

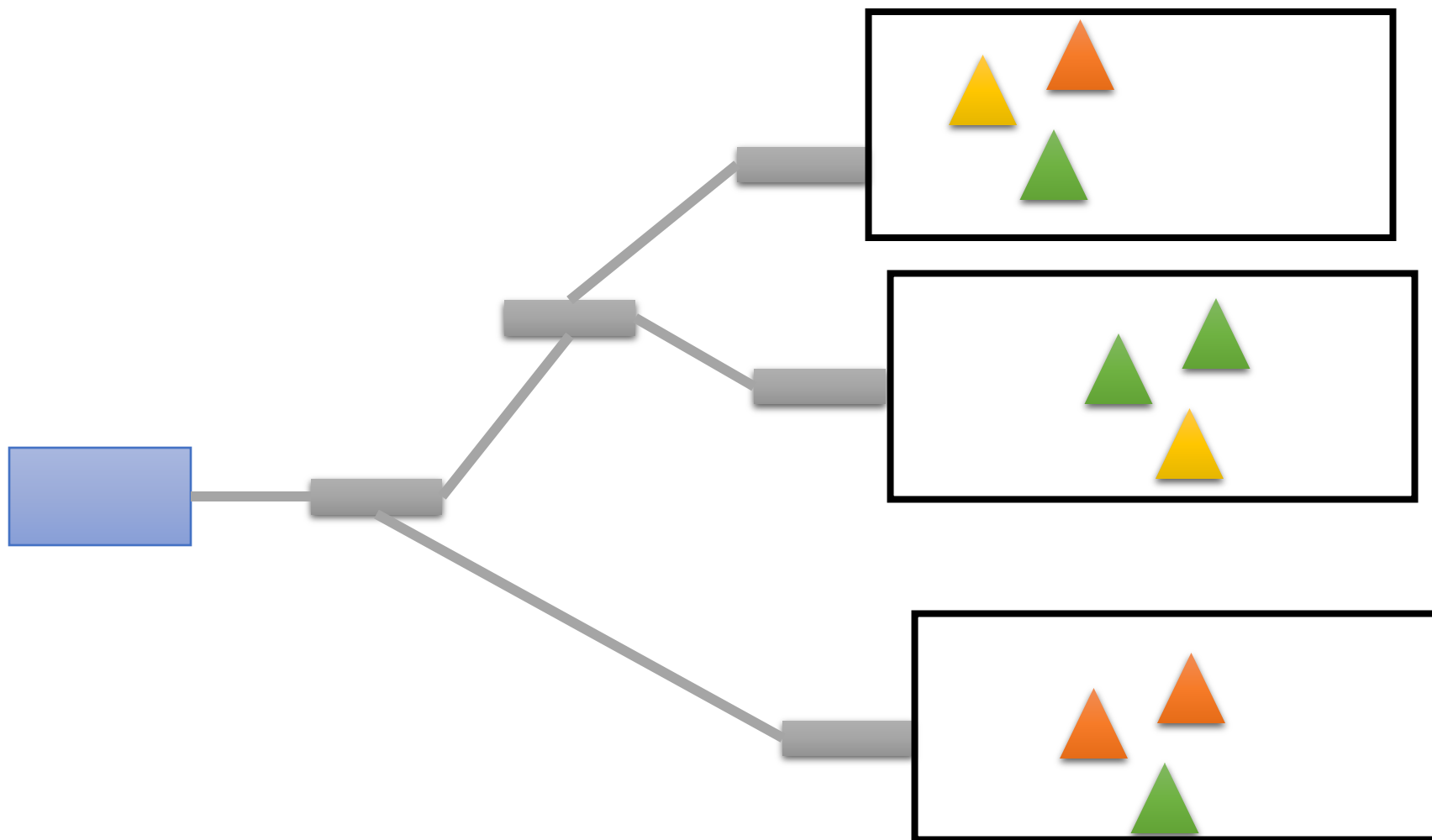
Edge-assisted Traffic Engineering and Applications in the IoT

Nikos Fotiou, Dimitrios Mendrinos, George C. Polyzos

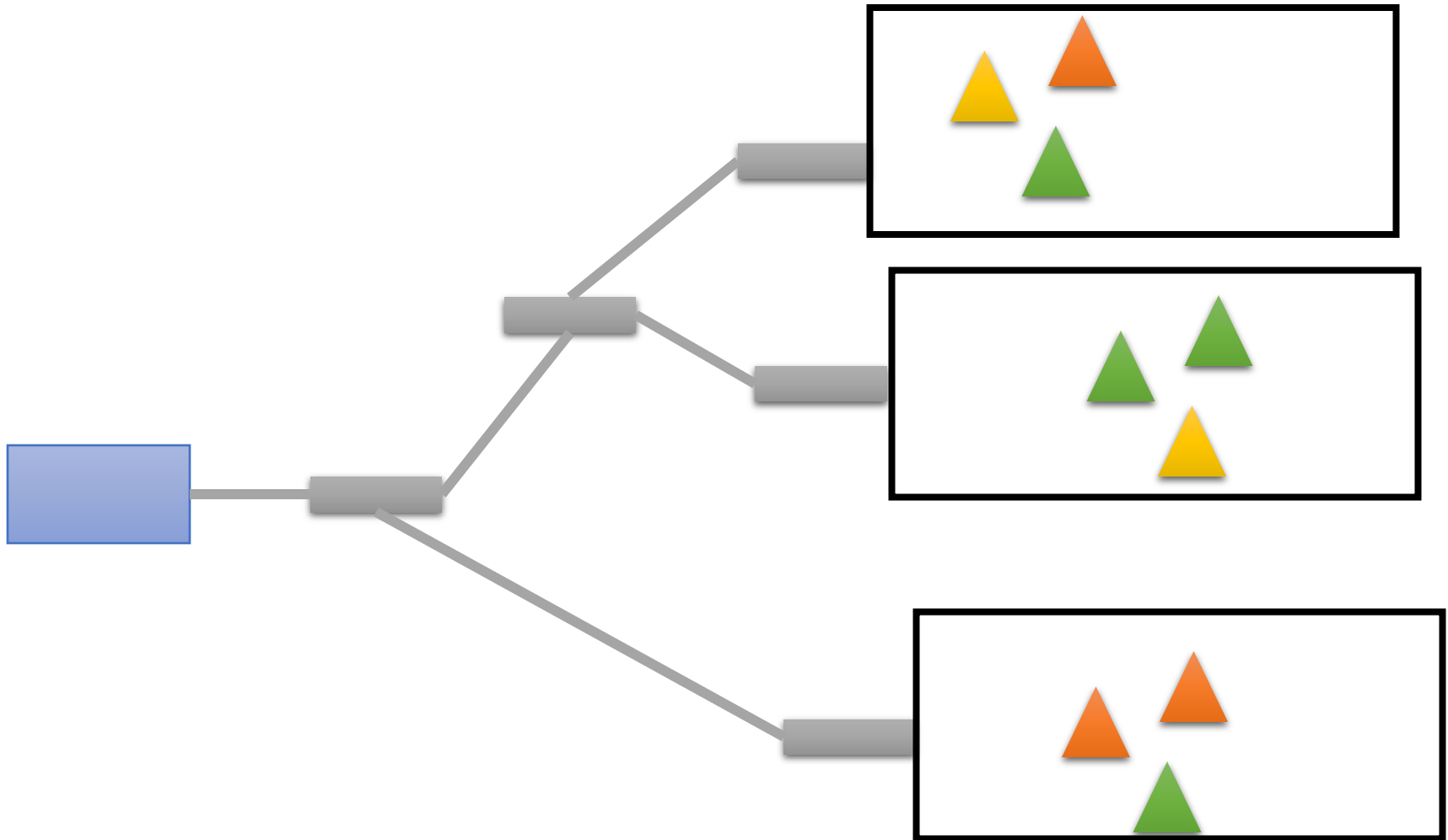


Motivation

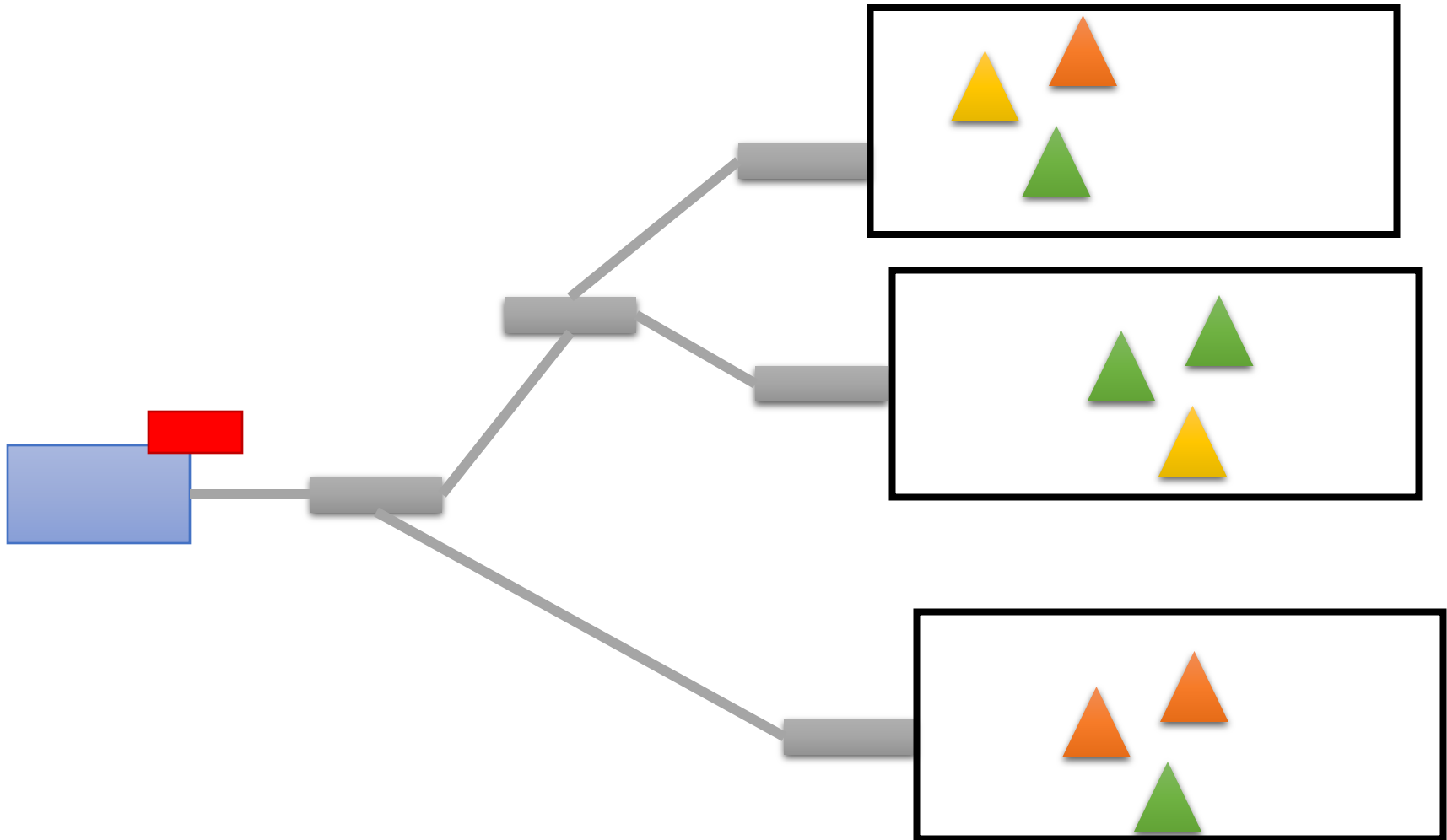
IoT group communication



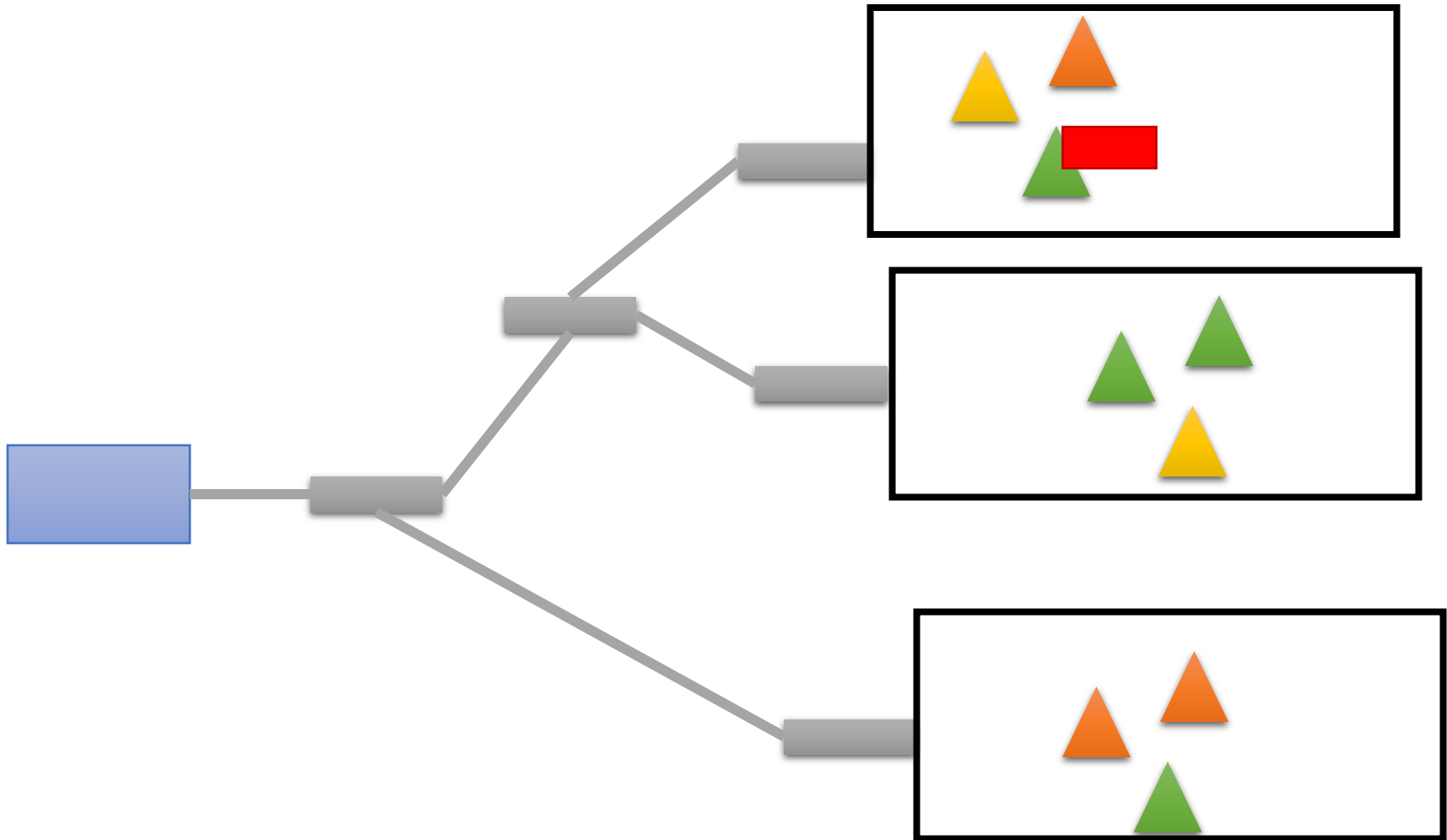
GET coap://building1.green



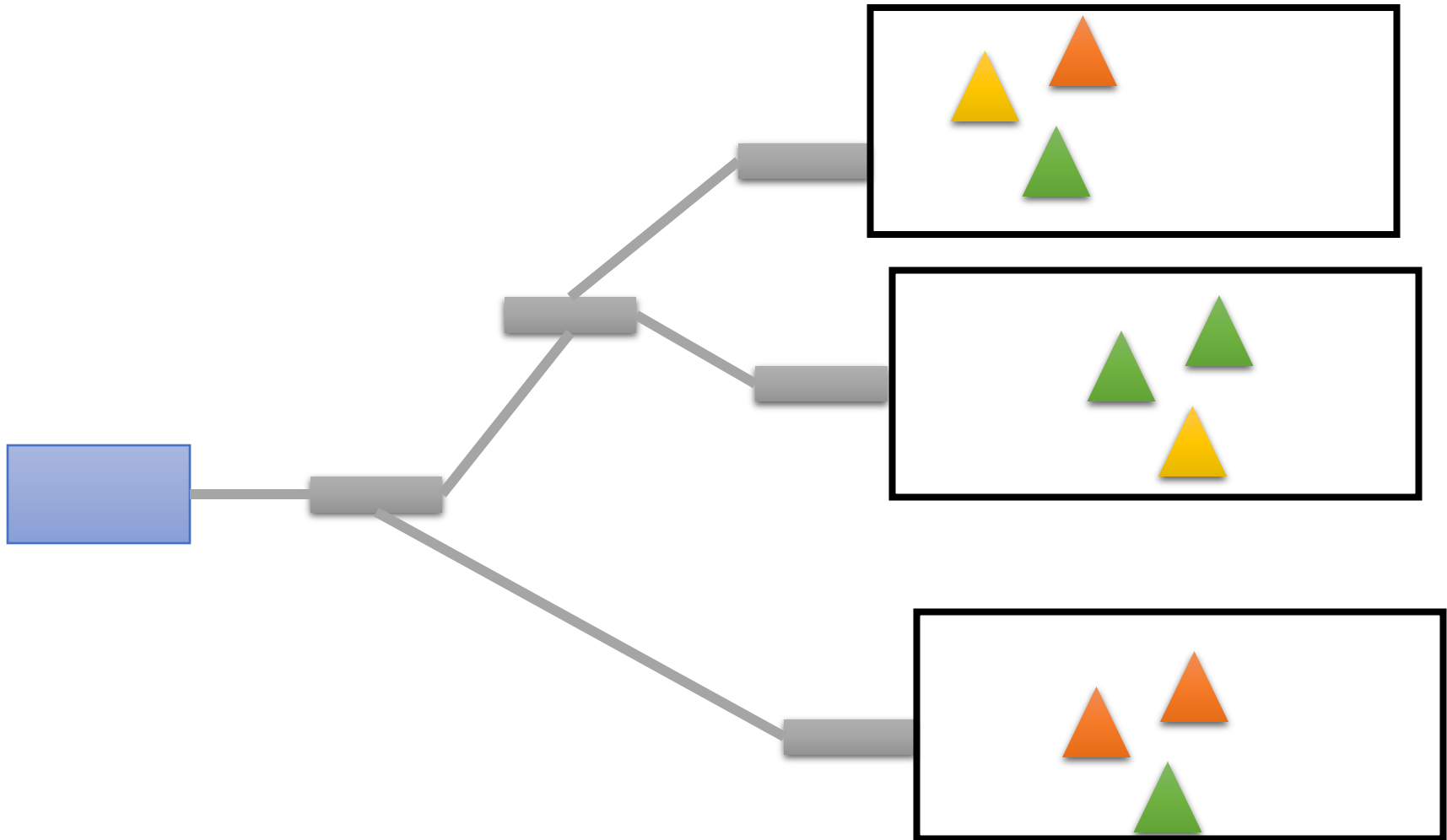
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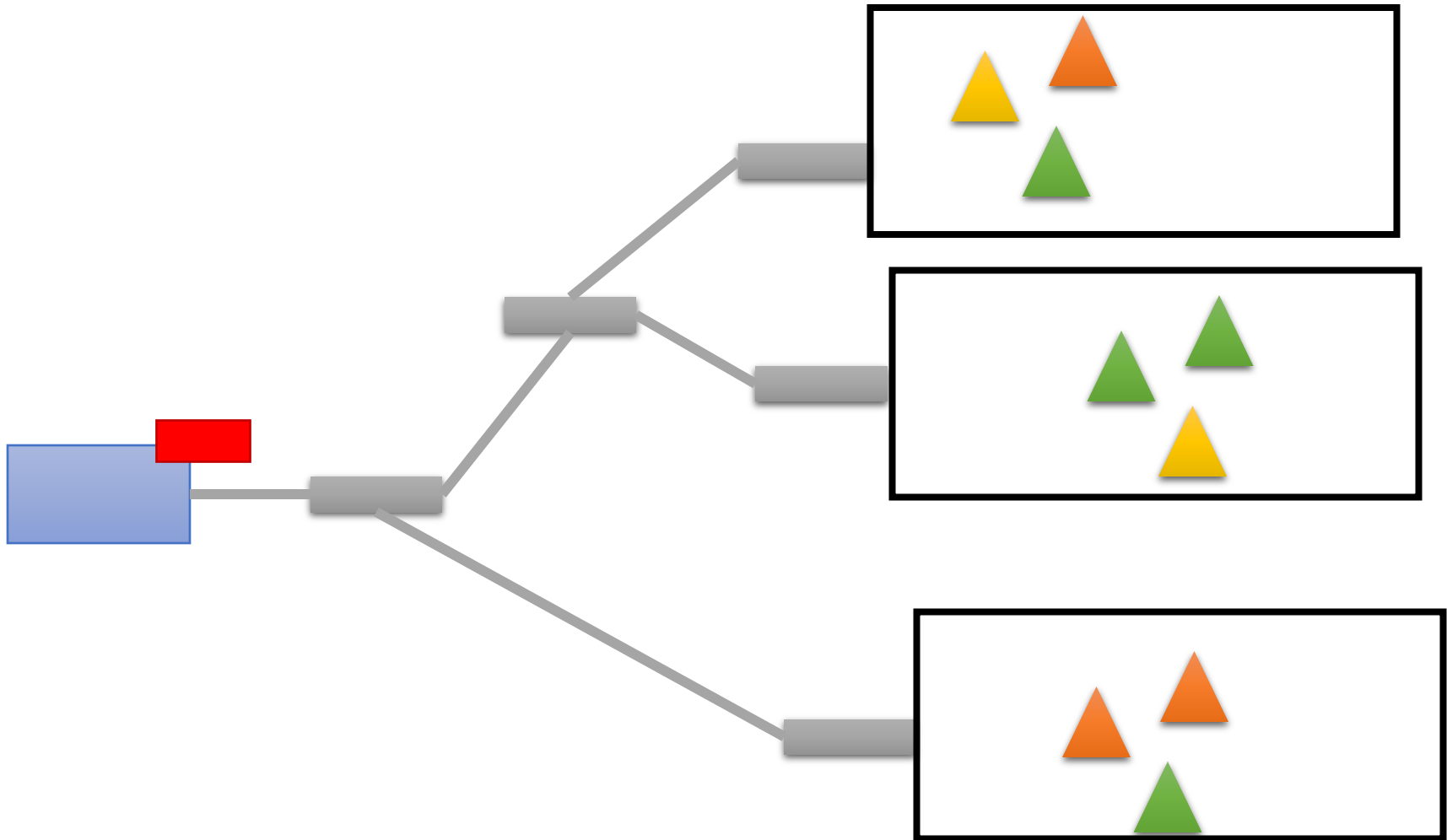
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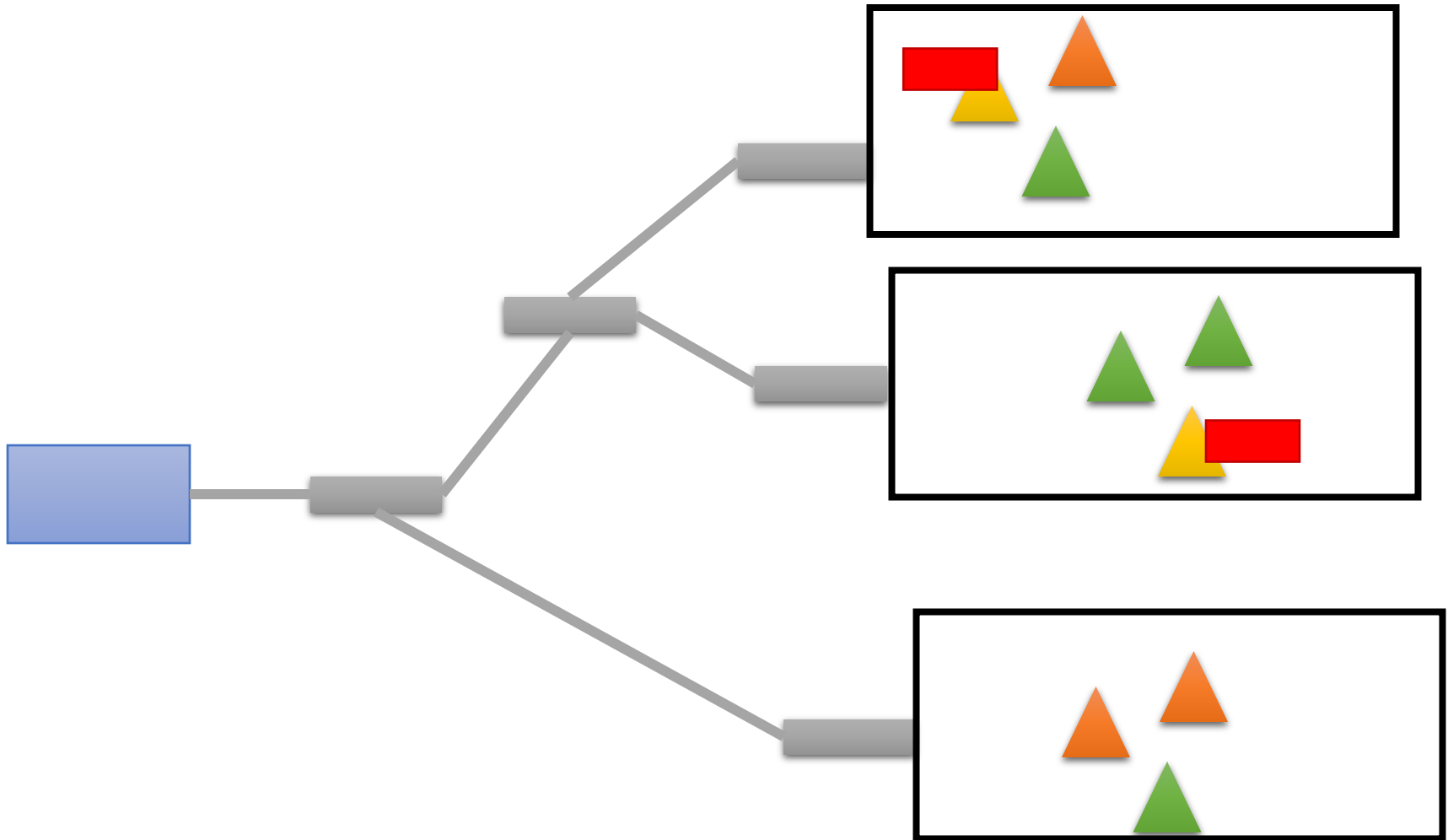
PUT coap://yellow ON



PUT coap://yellow ON



PUT coap://yellow ON



Recommended implementation approach

- For each possible group create an IP multicast group
- All Things should join the corresponding IP multicast groups
- Add the appropriate DNS entries

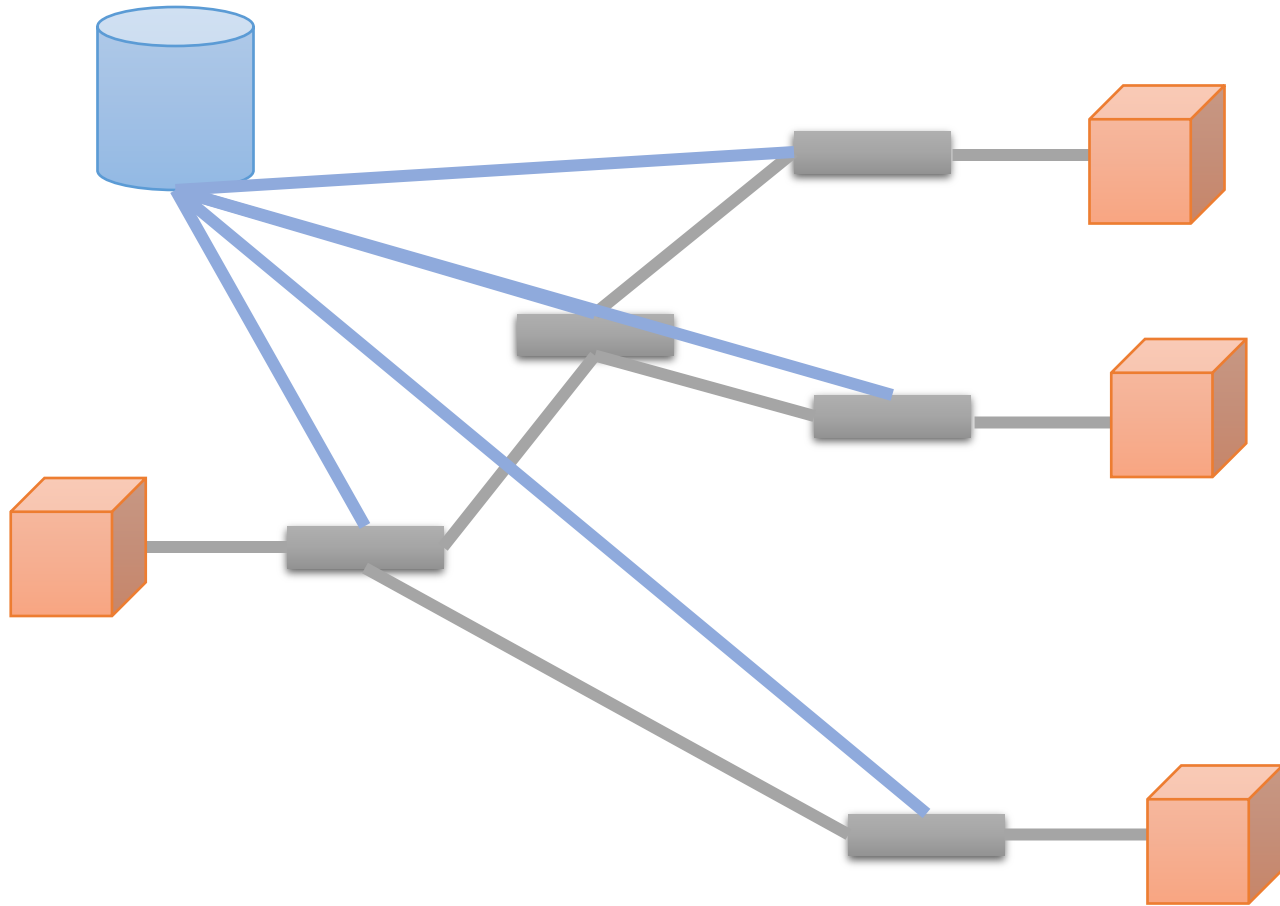
An alternative approach

Leverage edge and SDN technology

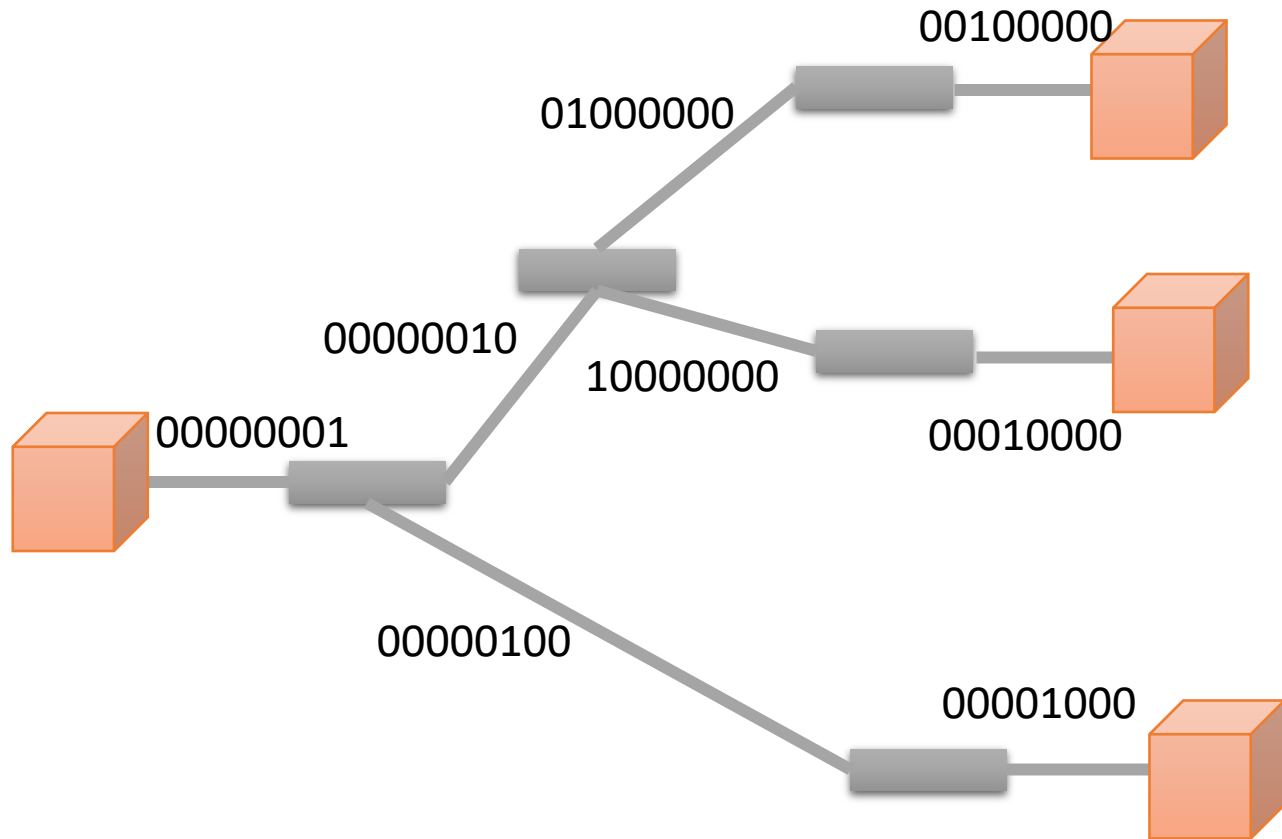
Design Goals

- No modification to endpoints
- Use only existing standards

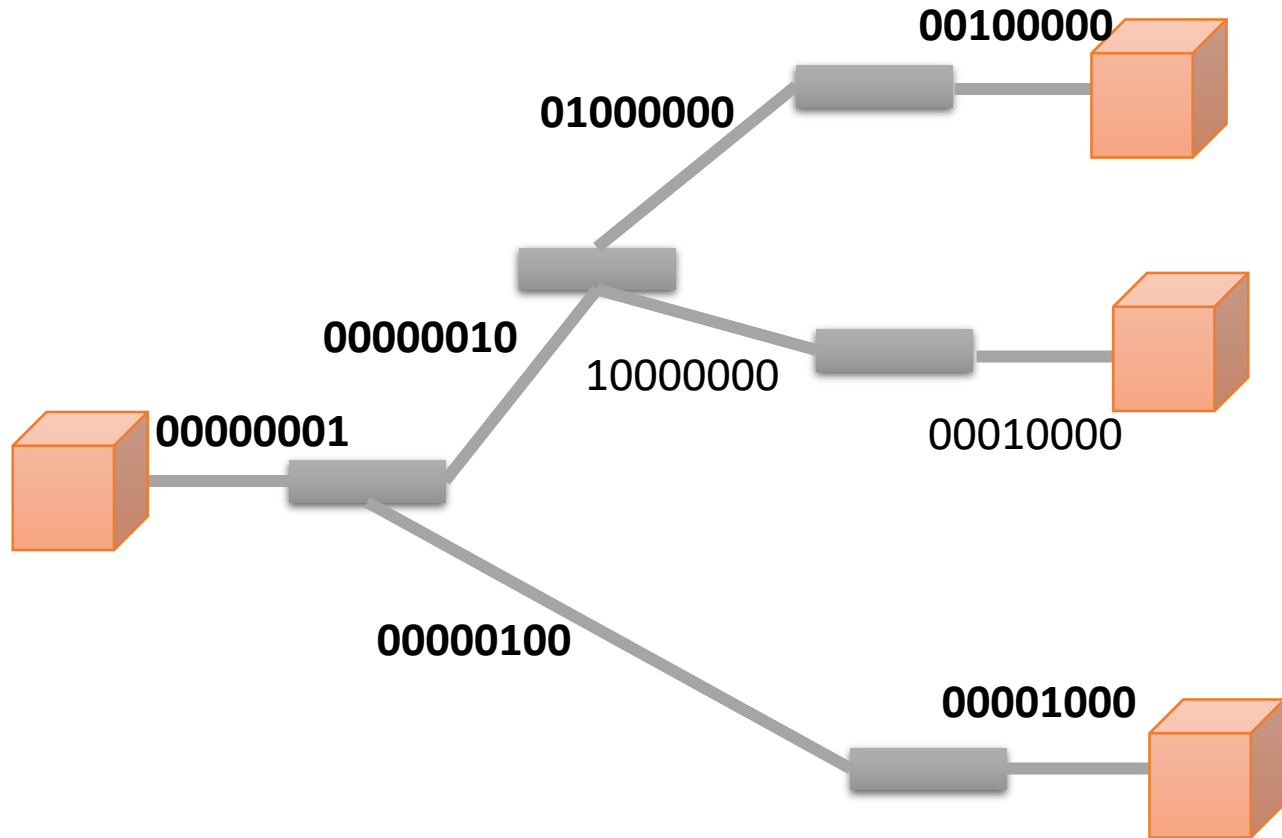
SDN underlay



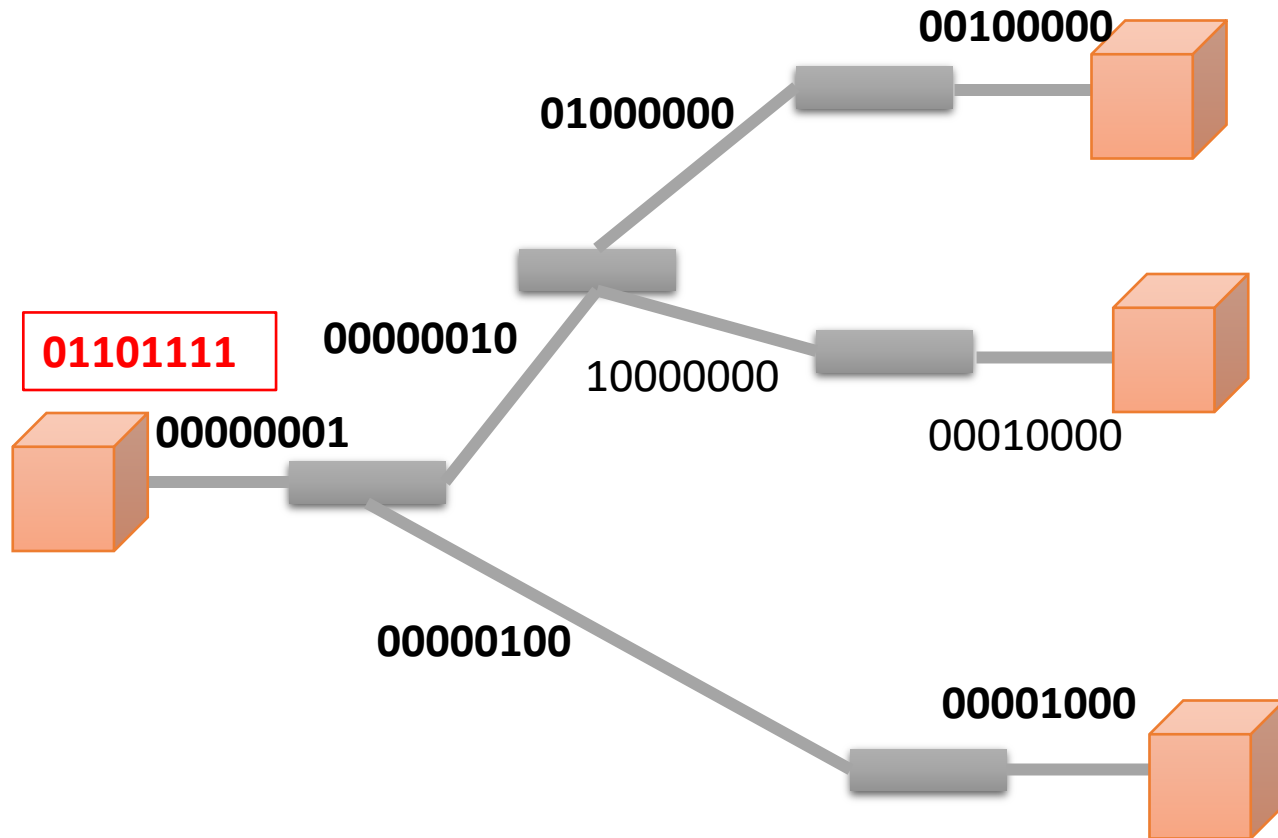
BF Forwarding



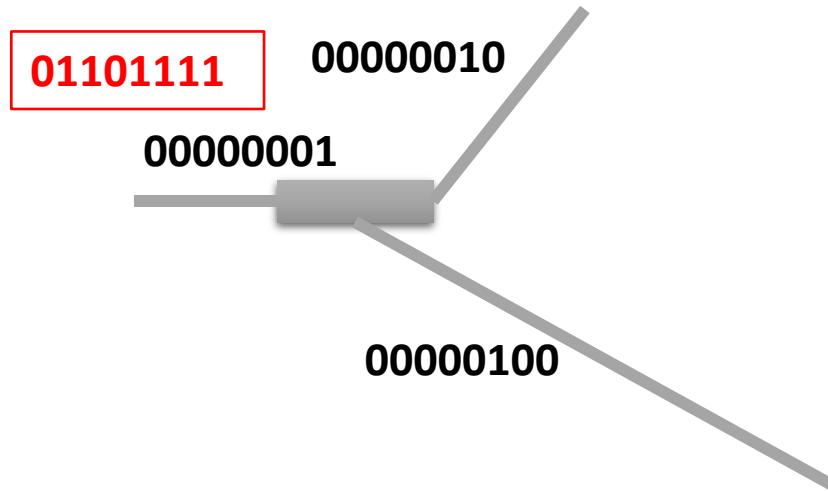
BF Forwarding



BF Forwarding



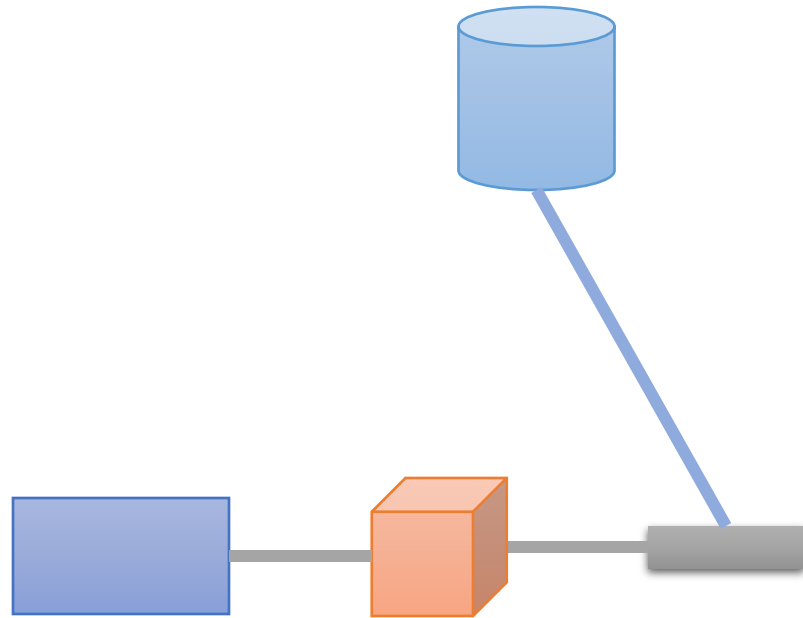
BF Forwarding



Enhanced SDN controller

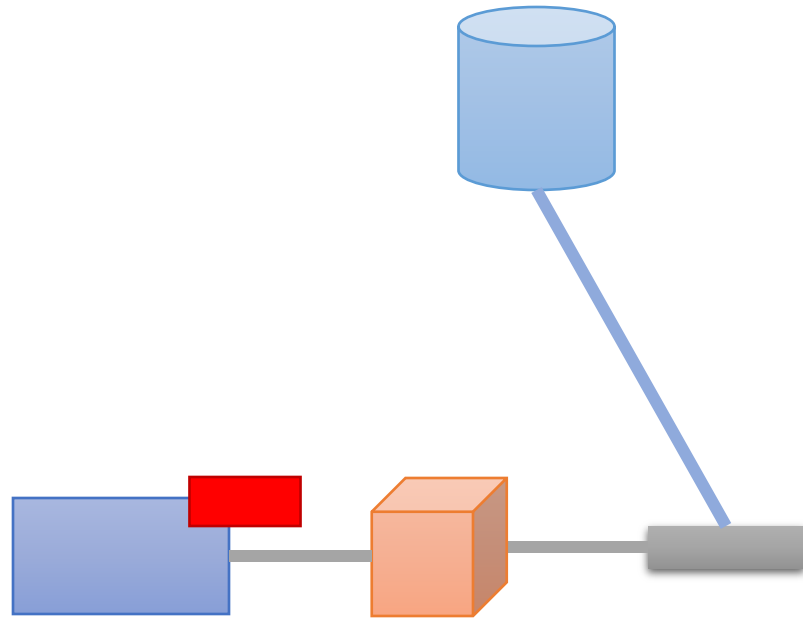
- The controller knows the whole topology and link identifiers
- Each edge node is associated with a set of “tags”
 - E.g., building1, yellow, green
- The controller can create paths from one edge node to others with specific tags
 - E.g., a path from a node towards all “yellow” nodes

Protocol handler



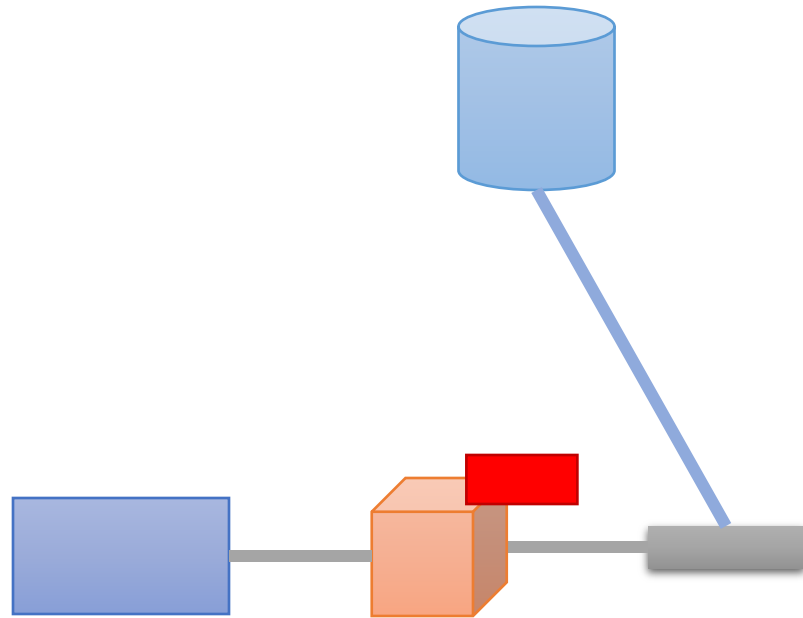
PUT coap://yellow ON

Protocol handler



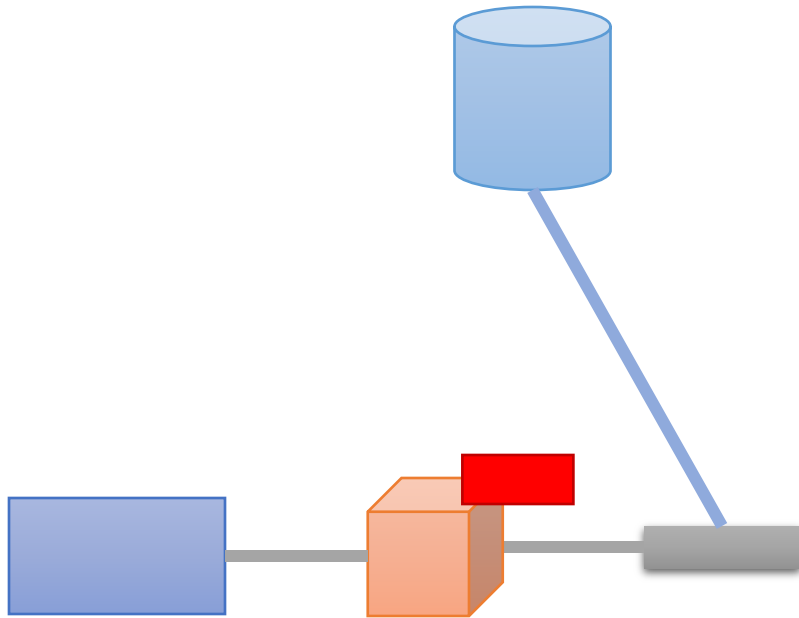
PUT coap://yellow ON

Protocol handler



PUT coap://yellow ON

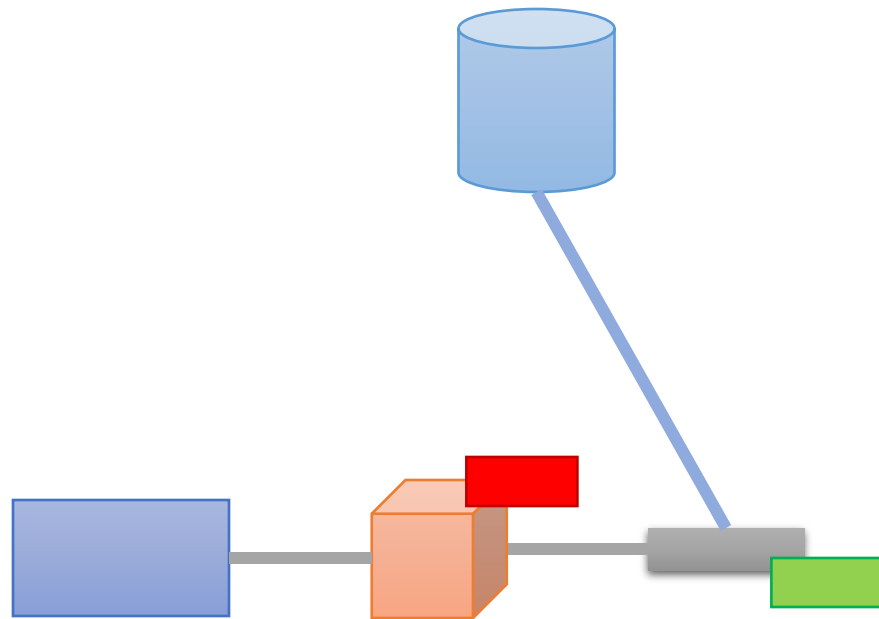
Protocol handler



PUT coap://yellow ON

Path to yellow

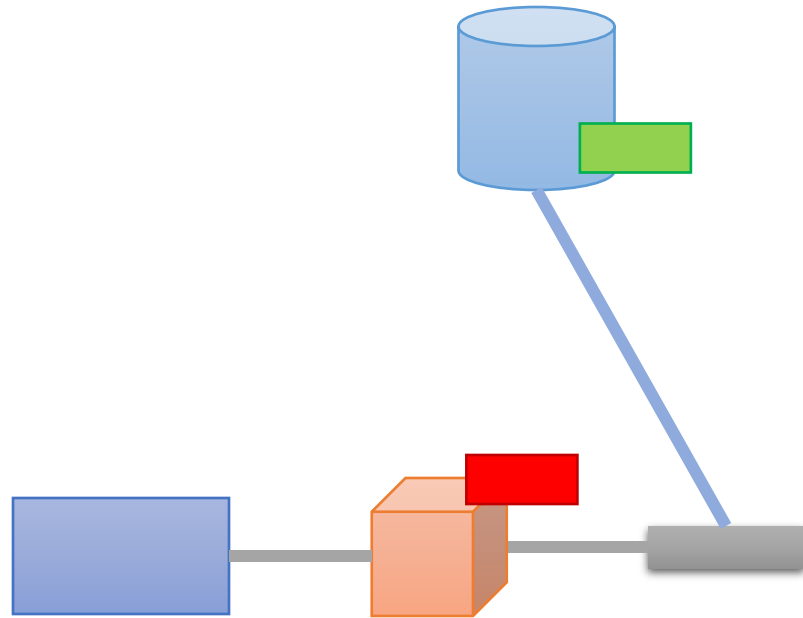
Protocol handler



PUT coap://yellow ON

Path to yellow

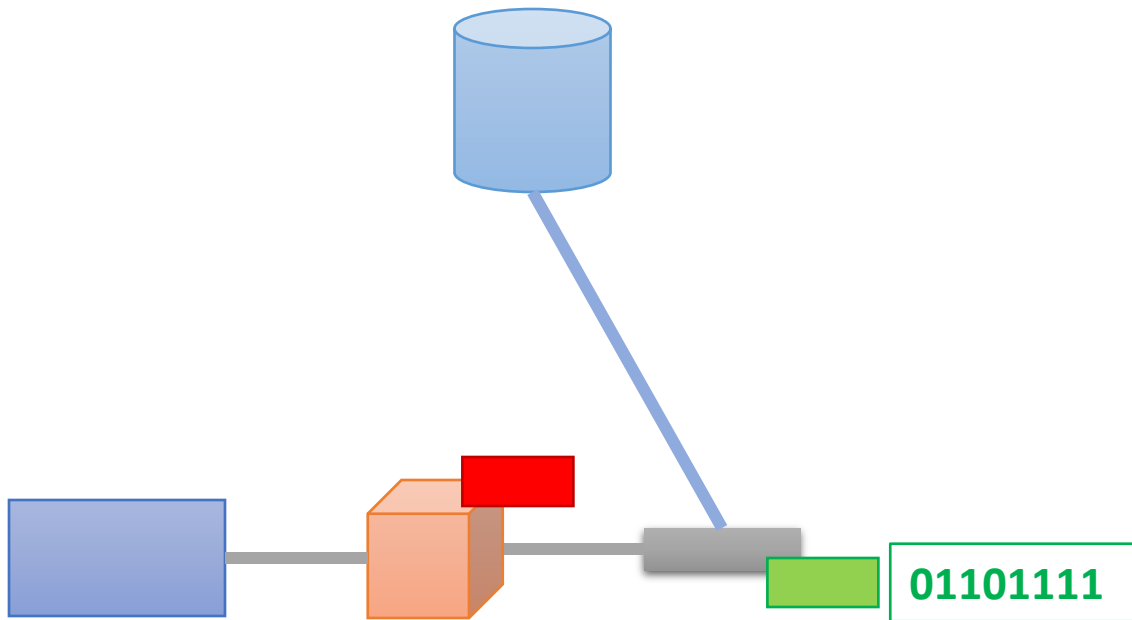
Protocol handler



PUT coap://yellow ON

Path to yellow

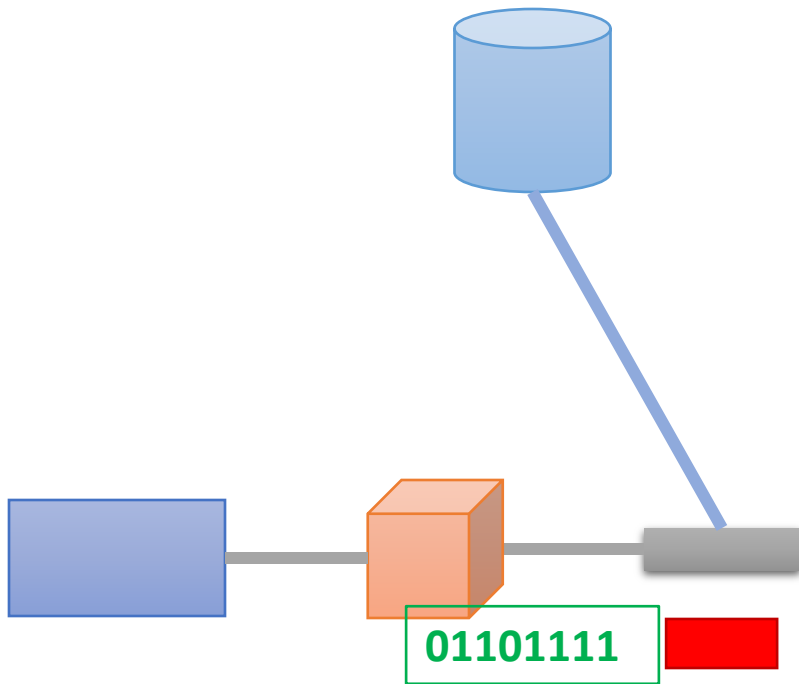
Protocol handler



PUT coap://yellow ON

Path to yellow

Protocol handler



PUT coap://yellow ON

Path to yellow

Benefits and status

- No need for IP multicast support
- Easier group management
- Things do not have to be aware of the groups they belong
- Implemented for mininet, POX SDN controller, and the CoAP protocol
- Topology initially included in a configuration file
 - Now the SDN controller discover the topology

Thank you

fotiou@aub.gr