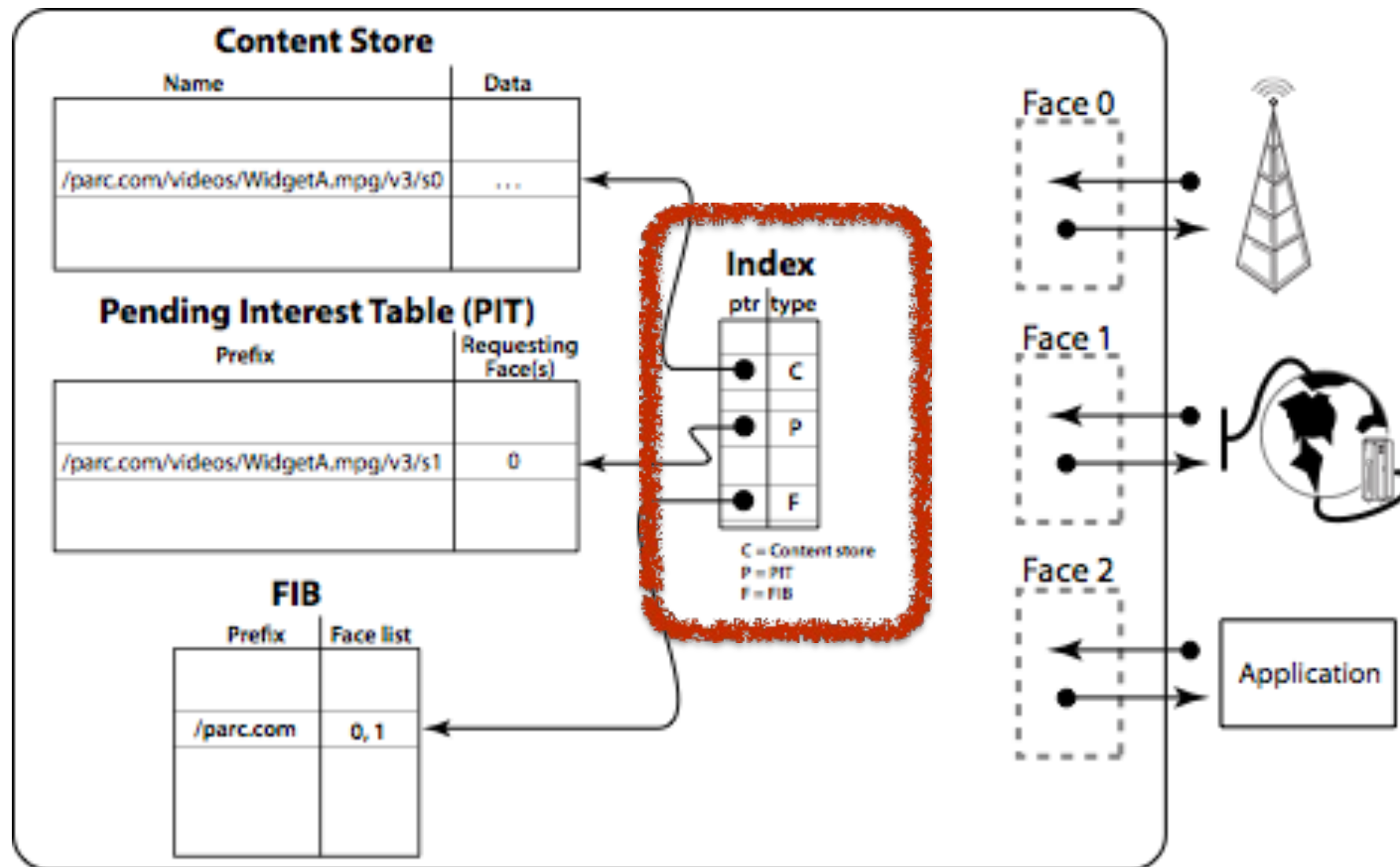
## State for reverse-path forwarding





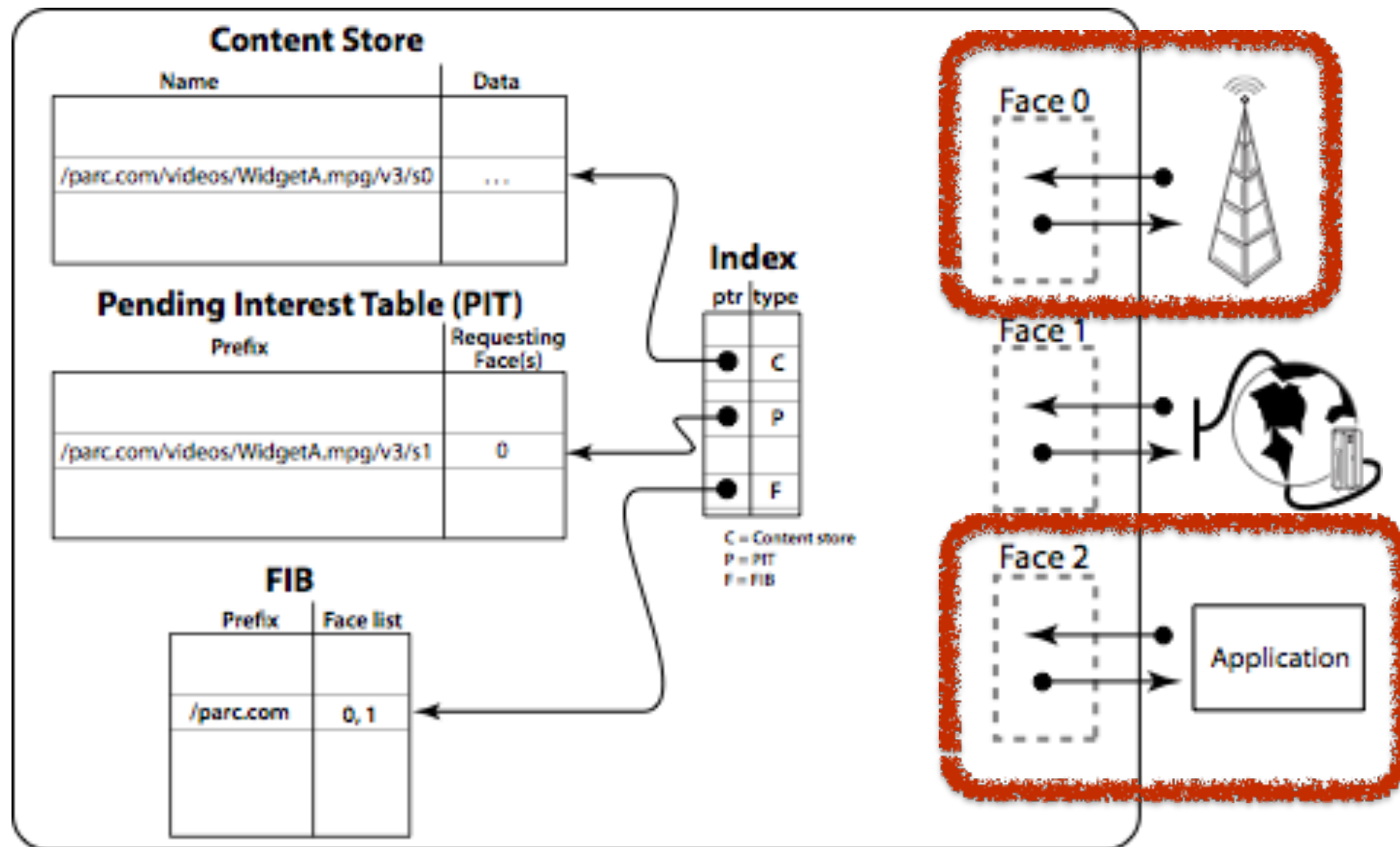
# Index

## Hash table or other index to tables



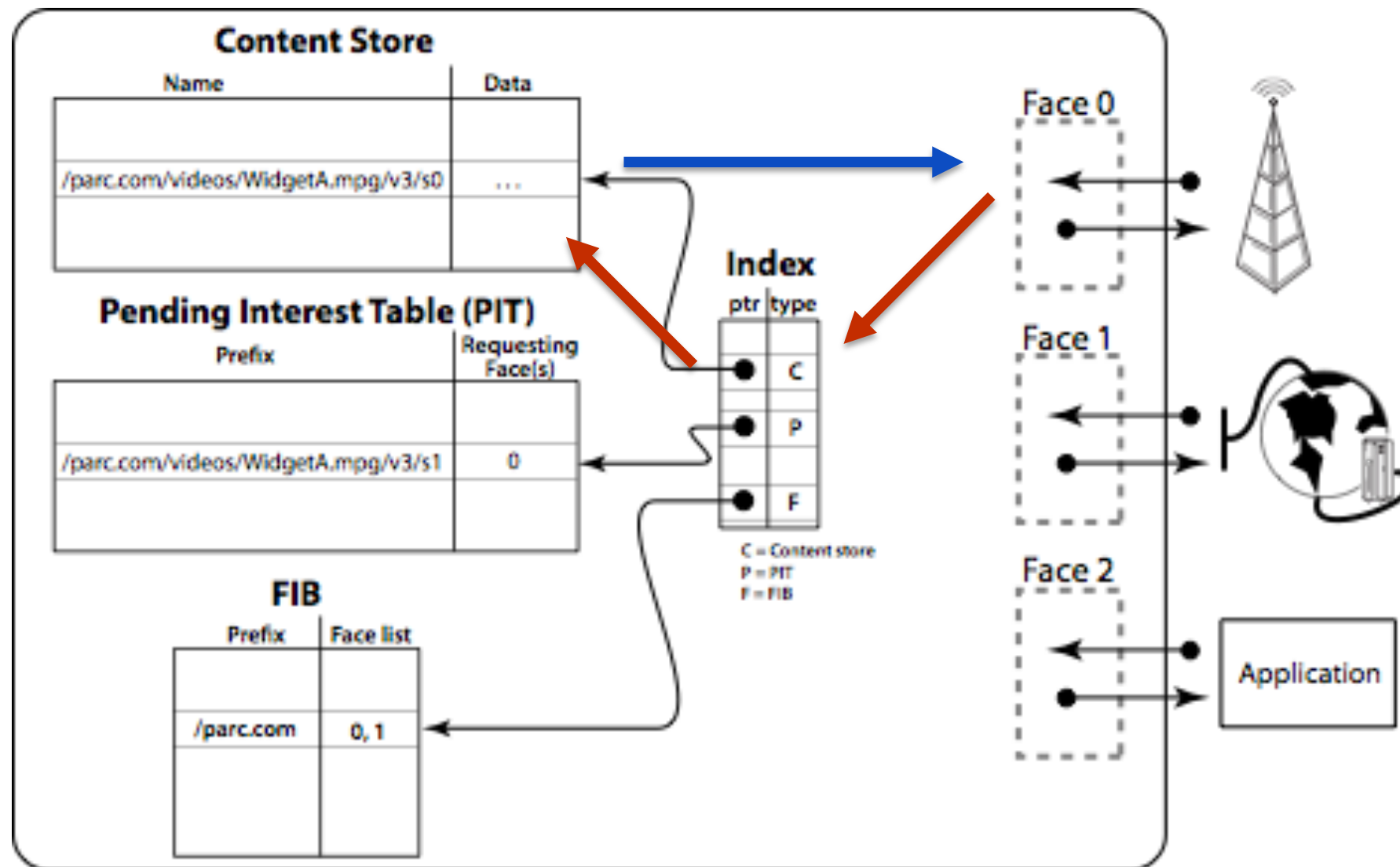
# Face

## Network interfaces or Applications



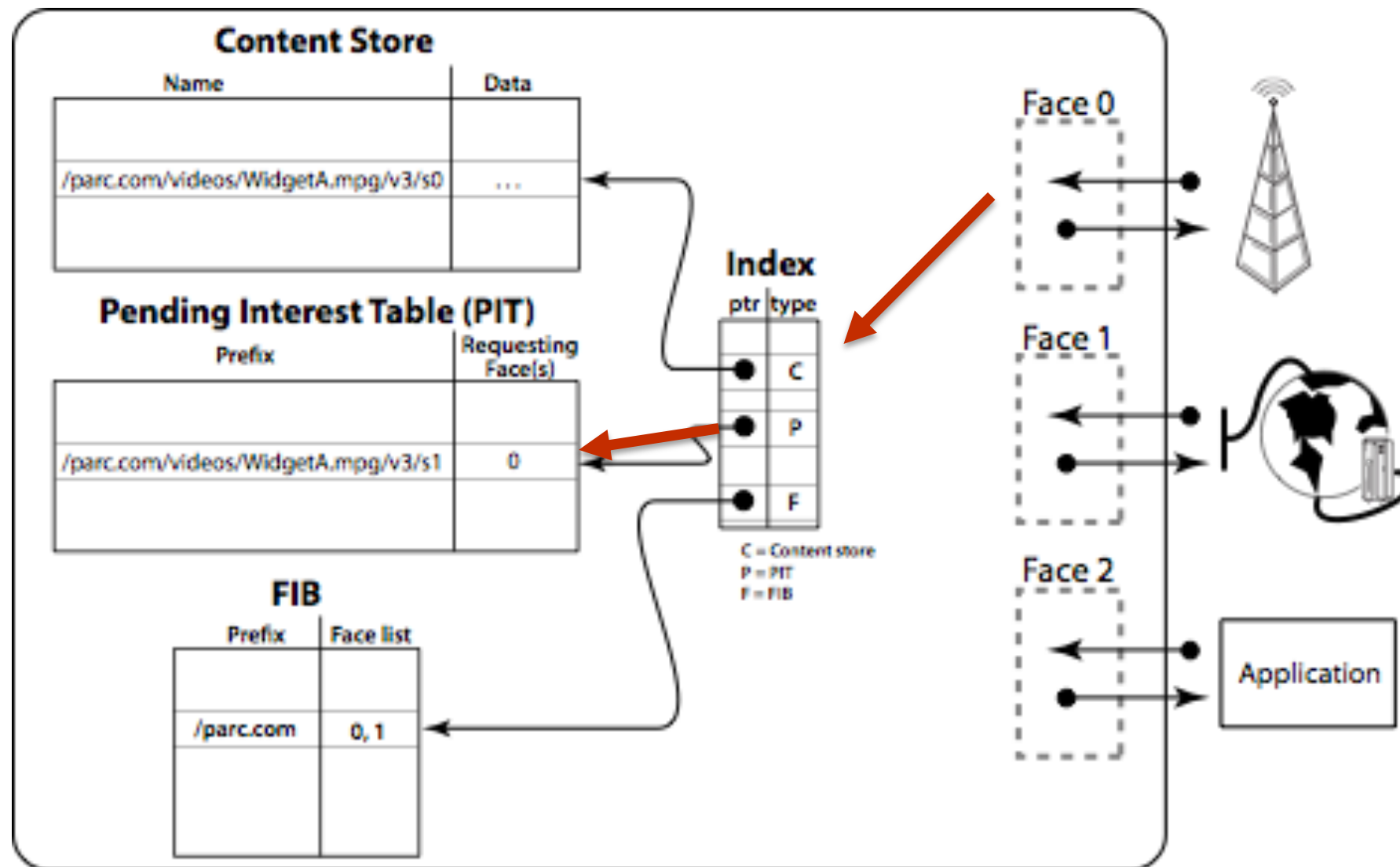
# CCN Forwarder Operations

# Interest Comes In Satisfied by Cache



/parc.com/videos/WidgetA.mpg/v3/s0  
exactly matches what's in the Content Store  
*Must match Content Object Hash or Verify KeyId*

# Interest Comes In Content Store Miss - Already in PIT

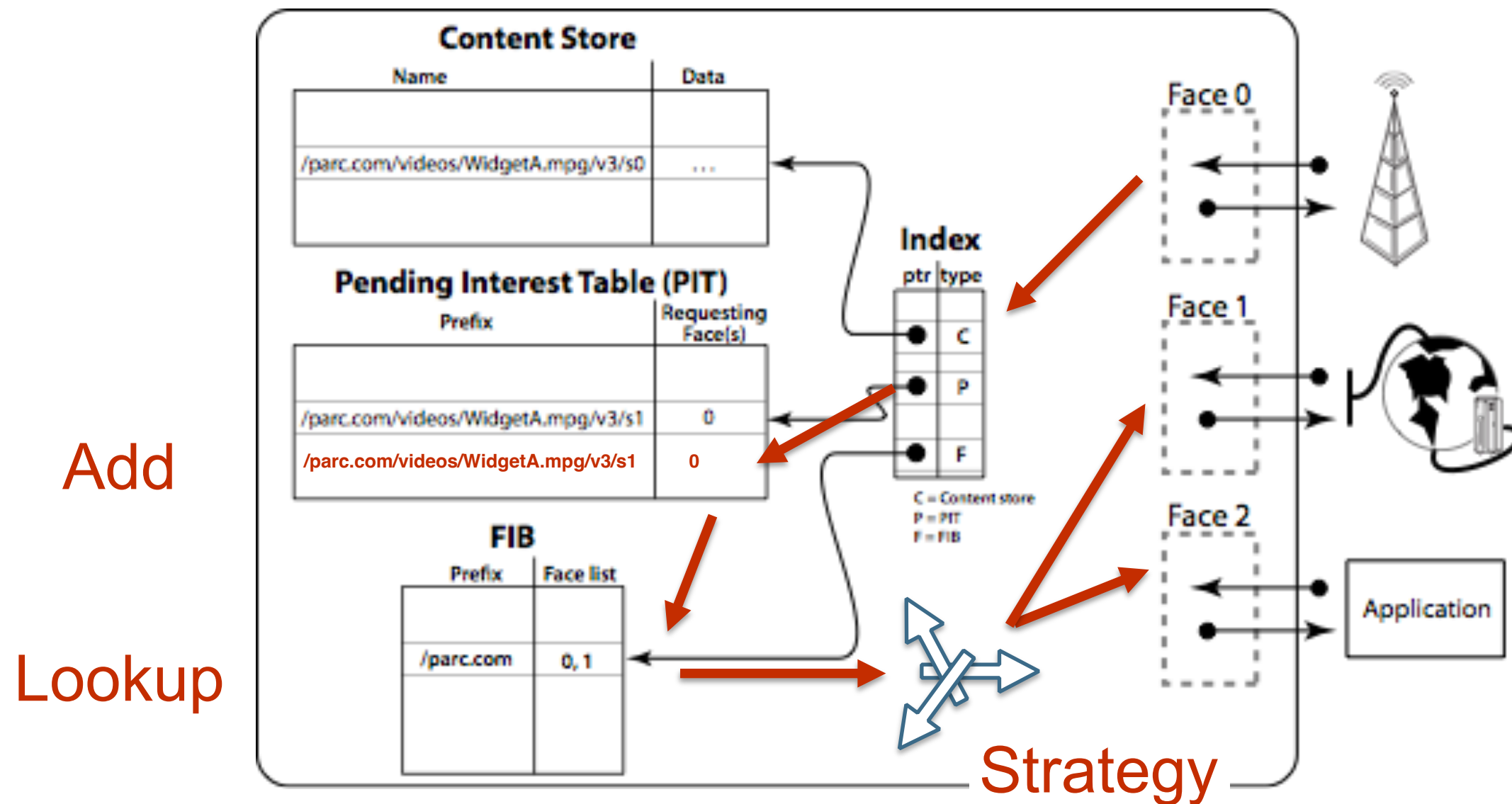


/parc.com/videos/WidgetA.mpg/v3/s0

Already in PIT, so suppress duplicate Interest forwarding



# Interest Comes In Content Store Miss - PIT Miss

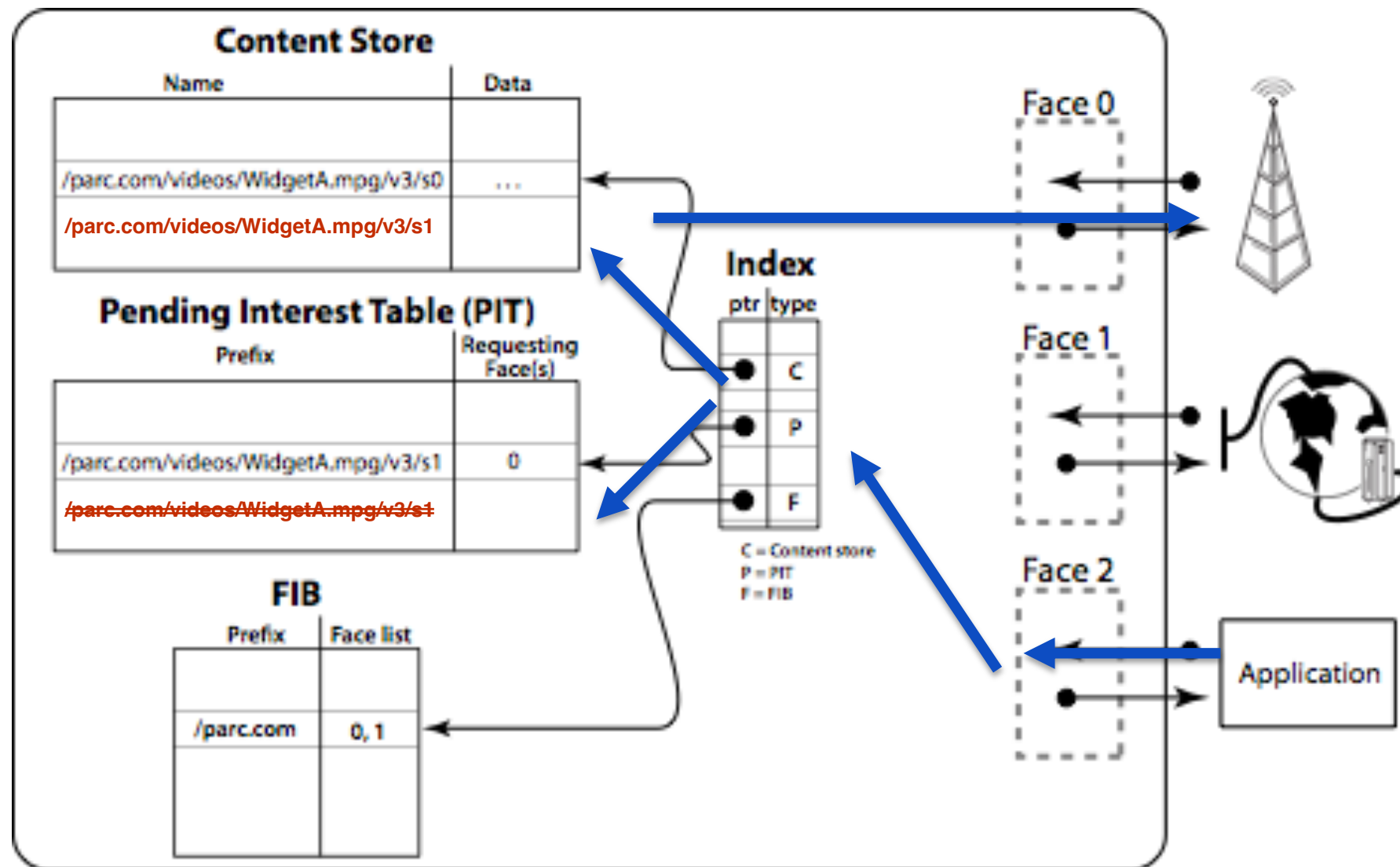


/parc.com/videos/WidgetA.mpg/v3/s1

Not in PIT, so add an entry, lookup in FIB, forward via Strategy

# Return Content

Add  
Consume



`/parc.com/videos/WidgetA.mpg/v3/s1`

Match to PIT, store copy in Content Store, Reverse Path forward

# Reverse Path Forwarding

*Allows efficient “best path”  
with alternate path exploration  
and load balancing*

## Content Store

*Off-loads sources for popular content  
Retransmission buffer*