Active Content Networking (ACN)

Tal Lavian
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

Active Content Networking
ACN and the Internet

Active Content Networking

Content Clients

Content Server
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