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# **ENUM Activities in Japan**

**- With Focus on Japan ENUM Study Group -**

**August 25, 2003**

**Hiro Hotta**

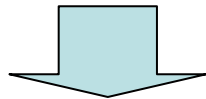
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**JPRS (Japan Registry Service)**

# Establishment of ENUM Study Group

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- **ENUM technologies**
  - being standardized in IETF
  - specifications almost fixed
- **Policy of International Operation**
  - had been discussed and becoming more well-defined in ITU-T
  - published as Supplement Document
- **ENUM trial environment**
  - being prepared by IAB , RIPE NCC , ITU-T, etc.
  - being under trial in several countries
- **In Japan**
  - IP telephone services are rapidly growing
  - 050xxxxxyyyy is being assigned to IP telephones

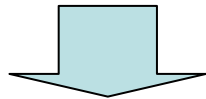


- **ENUM should be well studied and understood**
- **How ENUM is used should be made clear**

# Objectives

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- **Understanding the ENUM technology**
- **Studying the implementation and operation of the ENUM-based system, and related matters**
- **Finding political/regulatory issues related to ENUM-based implementation and operation**
- **Finding technological issues related to ENUM**
- **Clarifying pros and cons in ENUM usage**



**The followings are studied**

- **ENUM technology**
- **Related technology such as DNS , URI , DDDS**

# Members

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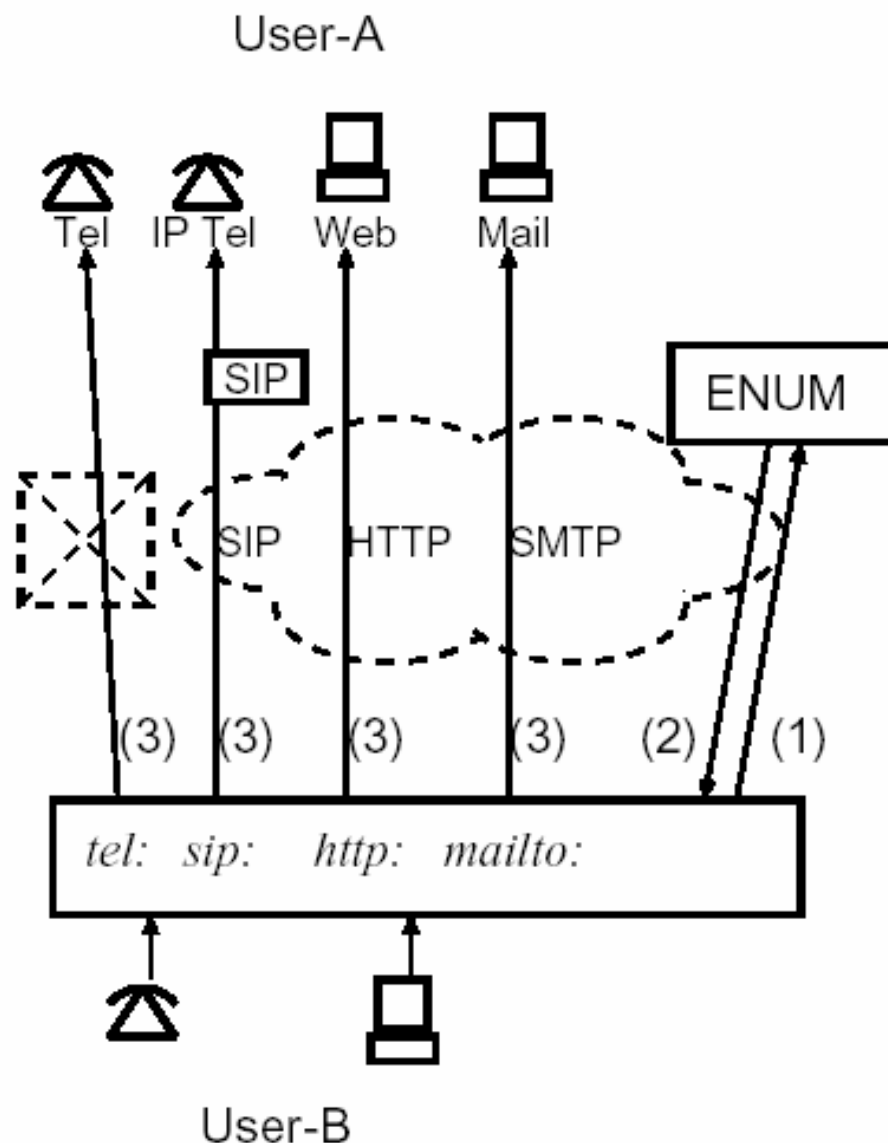
- **Chair**
  - **Shigeki Goto (Waseda Univ.)**
- **Vice Chair**
  - **Susumu Sano (JPNIC)**
- **Secretariat**
  - **JPNIC**
- **Members (23)**
  - **Telecommunication companies**
  - **IP telephone service providers**
  - **Network Device Vendors**
  - **Network Solution Providers**
  - **ccTLD registry (JPRS)**
  - **Trading companies**
  - **Non-profit organizations**
  - **Professionals from universities**
- **Observers**
  - **Ministry of Public Management, Home Affairs, Posts and Telecommunications (MPHPT)**

# Scope

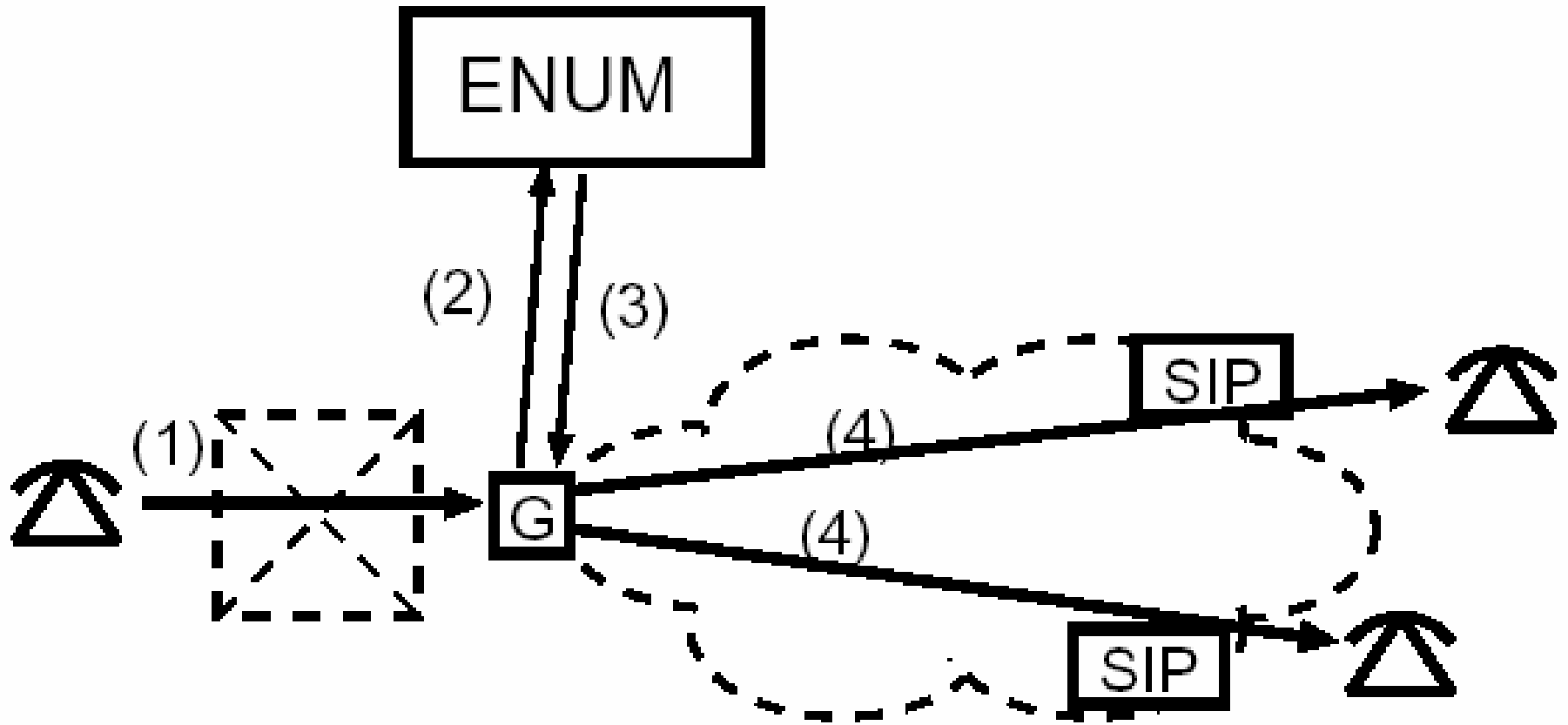
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- **ENUM technology itself**
- **Some issues happening after resolving the telephone number mapping is important to implement and deploy the service, but they are out of scope on current Japan ENUM Study Group**
- **Its report in May 2003 covers**
  - **Outline of ENUM**
  - **What are solved by ENUM**
  - **Registration model of ENUM**
  - **Privacy and security in ENUM**
- **All the activities were on the desk**
  - **No experiment / no trial**

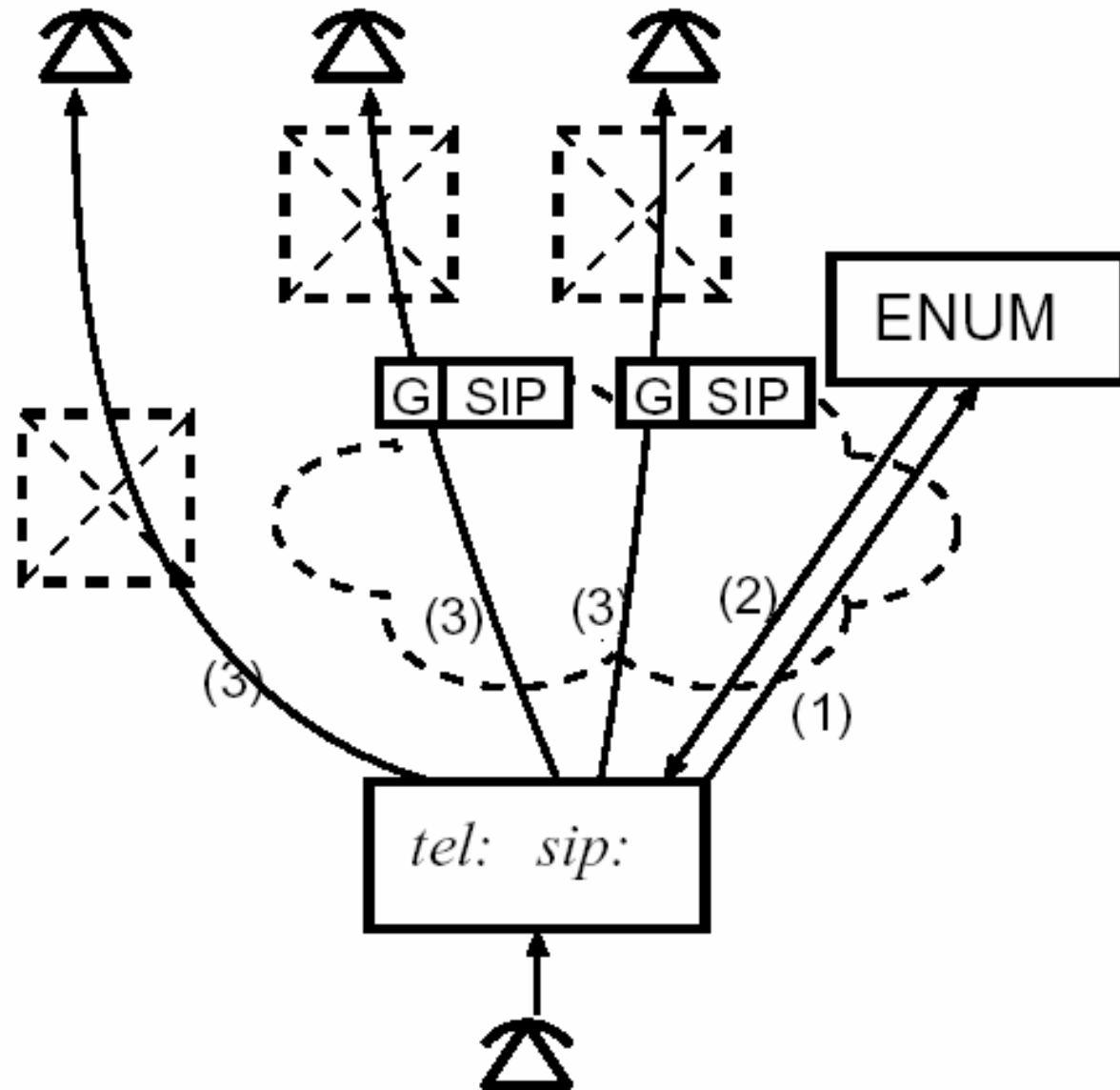
# Identification of applications by E.164 numbers



# From traditional telephones to Internet telephones

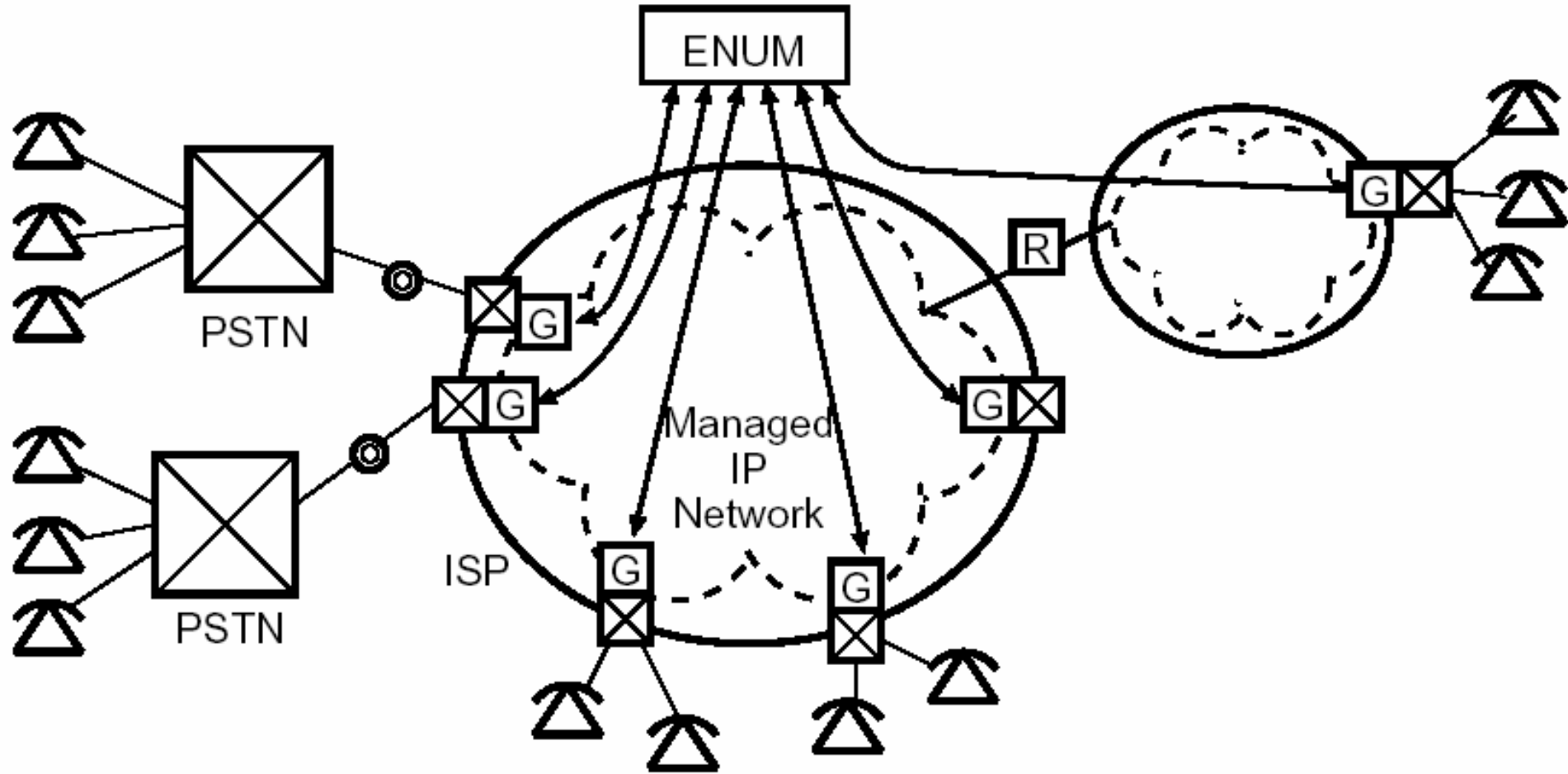


# From Internet telephones to traditional telephones





# Within a telephone network



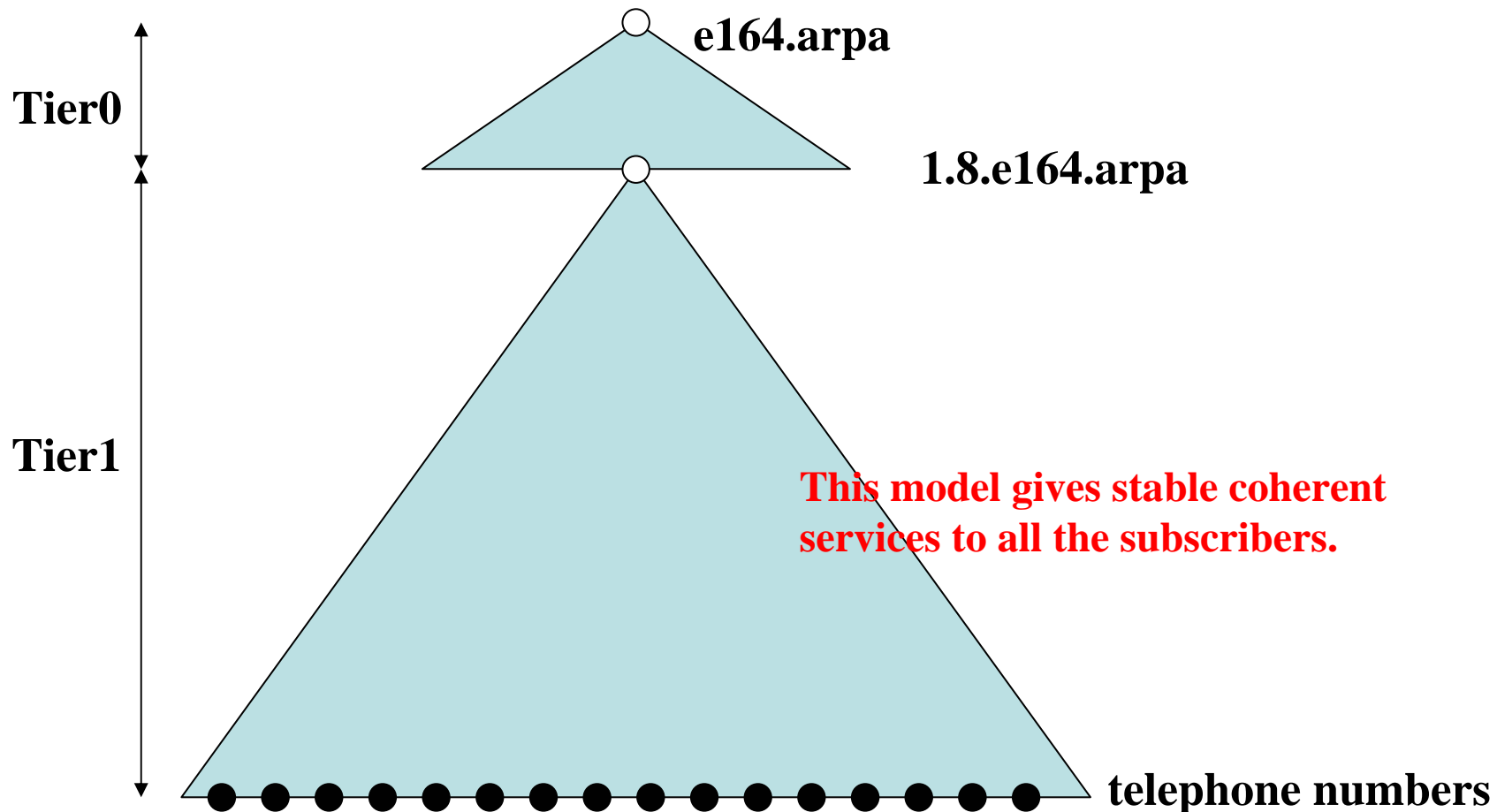
# Tier structure

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- **Tier structure and DNS zone structure**
  - **Country dependent**
  - **Existing structures of Telecom and Internet-related industry should be considered and a new combined/compromised structure may be necessary to utilize ENUM**
- **Recommendation**
  - **Boundary between Tier0 and Tier1 is 1.8.e164.arpa**
    - **as +81 is used for subscribers if and only if in Japan**
  - **Boundary between Tier1 and Tier2 has some options**
    - **Examples are shown in next pages**

# Boundary between Tier1 and Tier2 (model1)

**Tier1 has phone numbers in full and no Tier2 is introduced**

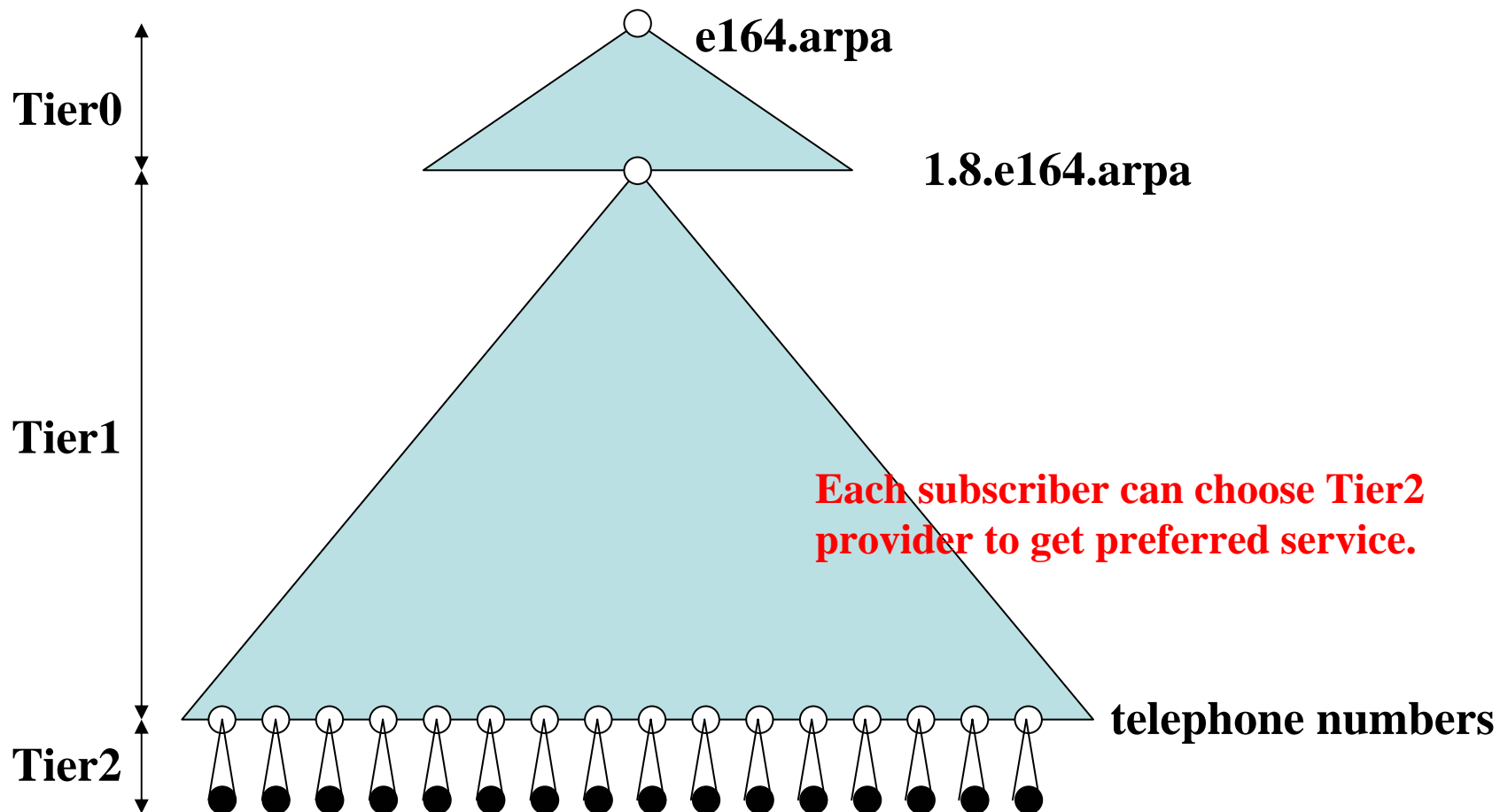


○ NS record

● NAPTR record

# Boundary between Tier1 and Tier2 (model2)

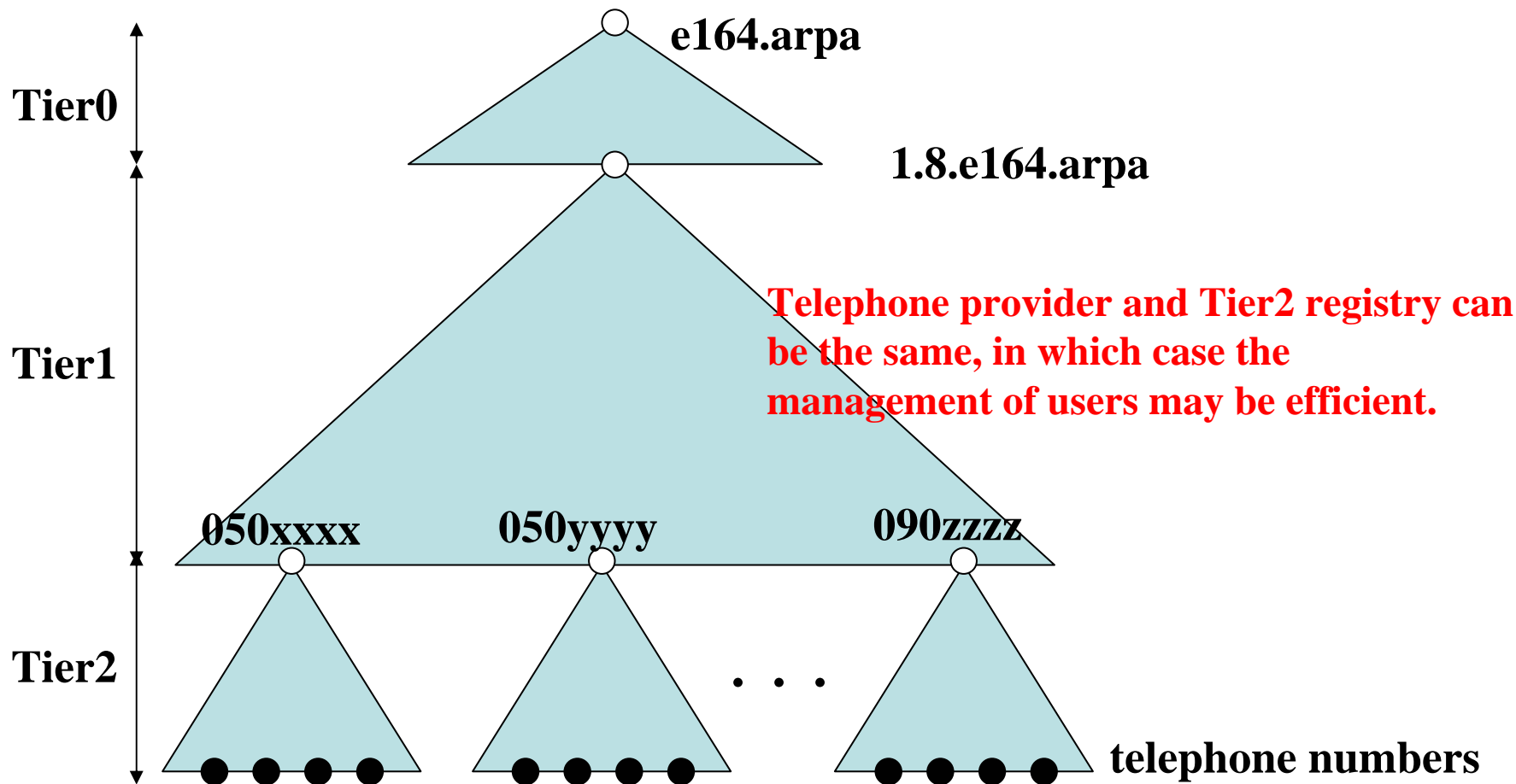
**Tier1 has phone numbers in full and Tier2 handles a NAPTR record of each number.**



○ NS record      ● NAPTR record

# Boundary between Tier1 and Tier2 (model3)

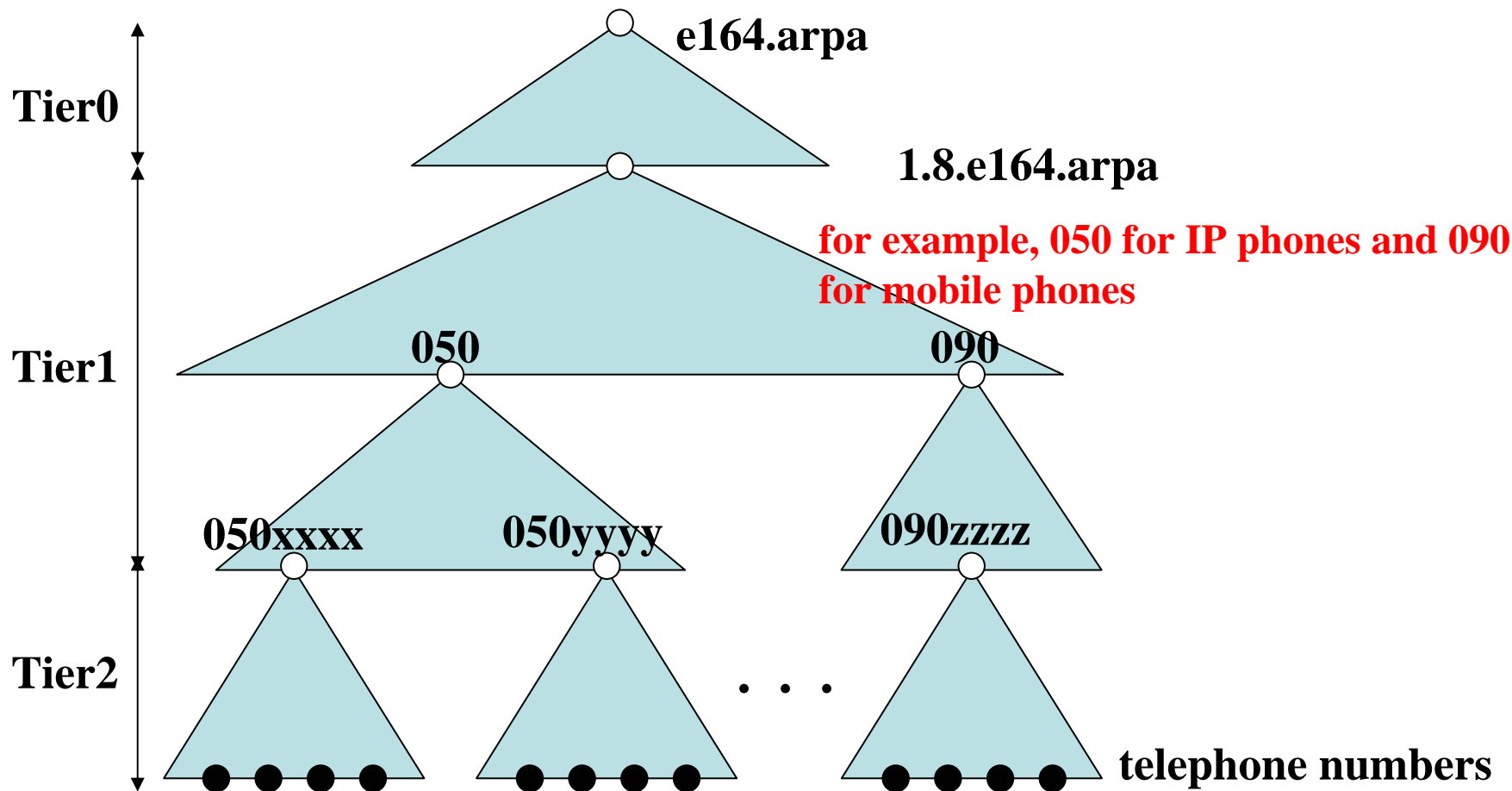
Boundary corresponds to the chunks (10,000 numbers) assigned to Telecom providers.



○ NS record      ● NAPTR record

# Boundary between Tier1 and Tier2 (model4)

Tier1 is divided into groups corresponding to chunks, each represents a phone service for example.

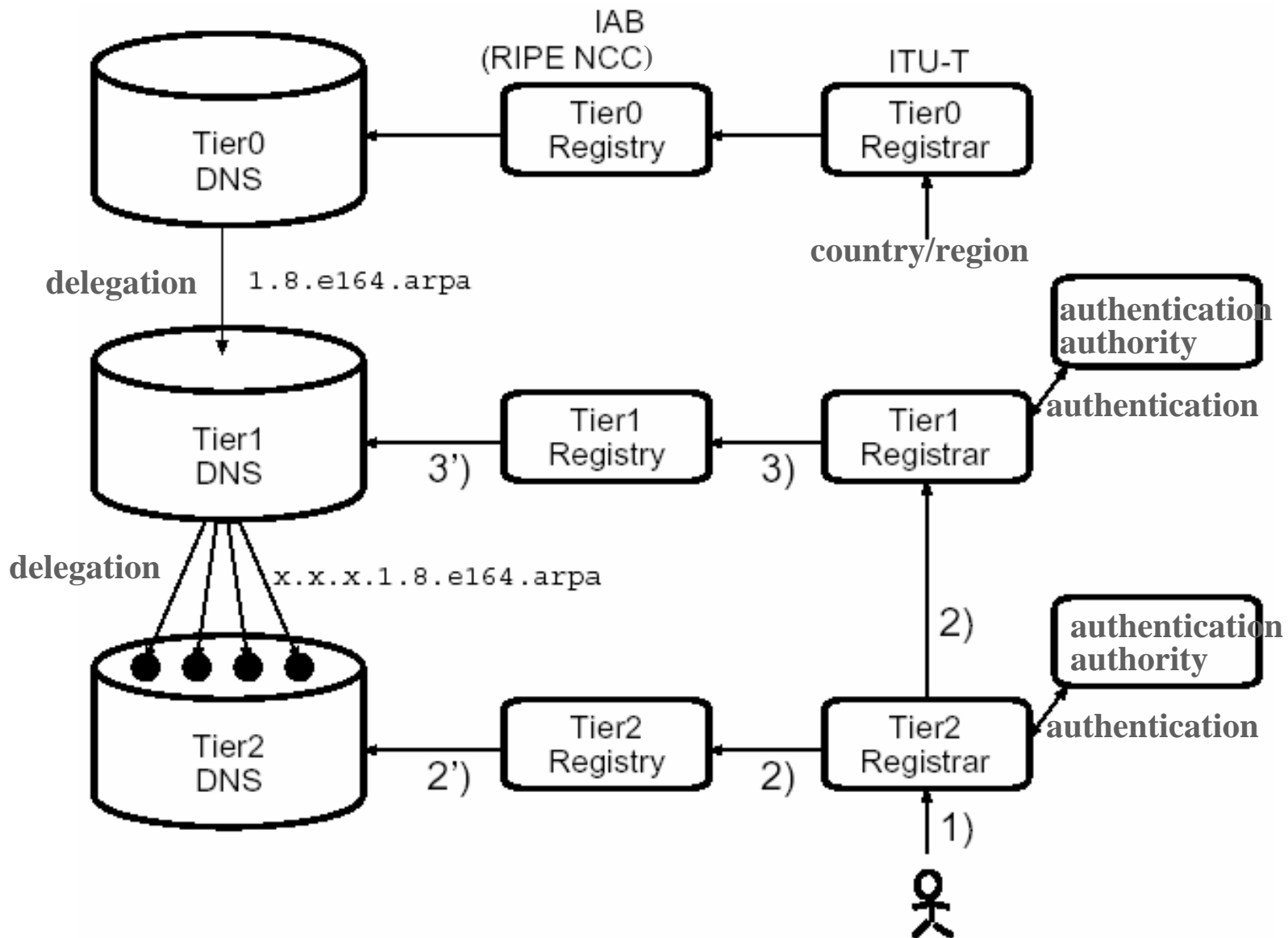


# User ENUM and Operator ENUM

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- **User ENUM and Operator ENUM**
  - Definitions of them were inevitable in carrying forward a discussion
  - Definition should have been done with our words and with knowledge of national telecom industry structure
- **User ENUM**
  - Each user of E.164 number, who subscribes a telecom service identified by the number, registers his/her favorite application services to ENUM records at his/her will
  - IETF, UKEG, ENUM Forum(US) seem to mainly give focus on this category
- **Operator ENUM**
  - A provider, which has assigned the number to the user, uses ENUM records to implement its service identified by the number at its will
  - This receives interests from IP telephone service providers in Japan
- **Combined models of User and Operator ENUM**
  - Addition of User ENUM flavor to Operator ENUM
  - Addition of Operator ENUM flavor to User ENUM

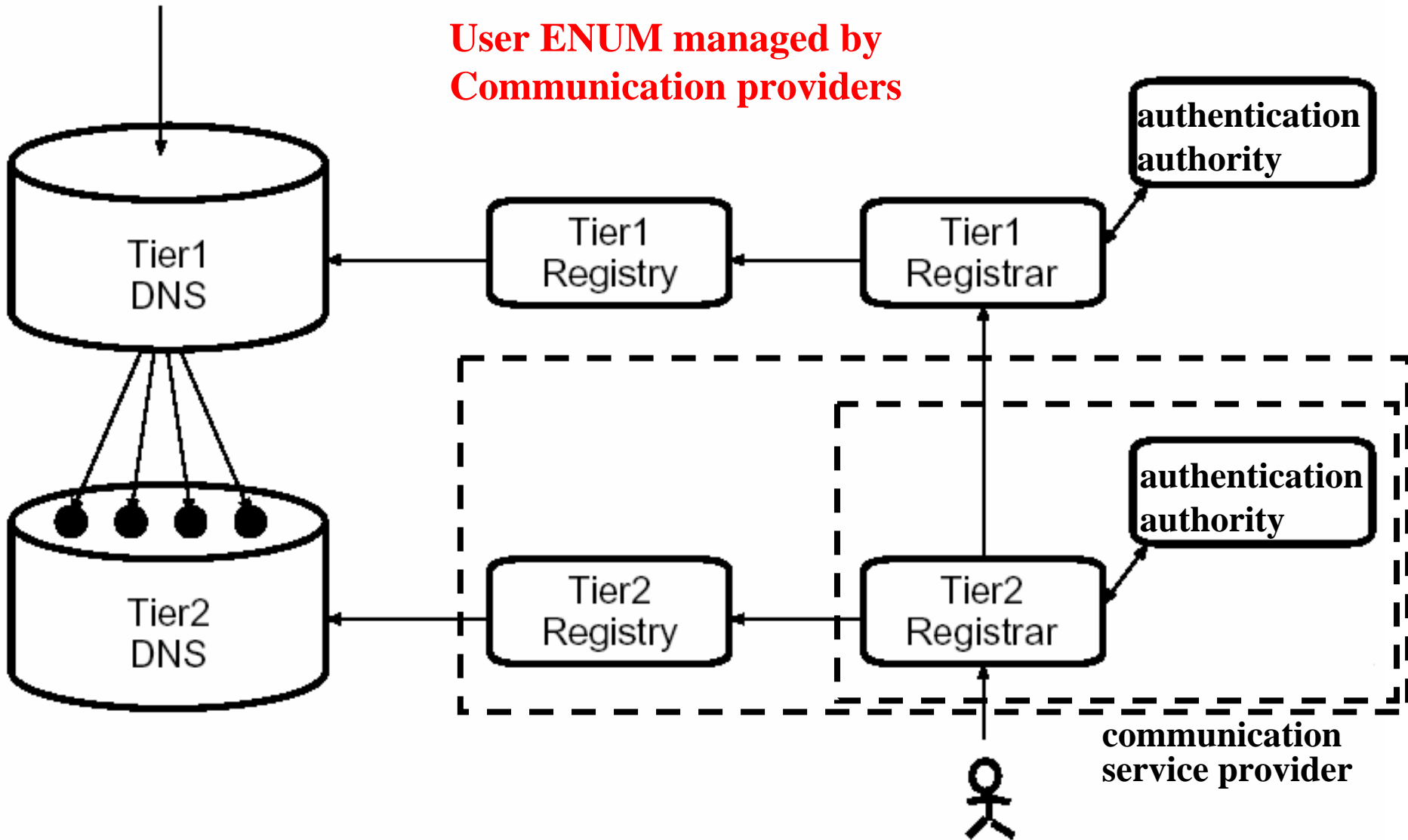
# Registration model





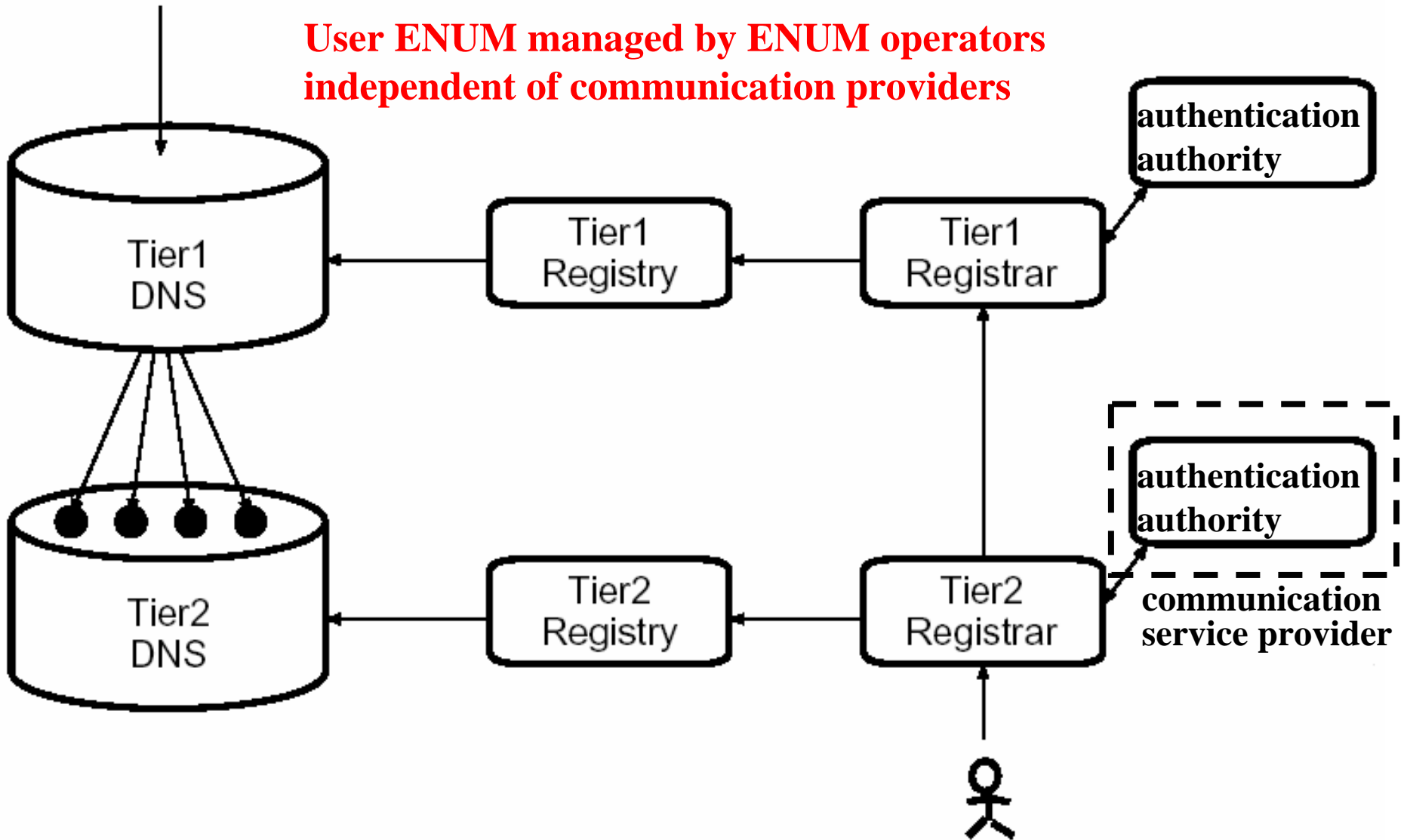
# Registration model (1)

User ENUM managed by  
Communication providers



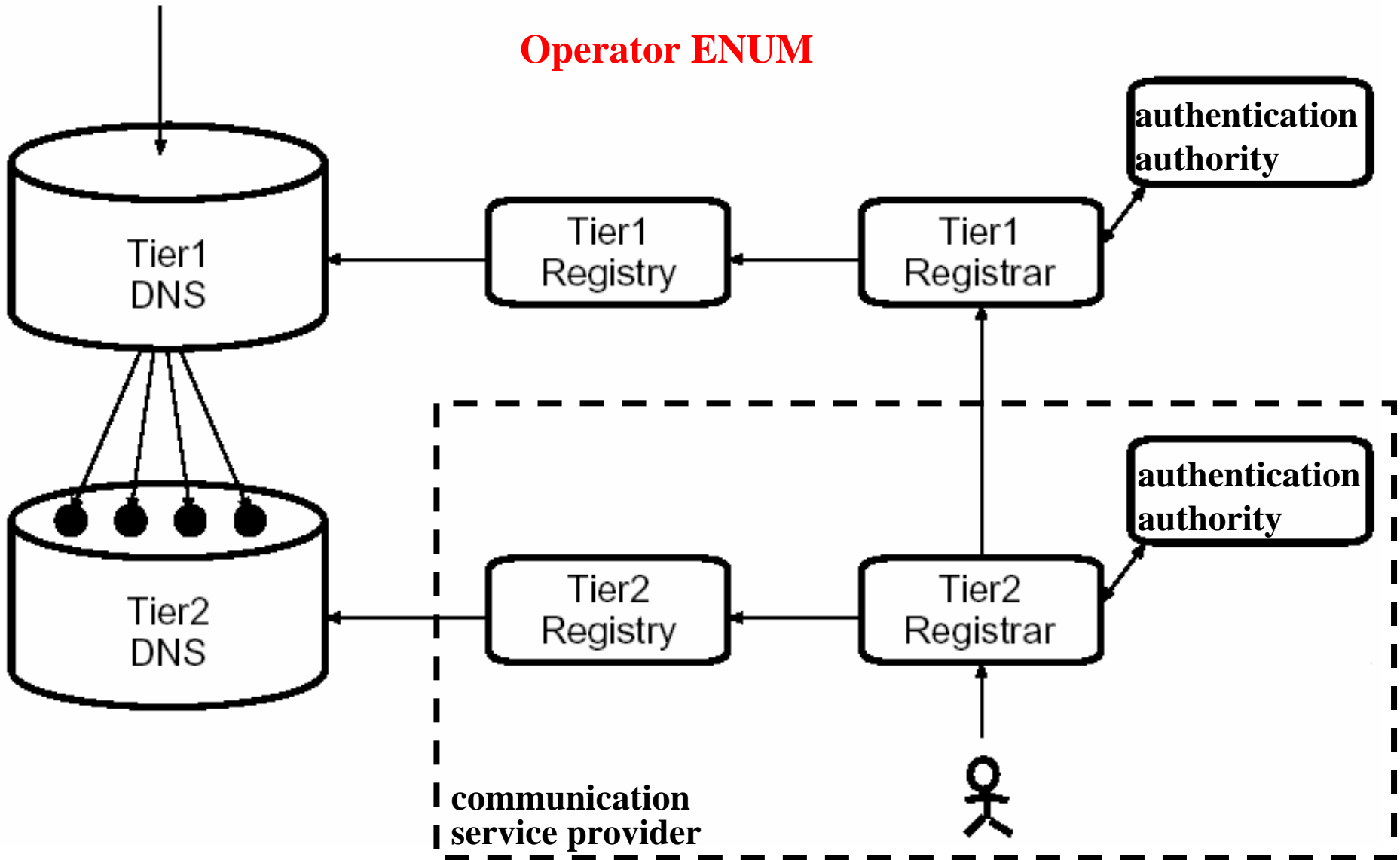
# Registration model (2)

User ENUM managed by ENUM operators independent of communication providers



# Registration model (3)

## Operator ENUM



# Example of registration policies

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- **Mandatory**
  - Operators register ENUM records to implement their communication services
  - Typical in Operator ENUM
- **Opt-in**
  - Users register ENUM records spontaneously
  - Typical in User ENUM
- **Restriction of available services**
  - Only allowed services can be registered
  - Only allowed parameters can be registered
- **Restriction on priorities**
  - For example, services provided by primary telecom operator are registered as prioritized

# Privacy issues

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- **Information within DNS**
  - Destination address is publicized in DNS
  - For example, to hide a direct mail address
    - Register [aci2hnwz@example.co.jp](mailto:aci2hnwz@example.co.jp) as NAPTR
    - Convert [aci2hnwz](#) to [yamada](#) in mail server
- **WHOIS information**
  - Information on registrants is publicized in WHOIS database for stable distributed operation
  - Balance should be made between operation stability and privacy
- **Customer information**
  - Should be secured as in the usual business

# Security issues

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- **ENUM**
  - **Spoofing of registrant**
  - **Falsification of registered data**
  - **Exhaustive loop-up for collecting data**
  - **DoS**
- **DNS**
  - **Wiretapping of DNS query**
  - **Falsification of DNS response**
  - **Spoofing of DNS server**
  - **Falsification of zone data**
  - **Counterfeiting of cache**
  - **DoS**
- **Communication service**
  - **Wiretapping of communicaiton**
  - **Falsification of caller/callee**
  - **SPAM**
  - **congestion**
  - **DoS**

# Access control issues

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- **Information within ENUM DNS**
  - All users can access the global unique DNS space
  - E.164 number space is globally unique
  - All users can access all the information on EMUM DNS
- **Users or communication providers**
  - may want to restrict the users who can access the portion of the ENUM under their control
- **Possible solution**
  - It seems there should be some mechanism to restrict the view in communication applications/devices (SIP, mail, ...)

# Other Issues

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- **Availability**
  - **Response time**
  - **MTBF, MTTR**
  - **Disaster recovery**
  - **Perseverance against congestion and DoS attack**
- **Reliability**
  - **Secondary servers**

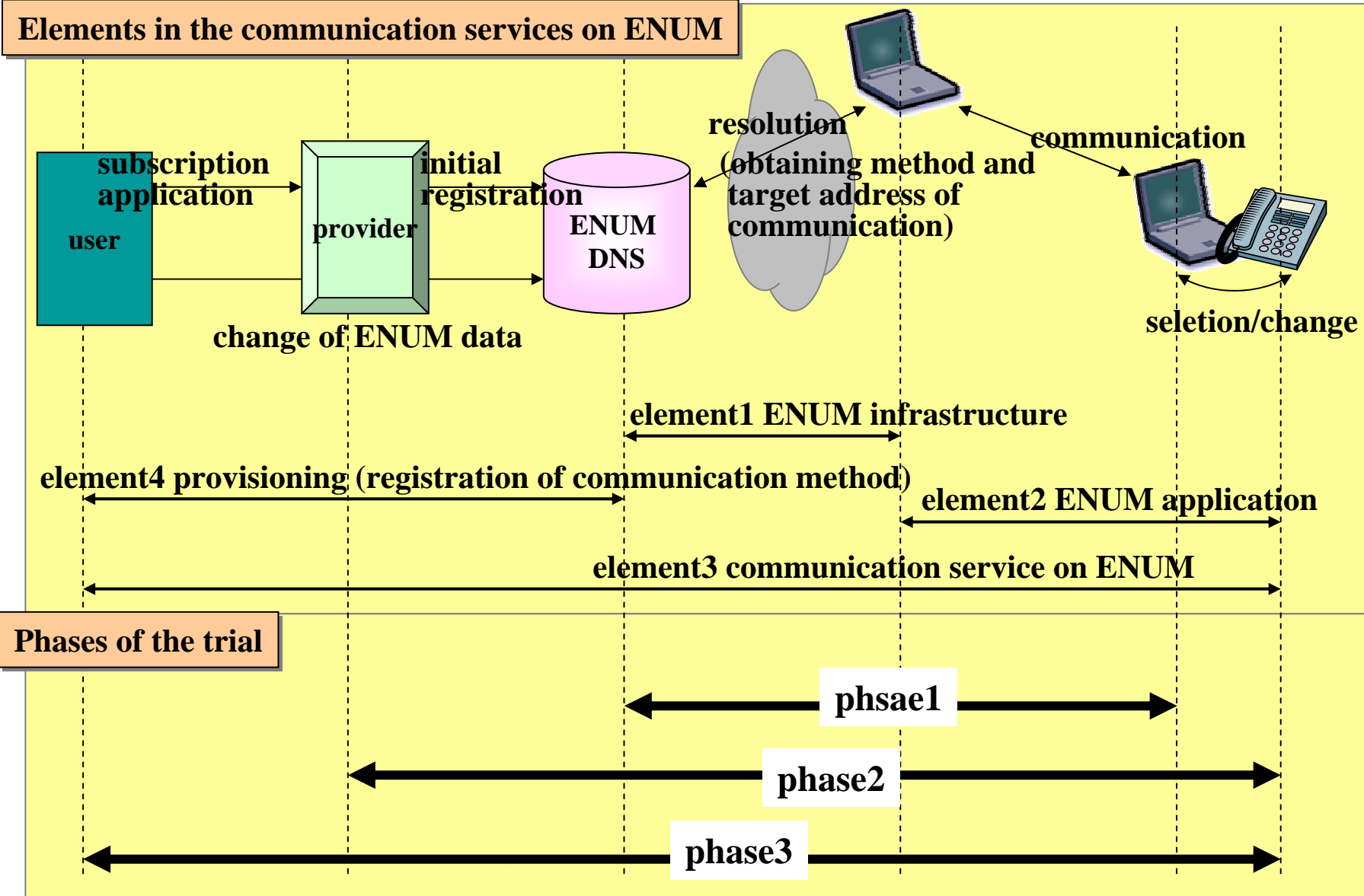


# Future activity

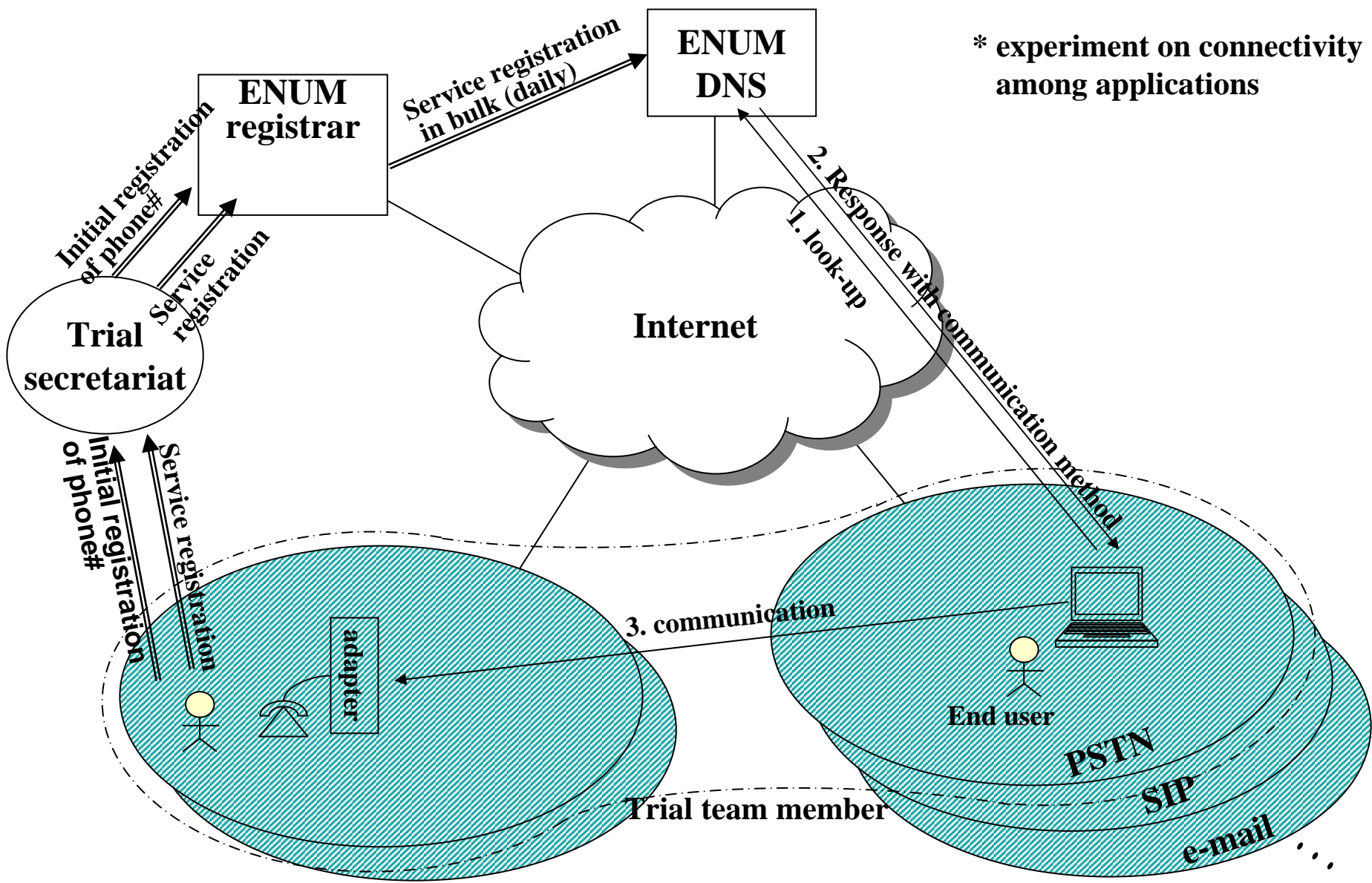
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- **More investigation on implementation and operation of User ENUM and Operator ENUM will be put forward**
- **Requirements will be investigated for both User ENUM and Operator ENUM**
  - **Efficiency**
  - **Function**
  - **Reliability**
  - **Security**
  - **Privacy**
  - **Management structure of DNS**
  - **Provisioning process**
  - **etc.**
- **Issues in each model will be clarified**
- **Experiment/trial will be commenced**
  - **to identify issues not extracted by the desk work**
  - **to elaborate practical solutions**

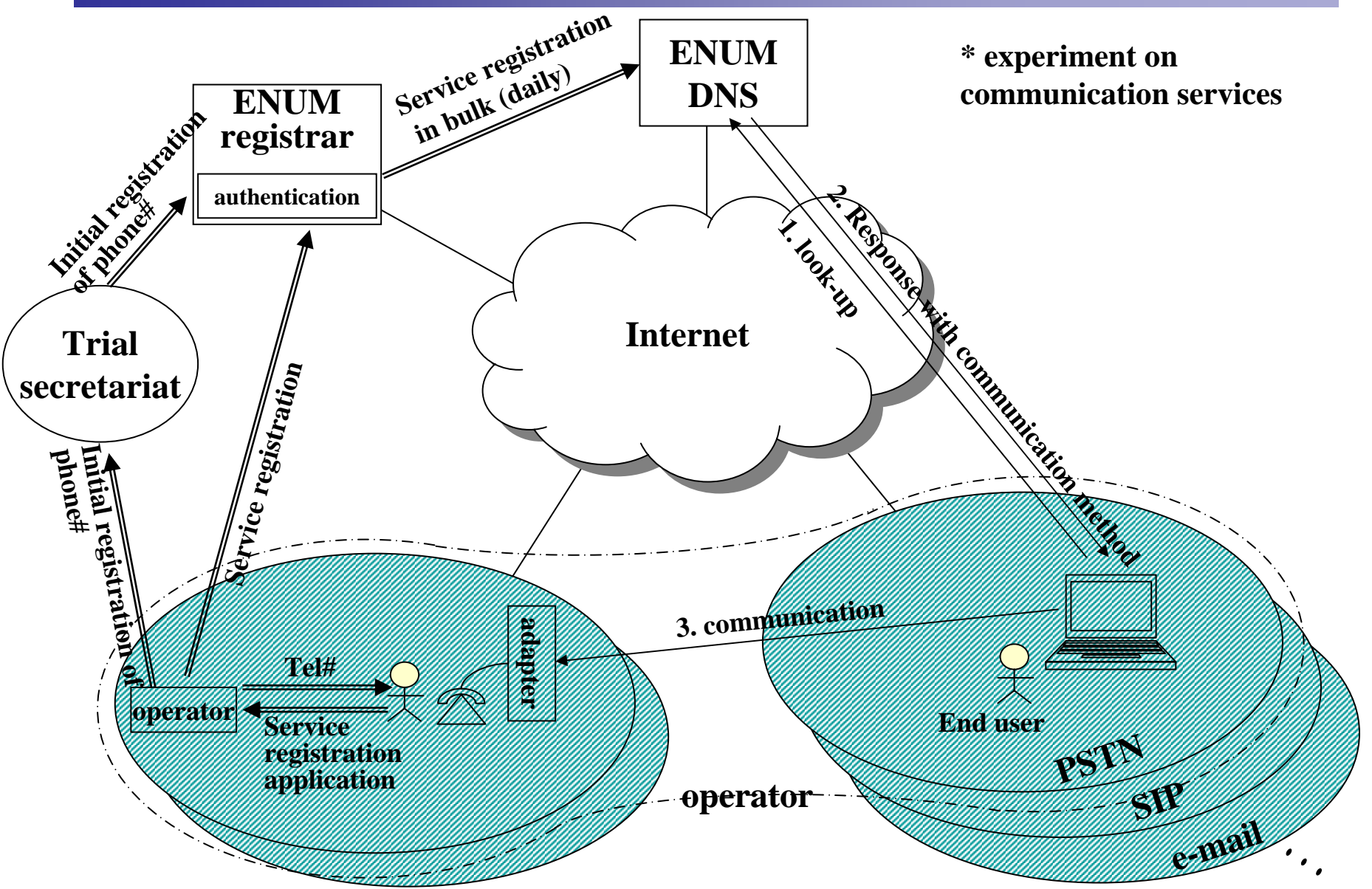
# ENUM trial (in preparation)



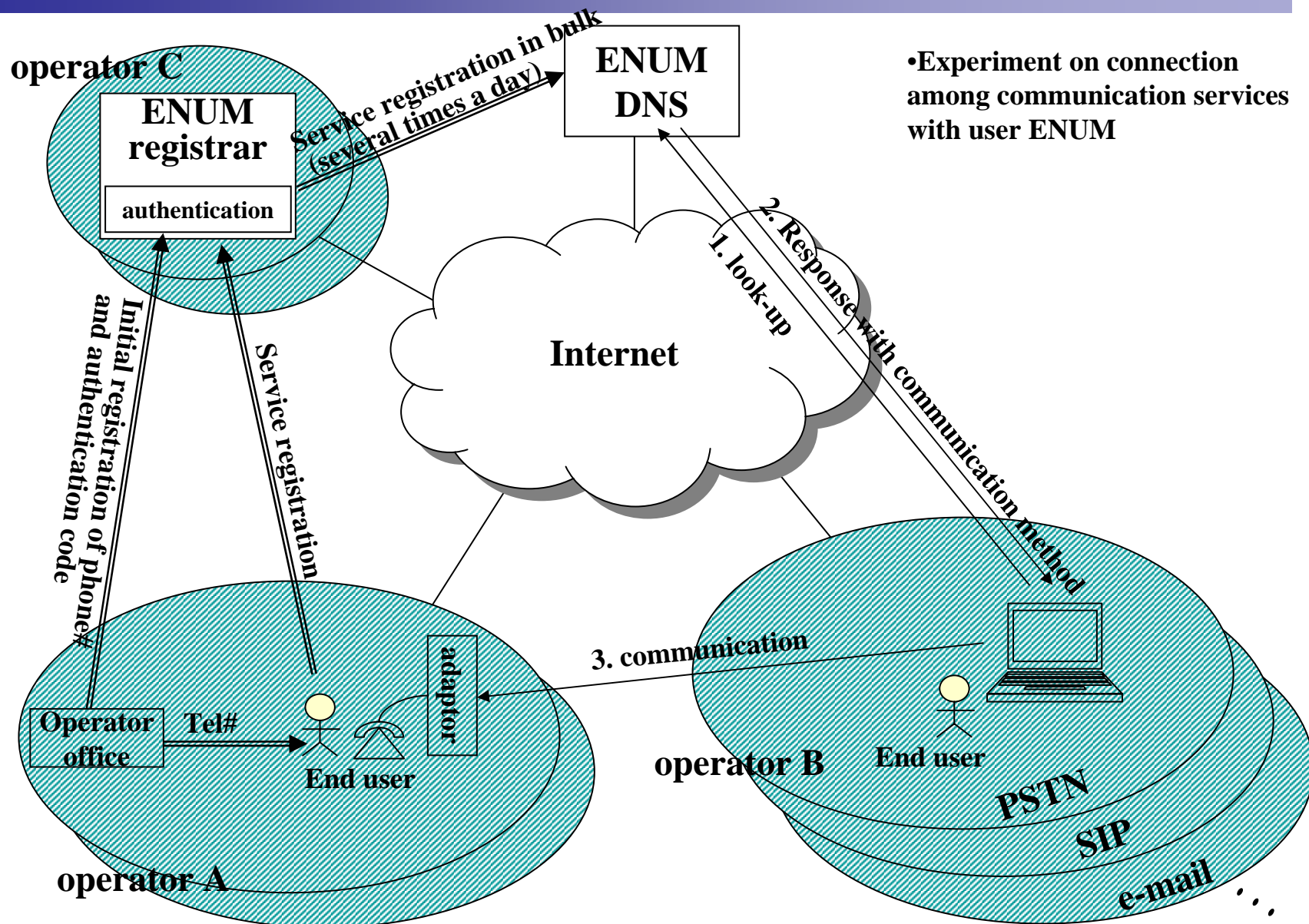
# ENUM trial (phase1)



# ENUM trial (phase2)



# ENUM trial (phase3)



•Experiment on connection among communication services with user ENUM