

# ICN Ping and Traceroute

Spiros Mastorakis & Dave Oran

# Outline

- Why do we need them?
- ICN Ping (draft-mastorakis-icnrg-icnping-03)
- ICN Traceroute (draft-mastorakis-icnrg-icntraceroute-03)

## Why do we need them?

- Need for some lightweight mechanisms/tools to provide some troubleshooting information before employing more “heavy-duty” tools like CCNInfo

# ICN Ping

draft-mastorakis-icnrg-icnping-03

# ICN Ping Functionality

- Target Flavors
  - Is an ICN forwarder reachable?
  - Is a producer application reachable?
  - Is a cached object reachable?
- RTT measurements
  - Run several pings and provide times for each response

# Reachability

- Is an ICN forwarder reachable?
  - Forwarders need names
  - Either globally routable, named under the name of their administrator (e.g., “/att/forwarder3”), or use forwarding hint to reach the forwarder’s administrative domain
  - Forwarder names need to be known
- Is a producer application reachable?
  - Discover the forwarder with local connectivity to (an instance of) the application
- Is a cached object reachable in some on-path CS?
  - If so, return administrative name of forwarder, where the object is cached

# Multipath

- E.g. RTT measurements in presence of multipath?
  - Path Identification
    - PathId TLV in Data Message packet header
  - Path Steering
    - PathId TLV in Interest Message packet header causes Interest to follow the reverse path of the Data Message that returned the PathId
  - Path Discovery
    - For Interests sent without PathIds, forwarders will switch Interests, making a probabilistic choice among next hops

# Echo Request/Reply

- Echo request
  - Target Name
  - PathId
  - CS bypass
- Echo reply
  - Responding forwarder name
    - Goal: user can reach this entity directly to ask for further management/administrative information (either through Interest/Data exchanges or CCNInfo)
  - Return code (type of reachability, 1-3)
    - Reply should be signed to avoid reflection attacks

# Packet Processing Process

- Re-use Interest/Data/IntReturn Message Types
  - Largely match Interest/Data forwarding semantics
  - Avoid aggregation with other pings or with Interests: Include random nonce in name
  - Avoid CS caching of response: ExpiryTime TLV=0, freshness period = 0
  - Header PathId for identification/steering (not restricted to echo)
- Echo Request/Reply Packet Types
  - Quick identification of ping messages
  - Allows forwarding semantic differences
    - Application node response from forwarder, i.e. Interest not passed to locally attached target application
- Matching can be FIB LPM-based (e.g. add entry for local router name to FIB, with internal next-hop)

# ICN Traceroute

draft-mastorakis-icnrg-icntraceroute-03

# ICN Traceroute Functionality

- Target Flavors
  - What is the path to an ICN forwarder?
  - What is the path to a producer application?
  - What is the path to a cached object?
- Path hop-by-hop RTT measurements
  - Run several protocol exchanges for each hop and provide times for each response
- High overlap with ping functionality/mechanisms/procedures

## Differences with ICN Ping

- Two packet types: TracerouteRequest, TracerouteReply
- Core mechanism based on HopLimit Expiry (expanding ring search)
  - Additional reply code from responding forwarder: HopLimitExpired