



Active Content Networking (ACN)

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Goals

Active Networks in Content Networking

Capsules used for service setup and network control

Content transport using normal IP protocols

CO2 EE processes capsules for

Service setup and network configuration

Content duplication for multi-receivers

Receive registration

Duplicate a content copy to each receiver

What's distinguished?

ACN vs RSVP and multicast

RSVP/Multicast: Requiring support on each router/switch

ACN: only at edge route/switch, service-enabling

ACN vs RTP and RTCP

RTP/RTCP: communication btw senders and receivers

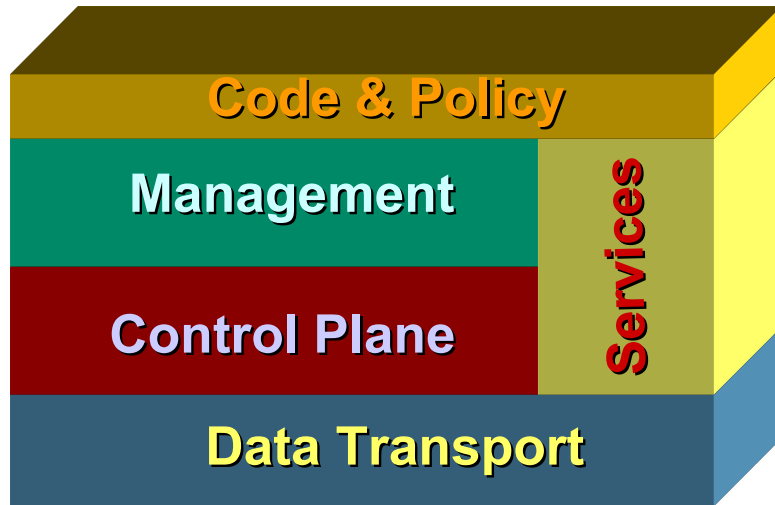
ACN: communication also with network

ACN vs Active Networks (AN)

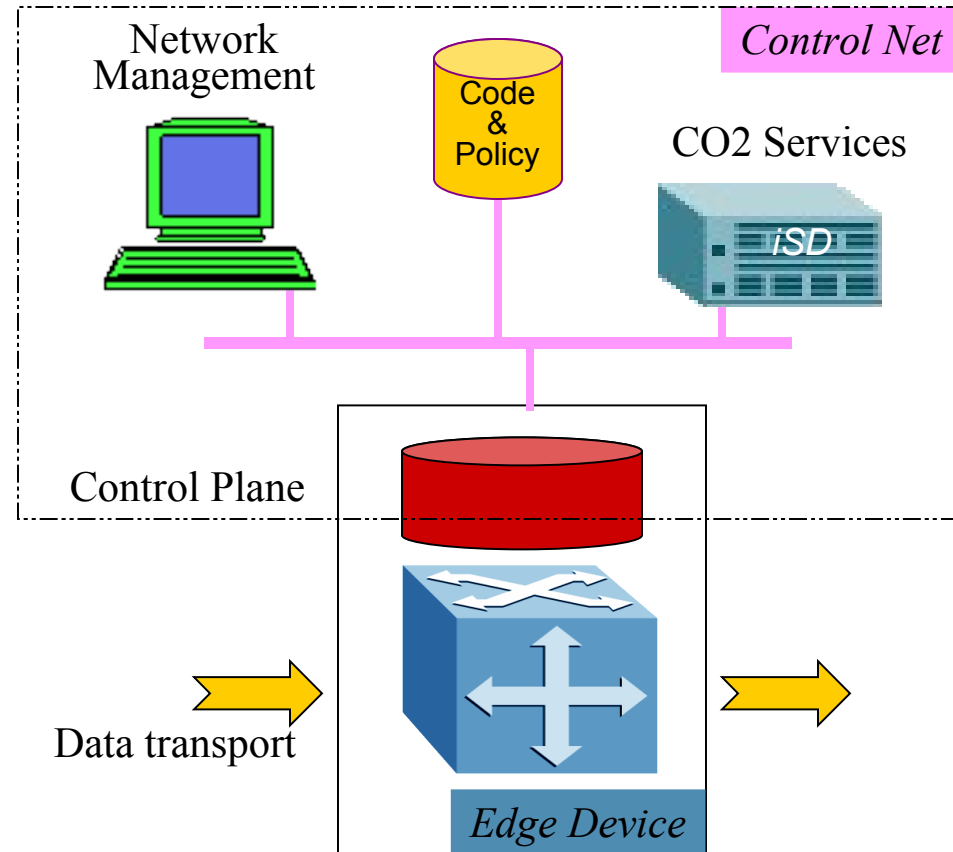
AN: capsules for network control and data transport, processing at every active node

ACN: capsules only for network control, and only processing at a few edge nodes

ACN Edge Node

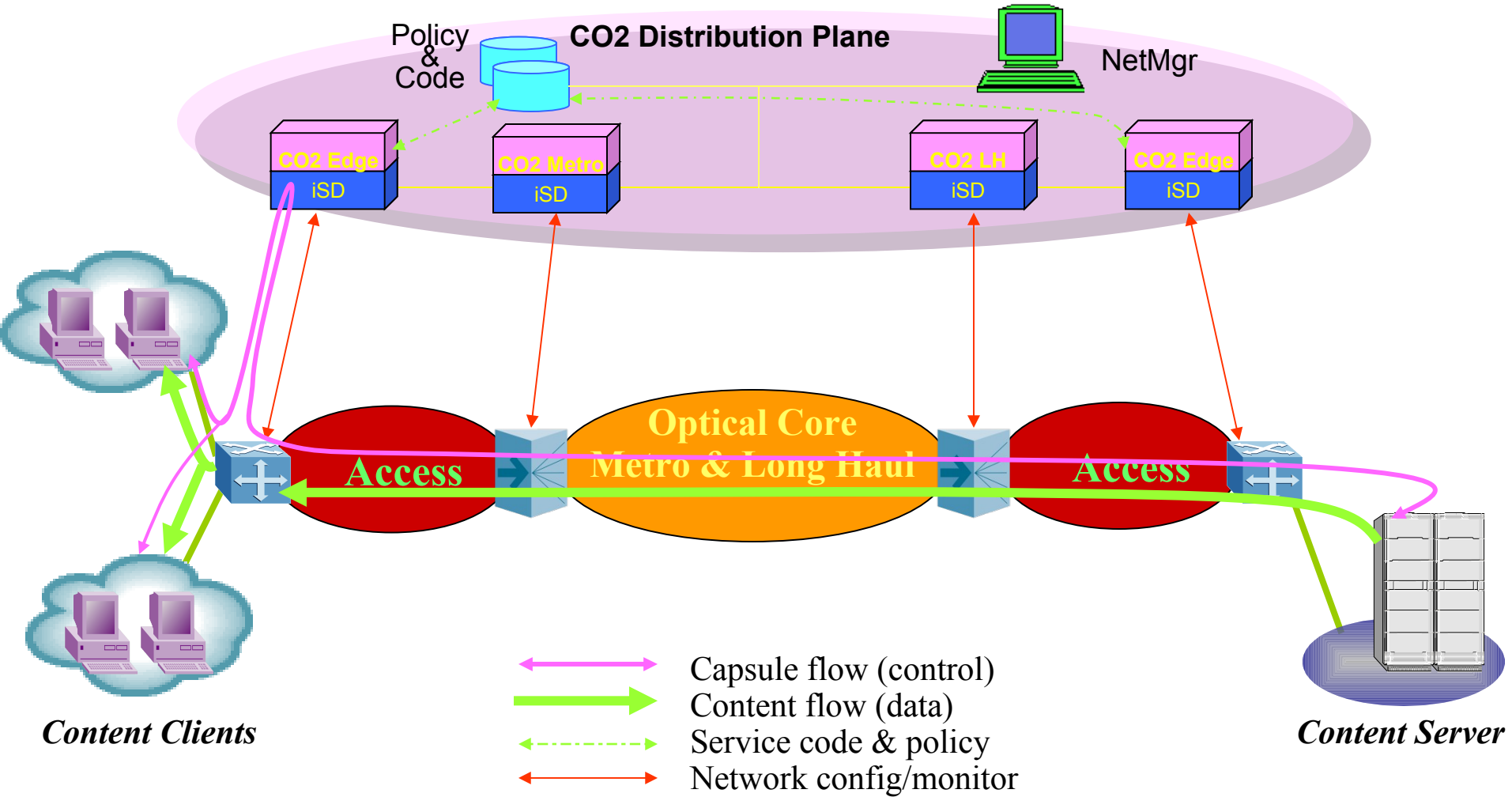


Node Components



Node Structure

ACN and the Internet



Issues

CO2 Distribution Plane

Capsule-based Control flow

Content Data flow

Control and Data flows: in- or off-band

Benefits

Shortcomings

CO2 Distribution Plane

CO2 nodes

Locate at the network edges where necessary

Types: Edge, Metro, LH

CO2-Edge processes capsules, and

Decides service setup and network configuration

Instructs CO2-Metro/-LH to establish optical connections

Code & Policy

Code: capsule processors and network services

Policy: service and network constraints

NetMgr

Service control and network management

Capsule-based Control Flow

Capsule: ANEP-based active packets

Purposes:

User signaling

Content service setup: enabling/disabling, etc
Network configuration: bandwidth, routes

Feedbacks btw senders and receivers

Service requests and grants/permission
Traffic statistics, and QoS

Processing at CO2-Edge

Downloading processor code

Content Data Flow

Based on normal IP protocols

Like UDP/RTP

No capsule is required

Content Duplication by CO2-Edge

When more than one receiver exists

Why? Traffic congestion is most often here!

Content Control and Data Flows

One connection: in-band

Under same UDP encapsulation

Resource saving

Capsule and Data have different payloads

But complex payload processing

But data transport may have to wait

Two connections: off-band

One for capsule and one for data

Separated communications

Network can be set up before data traffic starts

Benefits

Easy content service setup

“On-the-fly” by capsules

Based on CO2

Fewer capsules and their processing

At CO2 edge node only

Little interference with data path

Technology integration

Network signaling, like RSVP

Data transport, like RTP

Traffic feedback, like RTCP

Content duplication, like multicast

Shortcomings

Specific hardware support

Capsule redirection

Content filtering

Content duplicating

Inter-node CO2 communication