

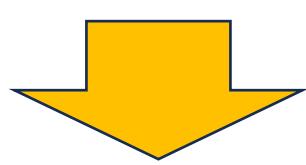
# Name Resolution and Packet Forwarding in

## IP/NDN Mixed Environment

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### 1. Introduction

- The main purpose of current Internet usage is to deliver digital content such as websites and videos



**ICN (Information-centric networking)**, which enables efficient content delivery, is being researched

**NDN** is an ICN architecture that has been particularly well researched

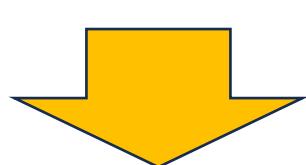
#### ■ Introduction to ICN

- A protocol that sends request packets (Interests) based on content names instead of IP addresses
- Reply packets (Data packets) are forwarded along the reverse path of the Interest forwarding path

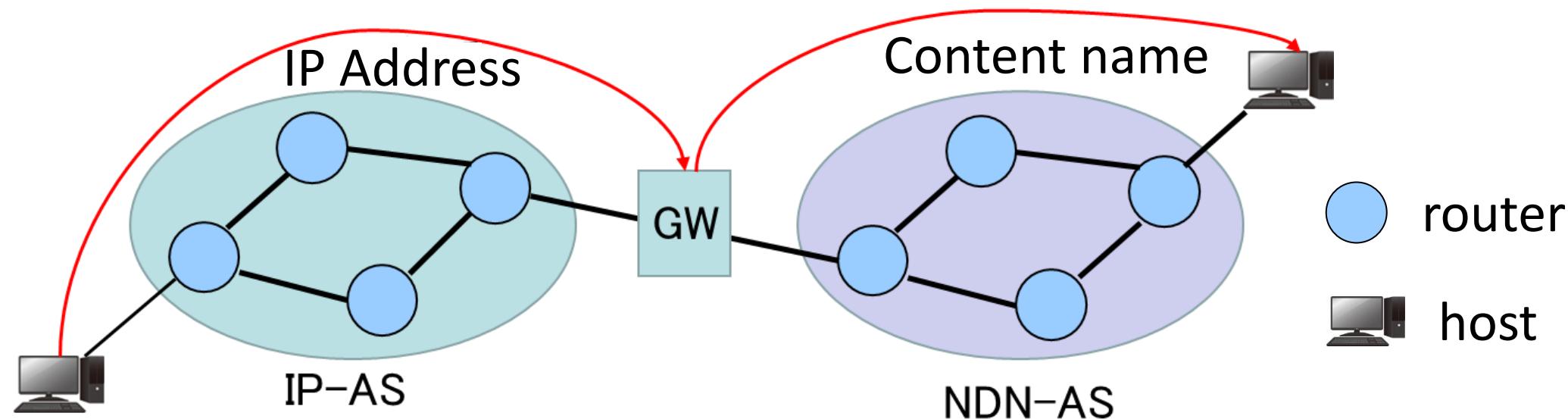
- The protocols adopted within each AS (Autonomous System) are determined by the respective network operators
- In the process of NDN adoption, networks where IP-ASes and NDN-ASes coexist are expected to emerge

### 2. Migration methods from IP to NDN

- Previous work: an approach that utilizes a **packet translation gateway (GW)**
- Packet translation requires an external system to associate IP addresses with content names
- The mechanism for associating IP addresses with content names remains **undefined**

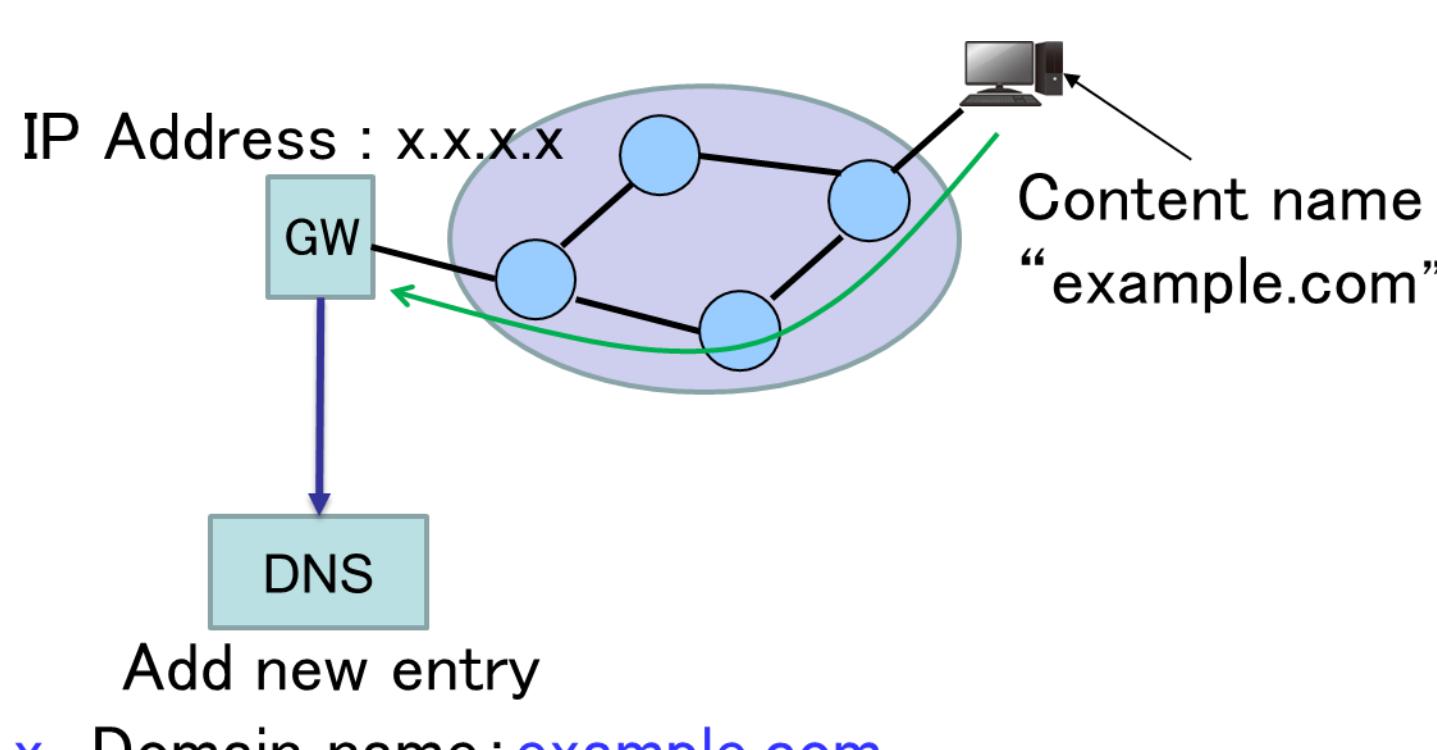


A packet forwarding method between IP and NDN that does not depend on external systems is needed

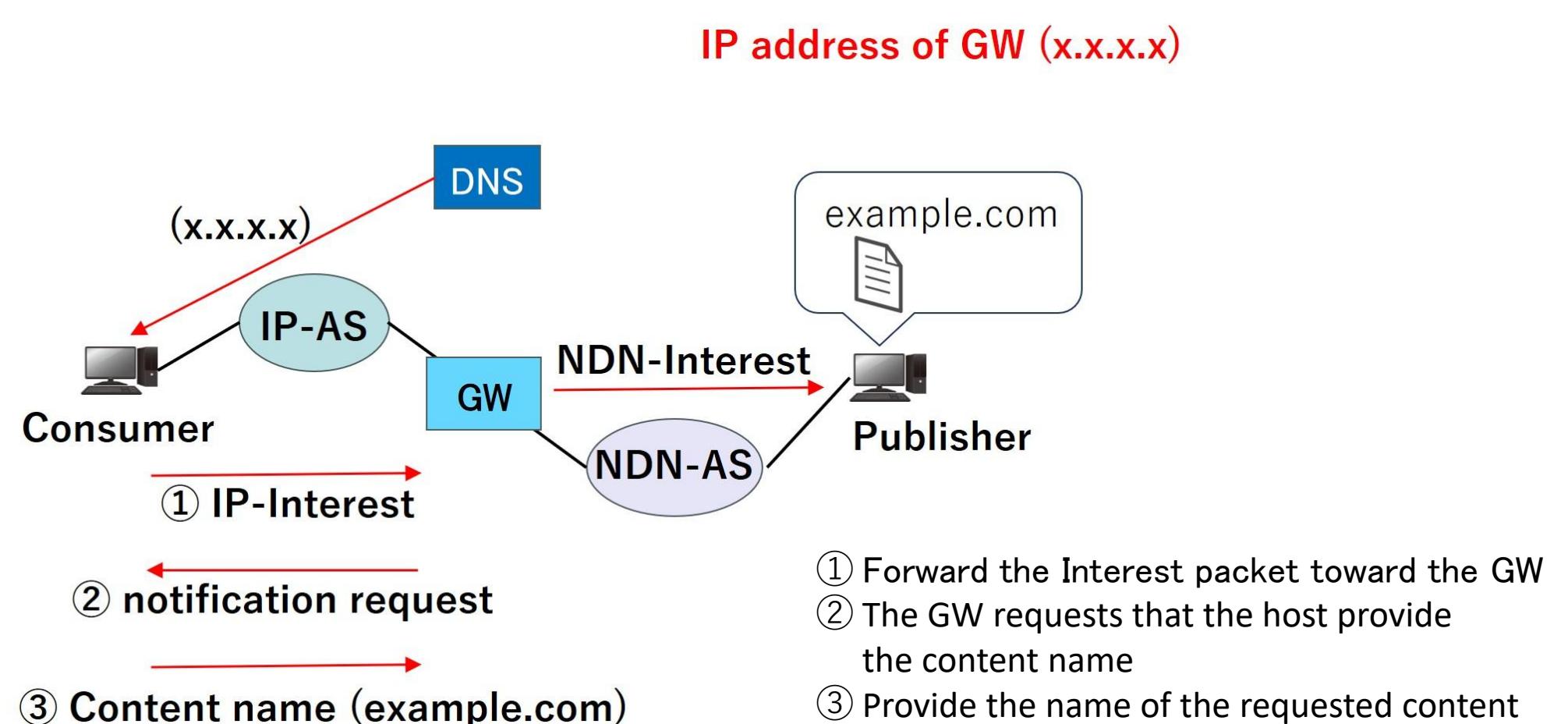


### 3. DNS Registration of NDN Content Names

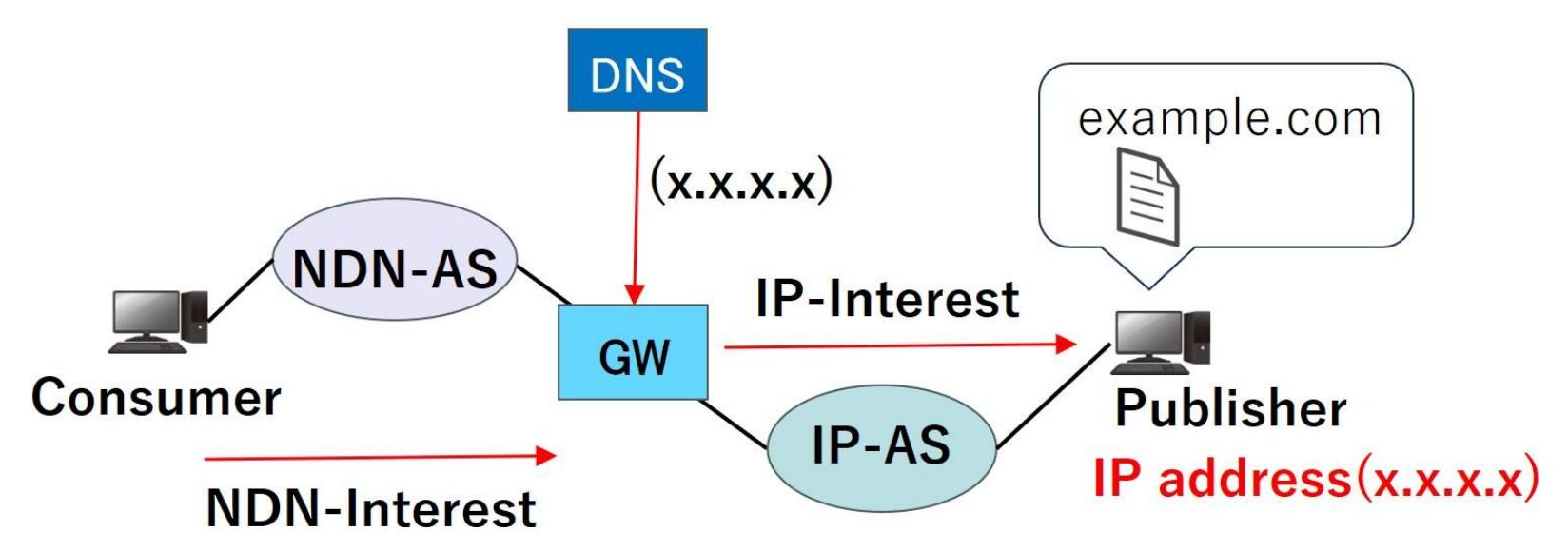
- If the host requesting the content (consumer) is an IP user, it is impossible to resolve the names of NDN content, which does not have an IP address
- Newly published NDN content is registered in DNS using the IP address of the GW



### 4. Proposed Method



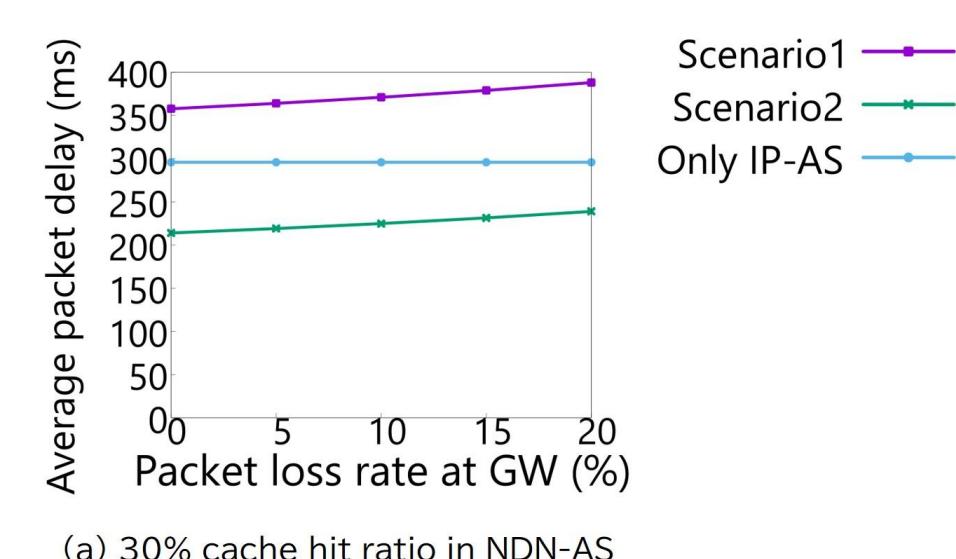
- In DNS, the name of NDN content is associated with the IP address of the gateway connected to the AS where the content resides
- After indicating the name of the content being requested, the Interest is forwarded through the gateway



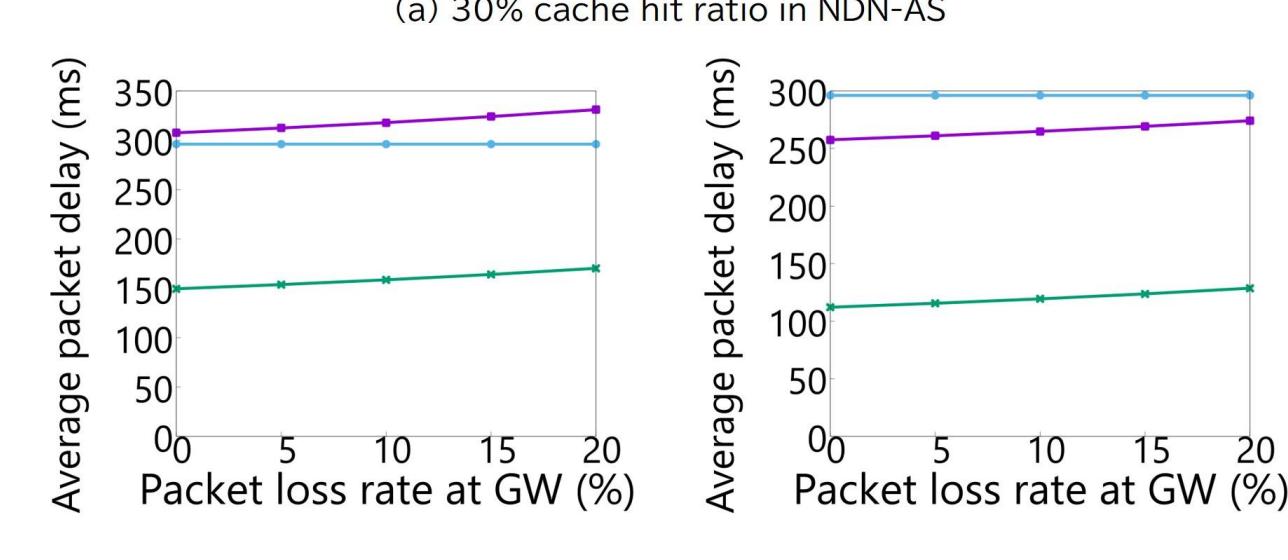
- NDN Interests carry information about the content name, DNS is used based on that name
- The GW translates the Interest packet based on the IP address (x.x.x.x) of "example.com"

### 5. Evaluation

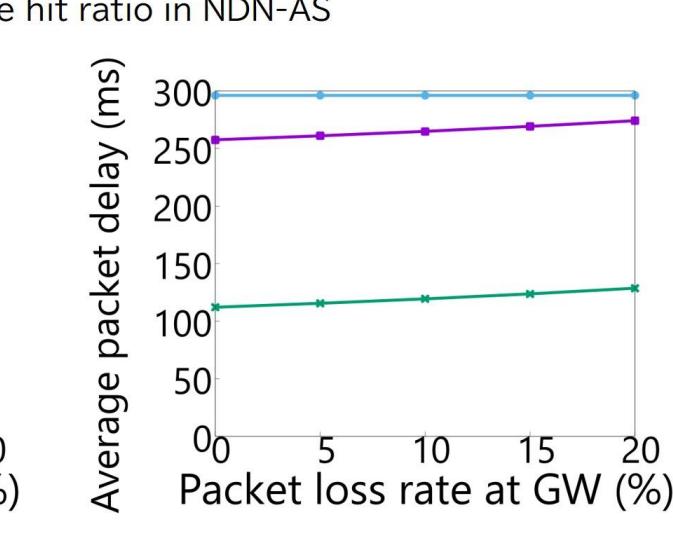
- NDN achieves efficient content delivery by leveraging in-network caching at routers
- Traffic that surpasses the processing capability of the GW results in packet loss



(a) 30% cache hit ratio in NDN-AS



(b) 60% cache hit ratio in NDN-AS



(c) 90% cache hit ratio in NDN-AS

- Scenario 1 corresponds to a practical NDN deployment model, whereas Scenario 2 corresponds to an idealized NDN deployment model
- In Scenario 1, NDN is deployed only in small-scale ASes, whereas in Scenario 2, NDN is also deployed in large-scale ASes (hub nodes)
- In a network combining NDN and IP, communication latency is significantly affected by the deployment of NDN Ases
- The deployment of NDN in large-scale ASes enables latency reduction