Laboratoire LSR
Logiciels Systèmes Réseaux

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Proactive Services

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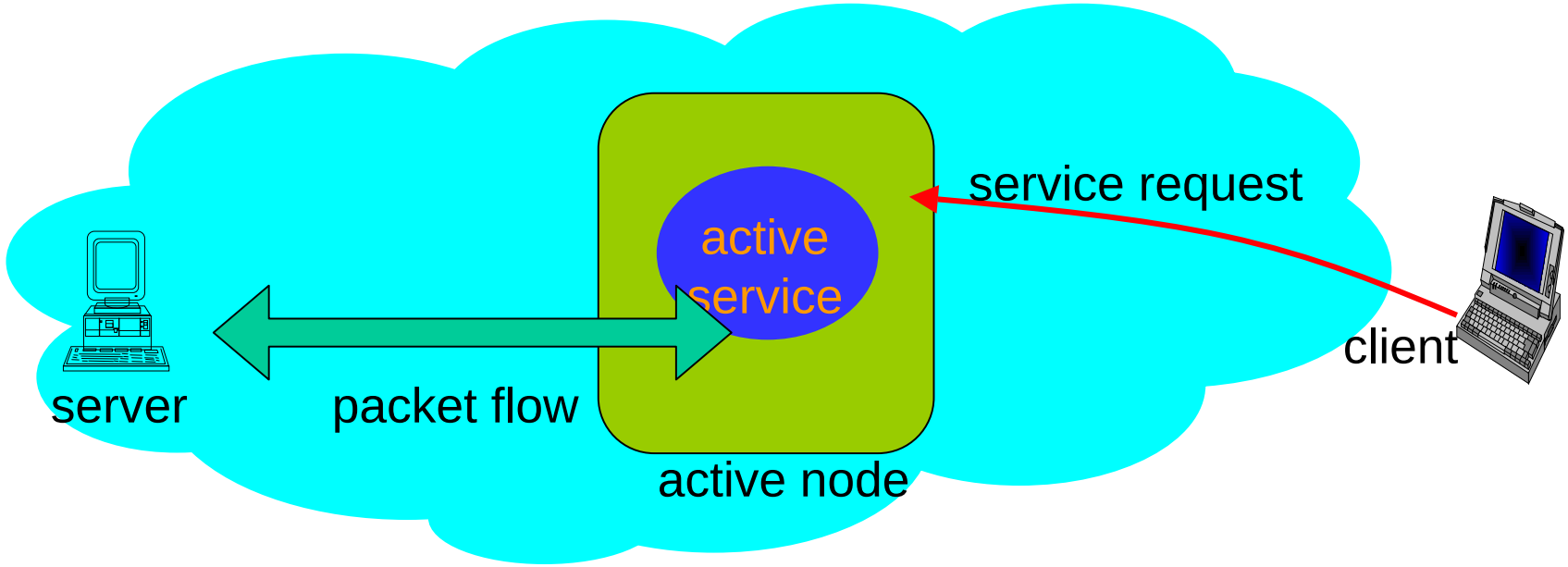
Outline

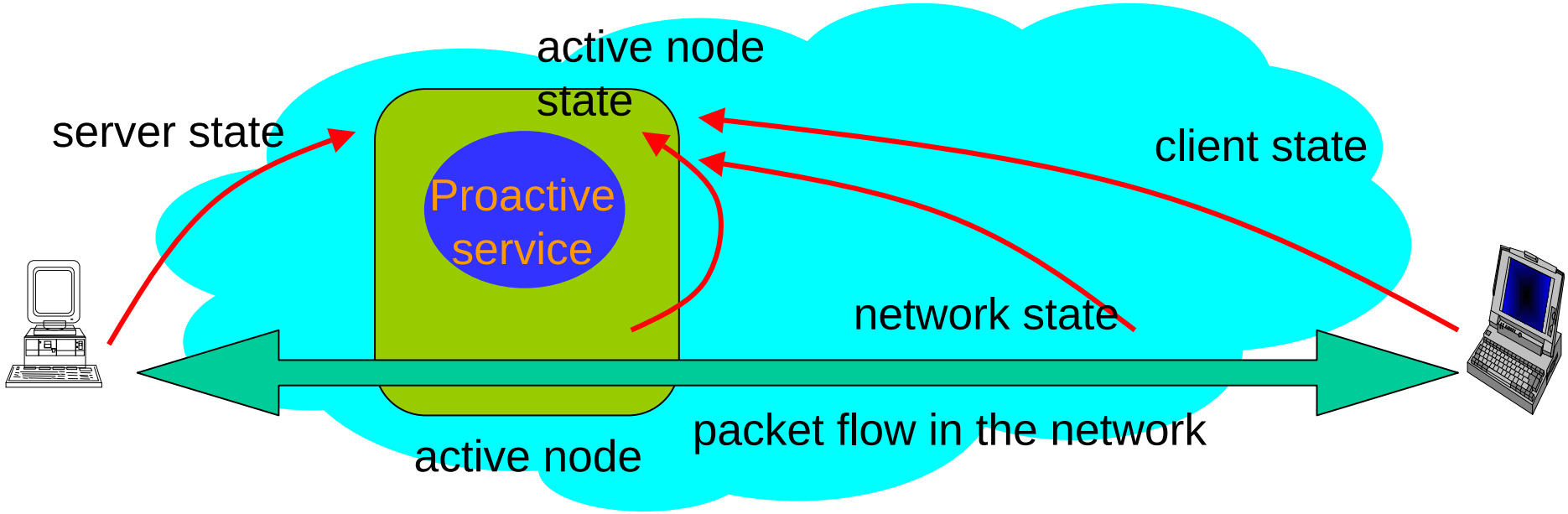
- Proactive Services
- Active Node Architecture
- Applications
- Implementation
- Future Works

Why Proactive Services ?



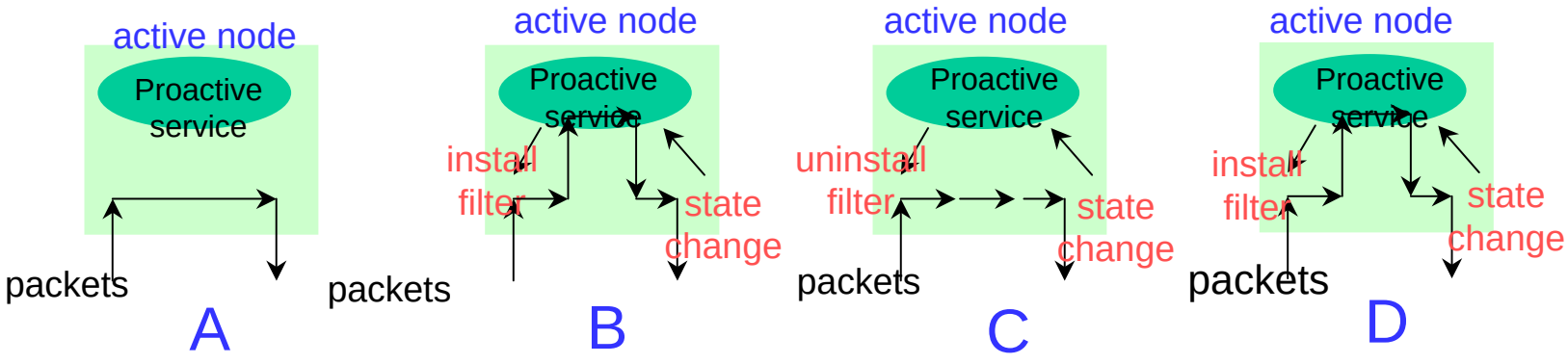
- End-point Applications need active services from networks
- Active services need information about states from end-point application
- Active services need information about states from networks
- User role needs to be reduced to supervision

What is a proactive service?



- Active service able to react to the changes in the environment without the intervention of the user
- Get users out from interaction loop – react faster than humain speed

Proactive Service Behavior



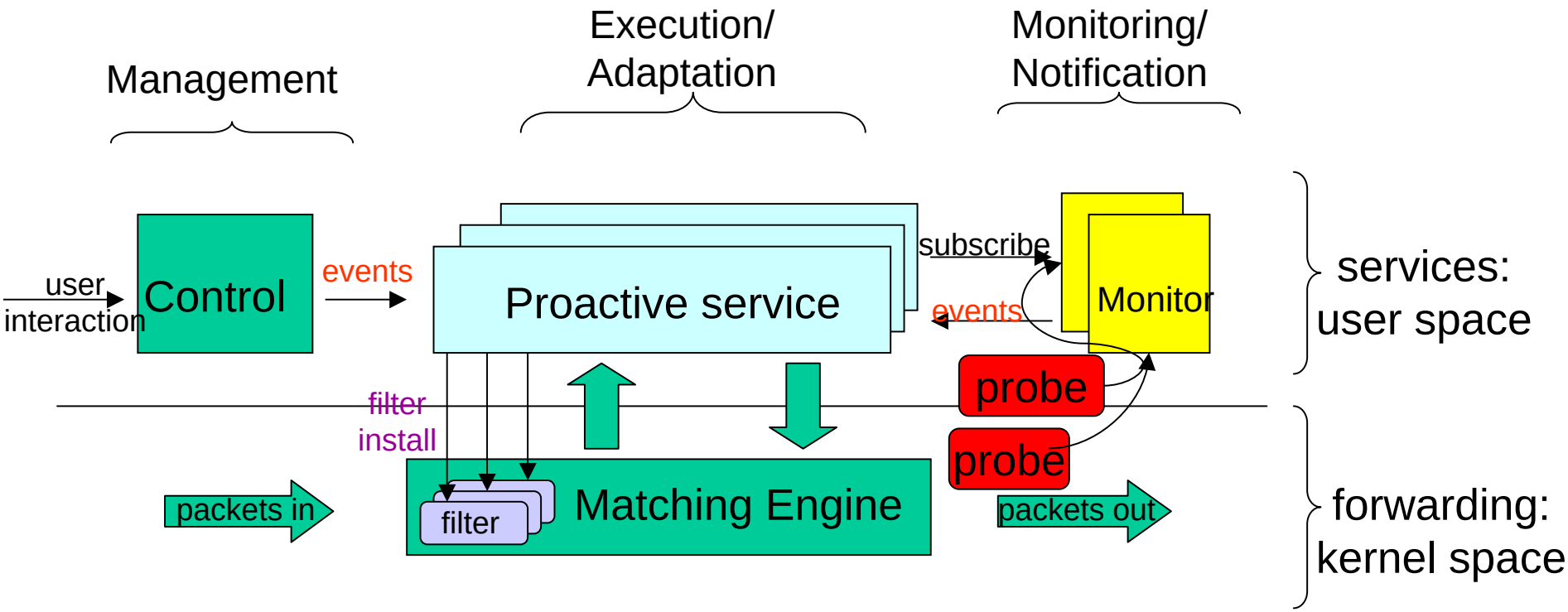
A – when a service is activated, the state of the environment is such that no processing is required. The service sleeps and packets are not passed to the service

B – an event signaling a congestion link is sent to the service. It wakes up and installs an appropriate packet filter. Packets are passed to the service

C- when the state changes again (congestion disappears), another event is sent to the service that uninstalls the filter so that packets are no longer intercepted. The service returns to sleep.

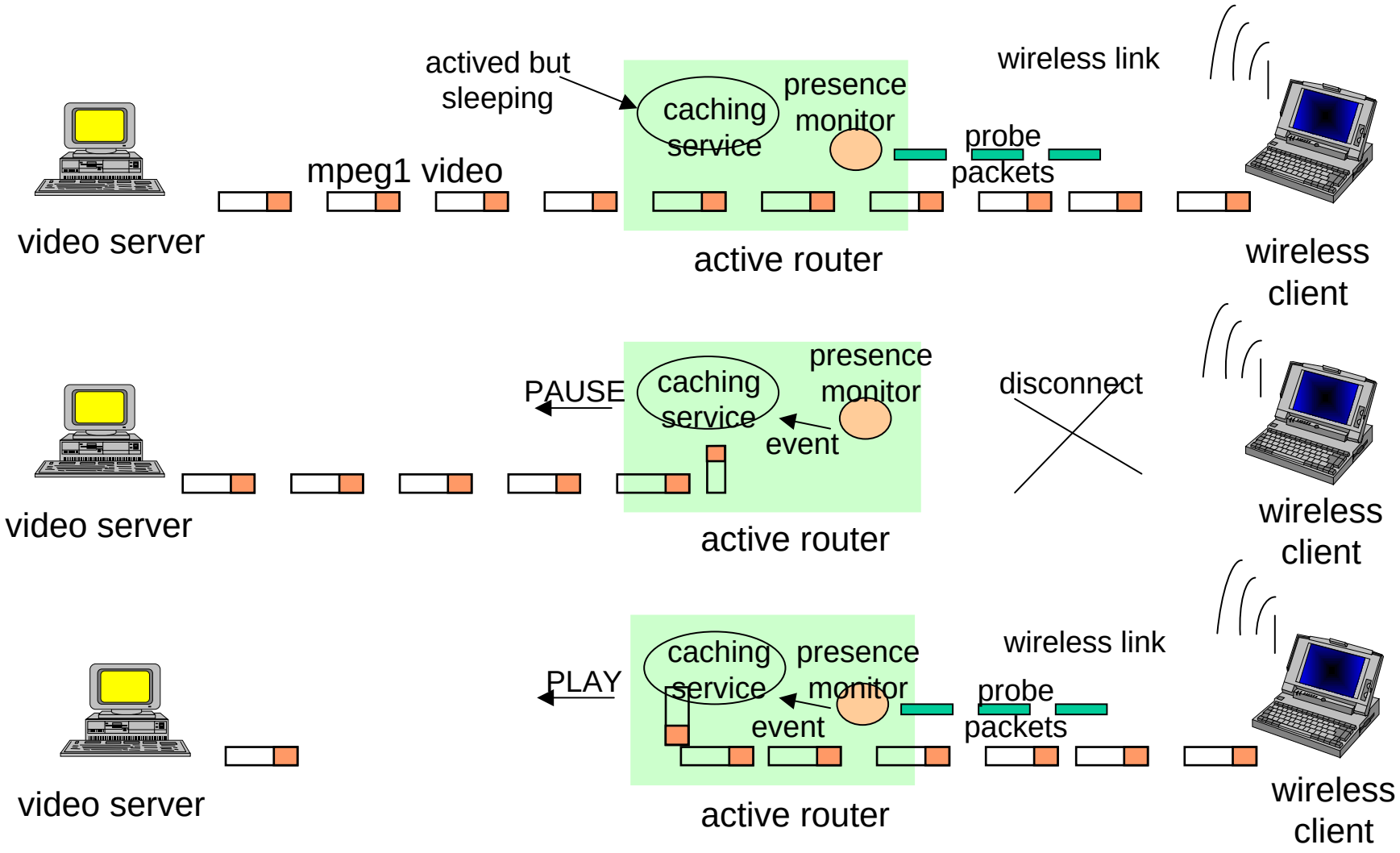
D - the whole process may repeat

Active Node Architecture

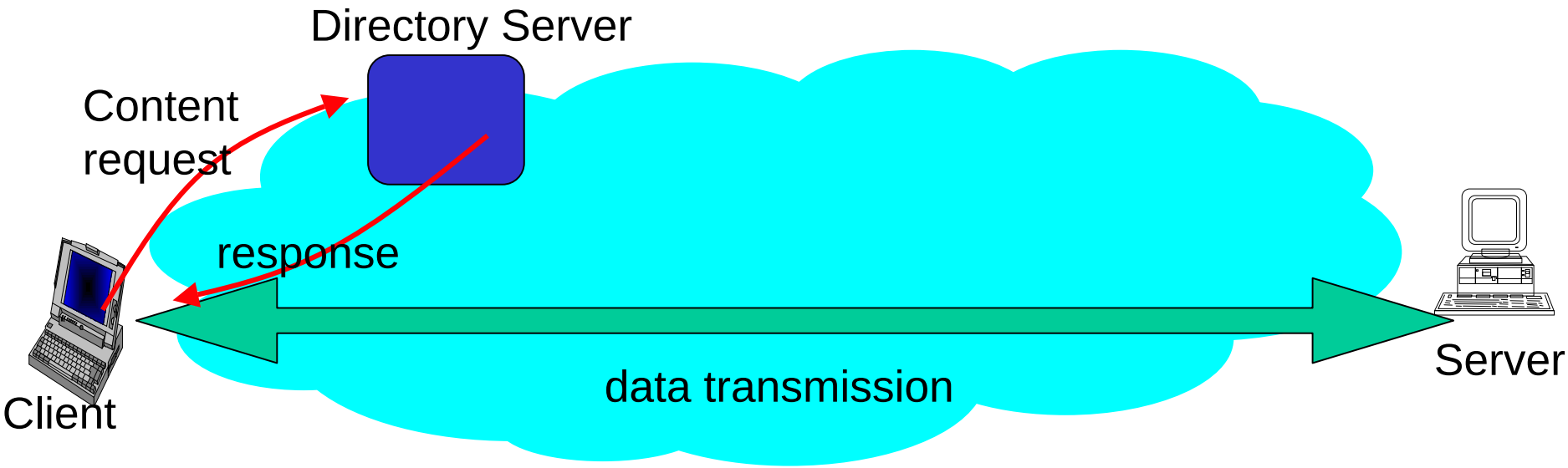


- Association of proactive services with chosen packet flows is done dynamically by the services themselves
- Monitors are able to detect varying conditions in the environment (network, active nodes, services, users)
- An asynchronous notification mechanism allows monitors to notify proactive services about events

Example of Caching Service

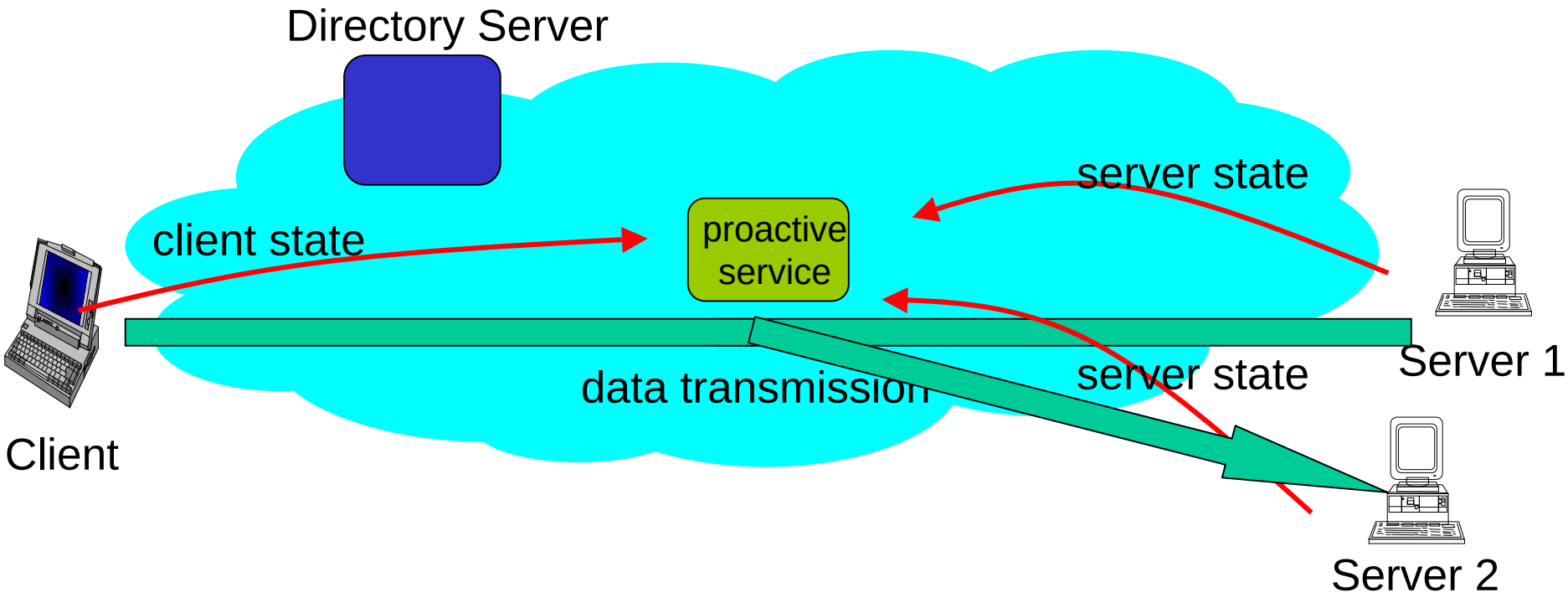


Session Migration Service



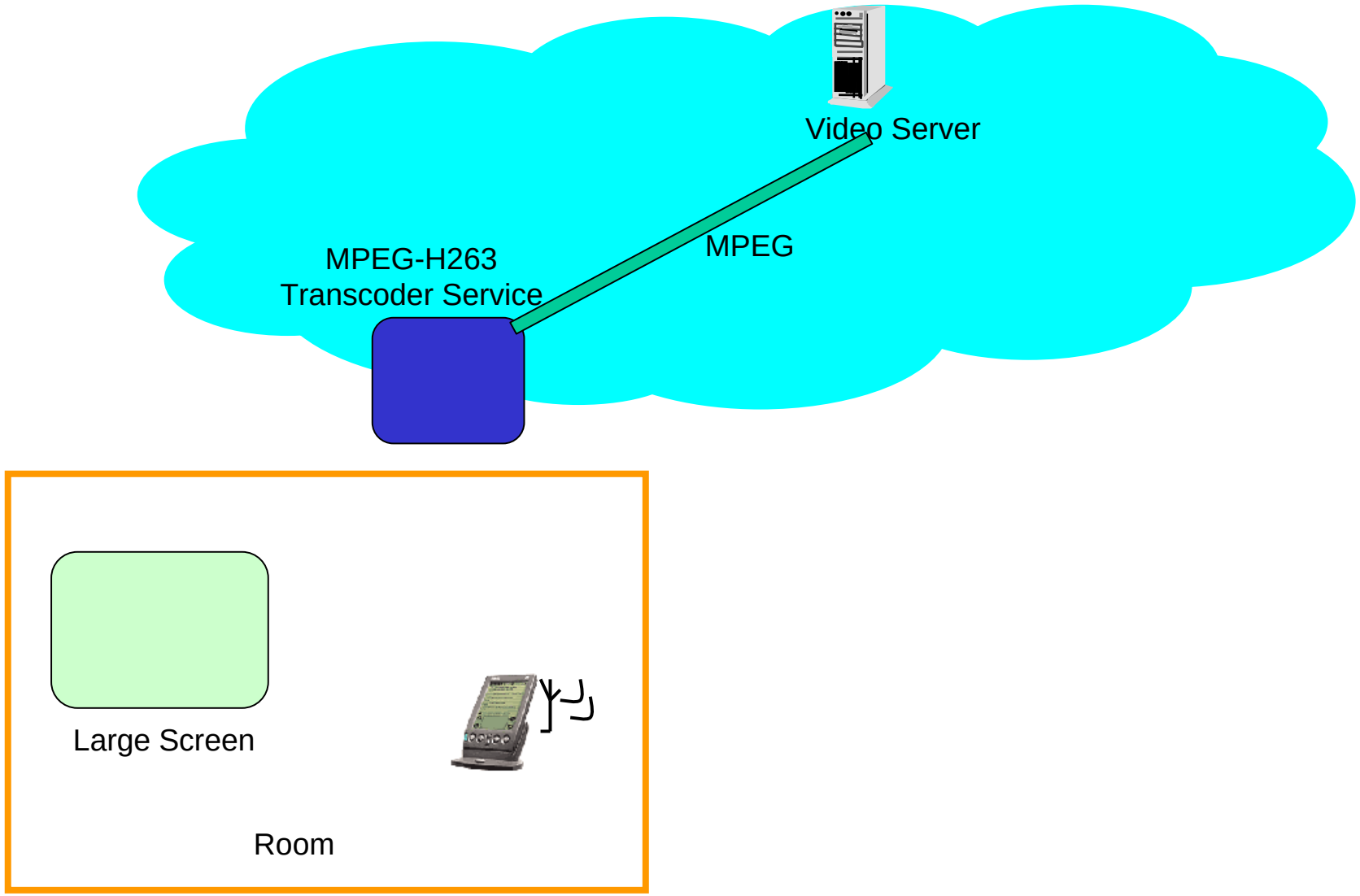
- What happens when the connection between the client and the server is degraded ? Server overloaded ? Server disconnected ? etc…

Session Migration Service



- Proactive service establishes new data session with other servers

Services for Ubiquitous Computing



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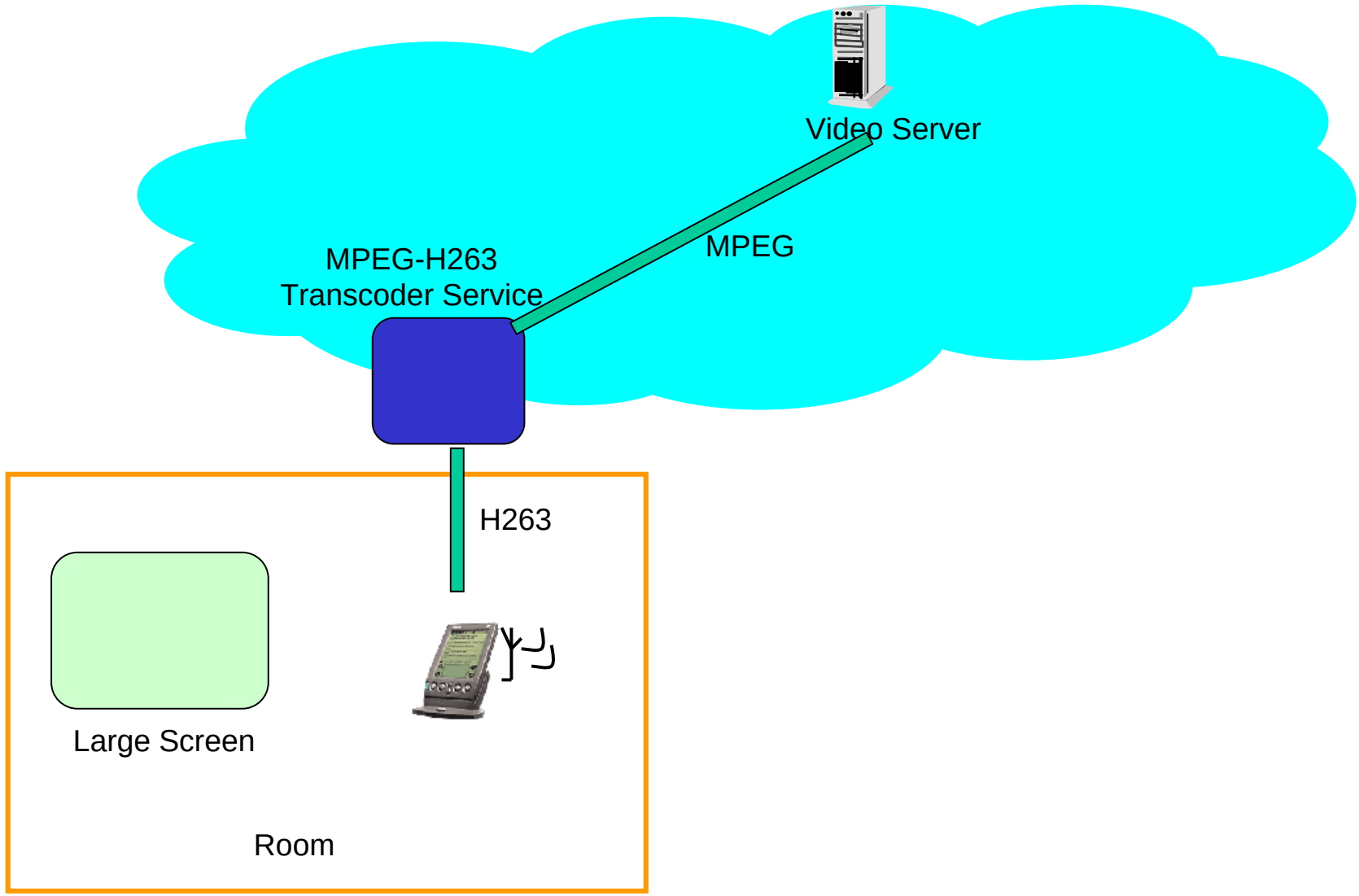

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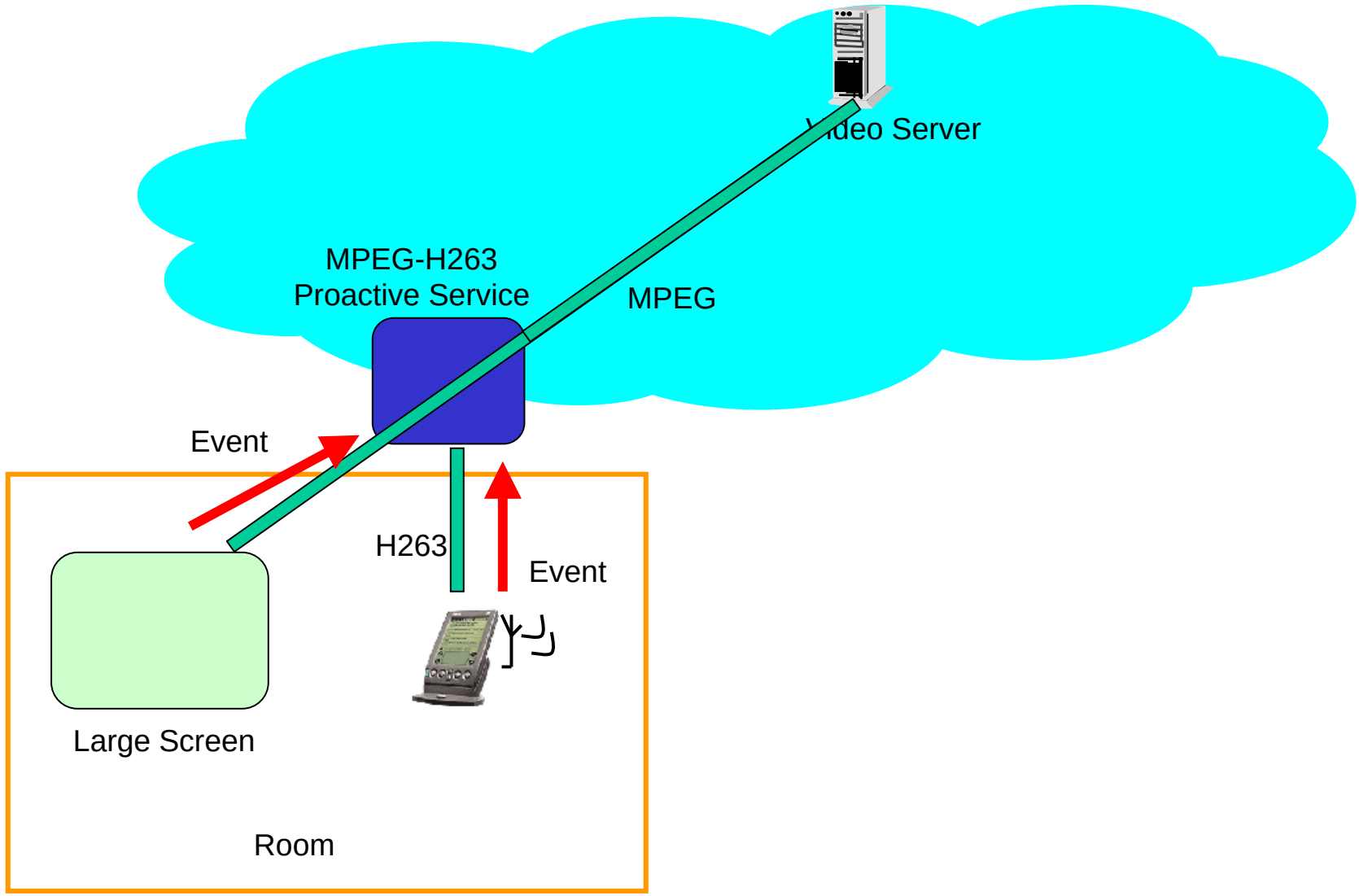

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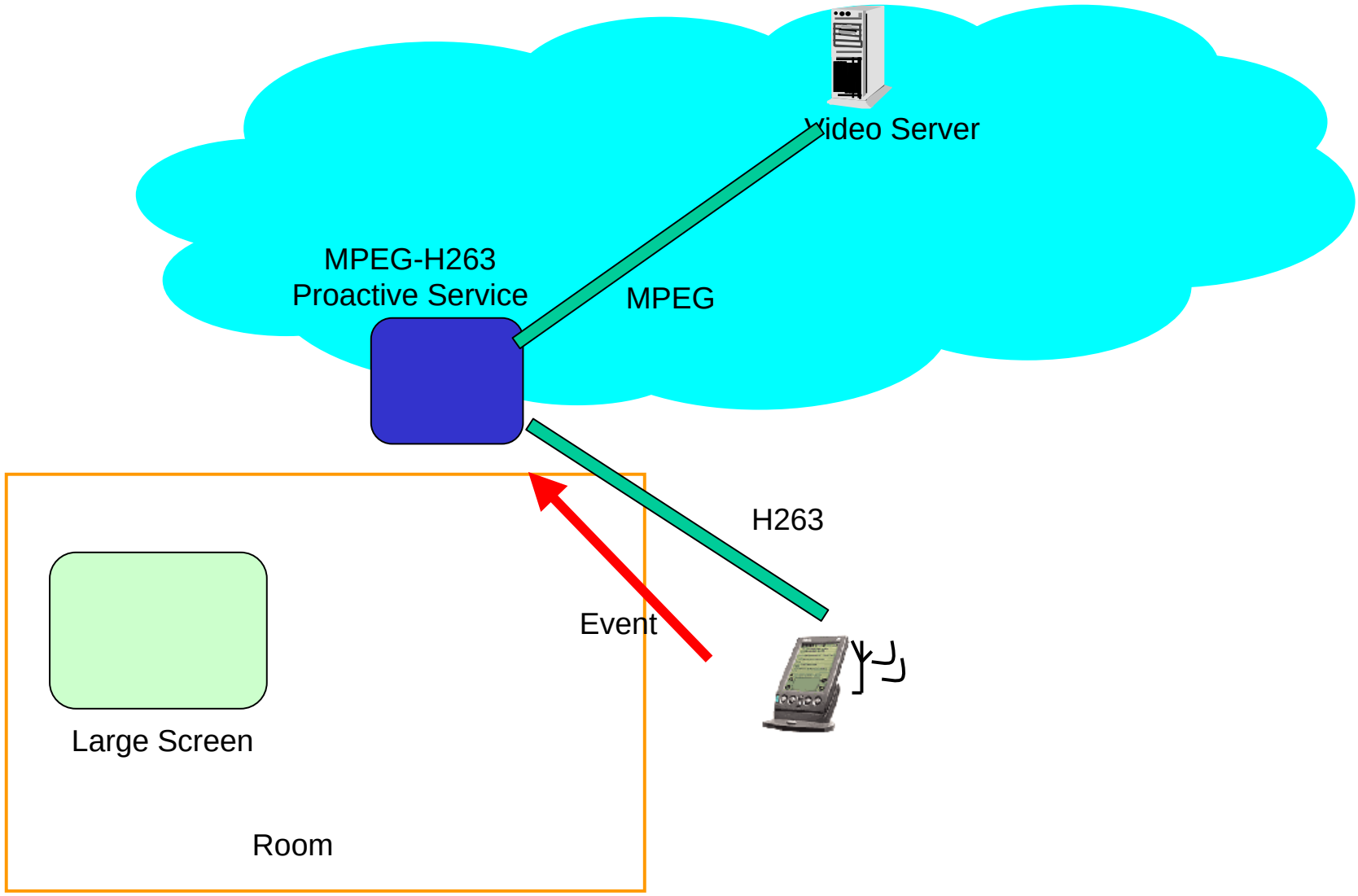
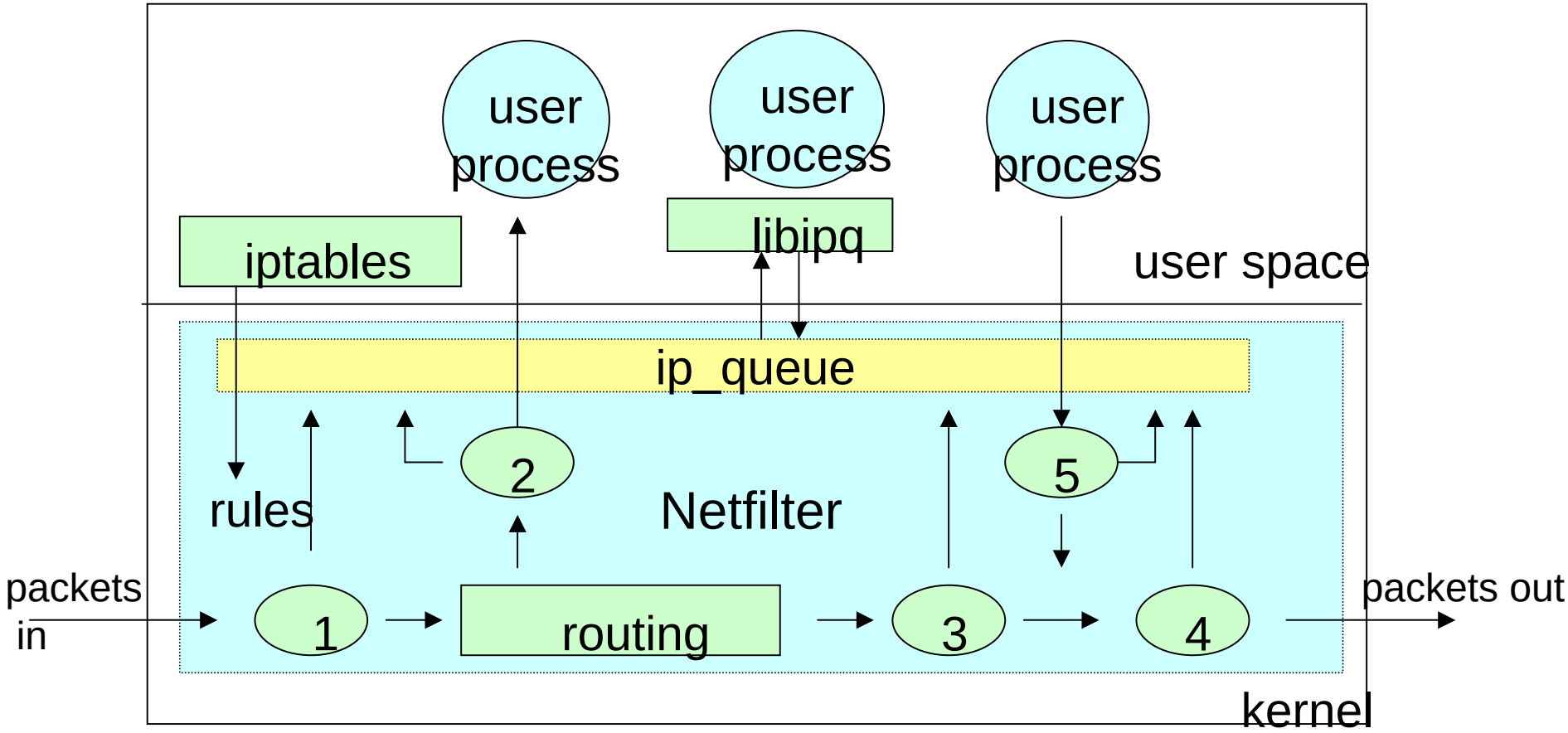


Implementation



Routeur running Linux kernel 2.4

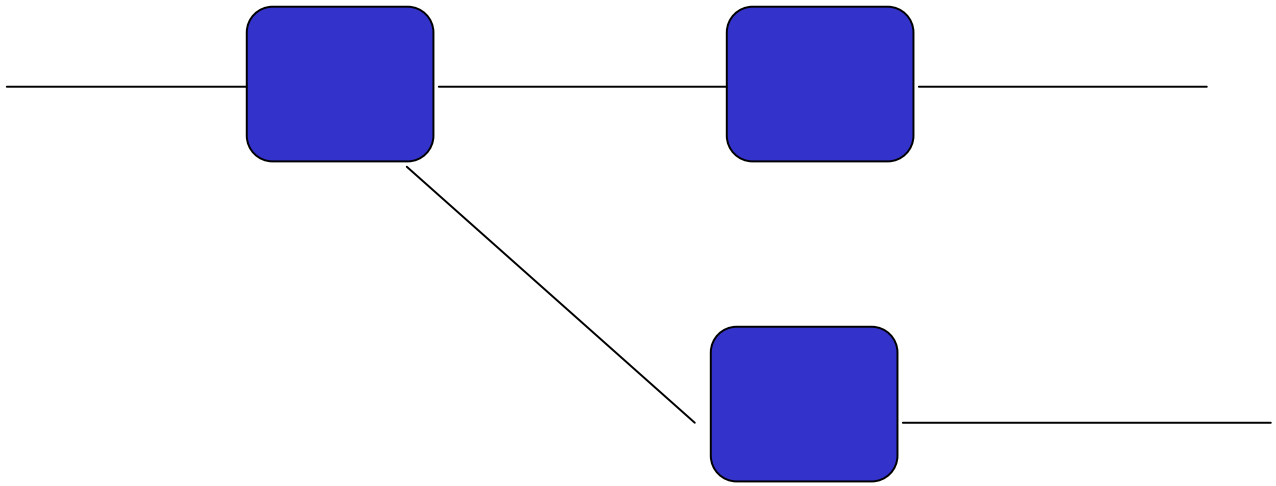
Implementation

- Netfilter and ip_queue are modified to support forwarding of different packet flows to different user space processes
- Proactive services run as user space processes and can be written using C or Java language.
- An example of a user space active network node
- Node monitors the resources used by proactive services

Future Works

- Provide a high level language for specifying proactive services
  - reason in terms of monitors, events, and actions
- Compiled into an implementation language such as C or Java
- Experiment with proactive services for different applications
  - ubiquitous computing
  - content distribution
  - sensor networks

Dynamic Routing Service



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