



On the Content Retrieval In Information-Centric Network

**Jing Ren
Will Liu
Jianping Wang
Fei Tang**

Motivations

INFORMATION-CENTRIC NETWORK

- ICN puts the content at the center of the network
- Many technologies are used to achieve faster content retrieval
- ICN is still a work in progress and there is a long way to go for standardizing



Our work

- List a set of basic requirements on the basis of the literatures.
- Identify the fundamental functionalities required to satisfy the requirements.
- Summarize the implementation status of such functionalities in various Information-Centric Network architectures.

Terminology

- ❖ **Content original provider**
 - An end entity that publishes and provides the content.
- ❖ **Content consumer**
 - An end entity that wants to retrieve a content.
- ❖ **Content holder**
 - Any entity that has a complete copy of the content (including provider, router, cache, and other devices which hold the content).
- ❖ **Content name**
 - Every content is given a unique name.
 - Content consumer requests the content by specifying its name rather than its location.

Requirements & functionalities

❖ Naming

- Persistency and unique, independent of location
- *Desired functionalities*
 - Naming mechanism, **name resolution system**...

❖ Availability

- Content is reachable at all time with low latency
- *Desired functionalities*
 - **Replication**, name resolution system, **in network cache discovery**...

❖ Failure recovery

- Recover from failure
- *Desired functionalities*
 - **K-anycast**, in network cache discovery...

❖ Authenticity

- Verify the integrity of a content and make sure it comes from authenticated source
- *Desired functionalities*
 - Naming mechanism, Key management...

❖ Bandwidth efficiency

- Minimize bandwidth consumption
- *Desired functionalities*
 - K-anycast, **multicast** in network cache discovery...

The implementation status of these five functionalities is summarized

Summary(1/3)

❖ Content name resolution

■ Route-by-name

- Name-based routing information are disseminated by routers with each other
- Packets with content name are forwarded based on the name-based routing table
- *Typical example:*
 - NDN...

■ Lookup-by-name

- A DNS-like resolution system are queried
- The location of nearby copy will be returned
- *Typical example:*
 - MobilityFirst, SAIL/4WARD, PSIRP/PUIRUIT ...

Summary(2/3)

❖ K-anycast

- Consumer fetches different data chunks from different holders
 - Network operator can use k-anycast to recover from failure and balance load
 - Content consumers can use k-anycast to minimize its transmission latency
 - *Typical example:* SAIL/4WARD ...

❖ Multicast

- Network delivery a content to all interesting consumers simultaneously in a single transmission
 - Consumers' requests are aggregated in the network
 - *Typical example:* NDN...
 - Some offline mechanisms are used to form a multicast tree
 - *Typical example:* PSIRP/PUIRUIT, COAST, MobilityFirst

Summary(3/3)

❖ Content replication

- CDN like offline replication strategies
- On-demand cache (In-network cache)

❖ In-network cache discovery

- On-path cache
 - Meets a cache by chance
 - Some proposals will find the nearby copy by flooding request in the local area.
 - *Typical example:* NDN ...
- Cache advertisement
 - Exchange routing information among routers
 - *Typical example:* SAIL/4WARD...



**Thanks for your attention!
Comments?**