

ITU Regional Forum on “Internet of Things, Telecommunication Networks and Big Data as basic infrastructure for Digital Economy”

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Signalling architecture of distributed ENUM networking for IMS

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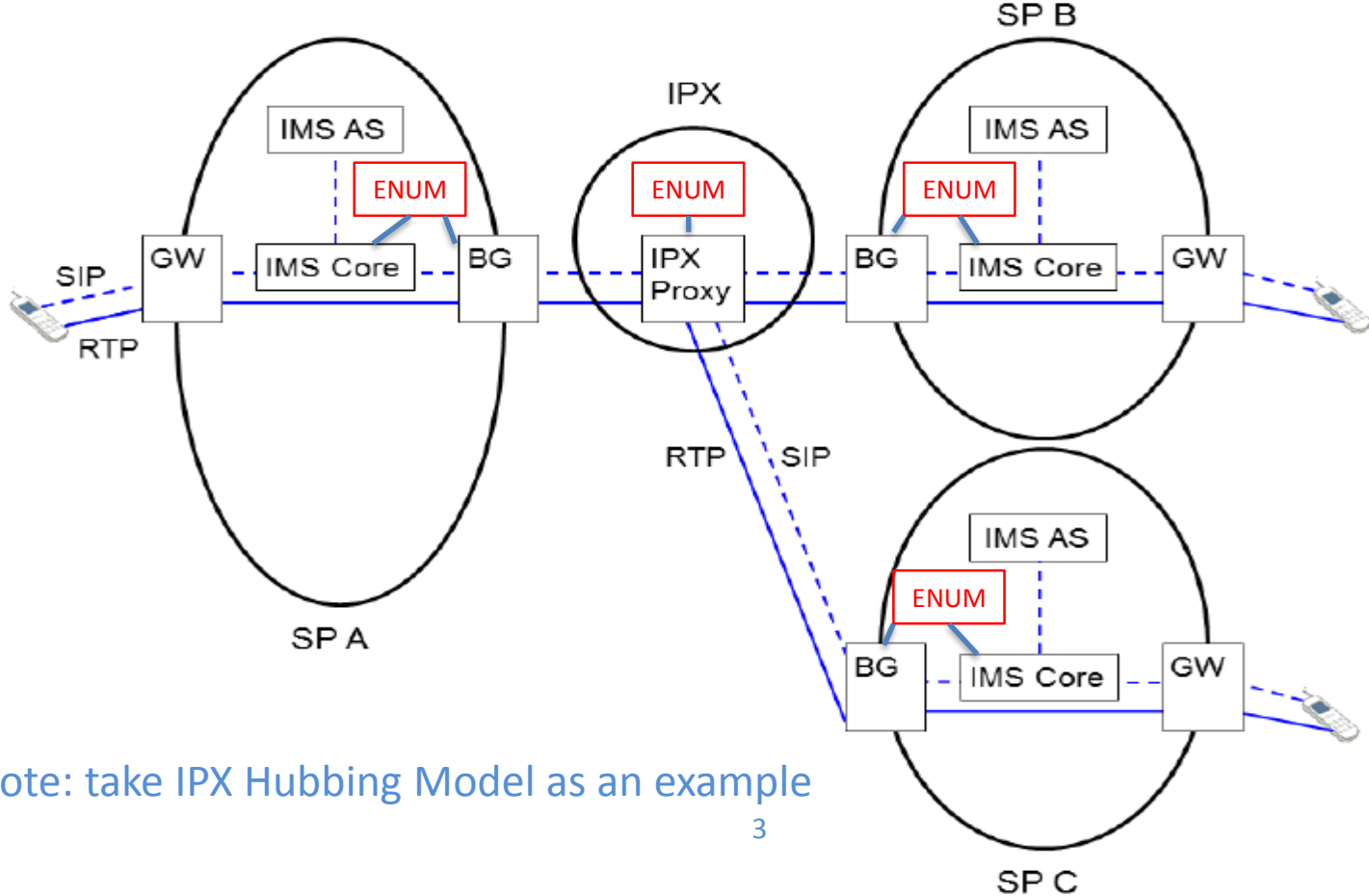


CONTENT

- **E.164 number translation issues of IMS interconnection**
- **Proposed distributed ENUM model for IMS**
- **Further work in ITU-T**

Requirements of E.164 number translation in IMS

- ❑ The requirements of ENUM (E.164 Number Mapping) in IMS
- ✓ mapping the telephone number of the destination into an URI (Uniform Resource Identifier), which is a SIP phone number that clearly identifies the destination network



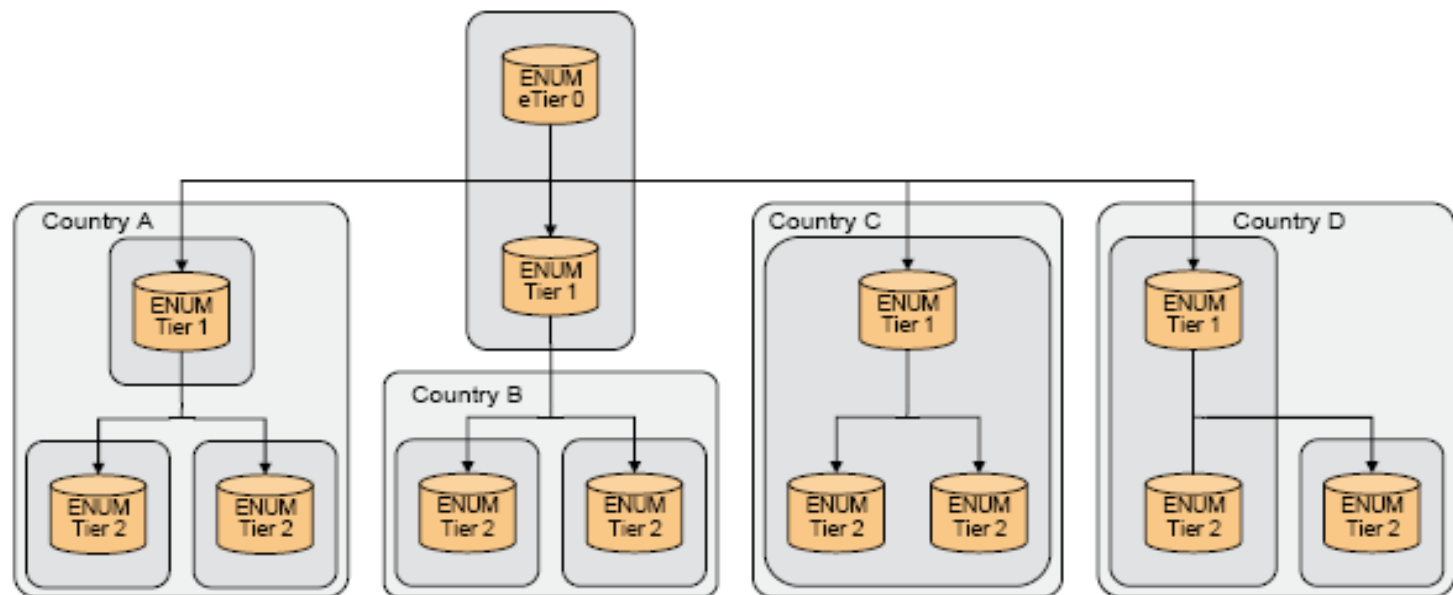
Note: take IPX Hubbing Model as an example



ENUM Hierarchical Model proposed in GSMA

❑ ENUM Hierarchical Model proposed in GSMA IR.67

- ✓ **Tier 0 : Global level**, authoritative for the ENUM top level domain. Under this domain are pointers to the Tier 1 authoritative servers.
- ✓ **Tier 1: Country Code level**, authoritative for ITU-T assigned E.164 country codes. Under this domain are pointers to the Tier 2 authoritative servers.
- ✓ **Tier 2:Service Provider level**, authoritative for National Destination Codes and individual Subscriber Numbers. Under this domain are the individual Subscriber Numbers each with one or more (Naming Authority Pointer) NAPTR records associated with them.



A) Tier 1 and Tier 2 on individual servers

B) Tier 1 hosted by "Tier 0" server, Tier 2 on individual servers

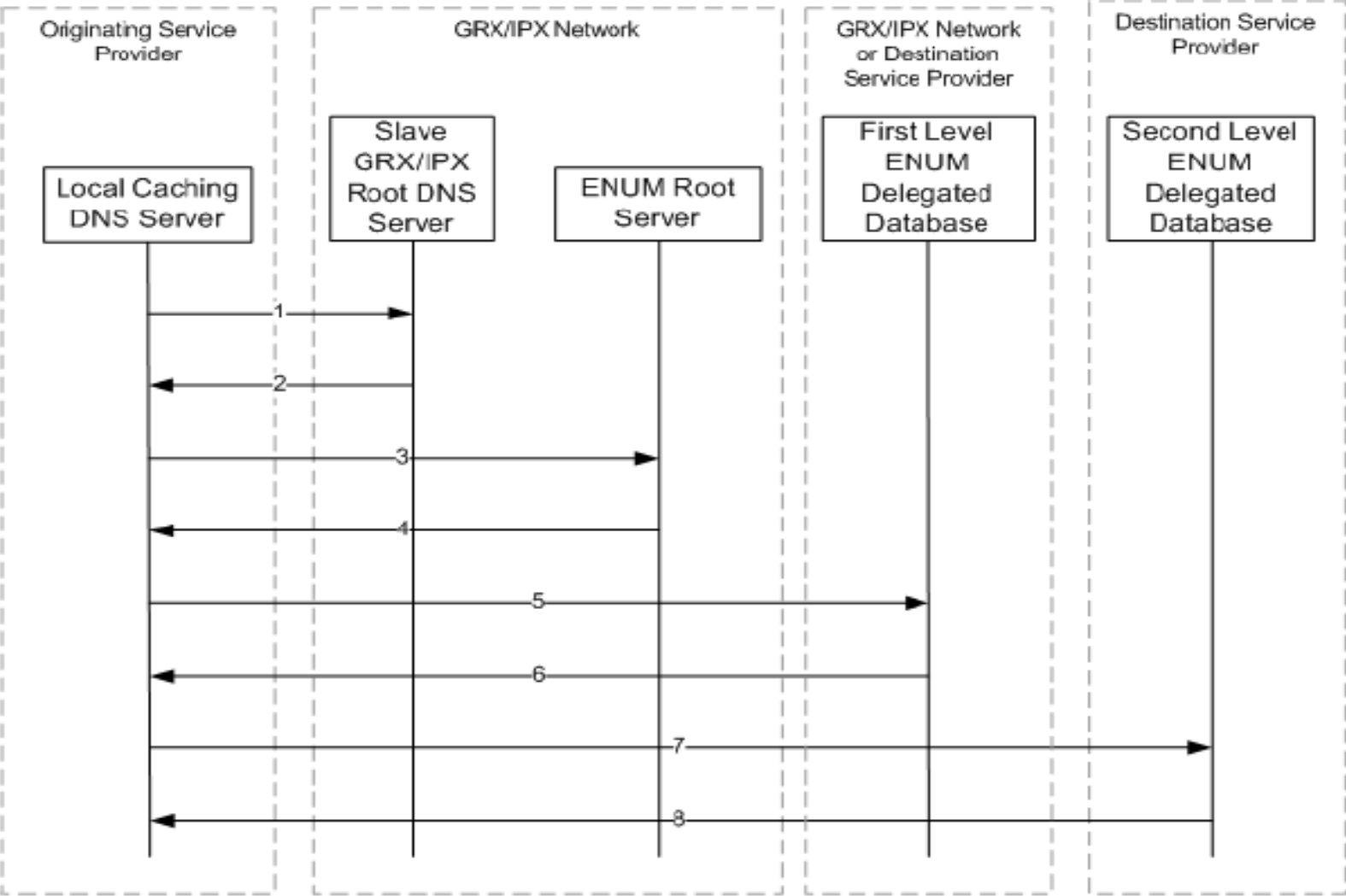
C) Tier 1 and Tier 2 for all SPs hosted on one common server

D) Tier 1 and Tier 2 for one or more SPs hosted on one common server, other SPs have individual Tier 2 servers



Resolution procedure in ENUM hierarchical Model

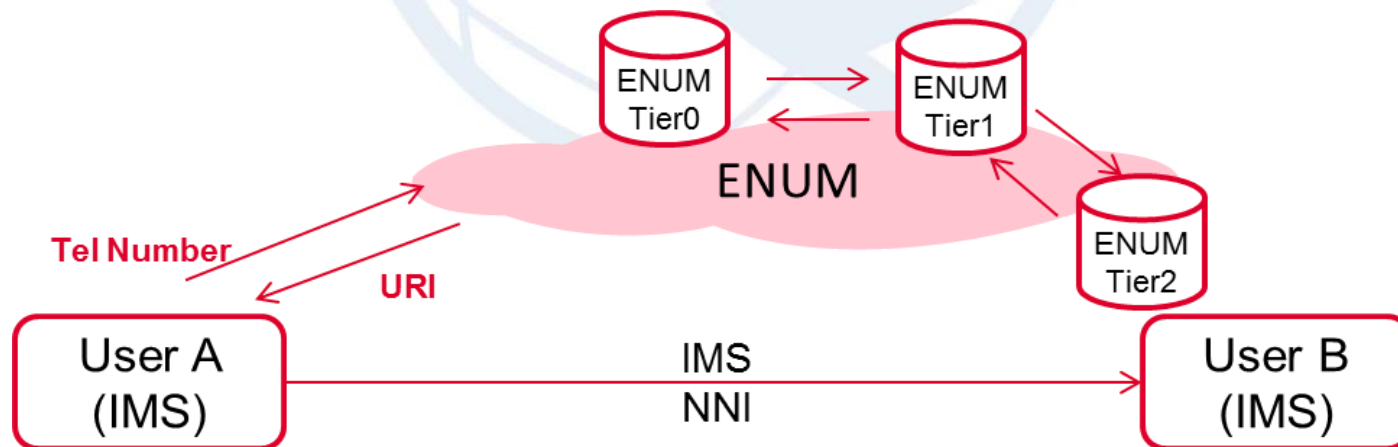
Example of ENUM/DNS resolution procedure in GSMA IR.67



E.164 number translation issues of IMS interconnection

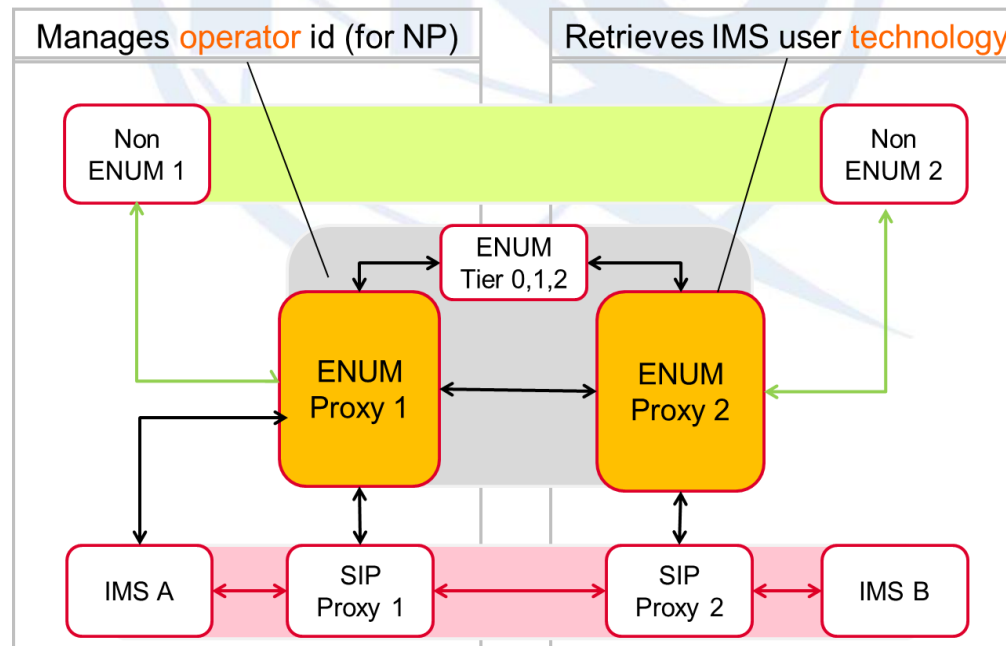
□ Key issues of ENUM Hierarchical Model for IMS interconnection

- ✓ All international sessions initiated by IMS users from different operators shall query the Tier 0 and Tier 1 ENUM server to map E.164 numbers into an URI, it will be **difficult to devise the query processing capacity of a Tier 0 and Tier 1 ENUM server**
- ✓ there is **no detailed timeline for deploying Tier 0 and Tier 1 ENUM servers**, as it is quite complicated to involve third parties in setting up ENUM servers to provide ENUM query services for operators.
- ✓ **Security issue: Customer Data Exposure remains a real issue.** Opening of ENUM Tier2 (operator level) to external queries is not available, because some IMS operators do not intend to open ENUM servers to external queries for security reasons.



Updated ENUM hierarchical Model

- ❑ A new component, called ENUM proxy was introduced to integrate ENUM and non ENUM environments to solve the security and number portability issues
- ❑ Issues of the updated version of ENUM hierarchical model:
 - ✓ the significant issues of hierarchical model deployment such as the absence of Tier0 and Tier1ENUM are still remain.
 - ✓ Before the introduction of Tier0 and Tier1ENUM, it's quite difficult to establish a full mash networking of ENUM/SIP Proxies.



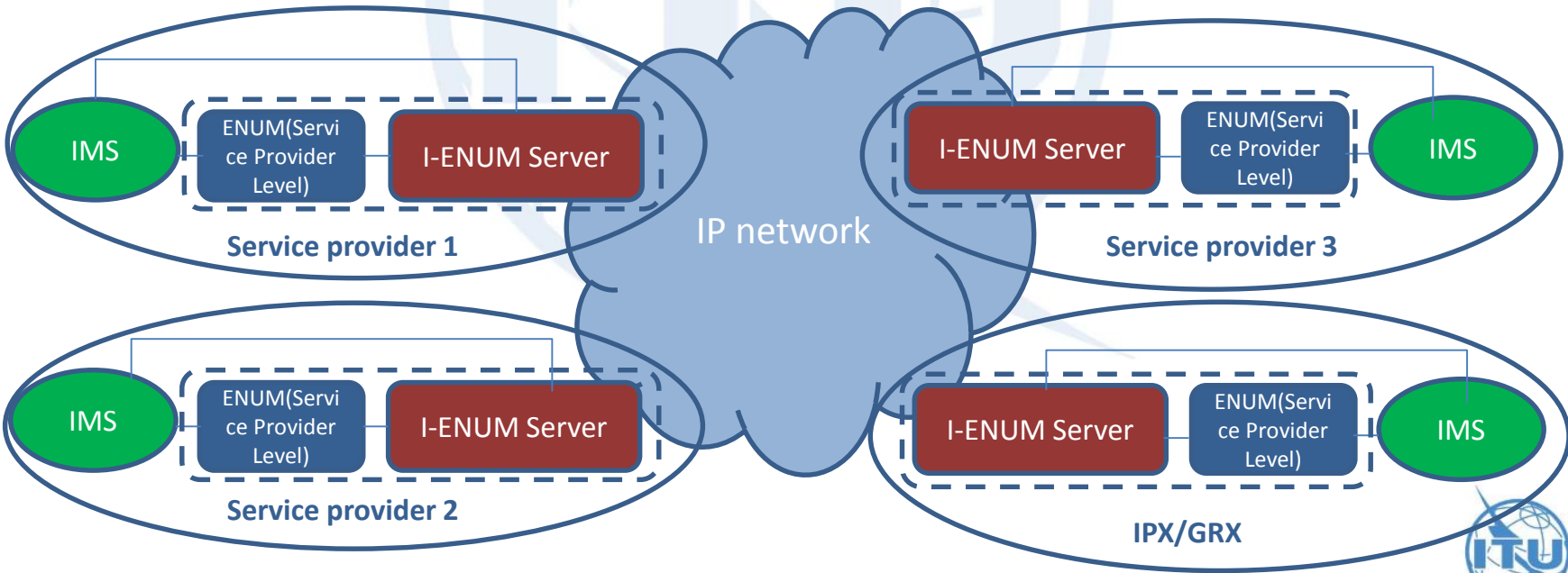
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- **Proposed distributed ENUM model for IMS**
- Further work in ITU-T

Proposed distributed ENUM model for IMS

□ Main purposes

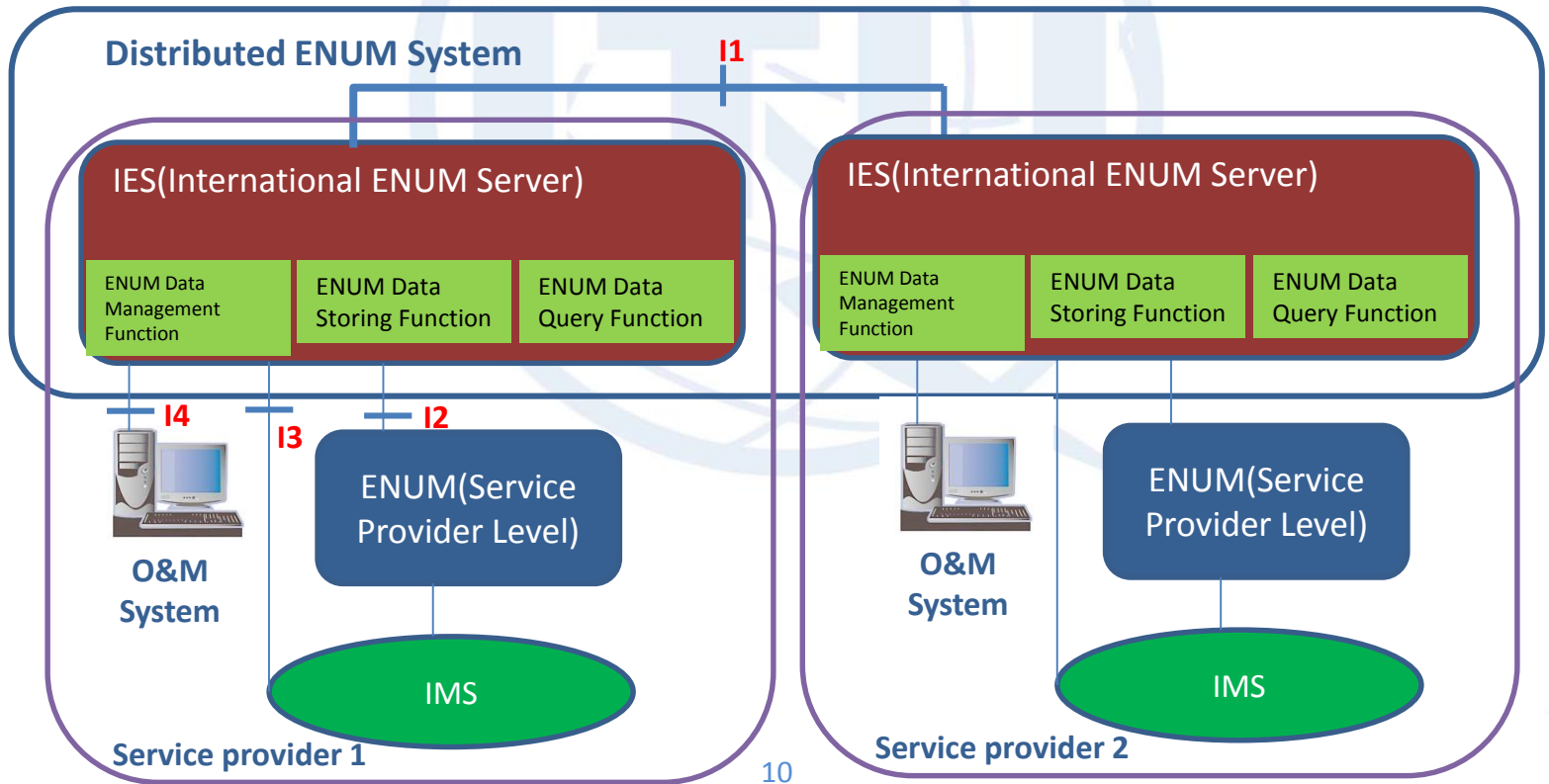
- ✓ To solve the issues of ENUM hierarchical model and speed up IMS interconnection deployment
- ✓ Introduce an International ENUM Server (IES), which will be deployed by operators, to establish a self-management distributed ENUM model in support of IMS interconnection.
- ✓ To specify an ENUM/DNS query-unrelated protocol in support of the self-management of the distributed ENUM architecture



Proposed distributed ENUM model for IMS

Functions contained in IES

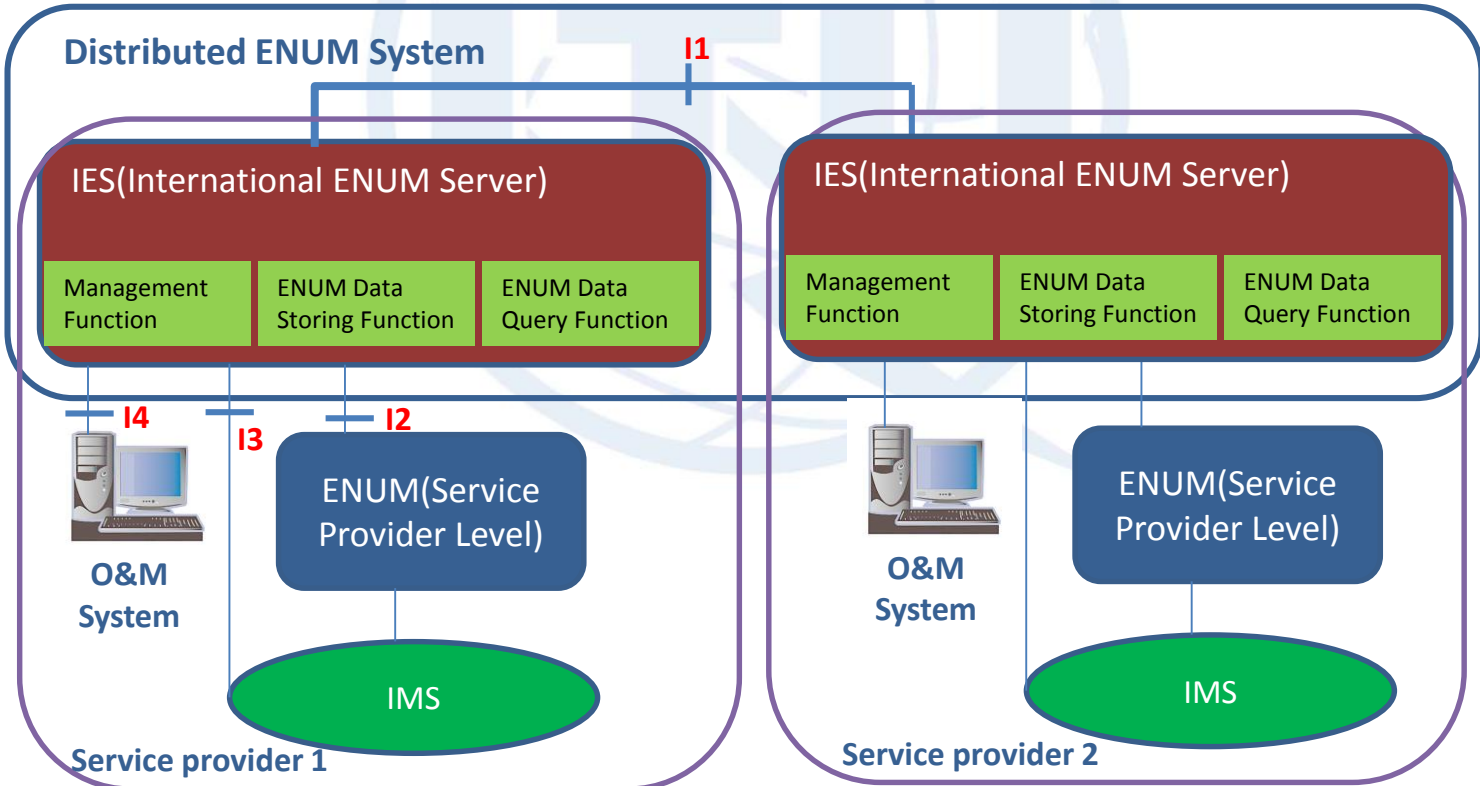
- ✓ ENUM Data Management Function(EDMF): performs basic ENUM data management and maintenance functions
- ✓ ENUM Data Storing Function(EDSF): a database which stores the ENUM data profile for IMS interconnection
- ✓ ENUM Data Query Function(EDQF) : is responsible for responses to queries for ENUM translation



Proposed distributed ENUM model for IMS

□ List of interfaces

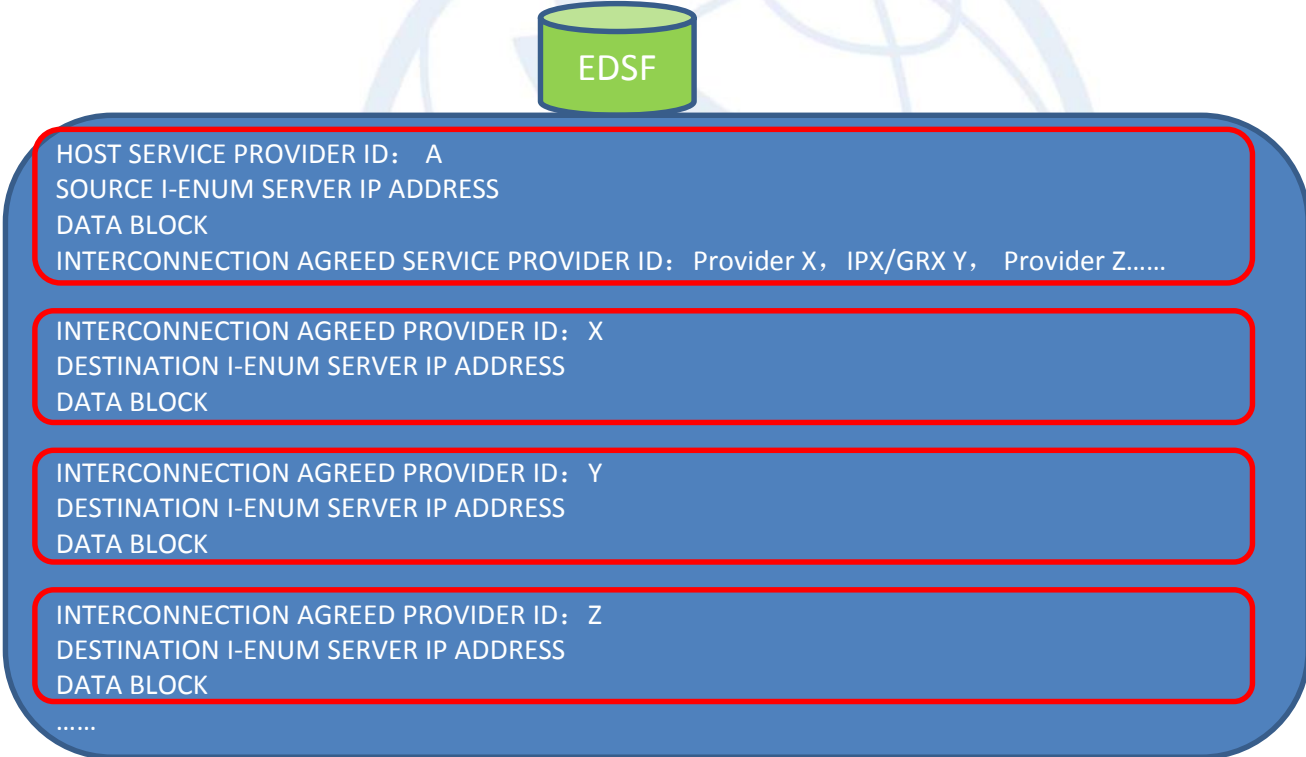
- ✓ I1: delivers ENUM data profile and ENUM data profile management information.
- ✓ I2: transports the query and response for ENUM translation in recursive mode.
- ✓ I3: transports the query and response for ENUM translation in iterative mode.
- ✓ I4: transports the requests and response for ENUM data profile management.



Proposed distributed ENUM model for IMS

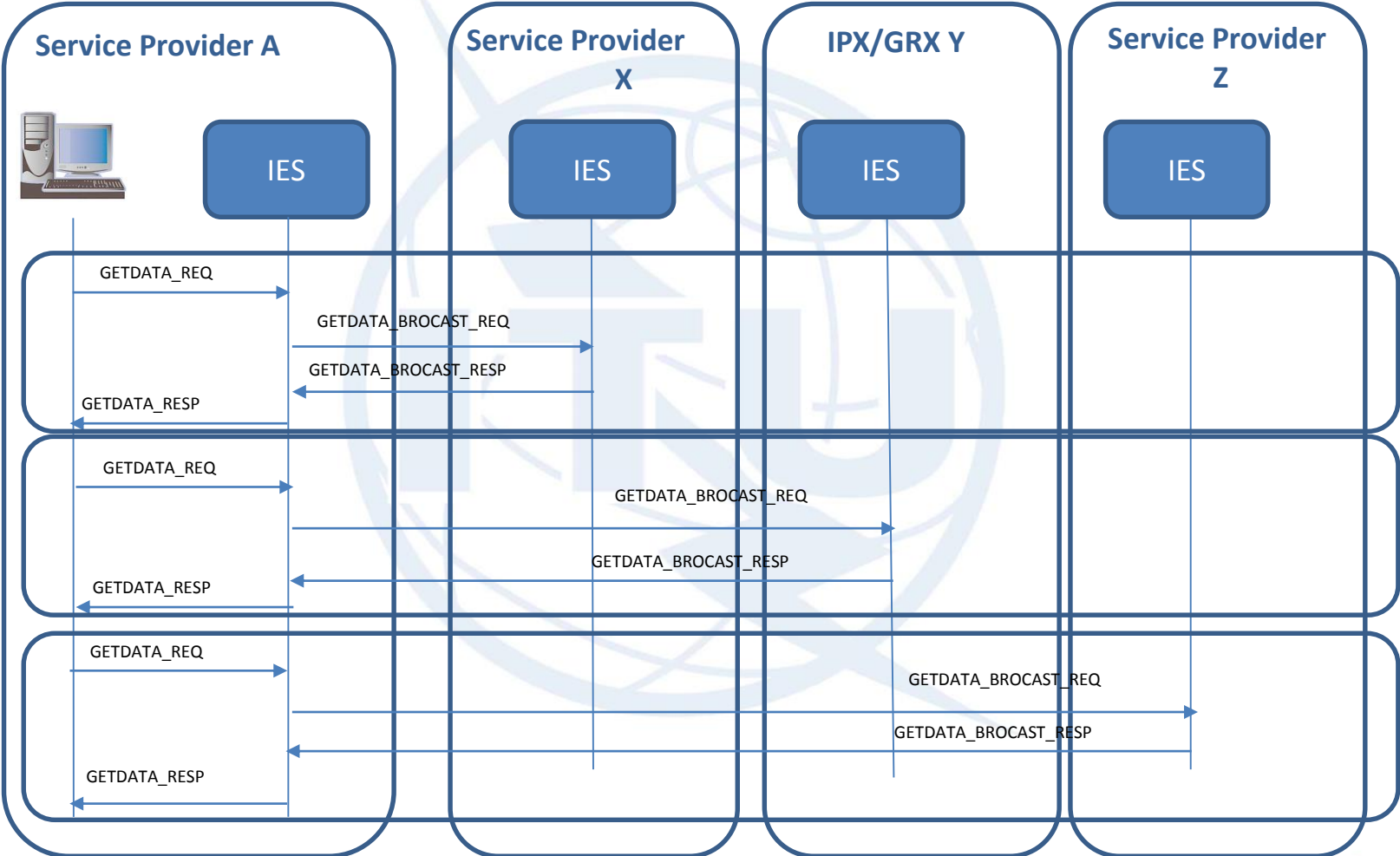
Example of ENUM Data profile stored in EDSF for Service Provider A

- ✓ ENUM Data profile for the Host Service Provider A
- ✓ ENUM Data profile for other Service Providers having interconnection agreements with SP A



Proposed distributed ENUM model for IMS

Example of self-management signalling procedures- The newly involved SP A gets ENUM data profile from other SPs

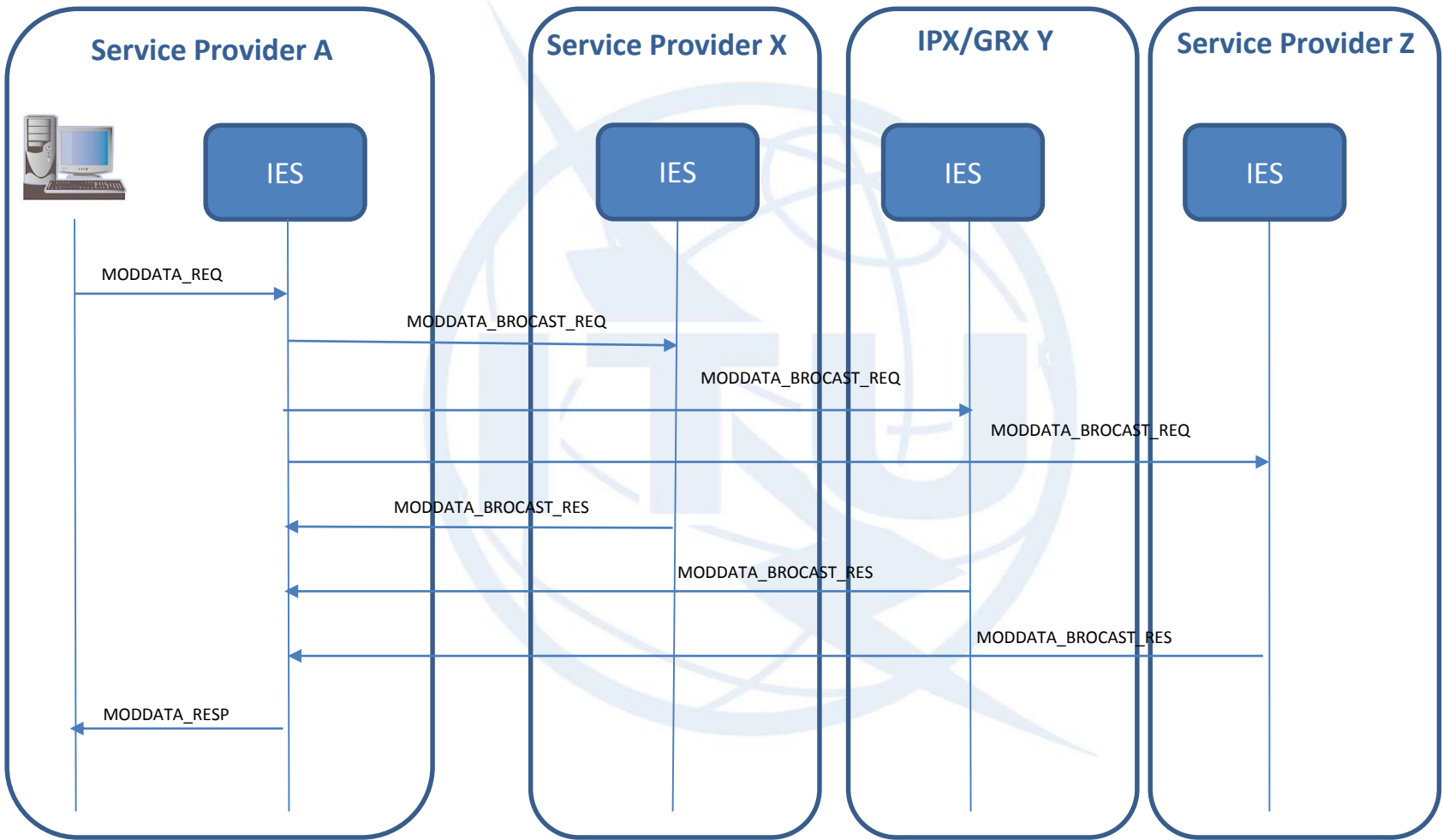


Note: I-ENUM server of Service Provider A is newly deployed and it has interconnection agreements with Service Provider X, IPX/GRX Y and Service Provider Z



Proposed distributed ENUM model for IMS

Example of self-management signalling procedures- SP A modifies ENUM data profile

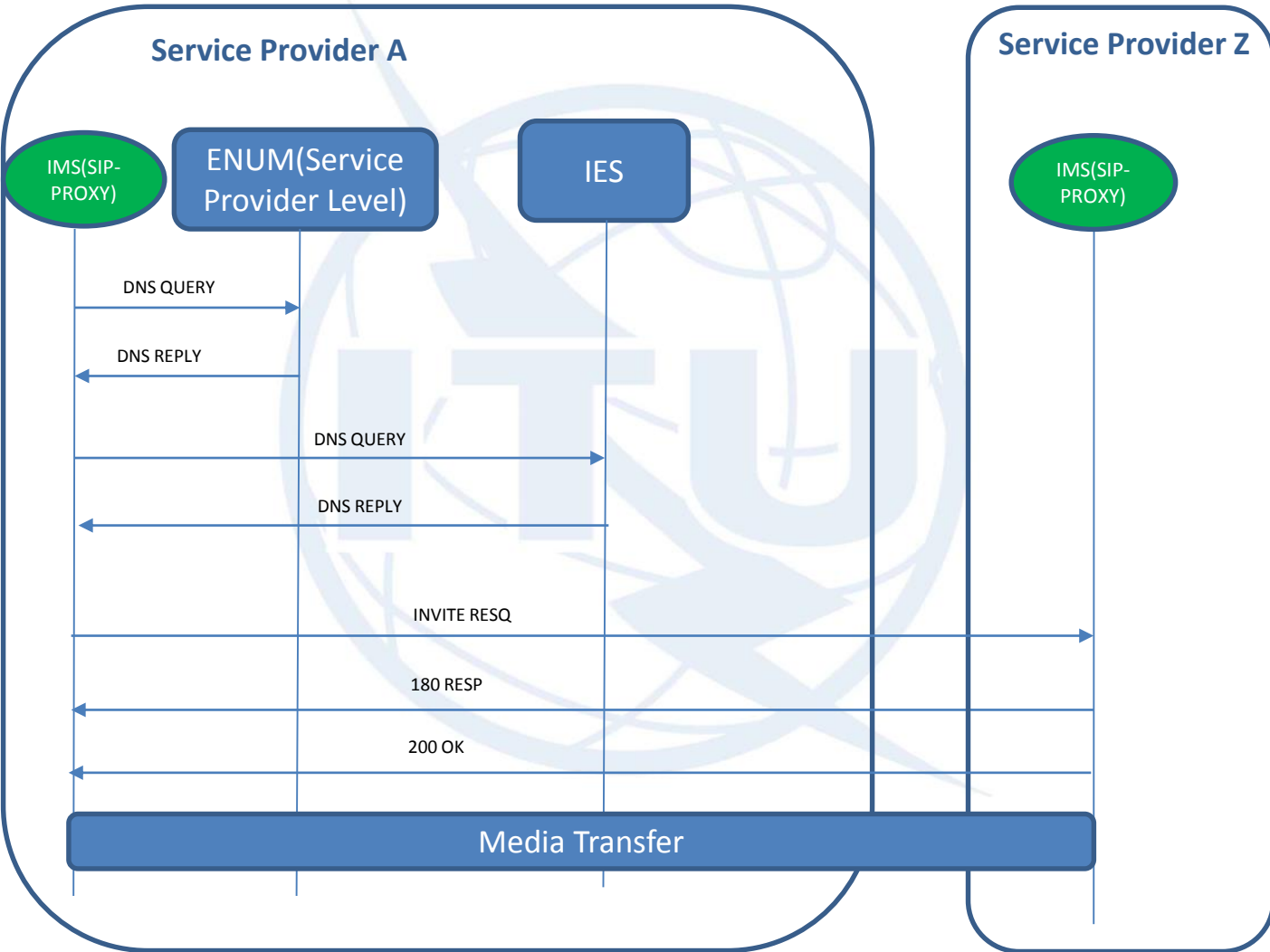


Note: I-ENUM server of Service Provider A is newly deployed and it has interconnection agreements with Service Provider X, IPX/GRX Y and Service Provider Z



Proposed distributed ENUM model for IMS

Example of ENUM query procedures- iterative mode

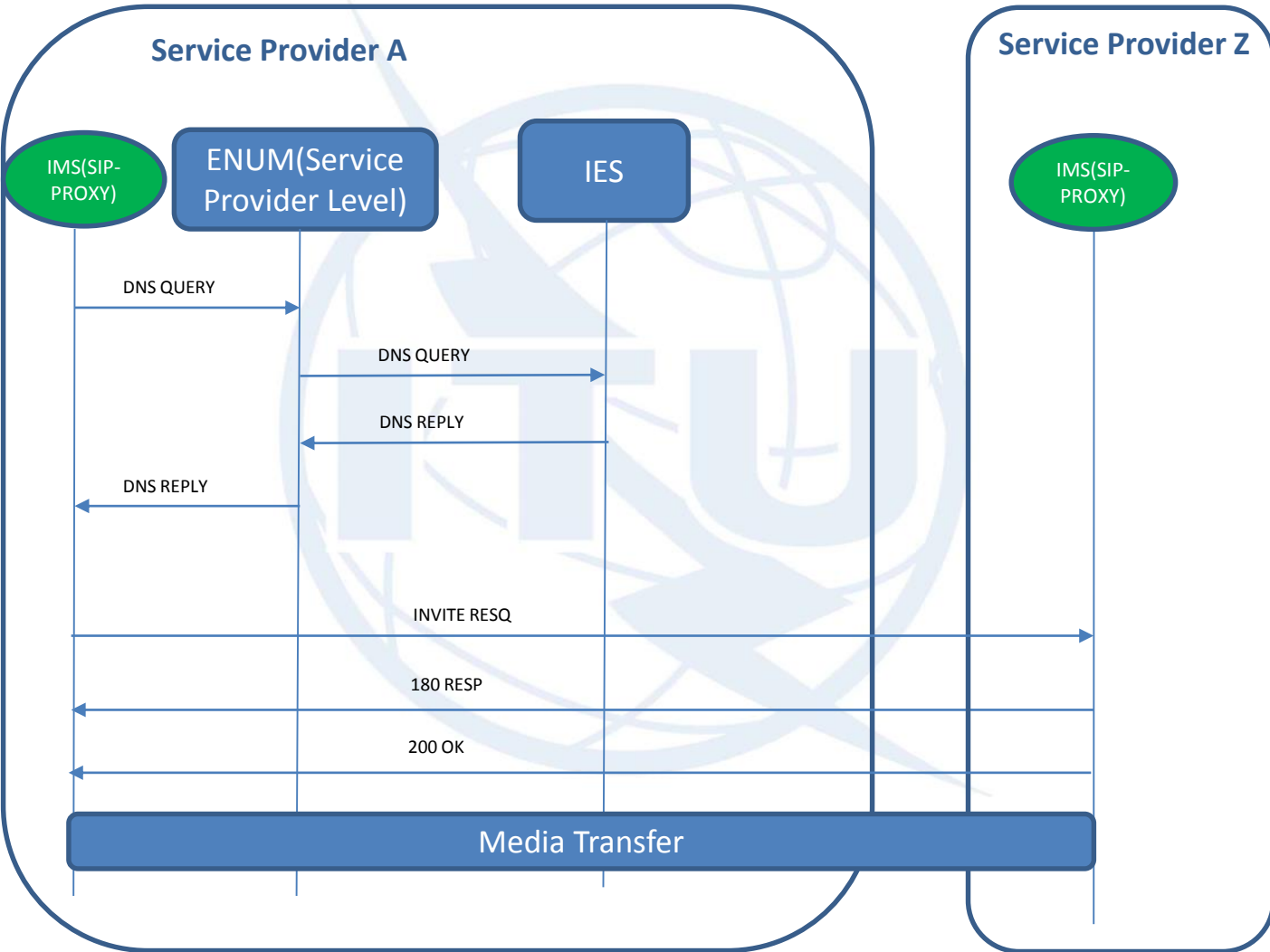


Note: Service Provider A has interconnection agreement with Service Provider Z



Proposed distributed ENUM model for IMS

Example of ENUM query procedures- recursive mode



Note: Service Provider A has interconnection agreement with Service Provider Z



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Further work in ITU-T

❑ Work item Q.DEN_IMS (Signalling architecture of distributed ENUM networking for IMS)

- ✓ Q.DEN_IMS was initiated in SG11 Q1 November 2017 meeting, the latest output can be found in [SG11-TD382/GEN](#)
- ✓ Currently the draft output provides a skeleton of the distributed ENUM model for IMS interconnection

❑ Future work for Q.DEN_IMS

- ✓ To complete the signaling architecture of distributed ENUM model, including the functional requirements and interfaces signaling requirements
- ✓ To specify the self-management signalling procedures for distributed ENUM model

❑ Future work for the ENUM/DNS query-unrelated protocol using in the distributed ENUM model

- ✓ To specify the messages and parameters of ENUM/DNS query-unrelated protocol in support of the self-management of the distributed ENUM model



Thank you for your attention!

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