# IBN: A Communication Paradigm for Mobile Applications

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**Project WebSite: http://www.cs.umd.edu/projects/ibn/**

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## Basics

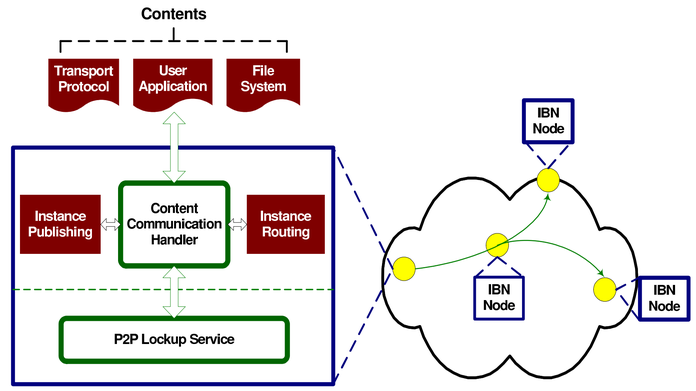
### Content-Based Network(CBN)

- Network of endpoint entities "*Contents*"
  - Active Contents
    - communicate together by messages
    - perform a lookup for other contents
    - e.g. application service, network connection agent, ..
  - Passive Contents
    - stored in the network
    - e.g. document, ..
- Location-independent addressing
  - Extends P2P lookup services (e.g. CAN, Chord,..)
  - Maps a content to a specific node

### IBN=CBN++

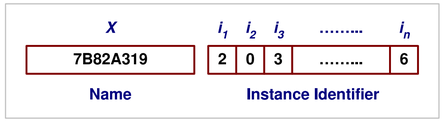
- Allows different instances of same content
- Instance Publishing
  - Self (active) / Free (passive)
  - Reliable
  - Leased
- Instance Routing
  - Decoupled from instance physical location
  - Routes to specific or closest instance
- Replicates contents for fault-tolerance
- Caches info for future queries

## IBN Node Architecture




## Features

### Addressing




**Content ID**

- Globally Unique Name
- n-tuple Instance Identifier
- Semantics assigned by applications
  - File Achieving System:(*logfile*:1,0,1) ➔ *logfile* v1.01
  - Multicast Group:(name:7,9) ➔ subgroup#7, member#9

### Routing

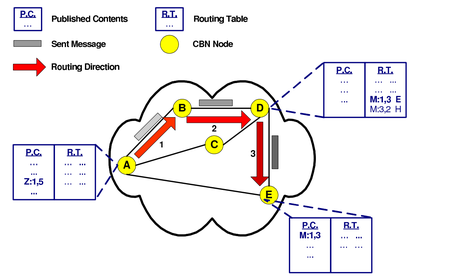
- Instance-based routing
  - Message routed to "closest" published instance
  - Ordering function assigned by application
- Extends underlying P2P routing
  - Route discovery service
    - Alleviates link failure
  - Routing efficiency
    - Considering network locality

## Implementation

### Proposed Implementation

- Rendezvous Point for each content
  - A single node is responsible for routing to all instances of a particular content.
  - Each message is routed first to its mapped node, then redirected to its final destination.
- Different contents mapped to different nodes
- Independent of underlying P2P service
- Each node has 2 data structures
  - Published Contents
    - Contents currently residing on that node
  - Routing Table
    - List of mapped contents and their current locations

### Routing Example



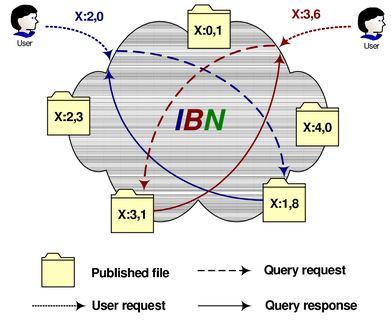

A message from content Z:1,5 destined to M:2,3 is routed to M:1,3

## Applications

### Interface

- *Publish* (ContentID, ContentData, NodeID)
  - Publishes a content in the IBN network at NodeID.
- *Republish* (ContentID, NodeID)
  - Changes content location in the IBN to NodeID.
- *Unpublish* (ContentID)
  - Removes a content previously published in the IBN.
- *Send* (Msg, DstContentID)
  - Sends a message to a content
- *Retrieve* (ContentID)
  - Retrieves a copy of a content data
- *Deliver* (Msg, SrcContentID, DstContentID)
  - Up call to the upper layer to deliver a message

### Applications

- File Archiving
  - Files ⇒ contents
  - Versions ⇒ instances
- P2P Anycast
  - Services ⇒ contents
  - Servers ⇒ instances
- Pervasive Environment
  - Application endpoints ⇒ contents
  - Communication Agents ⇒ instances

### Ex. File Archiving System