

ITU-T Kaleidoscope 2010
**Beyond the Internet? - Innovations for future
networks and services**

**Introducing Multi-ID and Multi-Locator
into Network Architecture**

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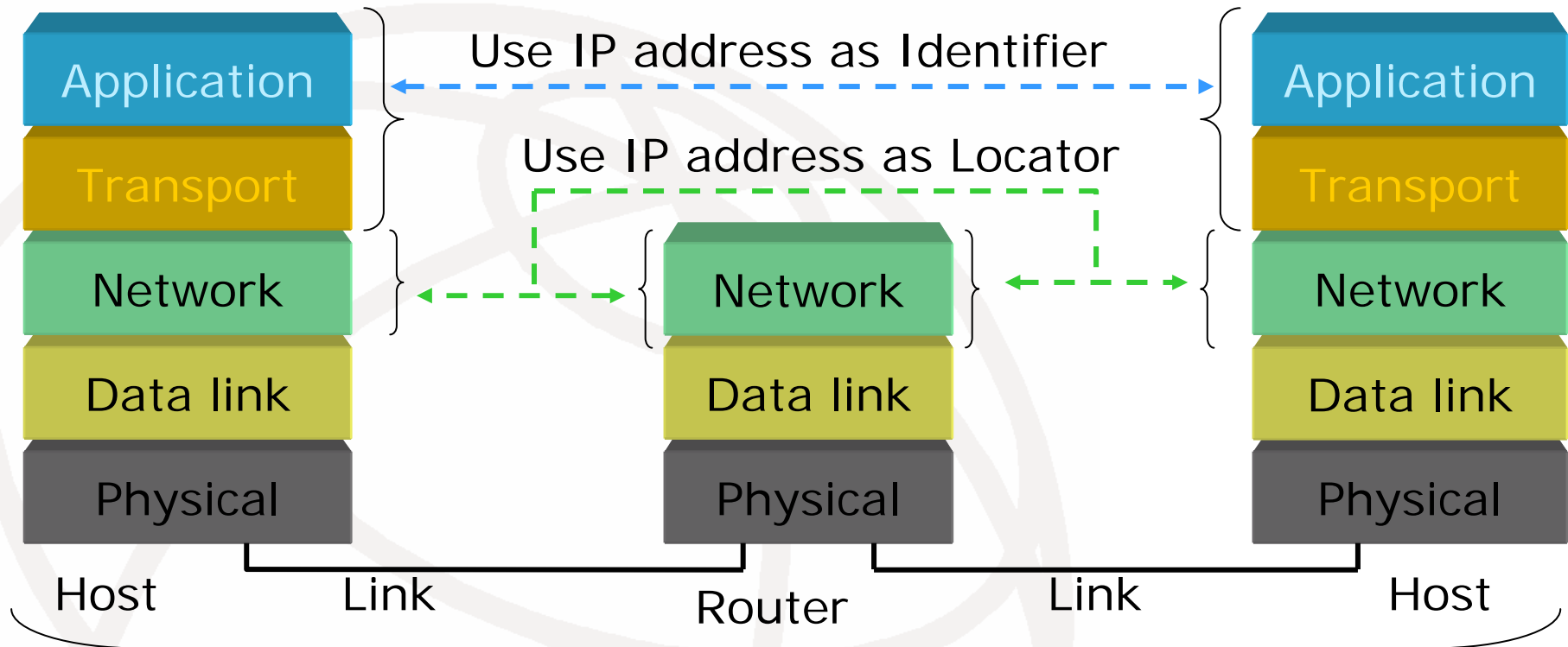


Pune, India, 13 – 15 December 2010

Presentation Layout

- Background and motivation
- Multi-ID and multi-locator (MIML)
- Service scenarios with MIML
- Items for research & standardization
- Conclusion

Background and Motivation

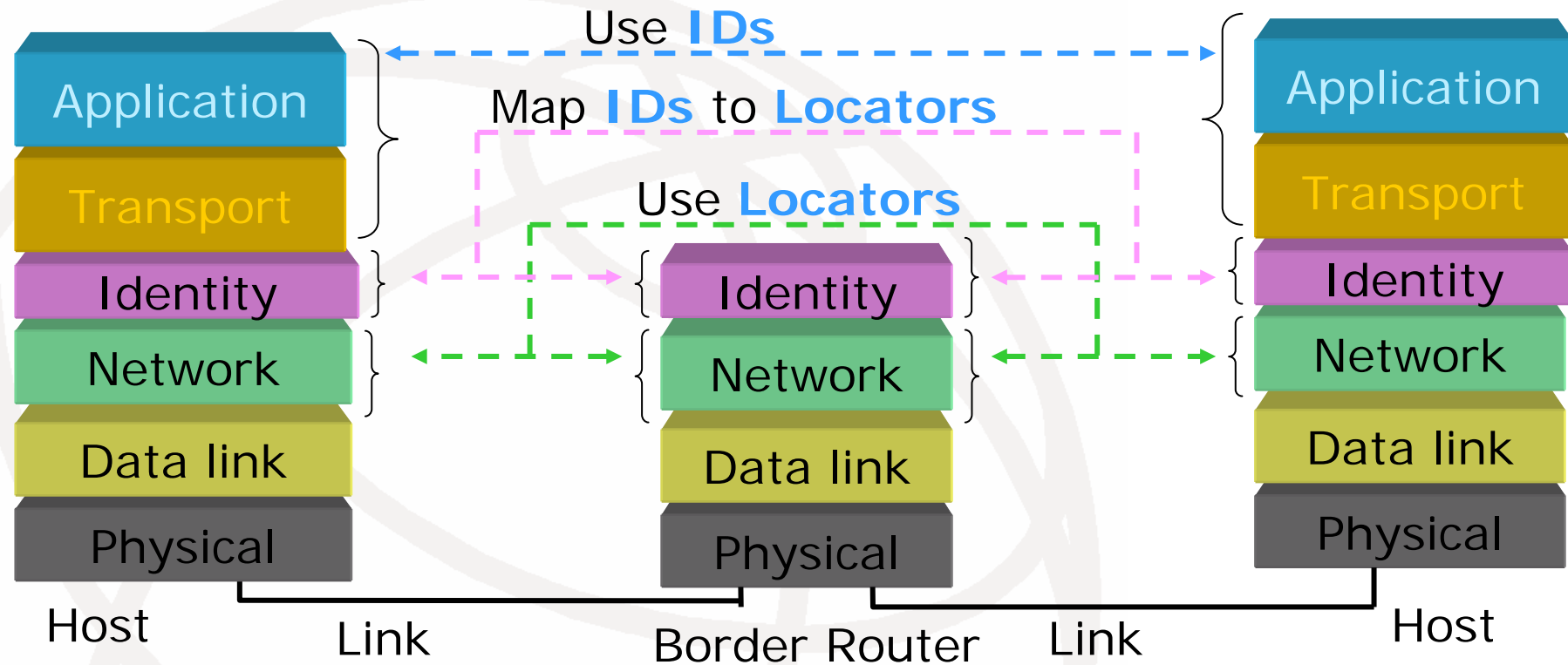


Current Internet: IP address used as both ID and Locator

Future networks demand ID and Locator split

- For mobility and multihoming: change locators without changing identifiers
- Scalable routing, traffic engineering: use different scoped locators, dynamically map them

ID/Locator Split Architecture Overview



- Different name spaces for IDs and locators
- ID↔locator mapping by the Identity layer

Related Work

- **AKARI Project:** (NICT's initiation to clean-slate design of New Generation Network)
 - ◆ ID/locator split architecture
 - ◆ presented at Kaleidoscopes 2009, 2008

- **ITU-T Study Group 13**
 - Y.2015 (2009)
 - Y.FAid-loc-split (in Q.5/13), Y.ipv6split (in Q.7/13)

- **IRTF/IETF**
 - ◆ **Routing Research Group (RRG)**
 - developing a technical framework for ID/locator split-based routing architectures

 - ◆ **Host Identity Protocol (HIP) Research/Working Groups**
 - developed a number of RFCs (5201-5205) on ID/locator split-based host protocols for secure mobility and multihoming

 - ◆ **SHIM6 Working Group**
 - developing protocols to support site multihoming in IPv6

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Multi-ID, Multi-Locator Concept

Layers

Related Work

Future Network

Application

Host ID ●

Host IDs ● ● ...

Transport

Host ID ●

Host IDs ● ● ...

Network

IP Addr ■

Locators ■ ■ ...

Link

MAC addresses

Physical



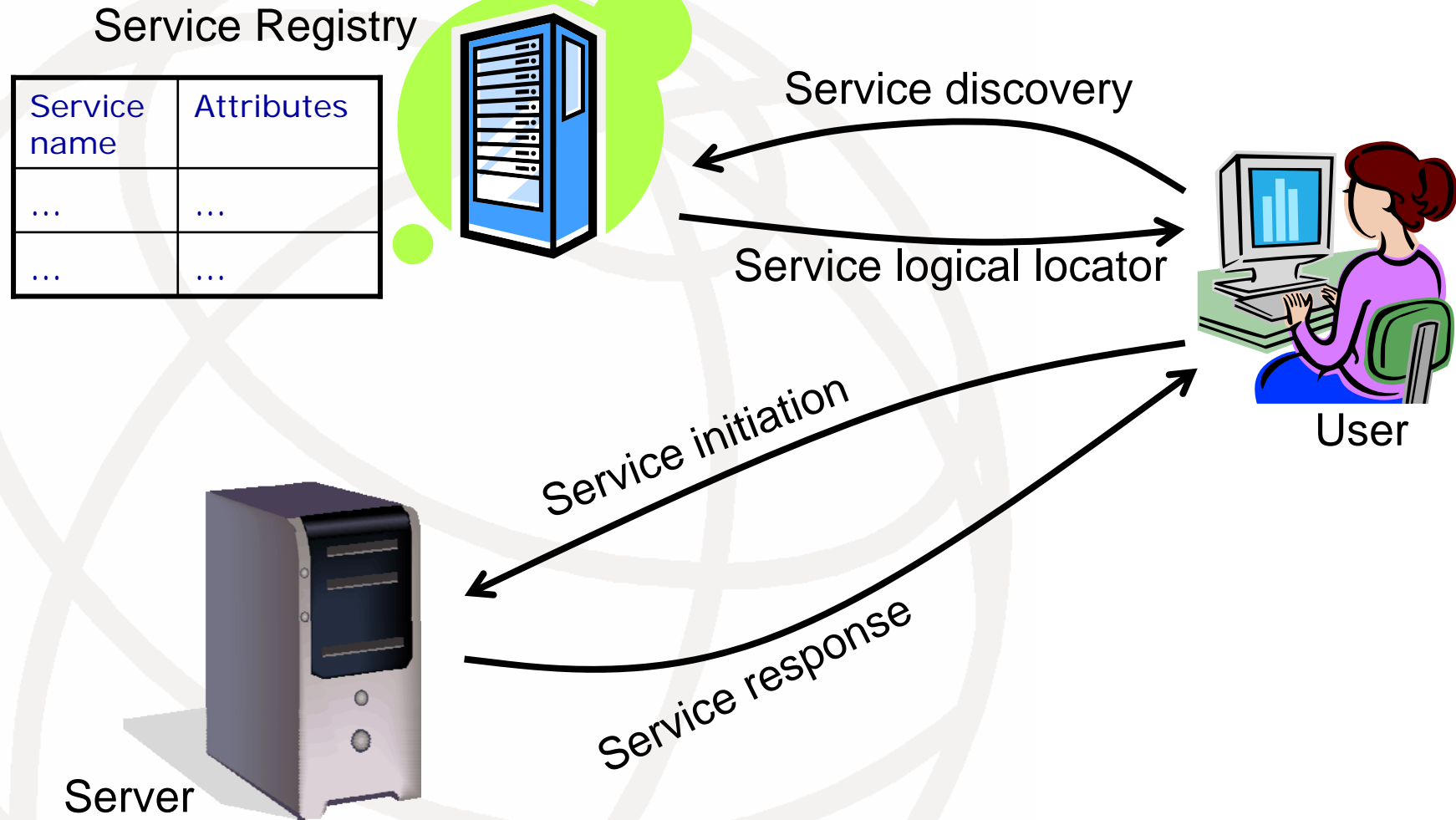
Why Multiple IDs?

- a) network-protocol independent multicast, group-cast, or geo-cast
- b) service differentiation
- c) optimal network/path selection
- d) private and public communication
- e) dynamic relationship between users, services, and hosts

Why Multiple Locators?

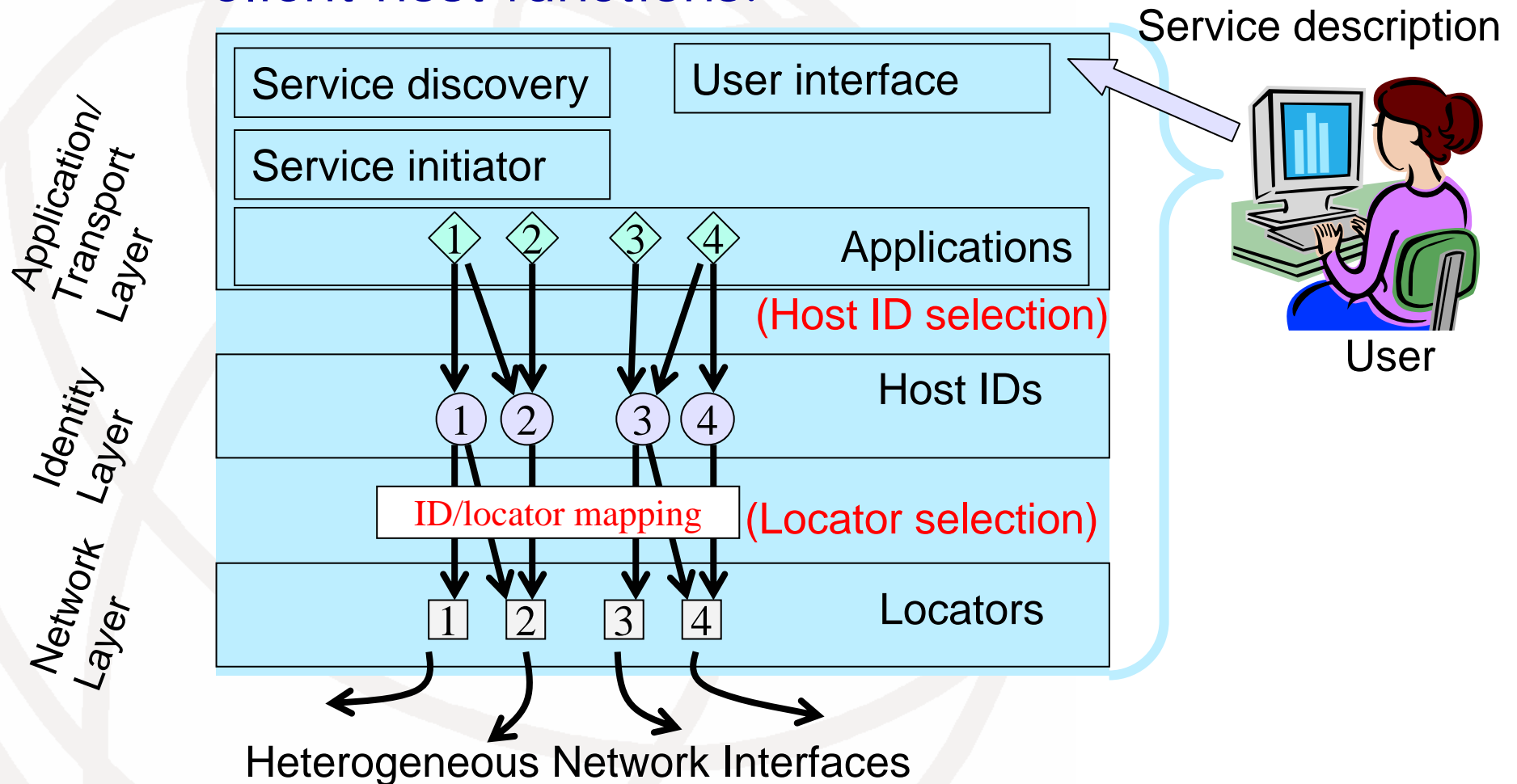
- a) mobility
- b) multihoming
- c) routing
- d) DTN
- e) heterogeneous network protocols
- f) privacy

Services Scenario by Utilizing MIML (1/3)



Services by Utilizing MIML (2/3)

Client host functions:

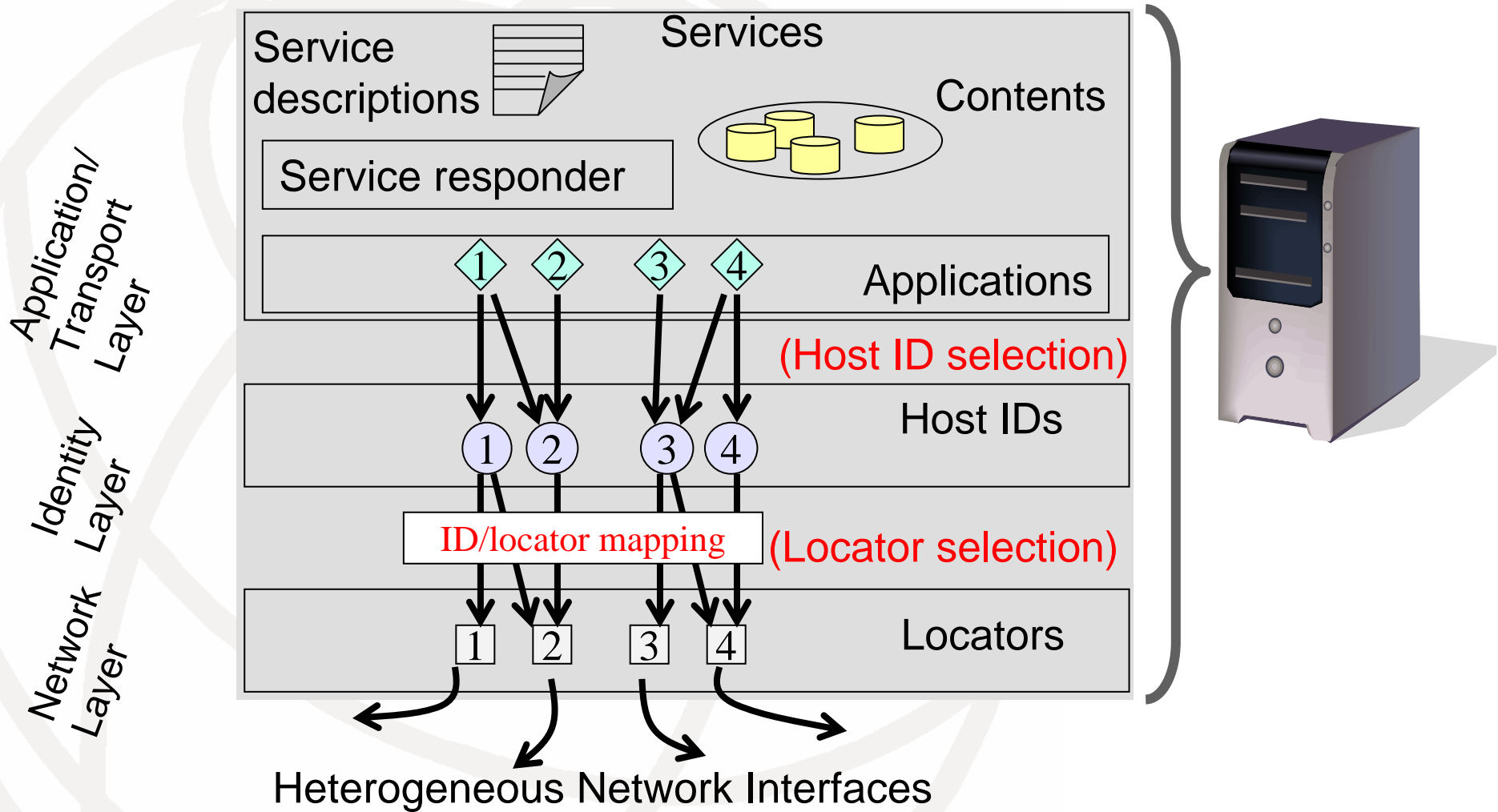


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Services by Utilizing MIML (3/3)

Server host functions:



Research and Standardization Items (1/4)

1. Service Representation

- ➔ unique representation of service name + quality

```
application_name | service_content_name | quality { parameters=values }
```

e.g., video: | movie_titanic-1997 | bw=10Mbps, delay=10ms

- ➔ service logical locator

```
application_name | host_name | service_content_name | list { parameters=value }
```

e.g., video: | **server1#providerA.com** | movie_titanic-1997 | bw=10Mbps, delay=10ms

Research and Standardization Items (2/4)

2. Hostname ↔ Host ID, Locator Resolution System

- ➔ to find host ID and locator from hostname

3. Host ID Configuration

- ➔ to uniquely represent hosts and QoS

*

organization_prefix		scope		service_code		version		host_specific_suffix
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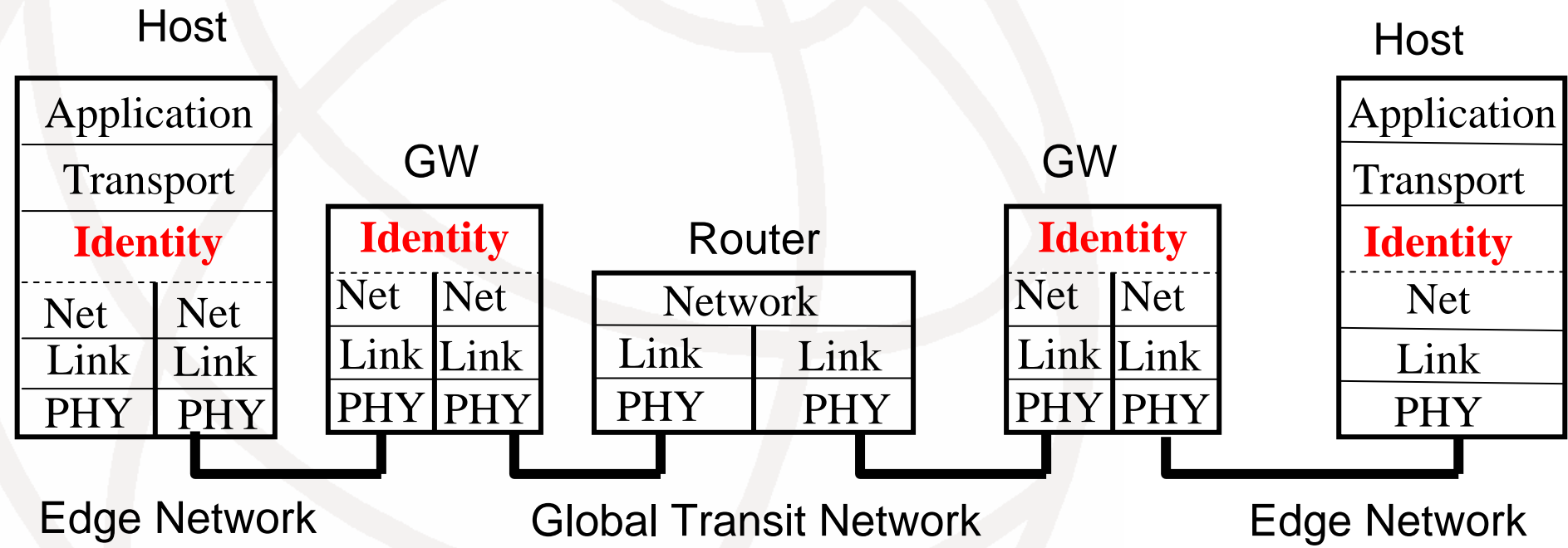
e.g., 1FFF:0001 :FF 01 : 0001 :3EA3:82D2:B948:B35C

* [8] V.P. Kafle et al., "An ID/locator split architecture of future networks," ITU-T Kaleidoscope 2009.

Research and Standardization Items (3/4)

4. Host ID to Locator Mapping Functions

- Identity Layer: algorithm for appropriate locators selection based on service_code in host IDs



Research and Standardization Items (4/4)

5. Service Discovery

- ➔ Service registry: to keep records of available services

6. Other Issues

- ➔ Host ID assignment mechanism/body: to fairly assign globally unique ID prefixes
- ➔ Collaboration between SDOs: to develop common architectures and protocols

Summary and Future Work

- Overviewed ID/locator split-based architecture of future networks
 - distinct namespaces for IDs and locators
 - mapping functions in the Identity Layer
 - helpful for mobility, multihoming and routing scaling
- Introduced multi-ID, multi-locators
 - Multi-ID: to convey application requirements to networks
 - Multi-locators: to optimally utilize heterogeneous networks
- Items for standardization
 - service representation and discovery, host ID configuration, id-to-locator mapping algorithm, etc.
- Future work
 - carry out experiments in large scale to prove the concept
 - bring outcomes to SDOs

Thank you for your attention !

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