

FG INET: Internet Network Architectures

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<http://www.inet.tu-berlin.de/>

INET: Research Group

□ Location

- MAR-4

□ Office hours

- Tuesday 12:30 – 13:00
- After the lecture or per e-mail

□ Contact

- Best per e-mail 😊

□ Teaching contact

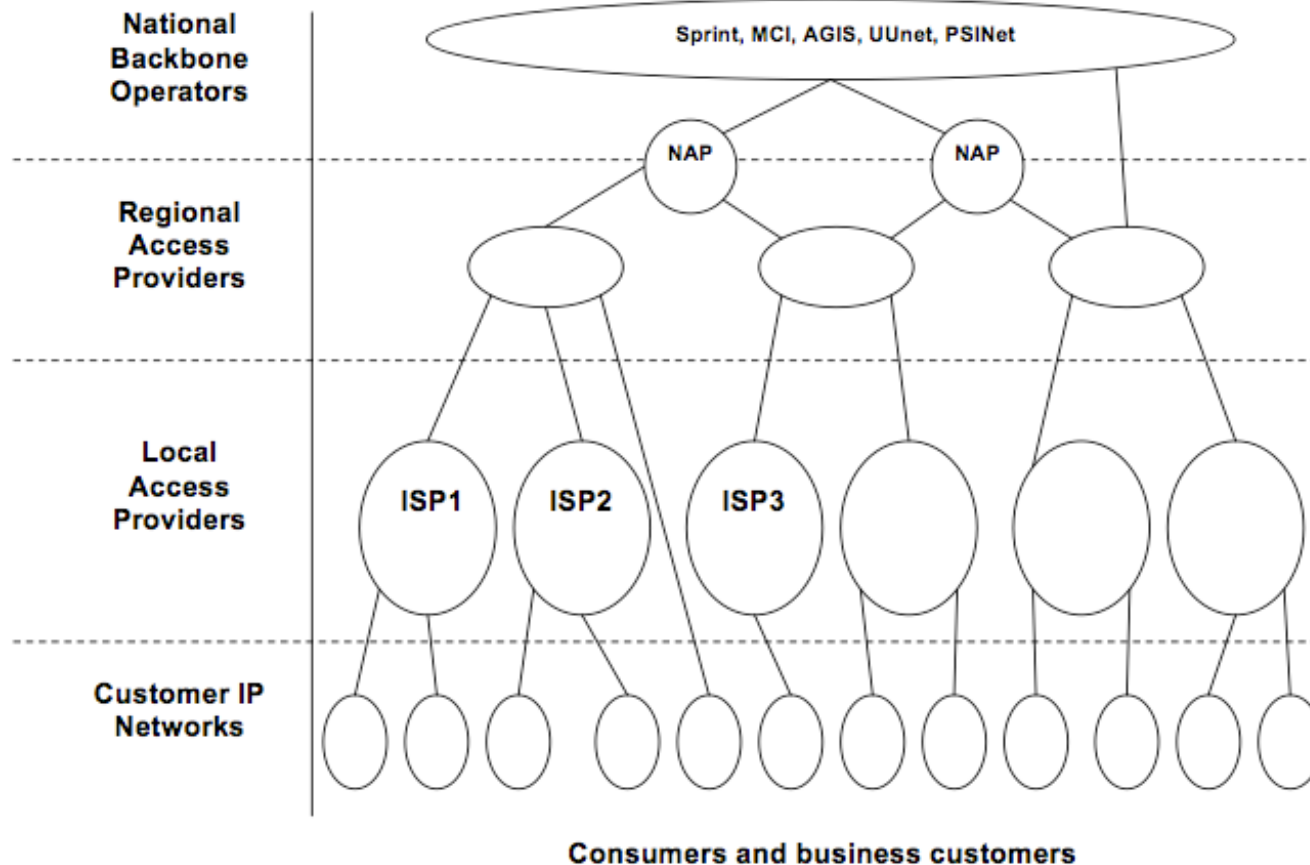
- Arne Ludwig

□ Web site <http://www.inet.tu-berlin.de/>

Current research topics

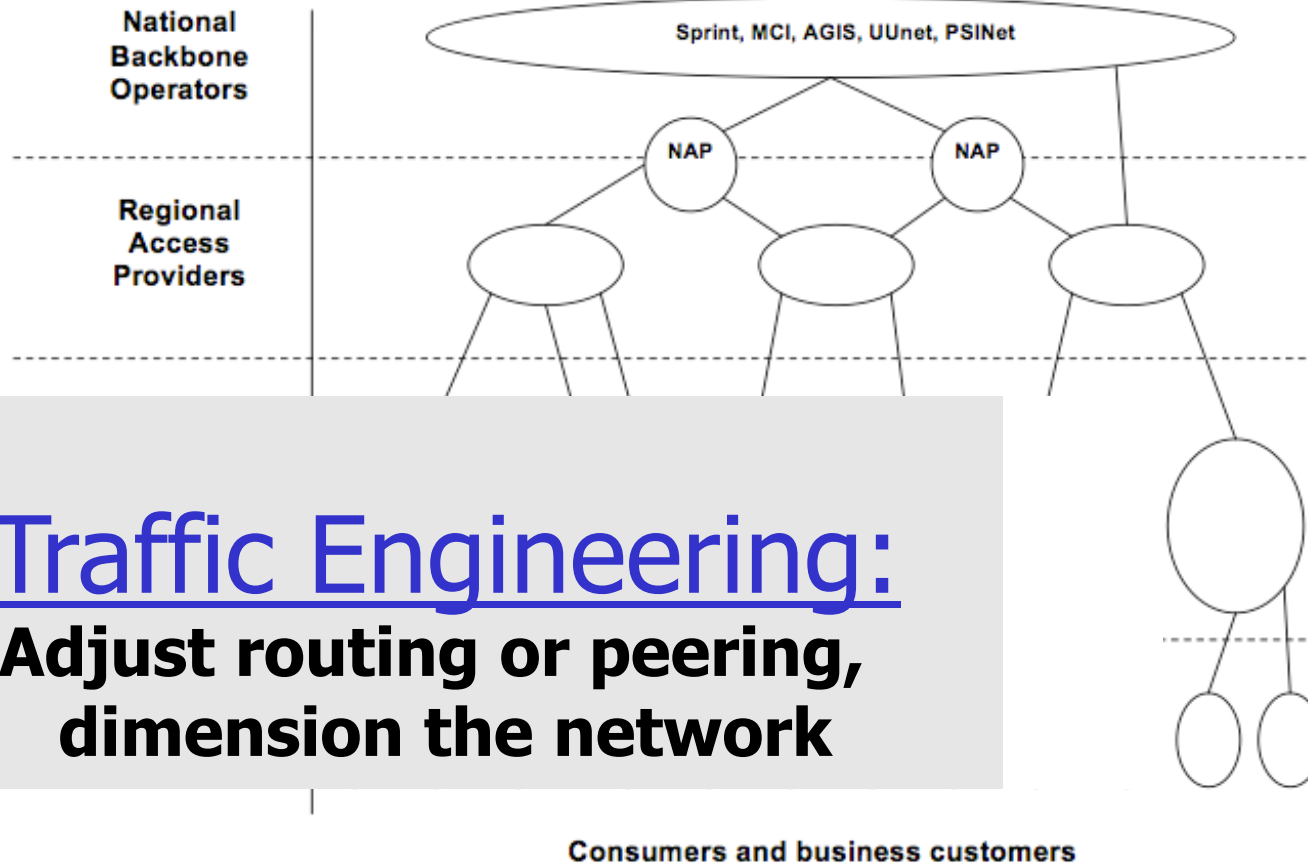
- ❑ IXP data analysis
- ❑ ISP-application collaboration
 - Content aware traffic engineering
 - Caching and content distribution networks
- ❑ Software defined networks
 - Berlin Open Wireless Mesh, OpenFlow, Software defined radios
- ❑ Broadband access evolution
 - Multipath TCP, Socket Intents Licensed/unlicensed spectrum, Mobile user experience
- ❑ Cloud Networking

Internet and traffic engineering



Source: Arbor Networks
2009

Internet and traffic engineering

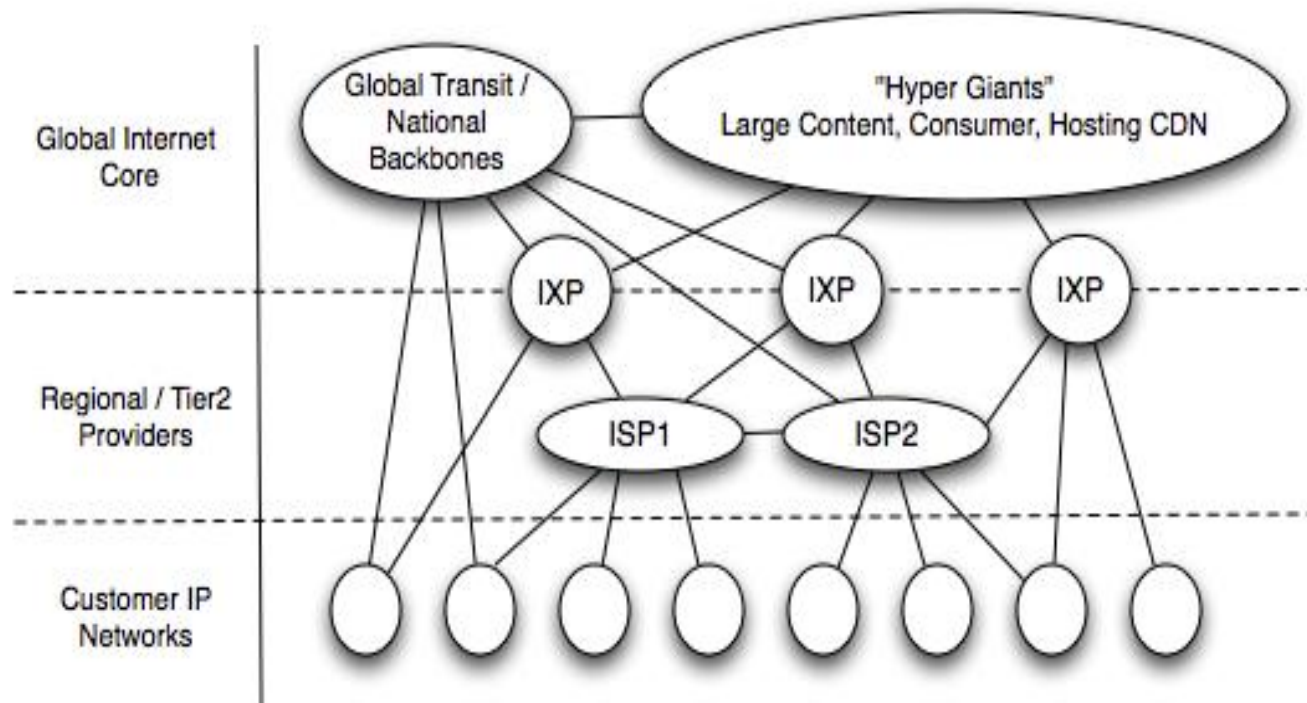


Traffic Engineering:
Adjust routing or peering,
dimension the network

→ **Offline Process**

Source: Arbor Networks
2009

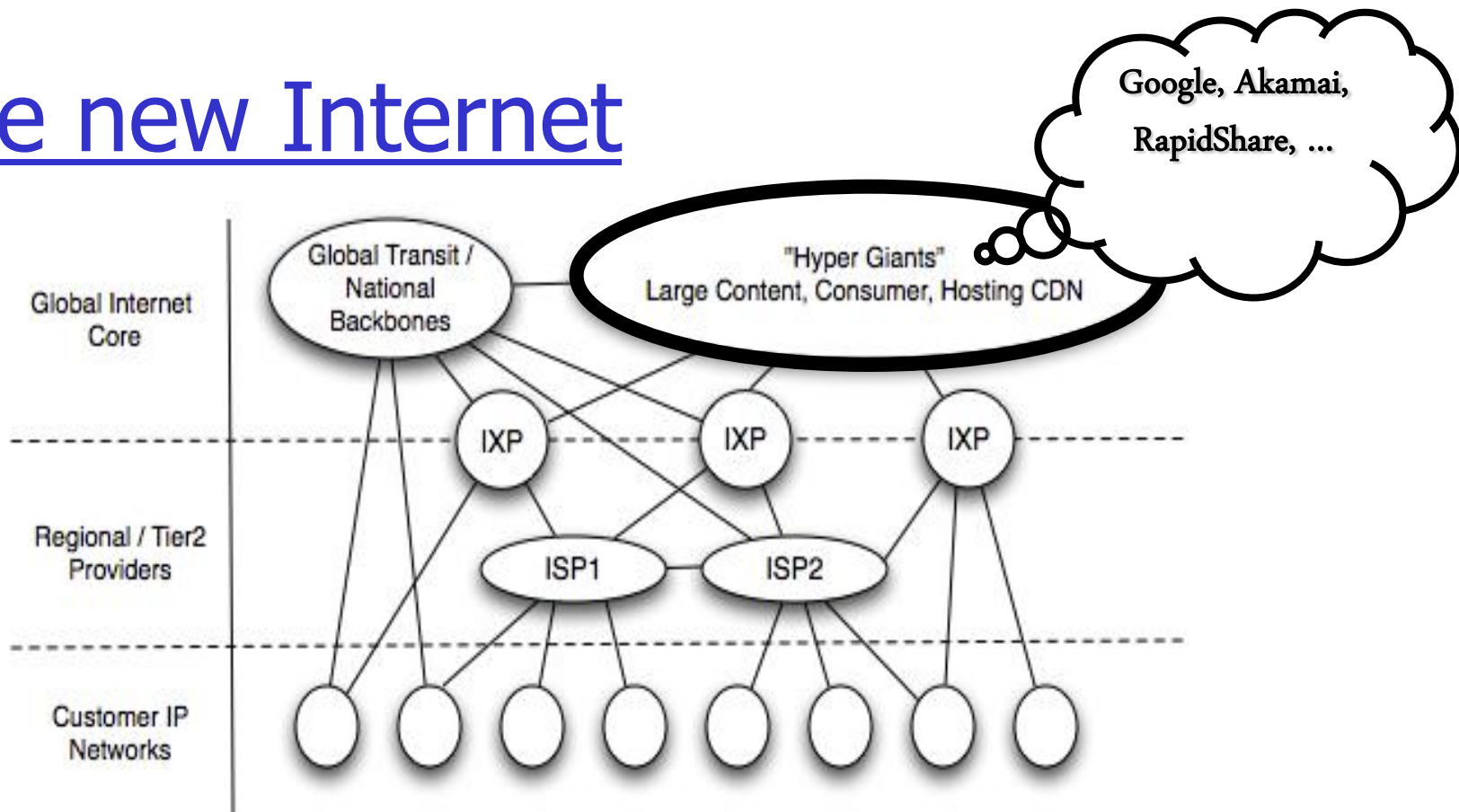
The new Internet



Source: Arbor Networks
2009

→ **New core of interconnected content and consumer networks**

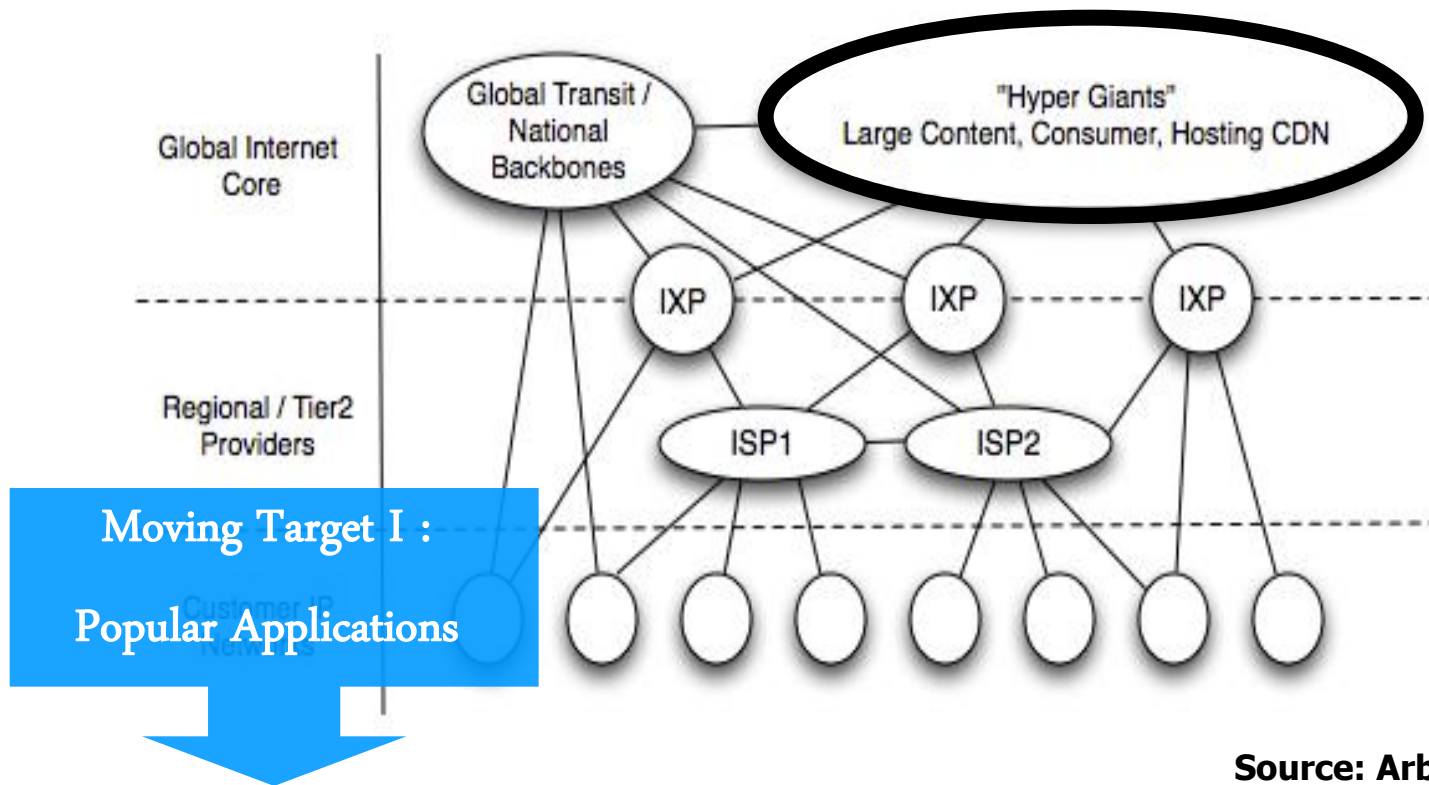
The new Internet



Source: Arbor Networks
2009

→ **New core of interconnected content and consumer networks**

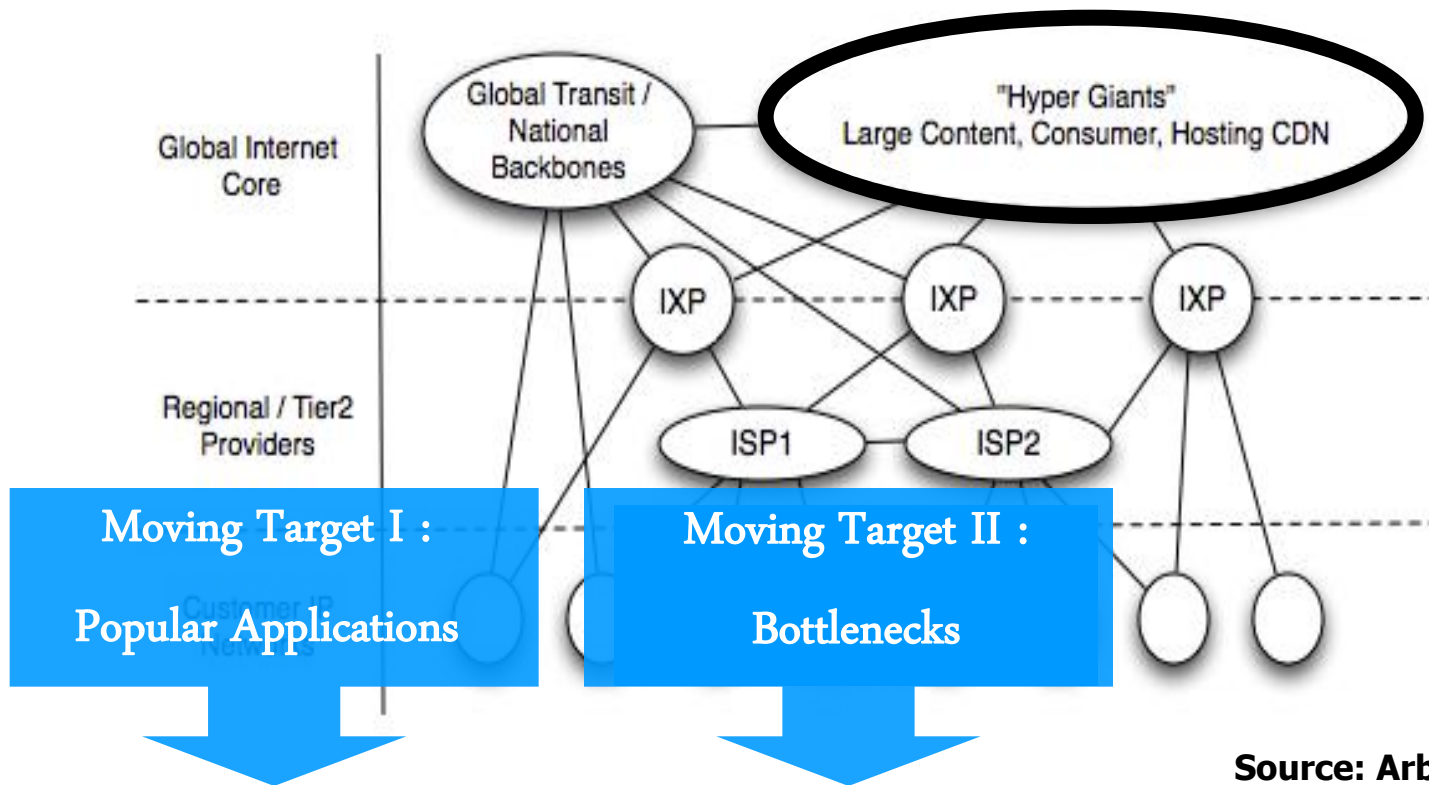
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Source: Arbor Networks
2009

→ **New core of interconnected content and consumer networks**

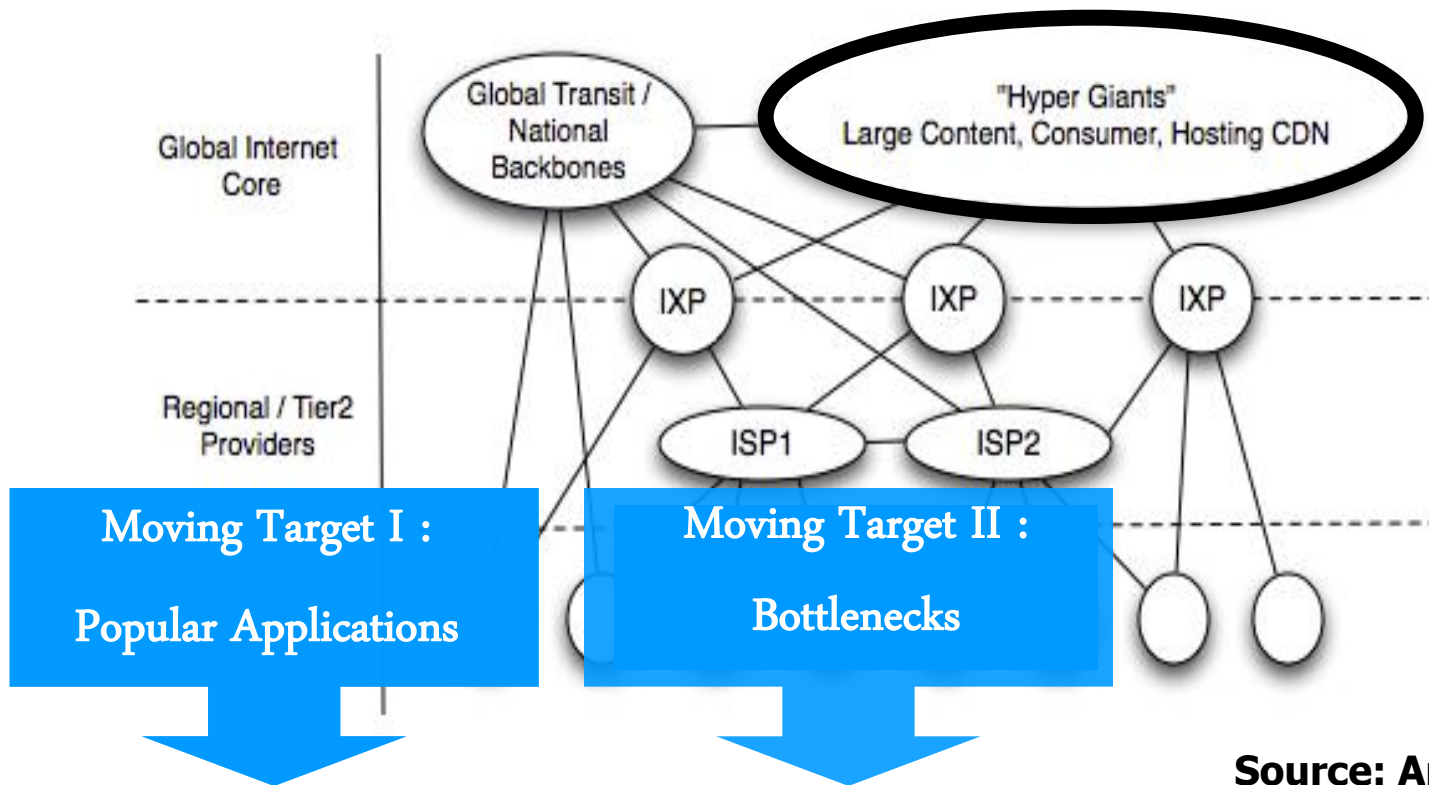
The new Internet



Source: Arbor Networks
2009

→ **New core of interconnected content and consumer networks**

The new Internet



Source: Arbor Networks 2009

→ **New core of interconnected content and consumer networks**

→ **ISPs lost control of their traffic**

The new Internet

Global Internet Core

Regional / Tier2 Providers

Moving Target I :
Popular Application

→ New content
→ ISPs

The screenshot shows the Financial Times website on a Mozilla Firefox browser. The page features a navigation menu, a search bar, and a main article titled "Google accused of YouTube 'free ride'". The article discusses the dispute between Google and European telecoms groups over bandwidth usage. A sidebar on the left lists various categories like "World", "Companies", and "Technology". A large blue arrow points from the "Moving Target I : Popular Application" text to the article. A large white text box at the bottom of the screenshot contains the quote: "Telekom's chief executive, said Google and others should pay telecoms groups for carrying content on their networks".

Global Internet Core

Regional / Tier2 Providers

Moving Target I : Popular Application

→ New content

→ ISPs

"Telekom's chief executive, said Google and others should pay telecoms groups for carrying content on their networks"

Challenge

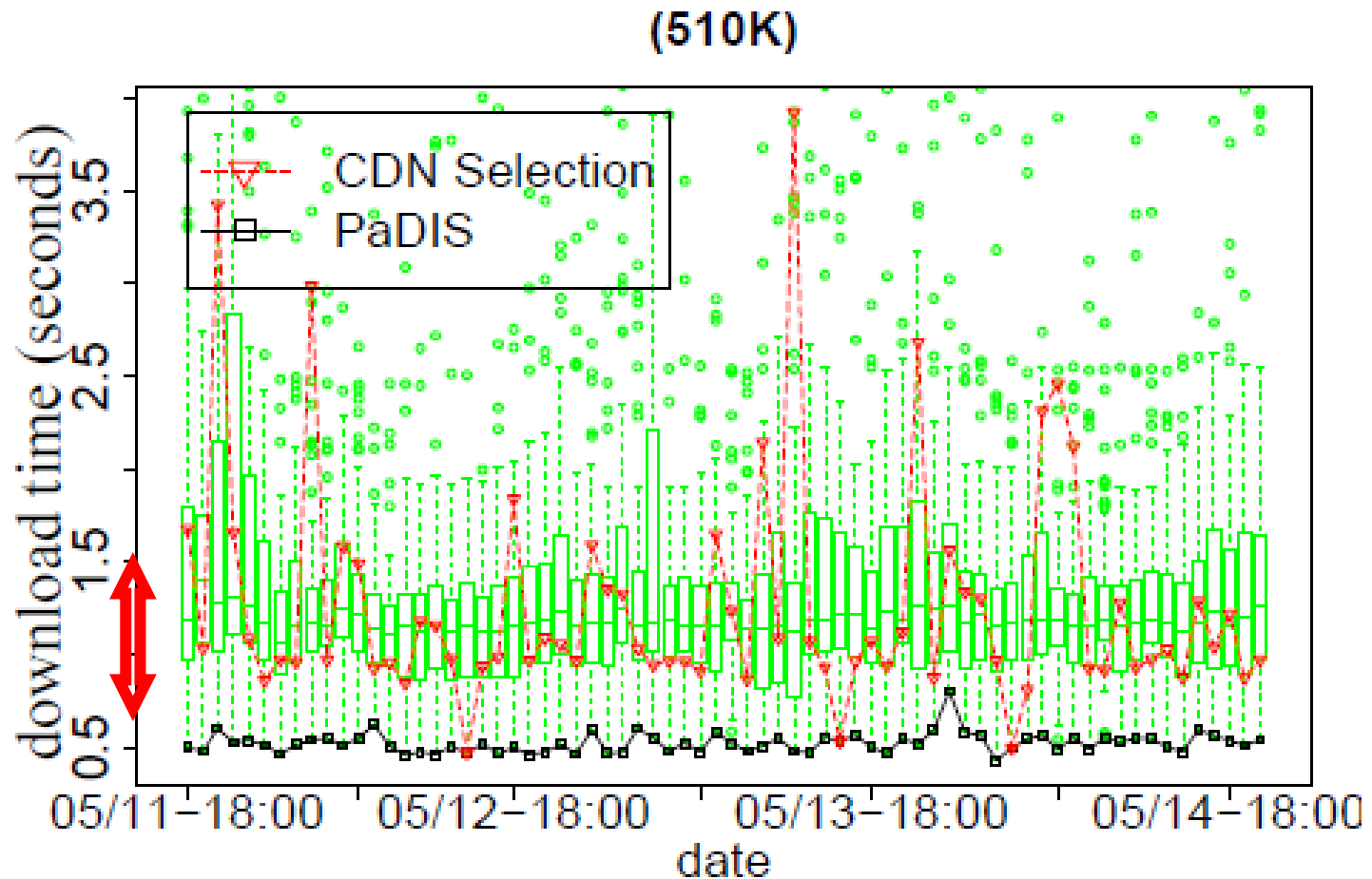
Content-aware

Traffic Engineering

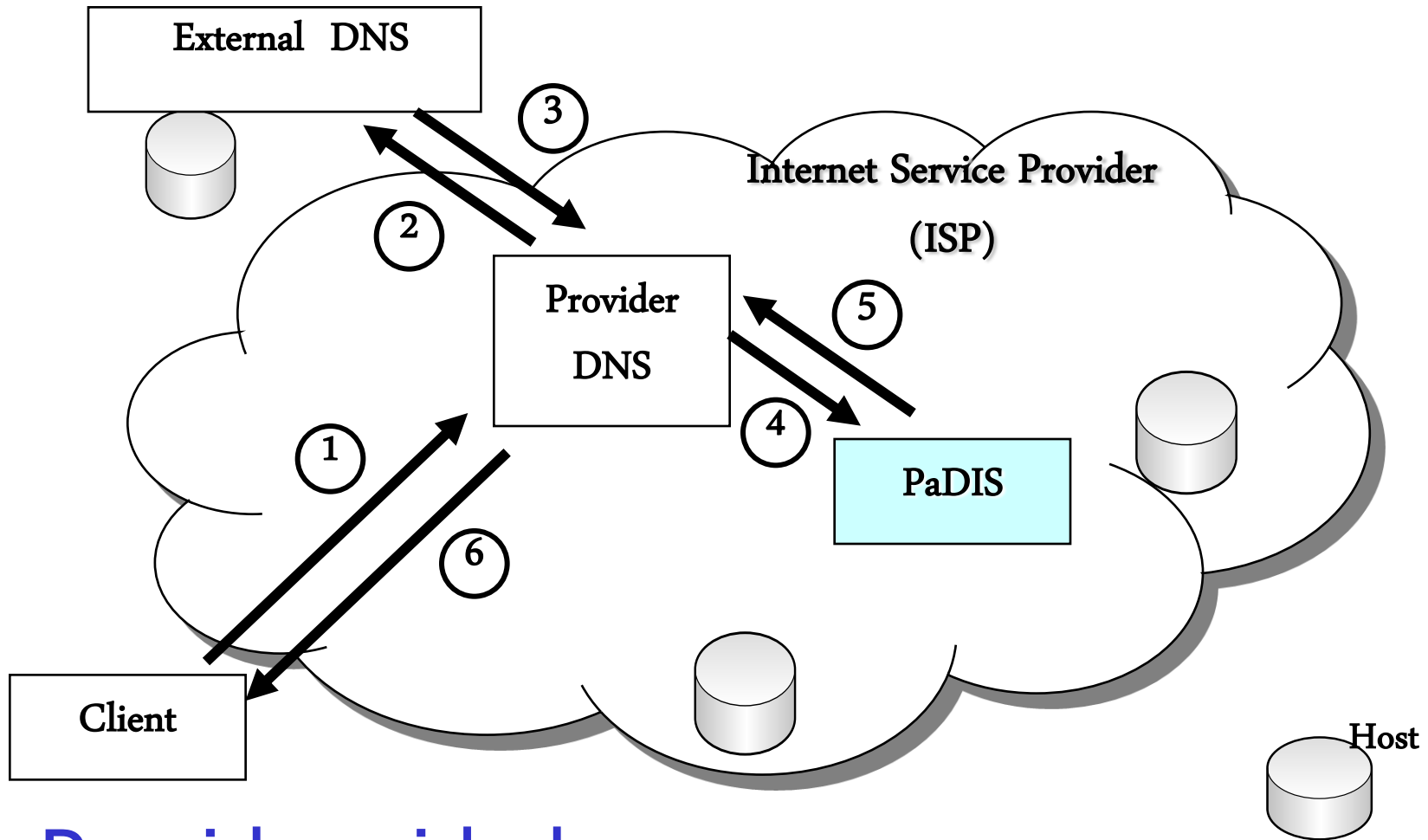
**ISPs re-gain control of their traffic
by biasing host selection**

Improving content access time

Case study: CDN



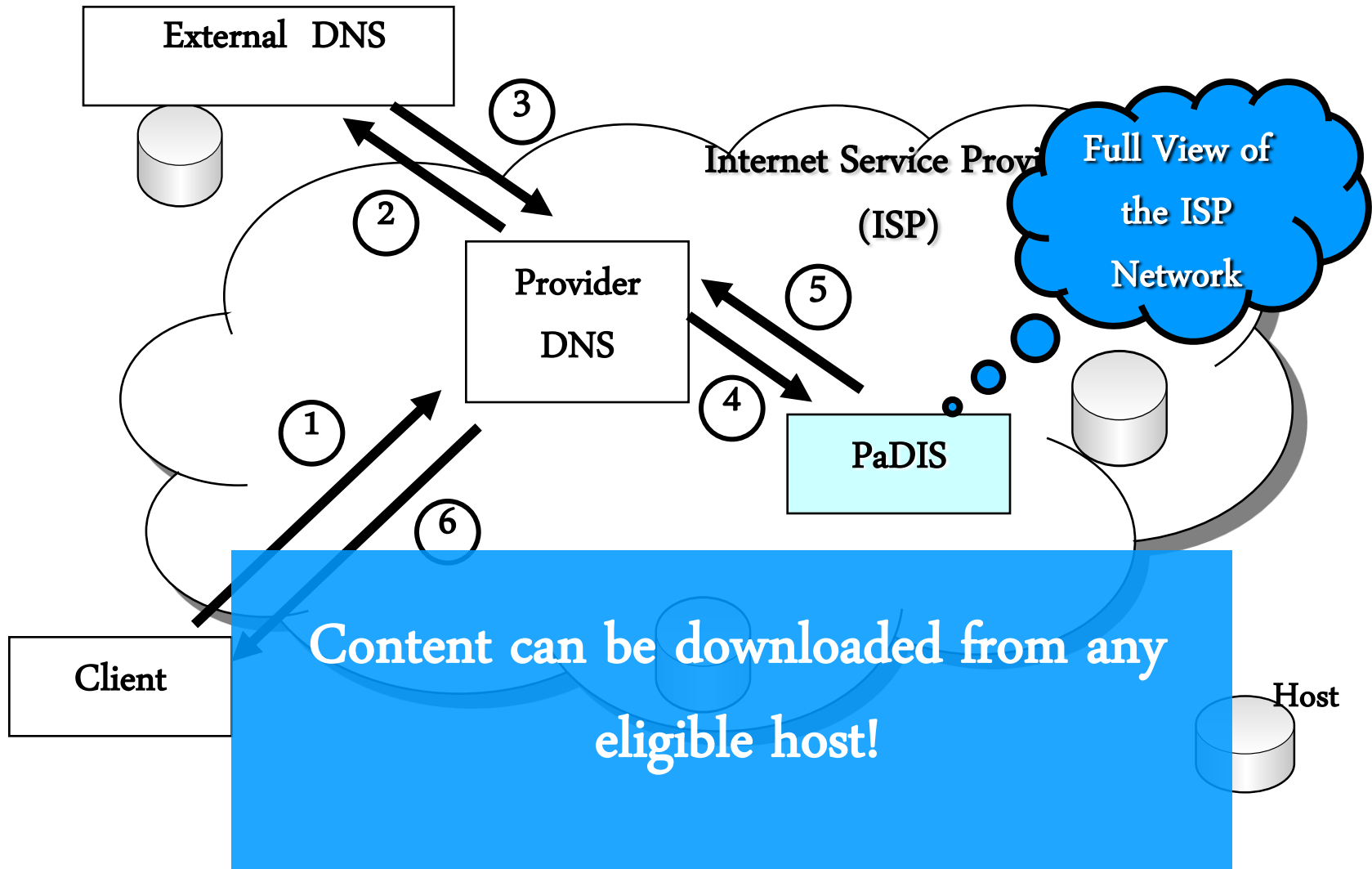
PaDIS



Provider-aided

Distance Information System

PaDIS



ISP-Application cooperation

- ❑ Insight: **ISP knows its network**
 - Node: bandwidth, geographical location, service class
 - Routing: policy, OSPF/BGP metrics, distance to peers
- ❑ **PADIS concept**
 - Service of AS / ISP
 - Input: list of possible dst IPs
 - Output: ranked list of dst IPs
 - E.g., according to distances between src IP and dst IPs
- ❑ **Applicable, whenever there is a choice!**

Teaching

- ❑ Lectures (Vorlesungen)
 - ❑ Seminars (Seminare)
 - ❑ Lab course (Praktika)
 - ❑ Projects (Projekte)
 - ❑ Theses (Diplom / Master / Bachelor)
-
- ❑ PGT: Project Group Meeting (Ph.D. Seminar)
 - ❑ NLS: Networking Lecture Series (External visitors)

Lectures

- ❑ Network protocols and architectures (VL+UE)
 - Design principles of the Internet....
 - Base for all other INET classes

- ❑ Internet Routing (VL)
- ❑ Internet Security (VL)

- ❑ Network Algorithms (VL+UE)
- ❑ Internet Measurement (VL)

Seminars

- ❑ Internet Routing
- ❑ Internet Measurement
- ❑ How
 - Topics: Current research papers
 - Task:
 - Summary paper + presentation
 - Participation in discussion during the seminar
 - En block after the end of term

Lab courses

☐ Hands on exercises

☐ **Wireless Lab**

- Understanding various wireless concepts (e.g., interference, MAC layer, multi-hop routing)
Experiments with mesh routers in the BOWL indoor network

☐ Router Lab

- Configuring and managing networks
- Internet experiments in a Lab

Projects and theses

□ Topics:

- See Web pages
- Talk to members of INET
- Suggest your own topic

□ Work flow:

- Literature/background search
- Presentation of idea at students' talks series (20 minutes 😊)
- Execution of idea / preparation of thesis document
- Presentation of results at students' talks (20 minutes)

Teaching at INET / Anja Feldmann

Topics

Internet Protocols:

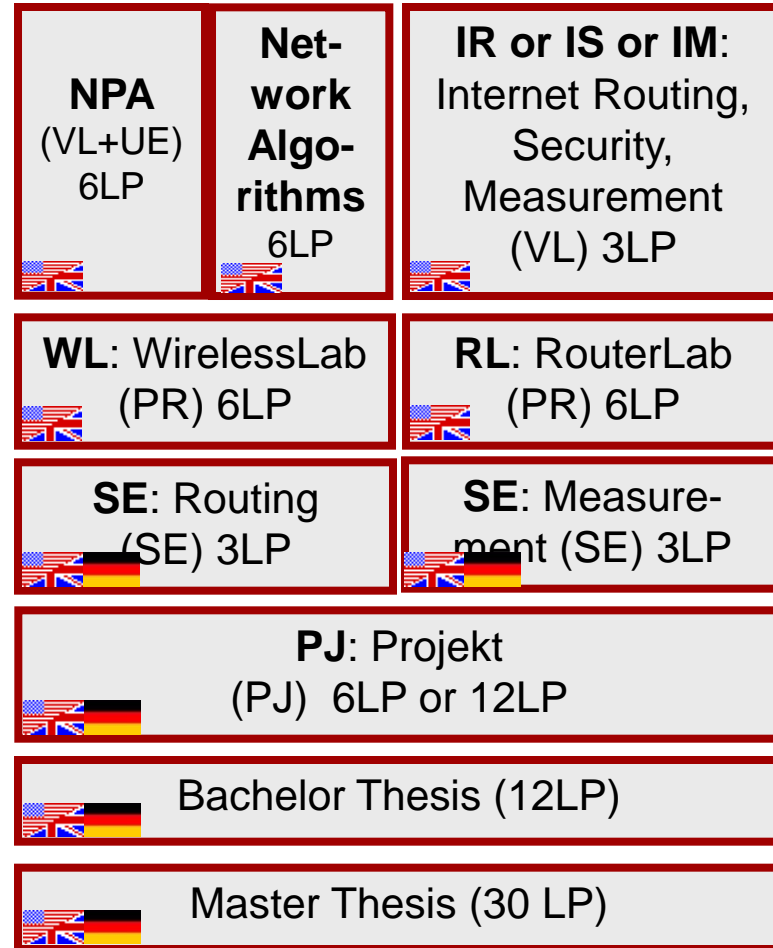
- Routing and IP
- Transport (TCP/UDP)
- Applications
- Future Internet

- Traffic Measurement
- Workload Modeling
- Wireless
- Performanceanalysis
- Network Security

Course Overview

WiSem

SoSem



Example Module Paths

